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ACHIEVING SUSTAINABILITY IS A TEAM GAME: BRINGING COLLABORATION ORIENTED HR SYSTEM AND KNOWLEDGE SHARING IN PLAY

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Abstract. Employees are the real asset of an organization whose operating activities directly hit the profit margin and sustainable growth rate of a company. In this paper, there is a brief description of how to achieve sustainable performance within an organization by developing a strong collaboration based human resource system. Knowledge sharing is considered as mediating variable, while the social performance, environmental performance, and economic performance are studied as dependent variables. In its online survey-based quantitative outcome, 428 participants’ data is considered where the majority of them belong to the business field. According to the five-point Likert scale based descriptive analysis, the structural equation modeling focused statistical technique is used to justify the hypothesis. The results depict that a collaboration-oriented HR system caused a major influence on the economic performance of a company along with the knowledge sharing mechanism, while the productive environmental performance is developed through creating strong communication channels within management and its working employees. This is informative research for the company's management, policymakers, and related business field scholars to understand the importance of collaboration to achieve sustainable development of a company. In addition to this, there are some limitations like lack of mixed research method and influence of IT factor in this analytical portion that can impact the authenticity of this research which can be overcome by the upcoming scholars in their research journals.

Keywords: Collaboration Oriented Human Resource System; Knowledge Sharing; Social Performance; Environmental Performance; Economic Performance


JEL Classifications: O14, Q15

1 Introduction

Indonesia has one of the fastest-growing telecommunication sectors internationally (Anas & Narjoko, 2019). The main objectives of the telecommunication sector of Indonesia are to increase the data usage, provide greater affordability, and to expand the coverage. According to Hanifah (2019), its growth was slowed down in 2017, but it is predicted that it will strongly grow in the next few years. The technology used by Indonesia is efficient and co-friendly. The 3-R approach plays an important role in the sustainable development of the telecommunication sector of Indonesia (Benintendi, Gòmez, De Mare, Nesticò, & Balsamo, 2020; Farooq & Ullah Yousafzai, 2020; Prawoto, & Basuki, 2020). Knowledge is a major tactical organizational resource that nurtures the establishment of corporate value (Acharya, Singh, Pereira, & Singh, 2018; Batool, Bashir, & Ch, 2020). It can play a vital role in improving the employment of new products and practices to obtain sustainable outcomes. 
Internal and external tools are used by Indonesia to promote the sharing of information. Knowledge sharing is important in the sustainable growth of telecommunication in Indonesia (Qibtiyah & Susanty, 2019). The following table 1 describes some important dimensions of collaborative HR systems that must be ensured to get high sustainable performance.

Table 1: Types of collaborative HR systems

<table>
<thead>
<tr>
<th>Dimensions of collaborative HR systems</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational culture and structure</td>
<td>Control-oriented management, presence-based culture, and resistance to change</td>
</tr>
<tr>
<td>Human resources and work practice</td>
<td>Low degree of perceived job fit</td>
</tr>
<tr>
<td>Information and communication technologies</td>
<td>Strict ICT requirements</td>
</tr>
<tr>
<td>Physical layout and facilities</td>
<td>Infrastructural constraints</td>
</tr>
</tbody>
</table>

Sulistyawan et al. (2019) in a study has illustrates that the problem regarding the achievement of sustainability and bringing collaboration Oriented HR systems and knowledge sharing in the sector of telecommunications has been increased in Indonesia these days. The growth of this sector slowed down in 2018 because of a lack of this factor (Al Dari, Jabeen, & Papastathopoulos, 2018; Bai, Wang, Li, & Liu, 2020). The goals of sustainable development should not be so broad. The strategies and objectives should be made that can be achieved in the next twelve years and the resources being used today are not renewable. The key problem regarding knowledge sharing is low Affective Commitment (AC) levels for female managers, older managers, and large firms (Ruiz-Jiménez, del Mar Fuentes-Fuentes, & Ruiz-Arroyo, 2016; Chang & Huang, 2020). The below figure 1 indicates that the economic performance of the Indonesian telecommunication sector decreased due to improper HR systems and other mechanisms.

![Economic performance of Telecommunication sector in Indonesia](image)

Figure 1: Economic Performance

Different researches have evaluated the significance of HRM systems and their overall impact on the economic as well as sustainable performance (SP) of the firm. For example, a recent study by Heisig et al., (2016) has also examined the direct impact or contribution of HRM systems in the overall economic and effective operational performance of the company. Though, the study has not been conducted regarding the telecom sector of Indonesia and its overall sustainability performance. Hence, this research is original and proves to be remarkable to understand the role of collaboration oriented HR systems on the sustainability performance bundle.
Besides, in the past few years, different studies such as (Heisig et al., 2016; Laužikas, & Miliūtė, 2020; Varyash et al., 2020) have demonstrated the role as well as the association between HRM systems and SP of the company in different areas and sectors. However, current research is important and justified majorly because no other study has examined the mediating role of knowledge sharing (KS) to identify the overall impact on the SP of the telecommunication sector of Indonesia. The present research has the following objectives and aims,

- The foremost objective of the research is to identify the impact of collaboration oriented HR systems on social performance (SP) in the telecommunication sector of Indonesia.
- The second aim of the study is to analyze the impact of collaboration oriented HR systems on the economic performance in telecom sector of Indonesia.
- The third purpose of the study is to identify the overall impact of collaboration oriented HR systems on environmental performance in the telecom industry of Indonesia.
- The fourth objective of the research article is to identify the mediating role of knowledge sharing in the association b/w collaboration oriented HR systems and social performance.
- The fifth objective of the paper is to analyze the mediating role play by knowledge sharing in the relationship b/w economic performance in telecom sector of Indonesia and collaboration oriented HR systems.
- The final purpose of the research is to evaluate the mediating impact of knowledge sharing on the linkage b/w collaboration oriented HR systems and environmental performance in the telecom industry of Indonesia.

This research is important to achieve sustainability by bringing collaboration-oriented HR systems and knowledge sharing in play. The Collaboration oriented HR system shares new knowledge to get sustainability in an organization (Amui, Jabbour, de Sousa Jabbour, & Kannan, 2017; Wichitsathian, & Nakruang, 2019; Jutidharabongse, Aujirapongpan, SRitkaew, & 2020; Woniak, & Wereda, 2020; Kashirskaya, Sitnov, Davlatzoda, & Vorozheykina, 2020; Laužikas, & Miliūtė, 2020; Atkociuniene, & Mikalauskiene, 2019; Gopal, Dhanorkar, Kale, & Patil Yogesh, 2019). According to Al-Busaidi and Olfman (2017), the process of knowledge sharing is crucial for organizations, employees, stakeholders, groups, and consumers. This research is vital for the scope of the HR system and KS in an organization to achieve sustainability. The new technologies are introduced due to the new knowledge to enhance the development of an organization (Grabara, Hussain & Szajt, 2020).

The research paper consists of five chapters and the first chapter of this research paper includes an introduction. The introduction further includes background, problem statement, research objectives, research questions, significance and scope. The second chapter of this research includes a literature review which includes the previous studies and theories related to this research. The third chapter of this research consists of methodology and it includes the detail about which type of method is used by the researcher to collect data. The fourth chapter consists of results and interpretation, this chapter contains the findings of results (Martínez, 2020). Finally, the last chapter includes the discussion and conclusion, which further contains the detail of limitations, and future indications.

2 Literature review

2.1 Theory of HRM systems

HRM systems are a primary strategic and significant organizational resource that initializes the development of organizational as well as sector value (Hamad, Burhanuddin, Abd Ghani, Elzamly, & Doheir, 2019). For example, HR systems can help to enhance and execute new technologies within the sector and according to Al Adresi and Darun (2017), it can effectively contribute to increasing the development and execution of new social as well as environmental practices to generate sustainable performance outcomes. According to the theory of HRM systems,
HR systems are a significant form of HR software that majorly combines several processes as well as systems to ensure the effective management of different resources to ensure the sustainable performance of the sector (Soltis, Brass, & Lepak, 2018). This theory states that such collaboration oriented systems are majorly used by different sectors to combine several essential HR functions, such as employee performance management (EPM), storing employee data and tracking competency for sustainable social and economic performance through effective knowledge sharing systems. Furthermore, this theory also states that collaborative HR systems facilitate knowledge sharing as well as integration within a sector and other necessary business systems of the sector majorly including finance supply chain and accounting. Collaborative HR systems also allow knowledge sharing with a third that directly influences the sustainable social performance of the sector positively (F. Wang, 2019).

2.2 Relationship between collaboration oriented HR systems and social performance (SP)
According to Logan (2016), teamwork, or collaborative work is worth more as it is the work of various members having skills and expertise in various fields to perform a task with excellence. Collaboration oriented HR systems are rather different than the traditional team to perform any task (Liu, Gong, Zhou, & Huang, 2017). The modern concept of COHR systems is that all members of the team are willing to solve the problems willingly. According to Davarpanah and Mohamed (2020), the ultimate goal of the collaboration oriented HR systems to achieve success through the means of open communication among all the members of the HR systems of all the departments and management levels (Andersën, 2019). With the digitalization of the industries, this collaboration has increased manifold, and this impact a lot in all fields of a lie in the market industry. This collaboration oriented HR system has a very positive influence on social performance. Innovation in the field of HR systems has influenced very positively and this relationship helps in the wellbeing of the social performance (Al-Lozi, Almomani, & Al-Hawary, 2018). This collaboration leads the organization to win the desired goals with the best skills. Hence, from all the above discussion, the following research recommends the below hypotheses,

**H1**: Collaboration oriented HR systems positively relates to the social performance of the sector.

2.3 Relationship b/w collaboration oriented HR systems and economic performance (EP)
According to Johnson, Lukaszewski, and Stone (2016), HR systems are an important asset of any organization or sector because such systems are mainly used to collect as well as store data on sector employees. Different past studies characterize the importance of collaborative oriented HR systems in a different way for example according to Tursunbayeva, Bunduchi, Franco, and Pagliari (2017) collaborative HR systems encompass the fundamental functionalities needed for better economical performance majorly through end-to-end HRM practices. Collaborative HR systems are remarkable systems for performance management, development, and learning which directly influence the economic process of the sector significantly (Bititci, Cocca, & Ates, 2016). According to Guerci, Decramer, Van Waeyenberg, and Aust (2019), collaborative HR systems within any firm and sector are considered to be highly critical as well as economical for the entire sector. This is mainly because several functions and benefits of such systems serve as an economical and supportive background for the sector mainly by proving everything from skilled employees to management training services (Borisov & Vinogradov, 2019). The given relationship b/w collaborative HR systems and EP of the sector are also supported by the above theory. This is because the theory of HRM systems states that such systems enhanced accuracy level which leads to better as well as the sustainable economical performance of the sector.

**H2**: Collaboration oriented HR systems are positively related to the economic performance of the sector.

2.4 Relationship b/w collaboration oriented HR systems and environmental performance (EnP)
Collaboration or teamwork is emerging its importance and its value cannot be denied in achieving the desired goals of the firm or the sector (Silva & Almeida, 2017). Collaboration is a sensitive matter which has a broad sense as it involves all the members of the organization to express their skills with the best practices and this teamwork creates unity, cooperation, and the best output (Akkermans, Van Oppen, Wynstra, & Voss, 2019). This harmony and positive response through all walks of fields develop a healthy environment. Thus a collaboration oriented HR systems lead the organization towards positivity and strengthens the productive ratio of the
organization. This healthy environment creates sustainability, progress, profit, and opportunities for making new passages throughout the globe. According to Andersén (2019), the impact of collaboration oriented HR systems on the environmental performance is very healthy and it can generate a high amount of product as all new technologies, strategies, and skills are a part of a single line and order to be followed and managed. Consequently, such organizations lead towards high achievements, and their rivals remain far behind to access their success or fame.

H3: There is a positive relationship b/w collaboration oriented HR systems and environmental performance.

2.5 The mediating role of knowledge sharing (KS) in the association b/w collaboration oriented HR systems and SP

New procedures are being used by the firms to lead HR into knowledge sharing. It is because, in this way, the employees will provide greater learning and collaboration (Ahmad, Mushtaq, & Umar, 2019). It will develop a greater ability among them to share their knowledge with their colleagues. SP and HR systems should be connected to sharing the knowledge among different systems within that organization. The efforts of knowledge sharing mainly focus on the objectives of an organization. It is important to share knowledge between the HR systems and service providers. These systems can also be used for the training of the employees and the process management of the business. According to Soto-Acosta, Popa, and Palacios-Marqués (2017), the HR system is a tool that is responsible for connecting the multiple systems of an organization so that the information and knowledge can be shared among them. It allows us to store the records of the employee and manage other work. It increases the scope of the work of an organization and also provides solutions for different problems. The telecommunication sector in Indonesia consists of an HR system that is connected with SR to offer benefits to the organization. This relationship can also be proved by the theory of HRM systems (Kamarudin et al., 2020).

H4: Knowledge sharing significantly mediates the relationship b/w collaborative oriented HR systems and SP of the sector.

2.6 The mediating impact of KS on the association b/w collaboration oriented HR systems and EP

Knowledge sharing (KS) is an important activity through which data and knowledge are exchanged between different individuals of the firm including employees, higher management, and other staff (Flinchbaugh, Li, Luth, & Chadwick, 2016). According to a study by Hormiga, de Saá-Pérez, Díaz-Díaz, Ballesteros-Rodríguez, and Aguiar-Díaz (2017) KS is a dynamic as well as a significant process with individuals of the sector, clients, firms, groups, and other different stakeholders. Sectors use internal as well as external strategies to promote this sharing of knowledge for better economic performance. Inter-firm and sector KS can bring several advantages, such as new services and products, lower costs, an effective level of manufacturability and efficient quality services, and sustainable economical performance. According to (Obeidat, Abdallah, Aqqad, Akhoershiedah, & Maqableh, 2016) organizations, and sectors recognized that KS constitutes a valuable and intangible asset for generating and sustaining economic performance. Therefore, KS can significantly mediate the relationship between collaborative HR systems and economic performance (EP). This is mainly because an effective mechanism of KS initiates a better and effective collaborative HR system which further influences the economic performance of the sector. Thus, from the above discussion, the current study proposes the following hypotheses,

H5: Knowledge sharing significantly mediates the relationship b/w collaborative oriented HR systems and EP of the sector.

2.7 The mediating role of KS in the relationship b/w collaboration oriented HR systems and EnP

The collaboration of HR systems and EnP allows the leaders to share their ideas, practices, and strategies on the future of their organizational work. This sharing also includes the sharing of the knowledge of transformation, inspiration, and design thinking. Disrupt is a method that is designed to exchange information, empower the executives, and energize the people in the field of human resources. According to a study by Yang, Nguyen, and Le (2018), this method determines that the previous approaches will not be proved successful in the future. The relationship between HR systems and EnP made it possible to decide on all these factors related to knowledge
sharing among all the leaders within an organization. Moreover, knowledge sharing has a positive impact on the collaboration oriented human resource system. It is helpful for the employees in communicating with each other. Collaborative links are built with different stakeholders in an organization. New knowledge can be explored in this way and Knowledge sharing helps organizations to be competitive in the era of globalized economies. The theory of HRM systems also proves that there is a positive impact of knowledge sharing on the relationship of collaboration oriented HR systems and EnP.

**H6:** Knowledge sharing significantly mediates the relationship b/w collaborative oriented HR systems and EnP of the sector.

Research Model is presented in Figure 2 below.

![Research Model](image)

**Figure 2:** Research Model

### 3 Methodology

In this paper, the quantitative research method is used to inspect the impact of collaboration oriented human resource system on the sustainability performance where different close-ended questions are asked from the related participants. The traditional quantitative method has several limitations in explaining the complex interactions and the phenomena between variables, so the online survey method is conducted in order to drive a constructive outcome (Taguchi, 2018). The five-point Likert scale (strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5) is used in order to justify or nullify the hypothesis. In order to collect a constructive outcome, 600 online questionnaires are distributed among the related human resource departments and their individuals. Out of this, 428 participants are showing the valid outcomes that help to make constructive research. According to its demographic statistics, the participants are segregated based on their gender, age and experience factors. In the test, the collaboration oriented human resource system is considered as an independent variable, and knowledge sharing is studied a mediating variable (Hussain, Anwar and Razimi, 2020). While,
sustainability performance-based variables like social performance, economic performance, and environmental performance are considered as dependent variables in this research study.

As far as the gender-based demographic factor is concerned, it becomes clear that among 428 participants, 237 are males and 191 are females. These participants' division shows that the percentage of males (55%) is ten times higher than females (45%) in the online research survey. In their age data evaluation, it becomes concluded that overall 137 respondents are less than 25 years old with 31.3%, while 182 participants are within the age group of 25 to 35 years old with 43%, 96 individuals are from 35 to 45 years old (22.4%), and only 16 of them are more than 45 years old (4%). This age division among the responded participants shows that all-around maximum is young and energetic to actively participate in the collaboration oriented activities within a workplace. Last, but the least, the experience factor depicts that the frequency of those respondents is much higher who have 2 to 8 years' experience in this related HR field. According to the statistics, it becomes clear that the frequency of individuals is 70 (and carry 16.4%), while 181 (42.3%) are within the 2 to 5 years' experience and 137 of them (32%) are having 5 to 8 years old, and only 40 of them are more than 8 years old with 9.3%. Its statistical information is shown in the appendix.

According to the above-mentioned statistics, it becomes clear that majority of the targeted participants are based on front-door managers, employees, and other active human resource departments. Their information regarding the collaboration oriented human resource system and the knowledge sharing factors added value in this statistical analysis. To make statistical analysis, the KMO and Bartlett's test and the structural equation modeling based SPSS tests are applied that help to provide an accurate evaluation of their tested variables (Wong, 2016).

4 Results and Analysis

In the statistical analysis portion, the KMO and Bartlett's test is an effective approach to measure the sampling adequacy which is recommended to check the variance ratio among the variables. The descriptive statistics of this SPSS test is given below (see Table 2)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
</tr>
<tr>
<td>ColOHRS</td>
<td>428</td>
<td>1.00</td>
<td>5.00</td>
<td>3.2255</td>
<td>1.04279</td>
<td>-.199</td>
</tr>
<tr>
<td>KnowShar</td>
<td>428</td>
<td>1.00</td>
<td>5.00</td>
<td>3.5220</td>
<td>1.16860</td>
<td>-.554</td>
</tr>
<tr>
<td>SociPerf</td>
<td>428</td>
<td>1.00</td>
<td>5.00</td>
<td>3.5623</td>
<td>1.14333</td>
<td>-.575</td>
</tr>
<tr>
<td>EconPerf</td>
<td>428</td>
<td>1.00</td>
<td>5.00</td>
<td>3.3812</td>
<td>1.00343</td>
<td>-.381</td>
</tr>
<tr>
<td>EnvirPerf</td>
<td>428</td>
<td>1.00</td>
<td>5.28</td>
<td>3.4411</td>
<td>1.12762</td>
<td>-.511</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>428</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the above-mentioned statistics, it becomes concluded that the mean value of these variables are within the range of 3.2 to 3.7, while the standard deviation value of economic performance is 1.00343 (least value as compared to the other ones) and its knowledge sharing carry 1.17 (highest value among others). These values outcome show that the economic performance-based dependent variable is less deviated from its mean position as compared to social performance and environmental performance. While the mediator (knowledge sharing) highly deviates from its mean position which shows that there is a direct influence on a collaboration oriented human resource system on this variable. KMO and Bartlett's test shows the two test outcomes that represent the suitability of structure detection data. The Kaiser-Meyer-Olkin measure of sampling adequacy is a statistic which
explores the proportion of variance among tested variables that might cause by underlying factors (Biasutti & Frate, 2017). Its statistics are shown in the following table 3.

**Table 3: KMO and Bartlett's Test**

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</th>
<th>.949</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
<td>12691.574</td>
</tr>
<tr>
<td>df</td>
<td>378</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>

According to the above-mentioned table, it becomes clear that the value of the Kaiser-Meyer-Olkin value is 0.949, which means within the threshold range. While its significance value is also appropriate with 0.00 (lower than standard 0.05), along with the proper Bartlett test value. It means this model is a good fit to justify the testing variables and derive authentic research. Its rotated component matrix-based statistics are shown in the following table 4.

**Table 4: Rotated Component Matrix**

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>.827</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2</td>
<td>.856</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO3</td>
<td>.814</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO4</td>
<td>.775</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO5</td>
<td>.804</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO6</td>
<td>.831</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KS1</td>
<td></td>
<td>.819</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KS2</td>
<td></td>
<td>.828</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KS3</td>
<td></td>
<td>.834</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KS4</td>
<td></td>
<td>.866</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KS5</td>
<td></td>
<td>.885</td>
<td></td>
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<tr>
<td>SP1</td>
<td></td>
<td>.782</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SP2</td>
<td></td>
<td>.821</td>
<td></td>
<td></td>
<td></td>
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<td>SP3</td>
<td></td>
<td>.857</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SP4</td>
<td></td>
<td>.849</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP5</td>
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<td>.844</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SP6</td>
<td></td>
<td>.862</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP1</td>
<td></td>
<td>.732</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP2</td>
<td></td>
<td>.702</td>
<td></td>
<td></td>
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<tr>
<td>EP3</td>
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<td>.770</td>
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<td>EP4</td>
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<td>.832</td>
<td></td>
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<tr>
<td>EP5</td>
<td></td>
<td>.798</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP6</td>
<td></td>
<td>.855</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP7</td>
<td></td>
<td>.801</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EN1</td>
<td></td>
<td></td>
<td>.836</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EN2</td>
<td></td>
<td></td>
<td>.849</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EN3</td>
<td></td>
<td></td>
<td>.836</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EN4</td>
<td></td>
<td></td>
<td>.840</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The above values depict that all the items are equally loaded on this model because all the rotated component matrix value is more than 0.7 means at their threshold range. As far as the existence of convergent and discriminant validity factors is concerned, the following tables 5 and 6 show the real outcomes.

### Table 5: Convergent and Discriminant Validity

<table>
<thead>
<tr>
<th></th>
<th>CR</th>
<th>AVE</th>
<th>MSV</th>
<th>EP</th>
<th>CO</th>
<th>KS</th>
<th>SP</th>
<th>EN</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP</td>
<td>0.942</td>
<td>0.701</td>
<td>0.342</td>
<td><strong>0.837</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>0.948</td>
<td>0.753</td>
<td>0.342</td>
<td>0.585</td>
<td><strong>0.868</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KS</td>
<td>0.960</td>
<td>0.828</td>
<td>0.316</td>
<td>0.483</td>
<td>0.474</td>
<td><strong>0.910</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>0.954</td>
<td>0.775</td>
<td>0.288</td>
<td>0.537</td>
<td>0.481</td>
<td>0.493</td>
<td><strong>0.880</strong></td>
<td></td>
</tr>
<tr>
<td>EN</td>
<td>0.940</td>
<td>0.796</td>
<td>0.316</td>
<td>0.481</td>
<td>0.468</td>
<td>0.562</td>
<td>0.421</td>
<td><strong>0.892</strong></td>
</tr>
</tbody>
</table>

As mentioned above, the composite reliability value of each variable is more than 0.7, and also its average variance extracted value is more than 0.5 which concludes that there is no convergent validity issue occurs in this testing mechanism. In addition to this, the bold letters based segregation among the tested items shows that there is no discriminant validity occurred within this test.

### Table 6: Model Fit Indices

<table>
<thead>
<tr>
<th>CFA Indicators</th>
<th>CMIN/DF</th>
<th>GFI</th>
<th>IFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Value</td>
<td>≤ 3</td>
<td>≥ 0.80</td>
<td>≥ 0.90</td>
<td>≥ 0.90</td>
<td>≤ 0.08</td>
</tr>
<tr>
<td>Observed Value</td>
<td>2.444</td>
<td>0.873</td>
<td>0.961</td>
<td>0.961</td>
<td>0.058</td>
</tr>
</tbody>
</table>

Model fit indices are an important source to show the effective uploading of the variables on the tested model. According to the above CFA indicators’ values, all of them are within their threshold range like the observed value of CMIN/DF is 2.444 (lower than 3) and GFI is 0.873 (higher than 0.80). Also, the RMSEA value is 0.058 (lower than 0.08), while the observed value of both CFI and IFI is 0.961 (higher than 0.90) which shows that this model is a good fit. Its graphical representation is shown in the following figure 3.
The structural equation modeling is a statistical technique which is used for testing and estimating the casual interdependence by effectively utilizing the qualitative casual assumptions and statistical data (Hair Jr, Hult, Ringle, & Sarstedt, 2016; Hair Jr, Sarstedt, Ringle, & Gudergan, 2017; J. Wang & Wang, 2019). This type of modeling is a statistical technique which allows a set of relationship among one or more independent variables and also examined one or more dependent variables. Its statistics are shown in the following important table 7.

Table 7: Structural Equation Modeling

<table>
<thead>
<tr>
<th></th>
<th>ColOHRS</th>
<th>KnowShar</th>
</tr>
</thead>
<tbody>
<tr>
<td>KnowShar</td>
<td>.459**</td>
<td>.000</td>
</tr>
<tr>
<td>EnvirPerf</td>
<td>.443**</td>
<td>.401**</td>
</tr>
<tr>
<td>EconPerf</td>
<td>.576**</td>
<td>.264**</td>
</tr>
<tr>
<td>SociPerf</td>
<td>.455**</td>
<td>.320**</td>
</tr>
<tr>
<td>Direct effect</td>
<td>ColOHRS</td>
<td>KnowShar</td>
</tr>
<tr>
<td>KnowShar</td>
<td>.459**</td>
<td>.000</td>
</tr>
<tr>
<td>EnvirPerf</td>
<td>.259**</td>
<td>.401**</td>
</tr>
<tr>
<td>EconPerf</td>
<td>.455**</td>
<td>.264**</td>
</tr>
<tr>
<td>SociPerf</td>
<td>.308**</td>
<td>.320**</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>ColOHRS</td>
<td>KnowShar</td>
</tr>
<tr>
<td>KnowShar</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>EnvirPerf</td>
<td>.184**</td>
<td>.000</td>
</tr>
<tr>
<td>EconPerf</td>
<td>.121**</td>
<td>.000</td>
</tr>
<tr>
<td>SociPerf</td>
<td>.147**</td>
<td>.000</td>
</tr>
</tbody>
</table>

The above SEM-based statistical values depict that any minor change in the collaboration oriented HR system caused 46% deviation on the mediating effect of knowledge sharing. While, in the case of dependent variables, the collaboration oriented HR system caused 44.3% deviation on the environmental performance, 57.6% deviation on economic performance, and 45.5% deviation on social performance. This shows that among all affected items, the economic performance of an organization is majorly affected by making some active collaboration among the human resource management system; while, on the other hand, environmental performance is least affected due to this factor. As far as the mediator's role is concerned, a 40% change occurred on environmental performance, 26.4% on environmental performance, while 32% on the social performance within an organization. These direct effect-oriented statistics show that the environmental performance of an organization is majorly affected by the knowledge sharing mechanism within the HR department and their economic performance does not show the major changes. Its outcomes can be shown in the following figure 4.
5 Discussion and Conclusion

5.1 Discussion
After critically analyzed the statistical outcomes, it becomes concluded that the sustainability performance of an organization is positively affected by the development of a collaboration oriented HR system within the operating activities. Lucia, Jesus, and Carla also discuss this point in their research article that the knowledge sharing mechanism factor positively enhanced the internal and external performance of HRM and attained long term sustainability performance of an organization. In the current era, there is a need of advanced and innovative HRM policies within the operating activities of a company by developing a democratic type of leadership in the operating activities of a company (Muñoz-Pascual, Galende, & Curado, 2020). The reason is that employees are the real stakeholders of the company whose operating activities directly hit the growth rate of a company and also create its image in the customer and competitive market. The above statistics show that the favorable sustainable economic performance of an organization is majorly dependent on the collaboration factor among the management and employees. Because this factor motivates the employees to become loyal to the company and considered it as their own company. While, the knowledge sharing based effective mechanism directly enhanced the internal organizational environment and create a positive word of mouth among employees towards the company’s operation (Farooq, 2018). In the current era, majority of the multinational and other diverse nature company’s management majorly work on this factor by creating a strong relationship among its stakeholders i.e. employees, suppliers, shareholders, etc. Its annual report based true and fair description of all its organizational performance enhanced the trustworthy relationship among the company and its stakeholders, and result in the development of sustainable growth of this company in the customer market and gain an efficient competitive advantage (Cantele & Zardini, 2018). As far as social performance is concerned, it majorly affected by the communication channels between the upper and lower management by focus on down to up model-based integrated communication framework within an organization (Qi & Chau, 2018).

5.2 Conclusion
Thus, after critically evaluate the impact of collaboration oriented HR system on the sustainability performance of an organization, it becomes concluded that its favorable economic performance becomes enhanced by developing strong communication-based knowledge sharing channels among the company’s management and its employees. According to SEM statistical outcomes, it becomes clear that knowledge sharing causes a major impact on the environmental performance within an organization and a lesser impact on the economic productivity factor. While the collaboration among the HR system enhanced the overall productivity of an organization to effectively contribute to a workplace and secured its future in the long run. This is informative research which depicts how much it is important to create a friendly relationship among the stakeholders within an organization that directly impacts on its socio-economic performance and environmental sustainability factor of an organization.

5.3 Future Implications
This is an informative paper for future researchers to utilize its information in their discussion portion. Also, SMEs and large scale organizations can utilize its information to attain a sustainable profit margin and competitive advantage in the highly competitive market. This paper also helps the policymakers to make such decisions within a workplace that directly fulfill the needs and desires of the target audience.

5.4 Limitations and Future Researches
Indeed, it is informative and challenging research, but still, there are some limitations within this paper. Like there is a lack of mixed (qualitative and quantitative) research work to justify the hypothesis in a more versatile format. Also, the technology factor is not considered to study its influence on the efficient sharing mechanism. In addition to this, no specific case-study is studied that may impact the authenticity of this research. All these limitations can be fulfilled by future researchers in their related studies.
References


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ARE PENSION OBLIGATIONS, PUBLIC OFFICE SALARIES AND INVESTMENT ON SOCIAL PROJECTS HURTING FISCAL SUSTAINABILITY? A PANEL DATA ANALYSIS OF ASEAN COUNTRIES

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Abstract. Fiscal sustainability is the implementation of economic policies, which enables the stabilization of the net value of ratio of budget deficit. This value is usually expressed as a difference among the budget expense and the budget revenue. Pension obligations, office salaries, and investment on social projects are the aspects that are crucial for any government as well as the economy of a country and they might affect the fiscal sustainability of the country. In this context, the current study was designed in order to investigate the impact of pension obligations, office salaries and investment on social projects on fiscal sustainability in different ASEAN countries. In order to fulfill this aim, the researcher has collected data from 6 ASEAN countries i.e. Brunei, Cambodia, Indonesia, Laos, Thailand and Philippines for a period of 30 years. The major tests applied on the collected data include cross sectional dependence test, CIPS unit root test, LM Bootstrap cointegration test, AMG estimation and panel casualty test. The results obtained from these tests suggest that the impact of pension obligation, office salaries and investment in social projects on fiscal sustainability are found as significant. The theoretical and practical implications along with the limitations of the study have been discussed in the last of the study.

Keywords: Pension Obligations; Office; Salaries; Investment on Social Projects; Fiscal Sustainability; ASEAN; Panel


Jel Codes: O15, Q14

1 Introduction

The various advancements in the countries have given rise to variations in the economic balances among the economies of the world, ranging from the emerging to the emerged economies and within the countries (Baharumshah, Soon, & Lau, 2017; İmrohoroğlu, Kitao, & Yamada, 2019; Mazzoni, 2020; Vergara, 2020). Hence, the preservation of a balance in the macroeconomic conditions of any country is very important. The concept of macroeconomic balance is related to sustainability, which ensures continuity and sufficiency in the economy. Fiscal sustainability is related to the economic sustainability and is considered as a vital provision in the policy planning of the country’s economy (Gümüş, 2019; Sasongko, Huruta & Wardani, 2019; Feriyanto, 2020; Chen, Liu, Wang, & Li, 2020; Čižo, Lavrinenko, & Ignatjeva, 2020).

Hence, the concept of a country’s fiscal sustainability shows the ability of its government by which they are able to finance the country’s budget in a smooth manner without accumulating the public debt excessively in the long
run or in short, it is the management of the financial responsibilities (Afonso & Jalles, 2016; Chapman, 2008; Chen, Zhen, Dong, & Xie, 2020; Krasnov, Okanova, Yeraliyeva, Kozhakhmetova, Karshalova, & Luká, 2020; Rakhmetova, Kalkabayeva, Kurmanalina, Gusmanova, Serikova, & Aimurzina, 2020). It is vital that the country’s government must have solvency and it must be able to repay the debt in the specific point of future (Adams, Ferrarini, & Park, 2010; Estrada, Park, & Ramayandi, 2010). Technically speaking, the fiscal sustainability is derived from the overall budget deficit and government debt (Cahyadin & Ratwianingsih, 2020). The conditions for a balanced budget are achieved through various means, the public debt being the most widely used one by a number of countries (Trehan & Walsh, 1991; Villena, Gamboni, & Tomaselli, 2018; Sabir & Hussin, 2020). As shown in table 1 and figure 1 below, the values for Budget Deficit and the Government debt for the ASEAN countries are relatively high.

### Table 1: Budget Balance of ASEAN countries (in relation to GDP expressed as %)

<table>
<thead>
<tr>
<th>Country</th>
<th>2020</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>-26.58</td>
<td>-10.46</td>
</tr>
<tr>
<td>Cambodia</td>
<td>-1.87</td>
<td>-0.45</td>
</tr>
<tr>
<td>Indonesia</td>
<td>-5.01</td>
<td>-2.23</td>
</tr>
<tr>
<td>Lao</td>
<td>-6.23</td>
<td>-5.15</td>
</tr>
<tr>
<td>Malaysia</td>
<td>-4.2</td>
<td>-3.18</td>
</tr>
<tr>
<td>Myanmar</td>
<td>-4.69</td>
<td>-3.5</td>
</tr>
<tr>
<td>Philippines</td>
<td>-3.36</td>
<td>-1.93</td>
</tr>
<tr>
<td>Singapore</td>
<td>-3.48</td>
<td>3.84</td>
</tr>
<tr>
<td>Thailand</td>
<td>-3.45</td>
<td>0.82</td>
</tr>
<tr>
<td>Vietnam</td>
<td>-5.15</td>
<td>-3.3</td>
</tr>
</tbody>
</table>

For the ASEAN nations, the management of the fiscal sustainability is a major macroeconomic issue for the government. These countries occupy a central position in a dynamic economic area of the globe. The financial performance of these countries has given rise to the ‘Asian Miracle’, which is a concept well known and well-investigated by the key economists and policymakers in the world (Bui, 2019; Hicklin, 1997). However, it is pertinent to note that the ASEAN economies had been badly affected by the financial crisis that took place in 1997-1998 when the group of the ASEAN countries consisted of the four nations of Malaysia, Thailand, Indonesia and Philippines and later in 2007-2008. The fiscal deficits in the ASEAN countries have been undergoing persistent variations. The reforms taken by these countries have enabled them to keep up with their fiscal sustainability (Lin & Kueh, 2019; Raymundo, 2016; Iqbal, et al., 2020). Though their public debts and the fiscal deficits have been decreasing over a period of time, yet they are still considered to be high (Bui, 2019). Hence, this region is of immense significance for the study of fiscal sustainability. Many factors affect the fiscal sustainability, out of which the factors of pension obligation, public office salaries and investment on social projects will be considered for this study.
The main aim of this paper is to study the indicators that hurt the financial sustainability, specifically in the ASEAN countries using panel data techniques. The specific research objectives of this paper are:

- To analyze the impact of pension obligations on fiscal sustainability
- To analyze the impact of public office salaries on fiscal sustainability
- To analyze the impact of investments on social projects on fiscal sustainability

This paper has multiple contributions to theory and practice. This paper has contributed to the empirical literature on fiscal sustainability as it has attempted to investigate various factors affecting fiscal sustainability as suggested in the studies of (Gümüş, 2019; Lau & Syn-Yee, 2018; Thuy, 2018) to further explore this notion in the South East Asian countries, which is a region attractive for economists. Practically, this study is beneficial to the policy makers and the economist as they can formulate and adjust their fiscal policies according to the requirement of the country using these results and can better understand how to adjust their fiscal indicators so that the budget and debt can be balanced. This study will help them adopt measures that can prove useful for boosting the economic growth and to support the socioeconomic development of the country.

2 Literature review

2.1 Pension Obligations

Scholars have defined fiscal sustainability as the implementation of economic policies which enables the stabilization of the net value of ratio of budget deficit (Buiter, 1983). This value is usually expressed as a difference among the budget expense and the budget revenue (Gümüş, 2019). (Blanchard, Chouraqui, Hagemann, & Sartor, 1991) has also given a comprehensive definition of fiscal sustainability as calculating the ratio of Public Debt/GNP and measures the ability of the government to pay off the loans using revenue from public. If the ratio of Public Debt/GDP remains consistent and stable compared to the economy’s total demand, then this confirms the presence of fiscal sustainability in the country’s economy. There are many factors that indicate the ongoing pressure and demand on the government and are affecting the sustainability of the country’s budget and question the fiscal policies (Ali, Naveed, ul Hameed, & Rizvi, 2018; Allen, 2005; Ha, 2016; Hamid, Shahid, Hameed, Amin, & Mehmood, 2019). Pension obligation is considered as one such main component of the fiscal sustainability issues in the both the short and the long run for many countries of the world. The pension obligations in a system are measured using the ratios of pension payments to GDP in the short term and the
The present value of future pensions commitments in the long run. The economists have highlighted the significance of pension obligations and its impact on the fiscal sustainability, which has been linked to the expected ageing of the populations in the countries (Medaiskis et al., 2018; Chomik, Piggott, & Yan, 2019; Kühner & Chou, 2019). Scholars have pointed out that these are likely to increase the government spending on the health care and the pensions of these people (Bird, 2006; Bryden, 1974; Chomik et al., 2019) with the rise in the aging population (Castro, Maria, Félix, & Braz, 2017; Hong, Teng, & Gan, 2019), especially in the ASEAN region (Chomik, McDonald, & Piggott, 2016; Roy & Le, 2018). Hence the countries are advised to restructure their pension systems or make adjustments for the pre-funding of their future payments so that the demanding pressures on the country’s future budget can be lessened. In a study by the European Economy, the factors of pension, health care and long term care were investigated as challenges to the country’s fiscal sustainability. The researchers found that the pension benefit ratio must be estimated and compared to the reference wage. If this ratio is very high then this means that the country has a generous pension system and vice versa. However, by reducing this ratio would mean that the generosity of pension system is being reduced that may lead to stabilization of the public pension expenditure and provide leverage to the government and the fiscal sustainability. For reducing the benefits, many factors, like the demographics, life expectancy on retirement and pension contributions can be shifted from being too generous to a point system or supplementary pension scheme, which can serve as a factor enhancing the fiscal sustainability (Carone & Eckefeldt, 2014). In a similar paper by Asian development Bank Institution, the economies of the ASEAN and other emerging Asian countries was considered to be at threat from the ageing population in these countries and the related drastic rise in the pension expense by the government in the coming decades as biggest long-term fiscal challenge. IMF has estimated that these economies will face increase in the public spending owing to pensions and other services. This discussion shows that the pension obligations on the government can constraint the fiscal sustainability and the following hypothesis is made to depict this relationship.

**H1: Pension Obligations are significantly related to fiscal sustainability**

### 2.2 Public Office Salaries

In order to ensure sustainability, a country’s primary balance of the public sector must be compatible and stabilized with the Public Debt/GDP ratio for ensuring sustainability. (Izquierdo & Panizza, 2003) have related the fiscal sustainability to the sufficiency of the country in meeting the budget deficit. In addition to the pension obligations, the employment in the public sector and the associated wages and benefits also are demanding on the country’s fiscal sustainability in the form of government expenditure (Dybczak & Garcia-Escribano, 2019; Schiavo–Campo, de Tommaso, & Mukherjee, 1997). A previously conducted World Bank policy study has shown that the government wage accounted for almost 5.4% of the GDP. The rates of the wages for the local government accounted to nearly three-fourths of the wages of the central government wages and the accumulation of the civilian government wages absorbed about 9% of the GDP as an average (Schiavo–Campo et al., 1997). This indicates that the salaries and wages of those working in the public offices had a huge effect on the government expenditure and the spending, which affects the fiscal sustainability. In another IMF working paper, it was reported that the growth in the bills for the wages of the public offices workers show how the government has expanded the measures and the activities for improving the social and the economic development, however this spending has a rigid effect on the fiscal sustainability at the same time (Mitchell, James, & Wickham, 2019). This discussion proves the linkage of the public office salaries with the country’s fiscal sustainability. Hence, the following hypothesis is made:

**H2: Public Office Salaries are significantly related to fiscal sustainability**

### 2.3 Investment on Social Projects

The funding of the social projects by the government deem a major threat to their capacity (Doorley, 2017; Garang, Issa, & Ali, 2017) until they are subjected to a feasibility assessment (Chotia, 2017; Guilherme, Santos, Yamashita, & Brandão, 2016). In UN meeting held in Brazil (2009), the investment on the projects aimed with
social and economic causes was considered as a counter cyclical instrument that provides a challenge for the fiscal sustainability. The projects set for the social services, public welfare and the development of infrastructure influences the economic growth and productivity, but it is equally important that the countries analyze these investments to assess the benefit gained out of them in terms of the social profitability. A similar study has studied the impact of fiscal consolidation and the social investment for public and was found to have a significant effect on the government expenditure. Hence, the countries have been in the practice of reducing their investment to sustain and consolidate their fiscal indicators as it is easy to cut down the investment on such projects but this can have negative effect on the country’s overall growth (Carranza, Daude, & Melguizo, 2014). The development of the social infrastructure in sustainable ways is a major goal of the countries, especially those with low and medium levels of income as they are the ones who are struggling to build and enhance their country’s infrastructure from the primary level. However, they are faced with the rise in the debt levels for building the said infrastructure, causing further decline in the growth rates and lesser productivity. This shows that investment in the social projects is the key to enhancing the growth and the productivity, which pushes the country into a vicious cycle of exacerbating the associated debt. It is a challenge for the countries to balance their fiscal budget constraints and the social goals. The World Bank has mandated the countries to develop measures for achieving the sustainable fiscal indicators and the social development. Hence, a precarious financial structuring is required weighing carefully the risks and the benefits of the investment in the social projects so that threat of increasing debt can be kept under control. A social project has the capacity to pass on a direct liability to the government. If projects are carried out without any proper analysis and planning, then costs will be unduly increased (Lu, Chao, & Sheppard, 2019). These findings reveal that the investment on the social projects by the government significantly affect the fiscal sustainability of a country. Hence the following hypothesis is made to show this relationship:

\[ H3: \text{Investments on Social Projects are significantly related to fiscal sustainability.} \]

3 Data and Methodology

3.1 Data

The current study is aimed at finding out and exploring the impact that is casted on the fiscal sustainability by pension obligations, office salaries and investment on social projects in different ASEAN countries. In order to meet this objective, the researcher has collected data from 6 ASEAN countries i.e. Brunei, Cambodia, Indonesia, Laos, Thailand and Philippines for a period of 30 years. As per the objectives of the study, the variables about which data has been collected include fiscal sustainability, pension obligations, office salaries and investment on social projects. Moreover, the researcher also has added two control variables among others which include per capita income and economic growth. The data has been collected from reliable data bases such as World Bank Development Indicators and Global Economy.

3.2 Model Specification

As far as the measurement units of the variables are concerned, fiscal sustainability is measured through debt to GDP ratio, pension obligation has been measured through US dollars. In the similar way, investment on social projects and office salaries has also been measured through US dollars. Per capita income, the first control variable has been measured by US dollars while economic growth has been taken as GDP growth of the country. The following regression model can be utilized for this study:

\[ FS_{it} = \alpha + \beta_1 PO_{it} + \beta_2 OS_{it} + \beta_3 IN_{it} + \beta_4 PCI_{it} + \beta_5 EG_{it} + \epsilon_{it} \]

In this equation, FS represents fiscal sustainability, PO represents pension obligations, OS represents office salaries, IN represents investment in social projects, PCI represents per capita income and EG represents economic growth. In the last, \( \epsilon_{it} \) is the term that represents an error.
3.3 Estimation Procedure

3.3.1 Cross Sectional Dependence Test
The first test that has been applied in the current study is cross sectional dependence test. The main reason behind using this test is that if the relationships that are present in the collected cross sectional data are not checked, it might result into the ambiguous outcomes (Breusch & Pagan, 1980). The following model can be used for this test:

\[ CG_{BP} = T \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \frac{P_{ij}^2}{T} \]  

(1)

However, this model cannot be used if N is having a large value. This is the reason why an alternative model has been introduced which is given as follows:

\[ CG_{LM} = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} T \frac{P_{ij}^2}{T} - 1 \]  

(2)

As far as the null and alternate hypotheses are concerned, the null hypothesis suggests that there is no cross sectional dependence while the alternate hypothesis suggests that there is cross sectional dependence. If the p values of the null hypothesis is less that the significance then it can be rejected otherwise it is accepted. In addition to cross sectional dependence test, the researcher has also applied slope homogeneity test. The null hypothesis of this test indicates that the slopes are homogenous while the alternate hypothesis indicates that the statistics are having heterogeneous slopes (Hussain et al., 2020).

3.3.2 Panel Unit Root Test
The next test that has been applied by the researcher is panel unit root test with the purpose of finding out the stationarity of the variables. The unit root test that is used in the current study is CIPS by Im Pesaran Shin. The reason behind using this test is that it considers the cross sectional dependence (Pesaran & Yamagata, 2008). The following equation can be used for this purpose:

\[ \Delta Y_{it} = a_t + b_t Y_{i,t-1} + c_t \Delta Y_{i,t-1} + d_t \Delta Y_{i,t} + e_{it} \]  

(3)

The version of the equation that considers the cross sectional dependence is as follows:

\[ CIPS = \frac{1}{N} \sum_{i=1}^{N} CADF_i \]  

(4)

In this equation CADF represents the cross sectional version of ADF test (Pesaran, 2007). The null hypothesis of this test indicates that there is unit root in the data while the alternate hypothesis suggests that there is no unit root and the data is stationary.

3.3.3 Panel Cointegration Test
After unit root test, the next important test that is used in the current study is panel cointegration test so that the presence of any cointegrating relationship between the variables of the study can be checked. The cointegration test applied in this study is Westerlund and Edgerton bootstrap LM panel cointegration test. The benefit of this test is that it also considers the cross sectional dependence of the data (Westerlund & Edgerton, 2007). The following equation can be used for this test:

\[ LM_{N}^+ = \frac{1}{NT^2} \sum_{i=1}^{N} \sum_{t=1}^{\tau} W_{it}^2 e_{it}^2 \]  

(5)

The null hypothesis of this test suggests that cointegration is present in the regression model while the alternate hypothesis suggests that cointegration is not present in the regression model. The rejection of the null hypothesis
is based on the p value, if it is less than the significant value, then null hypothesis will be rejected and otherwise it will be accepted. After cointegration test, the coefficients of the variables have been estimated by using AMG estimation procedure, which also has the benefit of considering the cross sectional dependence.

### 3.3.4 Panel Casualty Test

The last test applied by the researcher is panel casualty test so that the casual relationships among the variables of the study can be estimated. The casualty test that have been used in this study i.e. Könya casualty test is better than the other casualty tests because it assumes that there is no issue regarding the cross sectional dependence. In addition, it also assumes that the casualty tests have been performed on the series that have unit root and do not have cointegrating relationships. Moreover, it is beneficial because other pre requisite tests are not needed to be performed (Könya, 2006). The following equation can be used for this test:

\[
FS_{N,t} = \alpha_{2,N} + \sum_{i=1}^{1} \beta_{2,N,t} OS_{N,t-1} + \sum_{i=1}^{1} \delta_{2,N,t} FS_{N,t-1} + \theta_{2,N,t}
\]

4 Results and Analysis

#### 4.1 Results of Cross Sectional Dependence Test

The results of cross sectional dependence as well as slope homogeneity tests have been reported in the table 2. As per the results, it can be seen that in case of CD_{BP}, CD_{LM} and CD, the values for all the variables have rejected the null hypothesis of no cross sectional dependence. Based on these results, it can be stated that all the variables of the study are having cross sectional dependence. As far as slope homogeneity results are concerned, it can be seen that in case of both delta and adjusted delta, the p value is less than the significant value and thus the null hypothesis have also been rejected in this test. In other words, it can be stated that the unit coefficients of the study are heterogeneous. The results of these tests make the data qualified to be entered the next steps of the estimation.

#### Table 2: Cross-Section Dependence and Slope Homogeneity Tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>CD_{BP}</th>
<th>CD_{LM}</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO</td>
<td>136.388*</td>
<td>78.498*</td>
<td>23.397*</td>
</tr>
<tr>
<td>OS</td>
<td>177.397*</td>
<td>38.984*</td>
<td>21.498*</td>
</tr>
<tr>
<td>IN</td>
<td>123.374*</td>
<td>98.489*</td>
<td>24.487*</td>
</tr>
<tr>
<td>FS</td>
<td>198.498*</td>
<td>68.494*</td>
<td>43.763*</td>
</tr>
<tr>
<td>PCI</td>
<td>123.498*</td>
<td>98.498*</td>
<td>32.498*</td>
</tr>
<tr>
<td>EG</td>
<td>103.488*</td>
<td>78.398*</td>
<td>23.398*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Slope Homogeneity Tests Results</th>
<th>LM Statistics</th>
<th>t-value</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta</td>
<td>33.49*</td>
<td>3.367</td>
<td>.000</td>
</tr>
<tr>
<td>Adj Delta</td>
<td>27.39*</td>
<td>2.387</td>
<td>.000</td>
</tr>
</tbody>
</table>

#### 4.2 Results of Panel Unit Root Test

The results obtained by the application of CIPS unit root test by the researcher have been declared in the table 3. According to these results, it can be seen that in the level series, all the variables have not rejected the null hypothesis of unit root. Pension obligations and per capita income have accepted the null hypothesis. Therefore, the researcher has first differenced all the variables and has checked the results of CIPS test. In this series, it can be seen in the table that all the variables have rejected the null hypothesis and it can be stated that the data is stationary and there is no unit root in the model (Bilan et al., 2020)
4.3 **Results of Panel Cointegration Test**

After panel unit root test results, the results of panel cointegration test (LM bootstrap) have been presented in the table 4. As per this table, it can be seen that the p values in both cases i.e. constant and constant plus trend is less than the significant value and thus the null hypothesis of no cointegration has been rejected by the variables of the study. In other words, it can be stated that all the variables are having long run relationship or cointegration with each other in the study.

### Table 4: LM Bootstrap Panel Cointegration Test

<table>
<thead>
<tr>
<th>Conditions</th>
<th>LM statistics</th>
<th>Bootstrap p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-3.387</td>
<td>0.876</td>
</tr>
<tr>
<td>Constant + Trend</td>
<td>3.497</td>
<td>0.885</td>
</tr>
</tbody>
</table>

The AMG estimation results are very significant for the study and have been presented in the table 5. According to these results, it can be seen that the impact of pension obligation on fiscal sustainability is positive and significant for all the countries of the panel. In the same way, the impact casted by office salaries on fiscal sustainability is also significant and positive for all countries except for Indonesia, for which the impact of office salaries is positive but insignificant. As far as investment in social projects is concerned, its impact on fiscal sustainability is positive and significant for all the countries of the panel. In case of the control variable per capita income, its impact on fiscal sustainability for all countries is also significant and positive but for Cambodia, its impact is not found as significant. In the last, there is another control variable i.e. economic growth, the impact of which on fiscal sustainability for all the countries is positive and significant.

### Table 5: AMG Estimation

<table>
<thead>
<tr>
<th>Countries</th>
<th>PO</th>
<th>OS</th>
<th>IN</th>
<th>PCI</th>
<th>EG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>0.212**</td>
<td>0.127**</td>
<td>0.200**</td>
<td>0.176**</td>
<td>0.123**</td>
</tr>
<tr>
<td>Cambodia</td>
<td>0.133*</td>
<td>0.188*</td>
<td>0.187*</td>
<td>0.012</td>
<td>0.208**</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.187*</td>
<td>0.083</td>
<td>0.193**</td>
<td>0.103*</td>
<td>0.189*</td>
</tr>
<tr>
<td>Laos</td>
<td>1.317**</td>
<td>0.121**</td>
<td>0.203**</td>
<td>0.197**</td>
<td>0.186*</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.278**</td>
<td>0.202**</td>
<td>0.233**</td>
<td>0.132**</td>
<td>0.205*</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.129**</td>
<td>0.123**</td>
<td>0.139***</td>
<td>0.123**</td>
<td>0.195**</td>
</tr>
<tr>
<td>Panel</td>
<td>0.237**</td>
<td>0.302**</td>
<td>0.386***</td>
<td>0.254***</td>
<td>0.259**</td>
</tr>
</tbody>
</table>

4.4 **Results of Panel Casualty Test**

The results of the last test of the study applied by the researcher i.e. panel casualty test have been reported in table 6. Pair wise results for casualty between all the variables have been presented in the table. It is clear from the table that there is bidirectional casualty between office salaries and fiscal sustainability. In the same way, pension obligations and fiscal sustainability also have bidirectional casualty running between them. However, in case of investment in social projects and fiscal sustainability, there is unidirectional casualty running from IN to FS. As far as office salaries and pension obligation are concerned, they are also having bidirectional casualty running between them which is the case also observed in case of pension obligation and investment on social projects.
However, there is unidirectional casualty found between investment in social projects and office salaries running from OS to IN.

Table 6: Kónya Panel Causality Test

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS does not Granger Cause FS</td>
<td>4.33266</td>
<td>0.0099</td>
</tr>
<tr>
<td>FS does not Granger Cause OS</td>
<td>6.31730</td>
<td>0.0091</td>
</tr>
<tr>
<td>PO does not Granger Cause FS</td>
<td>4.72063</td>
<td>0.0017</td>
</tr>
<tr>
<td>FS does not Granger Cause PO</td>
<td>5.79076</td>
<td>0.0046</td>
</tr>
<tr>
<td>IN does not Granger Cause FS</td>
<td>5.05351</td>
<td>0.0087</td>
</tr>
<tr>
<td>FS does not Granger Cause IN</td>
<td>1.18308</td>
<td>0.3120</td>
</tr>
<tr>
<td>PO does not Granger Cause OS</td>
<td>7.37410</td>
<td>0.0092</td>
</tr>
<tr>
<td>OS does not Granger Cause PO</td>
<td>4.76630</td>
<td>0.0083</td>
</tr>
<tr>
<td>IN does not Granger Cause OS</td>
<td>0.68184</td>
<td>0.5088</td>
</tr>
<tr>
<td>OS does not Granger Cause IN</td>
<td>7.77580</td>
<td>0.0064</td>
</tr>
<tr>
<td>IN does not Granger Cause PO</td>
<td>9.09102</td>
<td>0.0007</td>
</tr>
<tr>
<td>PO does not Granger Cause IN</td>
<td>6.88280</td>
<td>0.0018</td>
</tr>
</tbody>
</table>

5 Discussion and Conclusion

5.1 Discussion

The current study was designed in order to investigate the impact of pension obligations, office salaries and investment on social projects on fiscal sustainability in different ASEAN countries. In this regard, the first hypothesis was that pension obligation has significant impact on fiscal sustainability. This hypothesis has been accepted as per the results obtained in the study. When the pension systems of the countries are developed and adjusted by the governments, it provides sustainability to the macroeconomic conditions and ultimately results in fiscal sustainability. The similar results have been obtained in a related study conducted in the past (Baharumshah et al., 2017). The second hypothesis was that office salaries have significant impact on fiscal sustainability, which has also been accepted for all the countries except for Indonesia where the impact was found as insignificant. If the office salaries are balanced as per the GDP of the country, it improves the fiscal sustainability of the country. The last literature supports this result (Biondi & Boisseau-Sierra, 2017). The last hypothesis was that investment in social projects has significant impact on fiscal sustainability. This hypothesis, as per the results, has also been accepted as its impact has been found significant in case of all the countries included in the panel. When the governments of different countries give attention to the social projects and infrastructure of the country in a balanced way, it provides fiscal sustainability to the economy of those countries. This result is in concordance with the similar studies conducted in the past. Apart from these three variables, two control variables were also taken i.e. per capita income and economic growth. The results have shown that per capita income has significant impact on fiscal sustainability for all the countries except for Cambodia while economic growth is found to cast significant impact on fiscal sustainability for all countries. These results comply with the past studies of similar context (Wang, Su, Li, & Ponce, 2019).

5.2 Conclusion

This study was conducted with the aim to explore the impact of pension obligations, office salaries and investment on social projects on fiscal sustainability in different ASEAN countries. The researcher collected panel data from six ASEAN countries for 30 years about the respective variables and applied various estimation techniques and approaches on the collected data to obtain the results. According to the results, as the impact of pension obligation, office salaries and investment in social projects on fiscal sustainability has been found as significant, it can be concluded that the countries that have been included in the panel of the current study must
give attention and devise policies to improve the conditions of pension obligations and office salaries and must also promote the investment in various social projects so that the fiscal sustainability might be enhanced.

5.3 Implication and Limitations
The theoretical implication of the current study is that it will provide a good amount of literature about the aspects such as pension obligations, office salaries, and investment on social projects and fiscal sustainability, which might be useful for the researchers for their studies. The practical implication of this study is that it will provide information to governments of the selected ASEAN countries about how they can attain fiscal sustainability in their economy. They will also be able to devise policies and regulations that will improve the systems of pension obligations, office salaries, and investment on social projects.

The most important limitations of the current study include small sample size; focus only on few ASEAN countries and applying selective estimation techniques. The other researcher might consider increasing the sample size and they must consider other countries or group of countries as well to conduct this study.

References


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INDUCING ORGANIZATIONAL CITIZENSHIP BEHAVIOR THROUGH GREEN HUMAN RESOURCE MANAGEMENT BUNDLE: DRAWING IMPLICATIONS FOR ENVIRONMENTALLY SUSTAINABLE PERFORMANCE. A CASE STUDY

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Abstract. Organizations have faced pressure from their stakeholders to adopt environmentally friendly business practices since the last few decades, which creates a major problem in front of their management to sustain their position in the highly competitive market. In order to retain its strategic image among the stakeholders' minds, there is a need to develop some green practices in its human resources department that boost its sustainability. In this paper, there is a brief description regarding how these green HRM bundles caused a major impact on environmental sustainable performance. Its independent variables are: green hiring, green training & involvement, and green performance management & compensation. While organizational citizenship behavior acts as a mediator between independent and dependent variables. An online survey-based quantitative data collection method is used where 402 participants' data is considered to apply the SPSS test i.e. structural equation modelling. The majority of the participants' results show that green performance management & compensation cause a major influence on organizational citizenship behavior and environmental sustainable performance. While green hiring has, the least impact and green training & involvement show the moderate outcome on the dependent and mediating variable. This study is an informative approach for the Indonesian healthcare sector and its management to make some efficient changes in its HR policies, and also this data will add value in the decision making process of this state policymakers and other research fellows. Indeed, this is important research, but there are also some limitations like lack of mixed research, and Indonesia state-based restricted research can affect the acceptability of this analysis. This gap can fulfill by upcoming scholars in their research journals.

Keywords: Green Hiring; Green Training & Involvement; Green Performance Management & Compensation; Organizational Citizenship Behavior; Environmental Sustainable Performance.


Jel Codes: M5, M12

1 Introduction

The health care sector of Indonesia has been somehow engaged in green human resource administration (GHRA) practices such as green involvement and training, green hiring, and green performance compensation and management (Pasharibu, Sugiarto, Ariarsanti, & Wijayanto, 2019; Ahmed, et al., 2020, Mazzoni, 2020). Previously, this sector did not use green human resource supervision activities much. Today, green HRM activities are directly contributing to the upgraded environmental sustainability performance of the sector through the use of organizational citizenship behavior (Amrutha & Geetha, 2020; Nuryakin, Maryati, 2020; Kanwal, et al., 2020). According to Ahmed, AlZgool, and Shah (2019) green HRM mainly includes the contribution of HRM practices and policies towards the wider corporate environmental outline. It includes the use of every worker to nurture sustainable practices in the industry and the enhancement of employee awareness regarding sustainability. Green hiring involves the consideration of environmentally friendly activities to attract the employees to work for
their green employers (Cheema & Javed, 2017). Besides, green training and involvement (GTI) also help a company in improving its sustainable development (Zaid, Jaaron, & Bon, 2018; Reinhold, Järvis, & Prause, 2019; Bombiak, 2019). Here, there is a figure 1 that shows the green hired persons in Indonesia during 2014-2020.

![Number Of Green Hired Persons](image)

**Figure 1:** Number of Green Hired Persons

Lastly, green performance compensation and management involve the use of a green indicator or standard to advance the environmental performance of a company (Zaid, Bon, & Jaaron, 2018). In this way, green HRM practices directly contribute to the improvement in sustainability performance (Bon, Zaid, & Jaaron, 2018). The following table 1 shows some significant green human resource management practices (along with indicators) used in the healthcare sector of Indonesia.

<table>
<thead>
<tr>
<th>Green HRM practices</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance standards</td>
<td>Determine relevant standards, select indicators, set objectives and targets</td>
</tr>
<tr>
<td>Performance measurement</td>
<td>Refine indicators and define measures, develop data systems and collect data</td>
</tr>
<tr>
<td>Reporting of progress</td>
<td>Analyze data feedback to managers and develop a regular reporting cycle</td>
</tr>
<tr>
<td>Quality process</td>
<td>Use data for decisions to enhance programmers and policies</td>
</tr>
</tbody>
</table>

Kim, Kim, Choi, and Phetvaroon (2019) in a study illustrates that green HRM practices are very important for a sector as these practices lead to improved environmental sustainability. However, the health care sector of Indonesia has been facing some issues of environmental sustainability performance because of the reduced use of green human resource administration practices. The firms in this sector do not engage in activities like green employment, green performance compensation and management, and green training and participation (Assyofa, Rani, & Yuliawati, 2020; Chen & Gao, 2020). This situation is leading the sector to low sustainability performance, which needs to be mitigated.

Different previous researchers have identified and manifested the importance of green human resource management (GHRM) practices. The recent research by Bon et al. (2018) has made a significant and clear vision as green practices involve some crucial steps that play a significant role to improve the overall performance and value of the firm. The previous efforts lack in describing the entire impact of GHRM practices through green training programs and green wiring on environmentally sustainable performance (ESP). The given research article has a very detailed as well as a significant description of improving ESP of the health care industry of Indonesia.
Moreover, in the past, several analysts such as Astuti and Wahyuni (2018) have explained the significance of green practices as well as the interrelationship between green management and sustainable performance. However, this research is crucial and justified because no other effort has described the relationship between GHRM practices and ESP of the health care sector of Indonesia. The current research has the following objectives,

- The first objective of the research is to evaluate the impact of green hiring of GHRM on environmentally sustainable performance in the healthcare sector of Indonesia.
- The second aim of the study is to identify the impact of green training and involvement on sustainable performance in the healthcare sector of Indonesia.
- The next aim of the study is to examine the impact of green performance management and compensation on the environmentally sustainable performance in the healthcare sector of Indonesia.
- The fourth objective of the study is to analyze the mediating role of organizational citizenship behavior (OCB) in the relationship between green hiring and ESP in healthcare sector of Indonesia.
- Another aim of the research is to identify the mediating impact of OCB on the association b/w green training and involvement and ESP in healthcare sector of Indonesia.
- The final purpose of the study is to evaluate the mediating impact of OCB on the linkage b/w green performance management and ESP in the healthcare sector of Indonesia.

This research and its findings prove to be significant for the health care sector of Indonesia, as Indonesia has been a significant and effective structure of health care. Indonesia is a strong as well as influential country thus the findings of this research prove to be very helpful and supportive for the health care sector of Indonesia. The health care industry has huge importance for the nation this is mainly because it is a sector that is very important for the nation’s life (Groves, Kayyali, Knott, & Kuiken, 2016; Chen, Qisheng, et al., 2020). The overall results and suggestions made by this research study have a wider scope as well as significant for the Indonesian health care sector majorly due to the fast-developing sector in terms of health activities.

The research paper mainly consists of five chapters to illustrate the detailed description of the following chapters. These chapters consist of the following topics such as introduction, review of the previous literature, research methodology, data analysis, and discussion, and conclusion. The first chapter expresses the background of the study, problem statement, justification and rationale, research objectives and research questions, and significance and the scope of the study. The literature review chapter discusses the variables, mediators, dependent and independent variables, and the previous studies are analyzed briefly. Research methodology explains the methods and techniques to gather information or data. Finally, the last chapters discuss the interpretation of results and discussion and conclusion.

2 Literature review

2.1 Theory of green human resource management

During the past few years, green human resource management (GHRM) has emerged as a significant trend of successful human resource management and combines as well as integrates environmental management and sustainable firm performance in a little to enhance and support a particular sector performance (Ren, Tang, & Jackson, 2018). According to the theory of GHRM, green management is essential for many organizations as it ensures sustainable as well as significant environmental performance majorly through a positive set of policies and practices that stimulate green behavior (Guerci & Carollo, 2016). The given theory is mostly used in different studies to refer to the contribution of HRM regulations and policies mainly towards the significant corporate environmental purposes that further enhance the environmental sustainable performance (ESP). According to Yong, Yusliza, Ramayah, and Fawehinmi (2019), the following theory also used to refers to incorporating every individual of the sector to support sustainable processes and enhance individual awareness and commitments on
the challenge of environmental sustainability. According to Anjana Nath green, HR are positive eco-friendly HR practices leading to better efficiencies, effective as well as sustainable performance in terms of environment (Yu, Chavez, Feng, Wong, & Fynes, 2020). Furthermore, the theory of GHRM also described that green human management practices help many sectors to minimize the insignificant impacts of their daily operations on the environment which in turn improves and sustains the environmental performance (Singh, Del Giudice, Chierici, & Graziano, 2020).

2.2 Relationship b/w green hiring (GH) and environmental sustainable performance (ESP)
Currently, different sectors and organizations are becoming more and more conscious of the significance of practicing sustainable practices and development in the workforce, for example, according to (Mousa & Othman, 2020; Pratama et al., 2020) entirely for the reputation it develops as an environmentally responsible sector, as well as for the operational advantages that permeate throughout the development. As a health care sector becomes more conscious of the advantages of an eco-friendly workplace and conditions, it is significant to also incorporate a green hiring strategy with a strong focus on improving as well as stimulating ESP (Pratama et al., 2019; Zaied et al., 2018). A study by Lubis et al., (2019); Wongleedee (2020) manifests that in today’s age of sustainability, the new workforce of employees is majorly pushing for employers to focus green practices and develop a sustainable workforce that further helps organizations to increase their ESP. Presently, many sectors in Asian countries aim to develop job descriptions and seats that can manifest a significant number of environmental challenges and problems that are majorly connected to roles and duties of the job being published (Roscoe, Subramanian, Jabbour, & Chong, 2019). This is mainly because applying green and eco-friendly practices can captures employees to the job for a green mission which enables many sectors to enhance the overall ESP. So, from the above discourse the study proposes the following hypotheses:

H1: Green hiring positively relates to environmental sustainability performance.

2.3 Relationship b/w green training and involvement and ESP
Green training and involvement (GTI) are described as an essential priority for any organization as it enables the organization to sustain its development (Amrutha & Geetha, 2020). It is also very necessary for effecting successful activities regarding environmental management and also cleaner production. According to Birou, Green, and Inman (2019) there is a piece of clear evidence that any organization that involves GTI has a better improvement in skills, knowledge, and awareness about material and processes. These two factors are the whole process as green training helps in finding the means and sources of utilizing the available resources in the best possible way and the result of this green training creates harmony and a peaceful atmosphere for sustainability performance (Hussain, Kamarudin, Thaker & Salem, 2019). The organizations are trying to find means and sources to cut down their expenses, create new markets, and the production with a minimum low cost. The new and positive reforms, skills, and innovations play a very significant in the sustainable performance of the organization.

H2: Green training and involvement positively relate to ESP.

2.4 Relationship b/w green performance management (GPM) and compensation and ESP
The process of green performance management (GPM) and compensation involves the adoption of a green indicator and standard that helps in cultivating the environmental sustainability performance of businesses (Ojo & Raman, 2019). GPM mainly involves the identification of green aims for all the workers, which assists in translating the environmental objectives into action plans (Owino & Kwasira, 2016). Different monitoring and reward systems are included in green performance compensation and management, which help in motivating the employees to work for ecological sustainability (Mishra, 2017). Thus, when the employees work better, the environmental sustainability performance of the sector is enhanced. This shows that there is a constructive connection between environmental sustainability presentation and green performance management (Adriana, Fahira, Nailissa’adah, & El Maula, 2020). This is because GPM provides many green compensation benefits to different sustainable projects of a company, leading to an improvement in ES performance. This relationship is
also supported by the theory of green human resource management (GHRM). According to GHRM, GPA is very important for a company because it ensures significant and sustainable environmental performance through the use of positive practices and policies.

H3: There is a positive association between GPM and compensation and ESP.

2.5 The mediating role of organizational citizenship behavior (OCB) in the relationship b/w GH and ESP

According to research by Jiang, Zhao, and Ni (2017) OCB is an employee’s voluntary as well as elective commitment within a sector or firm that is not part of his responsibilities and duties at work. Research studies like (Afsar & Badir, 2016) demonstrate that OCB majorly deals with behaviors and actions that are not needed by employees. They are important to the job, but benefit the sector as well as a team and encourage even ESP and sector efficiency in terms of environmental performance. The mediating role of OCB can play a major role in improving the performance of the sector regarding the environment majorly by contributing optimally to the sector and avoid burnout. During the last few years, different researches and meta-analysis have carried out to look at the association between OCBs and health care sector performance and achievements in terms of the environment (Hussain et. al., 2020). A study by Trong Tuan Luu (2019) found that OCBs were significantly related to unit-level as well as entire level performance and overall environmental performance. Thus, from the entire above discussion, the study recommends the following hypotheses,

H4: OCB significantly mediates the relationship b/w green hiring and ESP.

2.6 The mediating impact of OCB on the association b/w GTI and ESP

According to Yow (2016) in administrative and industrial mindset, organizational citizenship behavior (OCB) refers to the intended pledge of a person with a company or organization that is not involved in his contractual tasks. Green human capital can be deliberated as a major element for organizational citizenship behavior (Pham, Tučková, & Jabbour, 2019). It has been observed that organizational citizenship behavior helps a company in implementing an environmental approach, which leads to the increase in the knowledge, awareness, and skills of the employees regarding green human resource administration practices. Thus, in this way, organizational citizenship behavior directly contributes to the incorporation of green training and involvement (GTI) in a company. According to the theory of green human resource management, GTI leads to the high environmental sustainability performance of the company by encouraging the employees of the organization to work hard and fulfill its environmental objectives (Lu, Yue, Han, & Chen, 2018). In this way, the ESP of the company is improved to a great extent. Thus, it has been observed that OCB enhances the relationship between green involvement and training and environmental sustainability performance.

H5: OCB has a positive mediating impact on the association b/w GTI and ESP.

2.7 The mediating role of OCB in the relationship b/w GPM and ESP

Organizational citizenship behavior helps the employees of a company to feel more control over their job and activities and feel noble about helping others (Tuan Trong Luu, 2017). It can be assessed by evaluating how often workers show discretionary and extra-role behaviors. According to Zhao and Zhou (2019), the adoption of organizational citizenship behavior helps a company in improving its green performance management. This is because organizational citizenship behavior encourages a company to adopt a green indicator and standard in their operations. In this way, it assists in identifying the environmental objectives of the company and incorporating them into daily activities (Jiang et al., 2017; Valencia et al., 2020). Thus, organizational citizenship behavior directly contributes to the improvement in green performance management and compensation in the company. According to Niyomdecha and Yahya (2019), GPM leads to improved environmental stability by providing green compensation benefits. This fact is also supported by the theory of green human resource management, conferring to which GPM can assist many sectors in reducing the insignificant influence of their daily activities on their environmental sustainability. Thus, OCB plays a positive role in enhancing the association between GPM and compensation and ES performance.

H6: OCB plays a positive mediating role in the connection b/w GPM and ESP.
Research model is presented in Figure 2 below.

Figure 2: Research Model

3 Methodology
A primary research-based quantitative data collection method is conducted in order to collect the relevant outcome and justify or nullify the hypothesis (Dreyer, Macedo, & Velentgas, 2019; Hameed, Basheer, Iqbal, Anwar, & Ahmad, 2018). In this data collection procedure, the healthcare sector based working employees, students, and management are majorly considered to collect the online survey outcomes. An online questionnaire was distributed among people through a non-probability convince based sampling method to collect the relevant respondent experience regarding the green human resource management bundle. The five-point Likert scale is used that range from 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree. In this paper, the Green Human Resource Management Practices like Green Hiring, Green Training & Involvement, and Green Performance Management & Competition, are considered as independent variables that impact on Environmental Sustainable Performance, as a dependent variable. While, the Organizational Citizenship Behavior is studied as a mediating variable that plays a major role in strengthening the relationship between the independent and dependent variables. According to the statistics, All-around 500 online questionnaires were distributed to the relevant respondent and 402 of them show their valid responses to justify the hypothesis of this study.
According to the gender-based segregations, 222 participants are males (55.2%), while remaining 180 participants are females (44.8%), this shows that the frequency of male gender is much higher as compared to the female gender. While, in the age based demographic outcomes, 126 are less than 25 years old with 31.3%, 166 are within the age group of 25 to 35 years old (41.3%), 95 are between the age limit of 35 to 45 years old (23.6%) while remaining 15 (with 3.7%) are more than 45 years old. The respondents’ outcome shows that majority of the respondents are within the age limit of 21 to 35 and all of them are freshly jobholders and students of this industry. In case of their experience perspectives, 15% of the respondents having less than two years’ experience, 42% having two to five years medical job experience, 33% are five to eight years old, and only 10% having more than eight years’ experience in the related field. That means majority of the respondents are young people and having new ideas regarding green marketing.

In order to collect the relevant outcomes, the KMO and Bartlett’s test is used to identify the model fitness, and after this, the structural equation modelling based SPSS statistical test is used to derive a constructive outcome (Center, 2018; Prasad, Rao, & Vaidya, 2019). In addition to this, convergent and discriminant validity, and confirmatory factor analysis are used in order to depict the effective variables uploading and evaluate their threshold range (McGuire, Drost, & Zhang, 2016; Rimkeviciene, Hawgood, O’Gorman, & De Leo, 2017; Tarhini, Teo, & Tarhini, 2016). In the structure model, the clear relationship between the exogenous and endogenous construct is defined.

4 Analysis Interpretation
In order to critically evaluate the impact of green human resource management practices on the environmental sustainable performance factor, the following descriptive statistics explored all the related outcomes.

Table 2: Descriptive Statistics

|            | N Statistic | Minimum Statistic | Maximum Statistic | Mean Statistic | Std. Deviation Statistic | Skewness Statistic | Std. Error |
|------------|-------------|-------------------|-------------------|               |                         |                  |            |
| GreenHire  | 402         | 1.00              | 5.00              | 3.2939        | 1.01875                 | -.258             | .122       |
| GreenTrIn  | 402         | 1.00              | 5.00              | 3.4289        | .99193                  | -.442             | .122       |
| GreenPM    | 402         | 1.00              | 5.00              | 3.5480        | 1.16480                 | -.581             | .122       |
| OrgCitBeh  | 402         | 1.00              | 5.28              | 3.4572        | 1.10224                 | -.546             | .122       |
| EnvSPerf   | 402         | 1.00              | 5.00              | 3.5962        | 1.11844                 | -.593             | .122       |
| Valid N (listwise) | 402 |          |                  |               |                         |                  |            |

According to the above mentioned descriptive statistic table 2, it becomes concluded that the standard deviation of green training & innovation value is less deviated from its mean position as compared to the other variables, while green performance management & compensation variable highly deviates from its standard mean position. It means that the influence of less deviated variable is much higher on the environmental sustainable performance. While, the standard error of these statistics is 0.122 with the mean value within the range of 3.2 to 3.5. Its related KMO and Bartlett’s test based tabular description is given below (Table 3).

Table 3: KMO and Bartlett's Test

<table>
<thead>
<tr>
<th></th>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</th>
<th>Bartlett's Test of Sphericity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Approx. Chi-Square</td>
</tr>
<tr>
<td></td>
<td>.951</td>
<td>18199.888</td>
</tr>
</tbody>
</table>
According to the above-mentioned test statistics, it becomes concluded that the Kaiser-Meyer-Olkin measure of sampling adequacy value is 0.932 means within their threshold range. In addition, its variable difference value is 300 along with 0.000 significance value (lower than 0.05) which depicts that this model is a good fit to make a constructive analysis based outcome. Its rotated component matrix-based variables' outcomes are shown in the following table 4.

Table 4: Rotated Component Matrixa

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>GH1</td>
<td></td>
<td>.821</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GH2</td>
<td></td>
<td>.849</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GH3</td>
<td></td>
<td>.803</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GH4</td>
<td></td>
<td>.787</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GH5</td>
<td></td>
<td>.814</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GH6</td>
<td></td>
<td>.833</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GT1</td>
<td></td>
<td>.773</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GT2</td>
<td></td>
<td>.680</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>GT3</td>
<td></td>
<td>.739</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GT4</td>
<td></td>
<td>.821</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>GT5</td>
<td></td>
<td>.793</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GT6</td>
<td></td>
<td>.839</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GT7</td>
<td></td>
<td>.865</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GT8</td>
<td></td>
<td>.861</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP1</td>
<td>.846</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP2</td>
<td>.816</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP3</td>
<td>.792</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>GP4</td>
<td>.847</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP5</td>
<td>.871</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>GP6</td>
<td>.859</td>
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<tr>
<td>GP7</td>
<td>.874</td>
<td></td>
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<tr>
<td>GP8</td>
<td>.862</td>
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<td></td>
</tr>
<tr>
<td>OC1</td>
<td></td>
<td>.781</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OC2</td>
<td></td>
<td>.805</td>
<td></td>
<td></td>
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<tr>
<td>OC3</td>
<td></td>
<td>.794</td>
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<td></td>
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<tr>
<td>OC4</td>
<td></td>
<td>.825</td>
<td></td>
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<tr>
<td>OC5</td>
<td></td>
<td>.855</td>
<td></td>
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<tr>
<td>OC6</td>
<td></td>
<td>.848</td>
<td></td>
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<tr>
<td>SP1</td>
<td></td>
<td></td>
<td></td>
<td>.758</td>
<td></td>
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<tr>
<td>SP2</td>
<td></td>
<td></td>
<td></td>
<td>.794</td>
<td></td>
</tr>
<tr>
<td>SP3</td>
<td></td>
<td></td>
<td></td>
<td>.832</td>
<td></td>
</tr>
<tr>
<td>SP4</td>
<td></td>
<td></td>
<td></td>
<td>.825</td>
<td></td>
</tr>
<tr>
<td>SP5</td>
<td></td>
<td></td>
<td></td>
<td>.818</td>
<td></td>
</tr>
<tr>
<td>SP6</td>
<td></td>
<td></td>
<td></td>
<td>.838</td>
<td></td>
</tr>
</tbody>
</table>

The above table outcomes show that all the rotated component matrix values are more than 0.7 (standard value) means at their threshold range. Therefore, it becomes clearly seen that all the variables are effectively loaded in the model and no more confusion is made regarding the factor uploading method. Well, it is convergent and discriminant validity based statistical outcomes are shown in the following table 5.
According to the above table, composite reliability values of each tested variable is more than 0.7 based standard value, while its average variance extracted value is higher than 0.5 which means there no convergent validity issue faced in these variables uploading mechanism. In addition to this, the bold letters of each variable in the decreasing order explores the non-existence of any discriminant validity issue within this SPSS test outcome. This table is important to justify the authenticity of the results that will be generated in the CFA and SEM-based analytical outcomes (see Table 6).

**Table 6: Model Fit Indices**

<table>
<thead>
<tr>
<th>CFA Indicators</th>
<th>CMIN/DF</th>
<th>GFI</th>
<th>IFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Value</td>
<td>≤ 3</td>
<td>≥ 0.80</td>
<td>≥ 0.90</td>
<td>≥ 0.90</td>
<td>≤ 0.08</td>
</tr>
<tr>
<td>Observed Value</td>
<td>2.855</td>
<td>0.811</td>
<td>0.948</td>
<td>0.948</td>
<td>0.068</td>
</tr>
</tbody>
</table>

This model fit indices based outcomes show that all the observed values of CMIN/ DF, GFI, IFI, CFI, and RMSEA are within the threshold range. Like the value of CMIN/ DF is 2.855, lower than standard 3, while, on the other side, GFI value is greater than 0.80 with 0.811 value outcomes. In addition, both values of IFI and CFI show the same outcomes 0.948 which is more than 0.90 value. In addition, its RMSEA value is 0.068, lower than 0.08. All these observed values of this statistical model show that all the variables are effectively uploaded in the CFA model and this model is a good fit to make a constructive hypothesis outcome. Its graphical representation is shown in the following figure 3.

**Figure 3: CFA**
The above figure shows that all the variables are equally uploaded in this model, while the structural equation modelling based outcomes show the valid outcomes of this analysis. Its tabular representation is given below (Table 7).

Table 7: Structural Equation Modeling

<table>
<thead>
<tr>
<th>Total effect</th>
<th>GreenPM</th>
<th>GreenTrIn</th>
<th>GreenHire</th>
<th>OrgCitBeh</th>
</tr>
</thead>
<tbody>
<tr>
<td>OrgCitBeh</td>
<td>.384**</td>
<td>.187**</td>
<td>.187**</td>
<td>.000</td>
</tr>
<tr>
<td>EnvSPerf</td>
<td>.275**</td>
<td>.306**</td>
<td>.154**</td>
<td>.211**</td>
</tr>
<tr>
<td>Direct Effect</td>
<td>GreenPM</td>
<td>GreenTrIn</td>
<td>GreenHire</td>
<td>OrgCitBeh</td>
</tr>
<tr>
<td>OrgCitBeh</td>
<td>.384**</td>
<td>.187**</td>
<td>.187**</td>
<td>.000</td>
</tr>
<tr>
<td>EnvSPerf</td>
<td>.194**</td>
<td>.267**</td>
<td>.115*</td>
<td>.211**</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>GreenPM</td>
<td>GreenTrIn</td>
<td>GreenHire</td>
<td>OrgCitBeh</td>
</tr>
<tr>
<td>OrgCitBeh</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>EnvSPerf</td>
<td>.081**</td>
<td>.039**</td>
<td>.039**</td>
<td>.000</td>
</tr>
</tbody>
</table>

According to the above structural equation, modeling based statistical outcomes, it becomes clear that there is a direct relationship among the tested independent, mediating and independent variables. Like one percent deviation in the mediator role of organizational citizenship behavior, cause a 21.1% change in the environmental sustainability performance factor (Thaker et al., 2020). Similar to this, the independent variables cause a direct impact on both these variables. For example, one percent change in green performance management & compensation creates a 38.4% influence on organizational citizenship behavior and 27.5% on environmental sustainable performance. Well, in the case of green training & involvement factor, the 18.7% change occurred on a mediator and 30.6% on the dependent variable. Last, but not the least, one percent change in the green hiring produces an 18.7% change on the efficiency of organizational citizenship behavior, and 15.4% deviation occurred on environmental sustainable performance. All these statistical outcomes depict that there is a great influence of green human resource management practices within an organizational structure and its performance. Its graphical representation is shown in the following figure 4.
5 Discussion and Conclusion

5.1 Discussion
According to the above-mentioned statistical outcomes, it becomes clear that the influence of green performance management & compensation is majorly affected the organizational citizenship behavior as compared to the other independent variables that cause a similar impact on the mediating variable. While, the green training and involvement factor cause a major influence on the environmental sustainable performance which means if the management majorly works on enhancing its green HRM-related strategical approach, then more productive outcomes will be generated that will add values in their future performance (Nankervis, Baird, Coffey, & Shields, 2019). After this, the green performance management & compensation factors directly influence the perfect environmental sustainable performance and motivate the employees to remain loyal with the company and work hard to meet their standards (Lockie, 2019). While, the green hiring is the least effecting variable on the dependent and mediating variables which shows that Indonesian employees are not majorly affected by such an innovative hiring mechanism. While, they only impressed by the environment-oriented training, involvement, compensation, and other efficient performance management that hit their perception level towards the company's operation and feel themselves to be the part of the company. This strategic approach enhances the internal capabilities and motivation level of the employees to upgrade their capabilities towards the efficient sustainable development of a company. Mousa and Othman also explained this important strategic concept that over the past few years, there is great pressure on organizations from their stakeholders to adopt the environmental friendly business practices. In that perspective, the healthcare organization and its strategic policies are majorly affected to implement advanced green HRM policies in their operating activities (Mousa & Othman, 2020). In the International Journal of Manpower, Peter with others depicted that there is a need of new typological environmentally sustainable HRM evaluation based mechanisms in the current advanced technological era. Their resource-based theory explains the training of recruiters in the green candidate assessment within the HR decision making process is the best approach to develop a sustainable development of a company in the diverse competitive market (Adjei-Bamfo, Bempong, Osei, & Kusi-Sarpong, 2019).

5.2 Conclusion and Future Implications
Thus, after critically evaluate the structural equation modelling based statistical outcomes, it becomes concluded that the green performance management & compensation caused a major impact on both variables, named as organizational citizenship behavior and environment sustainable performance. According to the participants’ outcomes, green hiring has the least impact on the sustainable citizenship behavior among the Indonesian employees, while green training & involvement factor cause a moderate impact on the behavioral approach of the healthcare HRM efficiency. This online data-based quantitative research depicts that if the healthcare management sector in Indonesia made some productive and green HR-related strategies, then more favorable outcomes will be generated in the future that enhances the sustainable growth rate of this industry. This study will be informative for the healthcare sector and its management to consider organizational citizenship behavior through green HRM bundles. In addition, this data can utilize by policymakers and other related researchers to make a constructive and long-lasting decision-making process.

5.3 Limitations and Future Researches
In addition to its implication, some weaknesses/ deficiencies of this paper may affect the authenticity of its analysis. Like there is a lack of interviews or mixed method of research to generate a versatile research. Also, only Indonesian's healthcare sector and its related employee's data is considered for statistical analysis. If its statistics are compared with the other developed countries’ healthcare sector, then a more reliable and authentic outcome will be generated. In addition, there is a lack of data regarding the employee’s turnover factor in the green HRM practices that affect this research validity. Therefore, there is a chance in front of future scholars to cover its limitations and derive a productive and informative research analysis.
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WORKING TO REDUCE CO₂ EMISSION IN ASEAN COUNTRIES: CAN ENVIRONMENTAL SUSTAINABILITY, TECHNOLOGICAL INVESTMENT AND RENEWABLE ENERGY ACT AS DETERMINANTS?

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Abstract. The environment and atmosphere all over the world has been seriously damaged because of the increasing concentrations of CO₂ in different areas of the world. The major reasons behind this increase in emissions include usage of cheap energy sources and use of old and traditional technology and various others. In this regard, the current study has been directed to discover the effect of environmental sustainability, technological investment and renewable energy on the reduction of carbon dioxide emissions in ASEAN countries. Based on this purpose, the researcher has selected some ASEAN countries for data collection purpose. The data from these countries has been collected covering the time of 29 years. After applying appropriate techniques and tools on the collected panel data for example cointegration, panel unit root, coefficient estimation test and Granger Casualty test etc. the researcher has obtained the results. According to the results, the impact of all the independent variables i.e. environmental sustainability, technological investment and renewable energy have significant and negative impact on CO₂ emission. Moreover, a few variables also show casual relationships running between them. Based on these results, the government and industries of different countries might get guidance about using environment friendly procedures.

Keywords: Environmental Sustainability; Technological Investment; Renewable Energy; CO₂ Emissions; ASEAN Countries


Jel Codes: M5, M12

1 Introduction

The main greenhouse gas is the Carbon dioxide (CO₂), which is emitted into the air due to the many activities done by humans in the various industries and sectors (Nordin et al., Monni et al., 2017; 2015; Sandu et al., 2019; Zamil, Furqan, & Mahmood, 2019; Ji et al., 2019; Iacobuta et al. 2019; Mazzoni, 2020; Yeganeh Kia, 2020; Nasr et al. 2020).

The CO₂ is likely to produce global warming and has unfavorable effects on the world environment, which is the largest challenge faced by the human beings (Fethi & Rahuma, 2020; Zhenguo Wang, Su, Xie, & Long, 2020). After China and the US, the CO₂ level in atmosphere of ASEAN (Association of Southeast Asian Nations) countries has increased greatly and contributes a large share to the overall CO₂ levels of the world as can be evaluated from the following table 1.
Table 1: World share in the atmospheric CO₂ emission by ASEAN countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Share of the World (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>0.02</td>
</tr>
<tr>
<td>Cambodia</td>
<td>0.02</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1.48</td>
</tr>
<tr>
<td>Lao</td>
<td>0.01</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0.74</td>
</tr>
<tr>
<td>Myanmar</td>
<td>0.05</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.35</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.14</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.76</td>
</tr>
<tr>
<td>Vietnam</td>
<td>0.58</td>
</tr>
</tbody>
</table>

The economy of the ASEAN countries is one of the fast expanding in the world region (A. Silitonga et al., 2017; Vo & Le, 2019). The use of the energy mainly is done by the burning of the fossil fuels, like coal, gas or oil in these countries (Marquardt, 2016; Chen, Qiyue, et al., 2020; Ch, S. A., et al., 2020). Because of this reason, the energy is relatively cheap here and has led to the economic growth (Ismail, Moghavvemi, & Mahlia, 2013; Simpson & Smits, 2018). However, this growth comes with a detrimental effect on the atmosphere as this region has become one of the largest emitter of greenhouse gases, worsening the global warming (Mofijur et al., 2019) as shown in the figure 1, and will become a threat to the economic and social progress of these countries (A. S. Silitonga et al., 2018; 8. Qambar & Waheed, 2020).

Hence, there is a dire need to de-carbonize this area as the ASEAN region is one of the world regions facing severe climate changes (Sandu et al., 2019). If the efforts for the decarbonization of the ASEAN Region are not taken then the atmospheric level of CO₂ is expected to double by the year 2040, riding to an alarming level of 2.3 billion tonnes (Outlook, 2017; Panjaitan, Dargusch, PWadley, & Ammar, 2020; Chen & Zhang, 2020). The Climate Risk Index has claimed that there are total 25 countries badly affected by the climate change in the world and 5 of them are situated in the ASEAN Region. These countries are Cambodia, Myanmar, Thailand, Vietnam and the Philippines (Eckstein, Künzel, Schäfer, & Winges, 2019).
Since the climate change, global warming, CO₂ emissions and the detrimental impact on the ASEAN region are the hot topic of debate (Nordin et al., 2015; Sandu et al., 2019; Vo & Le, 2019), hence addressing this gap of the research, this study helps to find the possible effects of various factors that may help de-carbonize the region by decreasing the emissions of carbon dioxide in the ASEAN countries using panel data. The specific research objectives of this study are:

- To analyze the effect of environmental sustainability on reducing the CO₂ emissions
- To examine the influence of technological investments on reducing the carbon dioxide emissions
- To evaluate the impression of renewable energy act on reducing the emissions of carbon dioxide

This study contributes to theory by discussing the factors of environmental sustainability, technological investment and renewable energy act as determinants for reducing the CO₂ emissions using panel data analysis. This study also contributes to policy making for reduction of the carbon and other greenhouse pollutants and gases that are harming the environment and hindering the economic prosperity of the countries (Haseeb et al., 2021).

The structure of the research paper has been given as ahead. The first portion explains the Introduction to the study, while the second portion gives the literature review. The third portion provides the research methodology and the forth portion presents the detailed results. At the end of the paper, the conclusions are given, along with the implications and limitations of the study.

2 Literature review

2.1 Environmental Sustainability

The sustainability of the environment can play a leading role towards the efforts for de-carbonizing the atmosphere (Saint Akadiri, Alola, Olasehinde-Williams, & Etokakpan, 2020). Many studies in the environmental context using panel data from a number of countries have suggested that the CO₂ emissions is a major environmental pollutant and established a positive causal link among the environmental degradation and the emissions of carbon dioxide (Sandu et al., 2019). In the countries where the income is relatively high, the demand
for the energy consumption is increased, leading to a dangerous degradation of the atmosphere (Adedoyin, Gumede, Bekun, Etokakpan, & Balsalobre-lorente, 2020). Since the concerns for the climate change and global warming are on the rise, there is a greater pressure for saving the environment from hazards, resulting in sustainable practices (Bilgili, Ulucak, Koçak, & İlkay, 2020). These practices are aimed to adopt pathways or measures for decarbonization, such as the consumption of renewable energy for the reduction of the carbon dioxide emissions and for sustainable economic growth in the country (Eluwole, Saint Akadiri, Alola, & Etokakpan, 2020). In another study, using various time-period and the techniques of econometric for the data covering the ASEAN countries between period of 1971 – 2014 the relationship among the variables of energy consumption, renewable energy, environmental sustainability and economic growth was investigated. The outcomes of the research study has revealed that a co-integrated relationship was confirmed in the ASEAN countries and policy implications were developed for each country using these results (Vo & Le, 2019). More recent studies on carbon emissions and environmental sustainability by (Ögmundarson, Herrgård, Forster, Hauschild, & Fantke, 2020; Sun, Mohsin, Alharthi, & Abbas, 2020; Zhang, Hassan, & Iqbal, 2020) have also highlighted similar results in the Asian countries and have showed that inducing sustainability practices into the environmental activities can substantially reduce the level of emissions of the gas into the atmosphere and can lead to better environmental quality and better economic progress and prosperity. This discussion shows that the ES can have a substantial association with the CO2 emissions. Hence, the following hypothesis is made:

**H1: Environmental Sustainability is significantly linked to CO2 emission**

### 2.2 Technological Investment

Using a technology that is harmful for the environment also pushes the country to under-developed economic stance. Hence, making investments in the technology sectors keeping in mind the environmental concerns and problems can help the country in establishing better economic conditions and reducing the carbon emissions. The study by (Zoundi, 2017) has found out that the use and investment in safer technology can improve the social standing of the people, their per capita income can be increased and carbon emissions can be decreased. (Stern, 2004) has suggested that expanding the production increase the emissions of the pollutants especially in the areas where there is dense population and across the industrial sector. (Vo & Le, 2019) has revealed that by improving the state of technology, a lower level of pollutants will be generated and emitted into the atmosphere and hence, carbon emissions can be reduced (Hussain et al., 2021). This is possible by ensuring higher productivity using technology and innovation so a lower emission level is promised. In a similar study by (Zilong Wang & Zhu, 2020), the importance for the global warming was highlighted and concerns for the innovations in technology are laid down so that the countries may benefit from it by de-carbonizing (Ali, Naveed, ul Hameed, & Rizvi, 2018; Hamid, Shahid, Hameed, Amin, & Mehmoood, 2019; Razzaq, Maqbool, & Hameed, 2019). They explored the linkage between the technology innovations and investment with the carbon emissions and proved using spatial econometric model that the investment in technology and technological innovations are beneficial for reducing the carbon emissions level. They confirmed that in order to abate the green house gas emissions and to enhance the economic growth, the technology is effective. More studies have also shown that by investing and adopting new and improved technology processes and mechanism which are environmentally safe can actually lessen the carbon emissions into the atmosphere and refrain from environmental degradation (Liu & van den Bergh, 2020; Omri & Tarek, 2020; Shahbaz, Raghutla, Song, Zameer, & Jiao, 2020). Other contemporary scholars, like (Kumail, Ali, Sadiq, Wu, & Aburumman, 2020; Lu, Chai, Wang, Zhang, & Sun, 2020; Wen et al., 2020) have also considered this issue as a vital one and have conducted research works to prove these linkages in the South Asian countries of China and Pakistan. Based on these findings, it can be said that the technological investment are significantly linked to the carbon emissions. Hence, the following hypothesis is given:

**H2: Technological Investment is significantly linked to CO2 emission**
3.2 Renewable Energy Act
Bio mass is a vital component of the energies which is widely used in the chemical industries and bio- economic sector. There is a German legislation which is meant for developing the biogas market referred to as the Renewable Energy Act and it mainly concerns the sustainability issues. The biogas market is controlled by this act by focusing on the cultivation of the energy crops. A study on biogas sector has reported that the effect of carbon emissions have been in the limelight for over 15 years but there is a need to address these concerns from the perspective of regulations and legislations in the agriculture sector (Thrän, Schaubach, Majer, & Horschig, 2020). The sector of German biogas has been developed owing to the repeated versions provided by the Renewable Energy Act (REA) and the associated regulations since the year 2004. The purpose of these acts is to ensure that biogas is assessable to the electricity grids and the markets. It also aims to secure the financing and the investment on biogas plants by offering remuneration. The previous studies on the energy legislation that have fostered the sustainable development of the German biogas market is primarily due to the national REA (Thrän et al., 2020). Other studies have focused on the effects of REA on various economics variables, like energy efficiency, capacity build-up, flexible power provision (Scheftelowitz, Becker, & Thrän, 2018) and investment decisions (Sorda, Sunak, & Madlener, 2013). This act has been successful for developing and promoting the market for renewable energy technologies, for instance biogas, wind and photovoltaic. ERA is made possible by the implementation and periodic adjustments of the rules and regulations (Wen et al., 2020). Other countries, like China, Malaysia, Abu Dhabi and Latin American countries, have been also activating and implementing various laws to regulate the renewable energy technologies and consumption (Mezher, Dawelbait, & Abbas, 2012) so as to reduce the carbon emissions and protect the environment for ever lasting effects (Ng, Yew, Basiron, & Sundram, 2012; Ruiz-Mendoza & Sheinbaum-Pardo, 2010; Q. Wang, 2010). The scholars have suggested making changes and transforming the sector of energy and power in ways that can control the emission of CO2 into the atmosphere from emissions by the burning the fossil fuels so that the impending challenge to the mankind of environmental degradation can be made possible and be achieved efficiently(Sandu et al., 2019). In the research on the association among the GDP, GDP per capita, CO2 emissions, renewable energy, financial development and urbanization was carried out by using and conducting the ARDL bounds testing method in Turkey. The results revealed that these variables possess a long run relationship among themselves and that these variables increased the carbon emissions. This study also supported the hypothesis of environmental Kuznets curve (EKC) which indicated that an upturned U-shape association existed among them (Pata & Aydin, 2020). These findings indicate that the renewable energy act can be significantly linked to the CO2 emissions. Hence, the following hypothesis is made:

H3: Renewable Energy Act is significantly linked to CO2 emission.

3 Materials and Methods
3.1 Data
It has been quite clear from the earlier sections of the study that this study has been conducted with the purpose of finding out that what impact environmental sustainability, renewable energy and technological investment have on emissions of carbon dioxide in the ASEAN countries. According to this purpose, the researcher has selected some ASEAN countries for data collection purpose. The data from these countries has been collected covering the time period of 29 years. As per the objectives of the study, the data has been collected about CO2 emission, environmental sustainability, technological investment and renewable energy from these countries and the reliable data bases have been selected for this purpose such as global economy and World Bank Indicators etc.

3.2 Model Specification
There are three independent variables in the study i.e. environmental sustainability, technological investment and renewable energy. The first one, environmental sustainability has been measured in context of an environmental sustainability index. Moreover, technological investment has been measured through US dollars while the last one, renewable energy has been measured through tones oil equivalent. On the other hand, there is only one dependent variable i.e. CO2 emissions that has been measured through metric tons. In addition to dependent and independent variables, the researcher has also picked up a control variable i.e. population that has been measured
through the number of people of a particular country. The following regression model can be used for analysis purpose in the current study:

$$CO_2_{it} = \alpha + \beta_1 ENS_{it} + \beta_2 TIN_{it} + \beta_3 RNE_{it} + \beta_4 POPL_{it} + \epsilon_{it}$$ (1)

In the above equation, CO2 represents CO2 emission, ENS represents environmental sustainability, TIN shows technological investments, RNE denotes renewable energy, POP shows population while $\epsilon_{it}$ is the term that shows any error.

3.3 Estimation Procedure
3.3.1 Panel Unit Root Test

The initial involves a test that has been applied by the researcher in the current study is the test of panel unit root. This test has been used so that the stationary properties and stochastic properties of the variables can be studied. Moreover, the order of integration is another important aspect that is necessary to identify before moving further in the process of the research study. The order of integration of the variables can also be identified through unit root test. The most commonly used unit root tests include Im Pesaran Shin IPS, Levin Lin Chu LLC and Augmented Dickey Fuller ADF tests (Im, Pesaran, & Shin, 2003). This test is dependent on the null hypothesis that there is unit root in the collected data while the data is non stationary. If this hypothesis is rejected by most of the variables of the study, it will result in the conclusion that the data is immobile. The unit root test can be applied using the following equation;

$$\Delta y_{i,t} = \alpha_i + \rho \Delta y_{i,t-1} + \sum_{j=1}^{P} a_j \Delta y_{i,t-j} + \epsilon_{i,t}$$ (2)

Here, $\Delta y_{i,t}$ represents the difference of the term $\Delta y_{i,t}$ specific for $i^{th}$ country and the time period of $t$.

3.4 Panel Cointegration Test

After the identification of order of integration of the variables, the researcher has employed the panel cointegration test in the study so that the cointegrating relationships among the variables can be studied. There are various types of cointegration tests such as Kao, Pedroni etc. These tests also possess the hypothesis of null and alternate. The null hypothesis is based on the assumption that there does not exist any cointegrating correlation among the variables while the alternate hypothesis suggests that there is cointegrating relationship between the variables. There are two techniques i.e. within dimension and between dimension that are used in this test, both of which further have various statistic values under them. If the null hypothesis has been rejected, it will conclude that the variables of the study have cointegrating relationships between them (Levin & Lin, 1993). The following equation can be used in order to use this test;

$$y_{i,t} = \alpha_i + \delta_i + \beta_1 X_{1,i,t} + \beta_2 X_{2,i,t} + \cdots + \beta_n X_{n,i,t} + \epsilon_{i,t}$$ (3)

3.5 Coefficient Estimation Test

To proceed further in the analysis of the data that has been collected for the research, the researcher has applied the most important test in the study i.e. coefficient estimation test. This test informs about the magnitude and direction of the impact that is caused by liberated variables on the dependent variable. After the process of identification of order of integration and recognition of cointegrating associations between the variables of the study, this test is very important and conclusive test. There are numerous tests that are being used for this purpose such as FMOLS and DOLS which have been derived from the original ordinary least square tests OLS (Pedroni, 2001). The following equation can be used while applying this test.

$$\hat{\beta}_{FM} = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - \bar{x}_i) (\bar{x}_i - x_i) \right)^{-1} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - x_i) CO_2_{it} - T \hat{\delta}_{xu} \right)$$ (4)

In the above mentioned equation, $CO_2_{it}$ is presented as the transformed variable of CO2 emission because of endogeneity while $\hat{\delta}_{xu}$ denotes here the serial relationship correction.

3.6 Granger Casualty Test

Once the presence of cointegrating interactions amongst the variables is identified, there is possibility that there might be the occurrence of casual relations among the variables of the research study. To find out these relationships, the researcher has used Dumitrescu and Hurlin Granger casualty test to find out any unidirectional and bidirectional casualty in the variables (Dumitrescu & Hurlin, 2012). The null hypothesis involves the fact that there are no casual relationships while alternative hypothesis advocates the existence of casual relationships. The following equation may be used in this regard;
4 Results and Analysis

4.1 Results of Panel Unit Root Test
First of all the outcomes of panel unit root tests have been described in the table 1. These results have provided the values for both level and first difference series in context of both constant and constant plus trend. As it can be clearly comprehended in the table, in case of level, only three variables i.e. environmental sustainability, technological investment and population have rejected the null hypothesis in constant and only four variables have rejected the null hypothesis in constant plus trend while renewable energy has accepted it. However, in first difference series, it is evident that all of the variables of the study have prohibited the null hypothesis. This suggests that the data for all the variables is fixed and there does not exist any unit root in it. In other words, they are having the order of integration of (I). The detailed results can be viewed in the table 1.

Table 1: Unit Root Test

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Level Constant</th>
<th>Level Constant+ Trend</th>
<th>1st Difference Constant</th>
<th>1st Difference Constant+ Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>-3.3991</td>
<td>-4.2093*</td>
<td>-6.6283*</td>
<td>-8.383***</td>
</tr>
<tr>
<td>ENS</td>
<td>-2.9833*</td>
<td>-5.8382*</td>
<td>-8.3973***</td>
<td>-10.3982***</td>
</tr>
<tr>
<td>TIN</td>
<td>-5.1833*</td>
<td>-6.2083*</td>
<td>-7.7392**</td>
<td>-9.2098***</td>
</tr>
<tr>
<td>RNE</td>
<td>-3.3844</td>
<td>-3.2984</td>
<td>-4.0200*</td>
<td>-8.2900***</td>
</tr>
<tr>
<td>POP</td>
<td>-4.3383*</td>
<td>-4.8939*</td>
<td>-4.6203**</td>
<td>-7.0877***</td>
</tr>
</tbody>
</table>

4.2 Results of Panel Cointegration Test
As far as the panel cointegration test is concerned, the results have been reported in the table 2 of the study. This table elaborates that it can be seen in the within dimension section that three out of four statistics have rejected the null hypothesis of no cointegration as the p-values for these statistics are less than 0.05. Only the ADF statistic has accepted the null hypothesis as the p-value is greater than 0.05. In the same way, in between dimension section, two out of three statistics have rejected the null hypothesis because of the p-value lower than 0.05. In this case, the PP statistic has accepted the null hypothesis because of the p-value higher than 0.05. As overall five out of seven statistics have rejected the null hypothesis, it can be concluded that there are cointegrating relations present among the variables.

Table 2: Panel Cointegration Test

<table>
<thead>
<tr>
<th></th>
<th>Statistic</th>
<th>Prob.</th>
<th>Weighted Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel v-Statistic</td>
<td>-4.29844*</td>
<td>0.0103</td>
<td>10.3984</td>
<td>0.0003</td>
</tr>
<tr>
<td>Panel rho-Statistic</td>
<td>4.73924*</td>
<td>0.0234</td>
<td>4.60973</td>
<td>0.0122</td>
</tr>
<tr>
<td>Panel PP-Statistic</td>
<td>-3.73989***</td>
<td>0.0034</td>
<td>-5.97664</td>
<td>0.0023</td>
</tr>
<tr>
<td>Panel ADF-Statistic</td>
<td>0.192145</td>
<td>0.0838</td>
<td>-0.39944</td>
<td>0.0631</td>
</tr>
</tbody>
</table>

“Alternative hypothesis: common AR coefs. (within-dimension)
4.3 Results of Coefficient Estimation Test

The outcomes of the most important test of the study i.e. coefficient estimation test have been reported in the table 3 of the study. The results for both the pooled and grouped versions of coefficient estimation test have been given. The first variable is environmental sustainability. It can be seen that the impact of this variable has been found as negative and significant on CO2 emission in both pooled and grouped versions. In other words, with one unit increase in this variable, the CO2 emissions will be reduced by 19.2% as per pooled version and 20.3% as per grouped version. As far as technological investment is concerned, its impact has been found as insignificant for pooled version but significant for grouped version. It indicates that with the increase in technological investment, the emissions of carbon dioxide will be decreased by 9.8%. The next variable is renewable energy and its impact on carbon dioxide emission has been found as significant and negative for both pooled and grouped versions. It can be stated that with the increase in one unit of renewable energy, the CO2 emission will be decreased by 12% for pooled version and 13.2% for grouped version. At last, the results for the control variable, population also show that its impact on CO2 emission is significant and positive. In the last, the R square value suggests that the variation in CO2 emission is 73.6% because of these factors for pooled version and 71.5% for the grouped version. The remaining variation is because of various other factors that might impact the CO2 emission in one way or the other.

Table 3: Coefficient Estimation Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Pooled</th>
<th>Grouped</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENS</td>
<td>Beta</td>
<td>-0.192**</td>
<td>-0.203**</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.298</td>
<td>0.562</td>
</tr>
<tr>
<td>TIN</td>
<td>Beta</td>
<td>-0.092</td>
<td>-0.098**</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.634</td>
<td>0.234</td>
</tr>
<tr>
<td>RNE</td>
<td>Beta</td>
<td>-0.120*</td>
<td>-0.132*</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.287</td>
<td>0.199</td>
</tr>
<tr>
<td>POP</td>
<td>Beta</td>
<td>0.298**</td>
<td>0.232***</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.372</td>
<td>0.193</td>
</tr>
<tr>
<td>Adj. R Square</td>
<td>Beta</td>
<td>0.736***</td>
<td>0.715***</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.678</td>
<td>0.687</td>
</tr>
</tbody>
</table>

4.4 Results of Granger Casualty Test

The final test that was conducted i.e. Granger casualty test has obtained the results that are given in the table 4. According to the table, it can be seen that CO2 emission has significant casual relationship with environmental sustainability, renewable energy and population. In the same way, it has been found that environmental sustainability has significant casual relationship with technological investment, renewable energy and population. Moreover, it can also be evidently seen that Granger casualty runs between technological investment and renewable energy. All these outcomes shows that some of the variables of the study are having casual relationships among them.
5 Discussion and Conclusion

5.1 Discussion

In continuation of the aim of the research study i.e. to find out and explore the impact casted by environmental sustainability, technological investment and renewable energy on the reduction of carbon dioxide emissions, the researcher has formulated three hypotheses for the testing purpose. The first hypothesis that environmental sustainability has substantial effect on CO2 emission has been acknowledged as this impact has found to be significant as per the results. When the environment of a country becomes more sustainable, it enhances the quality of environment by decreasing the emissions of CO2 in the atmosphere. This result has been obtained in one of the similar studies in the past literature (Sarkodie & Strezov, 2018). The second hypothesis that the technological investment has significant impact on CO2 emission has also been accepted based on the results of the study, which show that this impact is significant. When the companies and government invests in technology to develop the operations and procedures to make them environment friendly, the CO2 emission is reduced considerably. Similar results have been witnessed in the literature (Sarkodie & Strezov, 2019). The third and the last hypothesis explains that renewable energy has momentous impact on CO2 emission and this hypothesis has also been accepted because of the significant impact proved by the results. When the renewable sources of energy will be used, it will decrease the CO2 emission from the environment and will provide better environment and air to breath. This result is in accordance with the studies and researchers performed in the past (Waheed, Chang, Sarwar, & Chen, 2018). Moreover, a control variable was also taken i.e. population whose impact on CO2 emission has also been found as significant. With the increase in population, the CO2 emission is supposed to increase because more people have more energy needs and thus more CO2 is emitted (Yu, Deng, & Chen, 2018).

5.2 Conclusion

In a nutshell, the current study was conducted with the aim to negotiate the effect of ecological sustainability, technological investment and renewable energy on the reduction of emissions of CO2 in ASEAN countries. The researcher for this purpose collected data from ASEAN countries for a period of twenty-nine years about the required variables. The results have indicated that all the independent variables have major influence on CO2 emissions and thus it can be concluded on this basis that the government and different companies must practice environmental sustainability by using renewable energy sources and by investing heavily in new technology so that the emission of CO2 can be effectively reduced.

5.3 Implications and Limitations

The current study possesses various implications and benefits in context of theory and practice. As far as theoretical implications are concerned, it will provide a good amount of literature about the discussed aspects and results obtained by them to the other researchers who might find it useful for further research and for using as literature in their studies. Moreover, it will provide information to the public about the awareness of environment sustainability and different practices associated with it. The practical benefit of the current study is that it will provide guidance to the government and the industries to move to renewable sources of energy and new and latest technology in their operations to support environment positively. The policies and regulations will be designed in favor of the environment.

The current study has been conducted for a few countries from ASEAN and the other researchers must use some other countries for the study purpose. Moreover, this study has used panel data and used appropriate techniques and approaches. The other researchers are recommended to apply some other new techniques to get better and accurate results. The study can also be improved by collecting the data for a greater period.
References


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IMPROVING EMPLOYEES' PERFORMANCE THROUGH SUSTAINABLE HRM PRACTICES: A TRIPLE MEDIATION MODEL

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Abstract. Sustainable HRM is an emerging field in the current era that underpins the favorable implementation of corporate sustainability initiatives. Based on the Indonesian HR management practices, this paper based on the detailed discussion regarding the influence of their sustainable HR practices on the performance level of the native employees, where different major mediating variables are studied. According to the statistical research-based outcomes, the sustainable HRM practices greatly influenced on the organizational identification and the person-job fit based employee's productive performance. However, the existence of organizational rationale for sustainability reduces the involvement level of employees towards the company's policies. These outcomes are derived from conducting an online survey where different relevant questions asked from the related HR managers, company's employees and students, where the SEM based statistics are generated. This is informative research for the current HR department to consider the employees' preferences in their decision-making process. In addition, lack of mixed research, no economic interest, and other incentives based mediating variables may affect its authenticity, which can be covered by upcoming scholars.

Keywords: Human Resource Management; Employees performance; Mediation


Jel Codes: M12

1 Introduction

The modern public health care in early stage of its development was limited to taking care of the plantation workers (Zimmerman & Kiss, 2017). Later on, it expanded to multiple hospitals and health care centers in rural areas. The Dutch have contributed a little in the field of health care before the 1990s and in 1995, several children's health centers were established as the people of rural areas started their family planning (Flores & Rojas, 2020; Mahendradhata et al., 2017). However, there were fewer resources, and there was only one physician for thousands of people. According to Surjaningrum, Minas, Jorm, and Kakuma (2018), organizations should meet the social and economic requirements of their stakeholders to achieve sustainable development. Sustainable HRM is a new strategy to manage the employees of the health sector of Indonesia. This HRM strategy enables to achieve the social and financial goals effectively (Sparrow et al., 2017). The organization signaling helps to motivate the employees and make them feel that their work is meaningful to the organization as well as the country (Kuvaas, Buch, Weibel, Dysvik, & Nerstad, 2017). See Table 1.
Table 1: Sustainable HRM practices

<table>
<thead>
<tr>
<th>Sustainable HRM practices</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee involvement</td>
<td>The extent to which there are structured initiatives for the involvement of employees</td>
</tr>
<tr>
<td>Talent management</td>
<td>The extent to which a structured approach used to develop talent</td>
</tr>
<tr>
<td>Employee development</td>
<td>The degree to which systems for learning have been set up</td>
</tr>
<tr>
<td>Measuring HR</td>
<td>The degree to which HR processes and outcomes are being evaluated</td>
</tr>
</tbody>
</table>

The employees in the healthcare sector assume that the organization focuses and gives importance to sustainability, not their personal beliefs (Wang, Temsah, & Mallick, 2017). The healthcare employees in Indonesia are provided with inadequate training and fewer opportunities that lead to dissatisfaction (Nababan et al., 2018). Training plays an important role in improving the performance of the employees and provides them opportunities to develop their skills. Labor force participation has been a great issue in the period of 2014 to 2020. According to Brooks et al. (2017), poor work culture is also a problem in the healthcare sector of Indonesia. It results in the employee’s job quitting and demonization. Performance goals are not set for the employees so that their performance could be measured. The biggest problem in the healthcare sector of Indonesia is the distribution of resources that are unevenly distributed (see Figure 1).

![Laborforce Participation in Healthcare sector of Indonesia](image)

Figure 1: Labor force

During the past few years, different analysts and scholars have evaluated the significance of sustainable HRM procedures as well as practices and their overall impacts on sector performance. For example, recent research by Pratono and Sutanti (2016) has evaluated the overall influence of HRM practices on the individuals and employees of the sector also with the direct impact of HRM practices on the work engagement of employees. This specifies that much of the research has been conducted in the last few years in terms of HRM practices to identify the performance of different sectors. However, the research has not been conducted regarding the health sector of Indonesia and its employee’s performance. Hence, this research article is the latest and important to clearly understand the impact of sustainable HRM practices on the employee’s performance (EP) of the health sector of Indonesia. Moreover, in the past, different scholars such as Jermsittiparsert, Siriattakul, and Wattanapongphasuk (2019) have identified the significance as well as the association b/w among HRM practices and economical...
performance of the sector in different areas and perspectives. However, this paper is proving to be significant as well as justified majorly because no other paper and study have evaluated the overall impact of HRM practices with the mediating role of person-job fit and organizational identification to evaluate and improve the performance of employees. The current research has the following aims,

- The initial objective of the given research is to identify the direct impact of sustainable HRM practices on the employee’s performance in the health care sector of Indonesia.
- The second purpose of the study is to identify the mediating impact of the organizational rationale for sustainability on the linkage b/w sustainable HRM practices and employee performance in the health care sector of Indonesia.
- The third goal of the current study is to examine the mediating impact role of organizational identification on the association b/w sustainable HRM practices and employee performance in the health care sector of Indonesia.
- Furthermore, the final objective of the study is to evaluate the overall mediating role played by person-job fit in the relationship b/w HRM practices and employee performance in the health care sector of Indonesia.

The sustainable performance of the employees plays a major role in the progress and development of organizations. There is a clear idea that sustainable HRM is a source of making a strong relationship among all the worthwhile sectors of life in any business. There is an undeniable fact that the health sector has its value and significance in the life of the employees of any field. Through sustainable management and the reforms, bring harmony and unity among the employees. Consequently, this study focuses on the role of employees of health sectors by the means of HRM sustainable management. Generally, a thesis consists of five chapters as the introduction, review of related literature, research methodology, findings, and conclusions. The first and the main point of discussion comprises of these subheadings as a general statement of the problem, the significance of the thesis, research questions, limitations and delimitations, assumptions, and definitions. The second chapter comprises the work of previous studies and their link on today's work. This chapter also expresses the uniqueness of the present study. The third chapter discusses design, methodology and the next express the findings, and results of the study and the last chapter discuss the discussion and the conclusion.

2 Literature review

2.1 Theory of HRM practices in the workplace

According to Dumont, Shen, and Deng (2017) in research the best human practices in the workplace are a collection of HRM processes as well as actions that work organizationally. In HRM theories, there are two most important arguments on how to manage employees and their overall performance at the workplace, the first one is the best fit and the second is sustainable practices (Bratton & Gold, 2017; Mehmood & Farooqi, 2020; Prasetyo, & Kistanti, 2020; Laužikas, & Miliūtė, 2020; Bombiak, 2020). Sustainable practices are a set of organizational HR methods and processes to majorly lead to better as well as superior employee performance (Khandakar & Pangil, 2019; Zeb, N., et al., 2020; Chen, Y., 2020). According to its promoter and advocator, there are specific bundles of HR processes that support different sectors and industries in improving the performance of their employees regardless of the sector settings and culture. This indicates that the HR strategy and sustainable HR practices should be aligned with the sector's strategy for sustainable employee performance as well as optimum efficiency (Lewis, Cardy, & Huang, 2019; Dong, X., 2020). In the given literature, this alignment and association have also been referred to as sustainable HRM practices to achieve better and sustainable employee performance. According to the theory of HRM practices, some sustainable HR practices help many sectors in attaining sustainable employee performance at the workplace (Kinnie & Swart, 2020). These sustainable HR practices are proving security to all employees at the workplace, performance-based rewards, and compensation, hiring the right individuals for the right place, training in related skills and abilities, self-controlled and effective teams,
developing an effective organizational culture and creating knowledge easily available to those who need it (Farndale & Sanders, 2017).

2.2 Relationship b/w sustainable HRM practices and employee performance (EP)

Sustainability is a process, a term that is beyond the limits to be described in words to expresses its worth and value (Goball, Ayyub, Mansor, Kelana, & Noordin, 2018). Sustainability means what the management does today and has very positive effects on tomorrow. Thus, sustainable HRM is about creating sources and the competitive advantage for the organizations, shareholder value, and sustainable employability for the employees. Kelana, Mansor, and Sanny (2016) in research explained that there is a very positive influence of sustainable HRM and the employee's performance as sustainable HRM wins the trust and loyalty of the employees. All the policies of the HRM are well accepted and a healthy environment is created to perform the duties and fulfill the desired goals and achievements (Nwosu & Ogunyemi, 2020). Sustainable HRM creates a very positive relationship between the employees and the authority (Mulwa, 2018). According to Mwangi and Njuguna (2019), the management impacts very positively and the production of the organization goes up and the rivals of the market world leave far behind. Sustainable management develops when it makes clear strategic planning with good leadership and the proper take care of the policies to engage the workforce or the employees so that they play a vital role in the continuous progress and the production of the organization. Thus, based on the above discussion this research study recommends the following hypotheses, H1: Sustainable HRM practices have a positive impact on employee performance.

2.3 The mediating role of the organizational rationale for sustainability in the relationship b/w sustainability HRM practices and EP

The process in which the employees need to perceive the commitment of the organization to attain sustainability is known as the organizational rationale for sustainability. The organizations are working to develop a competitive workforce and helping the employees in achieving its goals effectively by developing their skills (Jerónimo, de Lacerda, & Henrique, 2020). A new concept in the health care sectors in Indonesia is introduced to enhance the relationship of sustainable HRM practices and employee performance, named as role congruity of sustainability. The organizational rationale for sustainability improves the performance and engagement of the employees (Hosain, Hossin, Xiaohua, Akhtaruzzaman, & Mustafi, 2020). According to Guerci, Longoni, and Luzzini (2016), HRM practices involve training, diversity management, and the safety of the organization. The organization can fulfill the needs and requirements of the stakeholders without negotiating its capability to fulfill its future requirements and needs. Economic sustainability is not enough for achieving the overall sustainability of an organization. Sustainable HRM is majorly concerned with encouraging green actions and practices among employees. According to the Rasool, Samma, Wang, Zhao, and Zhang (2019) consumers, employees, and the environment are the three-goal factors that lead an organization to success. The HRM practices and the positive and effective performance of the employees are the key factors to attain competitive benefits and advantages for an organization. These practices encourage the employees at work to achieve the organizational objectives and goals through their knowledge. Multiple goals should be addressed in an organization to encourage the employees to attain sustainability. The triple bottom line approach should be used to provide sustainable HRM practices and can help in solving the grand challenges. The HRM practices are not only limited to environmental factors, but it also consists of the practices for enhancing the abilities of the employees in an organization (Masri & Jaaron, 2017). These practices help in encouraging employees through interest and action alignments. According to the study by Cooper, Wang, Bartram, and Cooke (2019) when the employees start taking an interest in their work, and their work becomes more meaningful to them, they are willing to contribute more effectively towards their organizational goals. The theory of HRM practices in the workplace proved the positive role of the organizational rationale for sustainability in improving the existing performance of employees of different sectors (Shanker, Bhanugopan, Van der Heijden, & Farrell, 2017). Hence, the above discussion leads to the development of the hypotheses as follows:
H2: Organizational rationale for sustainability positively mediates the relationship b/w sustainability HRM practices and employee performance.

2.4 **The mediating impact of organizational identification on the relationship b/w sustainable HRM practices and EP**

Organizational identification (OID) is a situation and environment in which the employees and the organization share the same goals and values (Carmeli, Brammer, Gomes, & Tarba, 2017). The employees and the management work on the same page and achieve the desired goals. According to Järlström, Saru, and Vanhala (2018), sustainable HRM builds a positive path and valuable strategies to maintain progress and development. When the HRM identifies the goals and aims at building a sustainable relationship and association with the workforce and the management of all walks of life they create a harmony and make it easy for the employees to share their ideas so that their performance and productivity may be increased and very strong and sustainable collaboration among all the departments of the firm or organization may be developed (Hussain et al., 2020). Thus organizational identification has a mediating role in the association between sustainable HRM practices and employee performance (Santana & Lopez-Cabales, 2019). OID is just like a team where all the members are very important to play their role and influence through their performance. Sustainable management makes it easy and provides such an environment to create a scenario that enables every individual to produce and perform with excellence. Hence, the above discussion propose the given hypotheses,

**H3:** Organizational identification significantly mediates the relationship b/w sustainable HRM practices and employee performance.

2.5 **The mediating impact of person-job fit (PJF) on the association b/w sustainable HRM practices and EP**

According to Mensah and Bawole (2017), alignment between the employee and his job is referred to as the person-job fit. When an employee is satisfied with his work, he contributes a lot to achieve the organizational goals and work for the welfare of the organization by heart (Bhat & Rainayee, 2019). The abilities and the interests of the employees in health care sectors should be lined up with the activities and the responsibilities of the organization. A person's job fit plays an important role in the job satisfaction of the employees. According to the study by Iqbal, Khan, Mohmand, and Mujtaba (2019) when the employee is engaged with the organization and is satisfied with his job, positive outcomes are produced that are beneficial for an organization. This engagement results in more productive and creative outcomes in the health care sectors in Indonesia. This engagement is the linkage of an employee with his work emotionally and physically. Work engagement requires the dedication and focus of an employee on the job (Cai, Cai, Sun, & Ma, 2018). Such engagement affects not only the financial aspects of an organization but also the mental and physical health of the employees. Engaged employees practice positive emotions and superior health conditions. Proper HRM practices help the employees in achieving high work engagement ranks (Kooij, van Woerkom, Wilkenloh, Dorenbosch, & Denissen, 2017). According to the study Bui, Zeng, and Higgs (2017) the employees who are engaged and committed to their job, face lower turnover. It is supported and proved by the theory of HRM practices in the workplace that the engagement of the employees with their job is beneficial for both the organization and the employee. Therefore, when the employee is fully engaged with his job, he feels satisfaction by efficiently achieving his goals. Based on the discussion, the subsequent hypotheses are proposed by the study as follows:

**H4:** Person-job fit positively mediates the relationship b/w sustainable HRM practices and employee performance.

Research model is presented in Figure 2.
3 Methodology
In order to critically evaluate the influence of sustainable human resource practice on the Indonesian employees' performance in the workplace, a quantitative research based descriptive approach is considered that helps to collect the exact data in the critical evaluation. In its data collection portion, the online survey-based questionnaires are distributed among the related participants (Bryman, 2016; Ul-Hameed, Mohammad, & Shahar, 2018). The major targeted audience of this paper is human resource department management and its employees in an Indonesian market perspective. In order to collect the relevant information regarding the working class perception and the sustainable HRM policies, different close-ended questions are asked from the related participants. In these questionnaires, the five-point Likert scale (strongly disagree = 1, disagree = 2, neutral = 3, agree = 4 and strongly agree = 5) is implemented in the tested variables based data interpretation. In this research, the independent variable is sustainable HRM practices, the dependent variable is employee performance, while the mediating variables are the organizational rationale for sustainability, organizational identification and person-job fit. This is an effective research method that helps to justify or nullify the tested hypothesis (Thaker et al., 2020). In order to critically evaluate its variables, the SPSS test-based statistical analysis will be made to make constructive outcomes. In this paper, the informative structural equation modeling based statistical technique will be used where the KMO and Bartlett's test, the confirmatory factor analysis and the convergent & discriminant validity are critically evaluated before considering any impact of an independent variable on the dependent variable. Its related outcomes are shown in the next heading, analysis interpretation.

3.1 Demographic Statistics
Its demographic statistics outcome segregated based on the gender, education and age factors like to collect the participants' point of view regarding the sustainable HR policies for employees, 450 questionnaires were distributed among the Indonesian HR managers, working employees, students and other related participants where only 315 of them gave authentic outcome. According to their gender based demographics, there are 165 males and 150 females. This quantity shows that percentage of male responses (52.4%) in the result outcomes is much higher than the female responses (47.6%). Well, in case of their educational factor, the frequency of graduate participants is 38 (12%), the post-graduates are 136 in number (43.2%) and masters are 105 in numbers (33.3%), while the 36 are the other educational field students with only 11.4%. Last, but not the least, is the age group
based division. The majority of the participants are within the age group 31 to 50 years old. According to their detailed statistics, 24% of the overall participants are within the age limit of 21-30 years old (with 76 in numbers), 29.5% are from 31 to 40 years old with 93 in quantity, 30.8% are within the age group of 41 to 50 years old (with 97 in numbers), and the remaining 15.6% (49 in numbers) are more than 50 years old. All the demographic statistics show that majority of the participants are on the managerial post and having experience-based information regarding the importance of health-oriented sustainable HR policies for retaining the employees and their loyalty with the company.

4 Analysis Interpretation
This is an informative research that majorly focuses on the employee's performance affected variables and applies the KMO and Bartlett test, and the SEM in its variables evaluation. Bartlett's test is a sphericity test based on a study of the correlation matrix and explores the unrelated and unsuitable structural detection (Domingues, Mufato Reis, Fonseca, Ávila, & Putnik, 2019; Mokarami, Alizadeh, Pordanjani, & Varmazyar, 2019). While, the Kaiser-Meyer-Olkin measures the adequacy statistics and majorly indicates the variance proportion in the tested variables that may cause underlying factors (Nelson & Cavanagh, 2018; Robinson et al., 2018). In this statistical analysis, there both results are shown in the following tables. Firstly, the descriptive statistics of its results are given below in Table 2.

Table 2: Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>SusHRMP</td>
<td>315</td>
<td>1.00</td>
<td>4.90</td>
<td>3.5667</td>
<td>1.09262</td>
<td>-.841</td>
</tr>
<tr>
<td>OrgRatS</td>
<td>315</td>
<td>1.00</td>
<td>5.00</td>
<td>3.5003</td>
<td>1.15106</td>
<td>-.679</td>
</tr>
<tr>
<td>OrgIdent</td>
<td>315</td>
<td>1.00</td>
<td>5.00</td>
<td>3.5600</td>
<td>1.10323</td>
<td>-.787</td>
</tr>
<tr>
<td>PeJobFit</td>
<td>315</td>
<td>1.00</td>
<td>5.00</td>
<td>3.5657</td>
<td>1.107708</td>
<td>-.842</td>
</tr>
<tr>
<td>EmplPerf</td>
<td>315</td>
<td>1.00</td>
<td>5.00</td>
<td>3.4447</td>
<td>1.10560</td>
<td>-.621</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>315</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the above-mentioned statistics, it becomes concluded that the employee performance is effectively deviated from its least mean position (with 1.15 in value) which means if the company's management made some efficient sustainable changes in their operating activities then a productive outcome will be generated. While, the person-job factor is such variable which is least deviated from its standard mean position. This shows that this mediator strongly impacts on the employee performance as compared to the other mediators, named as an organizational rationale for sustainability and organizational identification. Also, the value of sustainability HRM practices, as an independent variable, is less deviated from its mean position which shows that such long-lasting vision oriented sustainable policies of the HR department enhanced the confidence of employees to remain with the company. Well, the statistics of the KMO and Bartlett's test is shown in the following table 3.

Table 3: KMO and Bartlett's Test

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</td>
<td>.942</td>
<td></td>
</tr>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td>Approx. Chi-Square</td>
<td>12570.027</td>
</tr>
<tr>
<td></td>
<td>df</td>
<td>528</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>
The above table shows that the KMO value is 0.942 means within its threshold range. Also, its Bartlett test based chi-square, difference, and significance values show the favorable outcomes which depict that this model is a good fit. After this, its rotated component matrix-based outcomes are shown in the following table 4.

Table 4: Rotated Component Matrix

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR1</td>
<td>.671</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR2</td>
<td>.757</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR3</td>
<td>.815</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR4</td>
<td>.844</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR5</td>
<td>.826</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR6</td>
<td>.833</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>HR7</td>
<td>.821</td>
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<tr>
<td>HR8</td>
<td>.831</td>
<td></td>
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<tr>
<td>HR9</td>
<td>.846</td>
<td></td>
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<tr>
<td>HR10</td>
<td>.821</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR1</td>
<td></td>
<td>.741</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR2</td>
<td></td>
<td>.792</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR3</td>
<td></td>
<td>.799</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR4</td>
<td></td>
<td></td>
<td>.790</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OI1</td>
<td></td>
<td>.829</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OI2</td>
<td></td>
<td>.816</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OI3</td>
<td></td>
<td>.846</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OI4</td>
<td></td>
<td>.815</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>OI5</td>
<td></td>
<td>.849</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OI6</td>
<td></td>
<td>.842</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JF1</td>
<td></td>
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<td>.763</td>
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<tr>
<td>JF2</td>
<td></td>
<td></td>
<td>.774</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JF3</td>
<td></td>
<td></td>
<td>.780</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JF4</td>
<td></td>
<td></td>
<td>.811</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JF5</td>
<td></td>
<td></td>
<td>.842</td>
<td></td>
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</tr>
<tr>
<td>JF6</td>
<td></td>
<td></td>
<td>.839</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP1</td>
<td>.819</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP2</td>
<td>.874</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP3</td>
<td>.878</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP4</td>
<td>.879</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP5</td>
<td>.886</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP6</td>
<td>.886</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>EP7</td>
<td>.868</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the above statistical figures of the tested variables, the rotated component matrix values of each variable is more than 0.7 at their threshold range. So, no more confusion has remained on the factor loading mechanism and all the items are effectively loaded in this tested model. Its efficiency/validity based values are given below in Table 5.
Table 5: Convergent and Discriminant Validity

<table>
<thead>
<tr>
<th></th>
<th>CR</th>
<th>AVE</th>
<th>MSV</th>
<th>OI</th>
<th>HR</th>
<th>EP</th>
<th>ORS</th>
<th>JF</th>
</tr>
</thead>
<tbody>
<tr>
<td>OI</td>
<td>0.948</td>
<td>0.751</td>
<td>0.375</td>
<td><strong>0.867</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>0.967</td>
<td>0.748</td>
<td>0.325</td>
<td>0.503</td>
<td><strong>0.865</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP</td>
<td>0.969</td>
<td>0.819</td>
<td>0.244</td>
<td>0.414</td>
<td>0.494</td>
<td><strong>0.905</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORS</td>
<td>0.941</td>
<td>0.799</td>
<td>0.375</td>
<td>0.612</td>
<td>0.567</td>
<td>0.364</td>
<td><strong>0.894</strong></td>
<td></td>
</tr>
<tr>
<td>JF</td>
<td>0.937</td>
<td>0.712</td>
<td>0.353</td>
<td>0.472</td>
<td>0.570</td>
<td>0.459</td>
<td>0.594</td>
<td><strong>0.844</strong></td>
</tr>
</tbody>
</table>

According to the above convergent and discriminant validity based outcomes, it becomes clear that the average variance extracted value is more than 0.5 while its composite reliability value is higher than 0.7 based standard value which means there is no convergent validity issue within this tested model. In addition to this, the above-mentioned bold letters depict that each variable differs from the other ones so there is no discriminant validity issue occurs within this testing. This test enhanced the validity based outcomes to tested variables. See Table 6.

Table 6: Model Fit Indices

<table>
<thead>
<tr>
<th>CFA Indicators</th>
<th>CMIN/DF</th>
<th>GFI</th>
<th>IFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Value</td>
<td>≤ 3</td>
<td>≥ 0.80</td>
<td>≥ 0.90</td>
<td>≥ 0.90</td>
<td>≤ 0.08</td>
</tr>
<tr>
<td>Observed Value</td>
<td>2.711</td>
<td>0.804</td>
<td>0.934</td>
<td>0.934</td>
<td>0.074</td>
</tr>
</tbody>
</table>

The above confirmatory factor analysis indicators based model fit indices show that all the variables are equally uploaded on this SPSS statistical model (Crede & Harms, 2019). Like the above mentioned GFI value is 0.804 (higher than 0.80) and its CMIN/DF value is 2.711 (lower than 3). In addition to this, its RMSEA value is 0.074 which is lower than 0.08, while the similar outcomes (0.934) based IFI and CFI outcomes are higher than 0.90. These statistical outcomes depict that this tested model is accurate for the proper uploading of all the tested items. The graphical representation of CFA is shown in the following figure 3.
According to the above informative statistics based SEM outcomes, it becomes concluded that there is a strong influence of the tested independent and mediating variables on the employee's performance. Like the above statistics show that any minor change in the sustainability HRM practices cause a major influence on the person-job fit and organizational rationale for sustainability as compared to the other tested variables. Like, the tested person-job fit variable is 54.3% deviated from its mean position due to the sustainable HR practices within an
organization, while the factor of the organizational rationale for sustainability is 54.9% deviated from the impact of an independent variable. While, the organizational identification changed by 47.8%, and the employee performed shows 48.5% deviation due to the sustainable HR policies based influence. Well, the influence of mediators can be tested through the above-mentioned table that employees' performance shows a 23.4% change due to person-job fit variable, 19.6% through organizational identification, and negatively 5% because of the organizational rationale for sustainability. The graphical representation of this structural equation modeling is shown in the following figure 4.

![Figure 4: SEM](image)

5 Discussion and Conclusion

5.1 Discussion

The above statistical analysis based outcomes depict that majority of the employees' performance and productivity towards the company mission is highly dependent on the relationship among the company's management and its working employees. Like Helena, Teresa, and Paulo (2020) critically studied the different factors for sustainable human resource management policies towards the employee performance. According to them, the ability-motivation-opportunity theory is a favorable approach to retain a long terms relationship among the company and its related employees. The road to achieve the sustainable HRM from the performance of employees is easy and straightforward, but mostly interlinked with the double-mechanism effect of the perceived organizational rationale for the organizational identification and sustainability (Jerónimo et al., 2020). The above mentioned statistical outcomes from the SEM test also show the negative impact on this organizational rationale for sustainability on the perception level of employees and their productivity factor. It means a company must be conscious regarding developing their entrepreneurial HR development based policies and strategies within a workplace. Also, it becomes quite difficult in front of management to retain the interest of talented employees towards the company's goals. Leonardus, Kittisak, Umair, Hafezali, and Thitinan also discussed the importance of human capital, reward, and training based effective human policies on the development of advanced service recovery performance of a company. This is an effective approach to enhance the commitment level of the employees towards the company’s management (Mihardjo, Jermsittiparsert, Ahmed, Chankoson, & Hussain, 2020). According to the
statistics, it becomes clear that if the psychological, biological, personality, goals, abilities, and biological needs based individual characteristics are fulfilled by the HR sustainable practices, then the employees' performance factor will be favorably developed. If this factor is critically considered by the HR manager in the diverse nature-based Indonesian companies, then the confidence level of the employees becomes developed and they started to remain loyal with the company's goals and operating activities (Basuki & Khuzaini, 2020; Sriviboon, 2020).

5.2 Conclusion
Thus, after critically evaluate the influence of sustainable HRM practices within a workplace in the Indonesian market perspective, it becomes concluded that their employees' performance is majorly affected due to the person-job fit based mediating variable. In order to make constructive outcomes, the SEM-based statistical test is applied where all the factors are equally uploaded and their outcomes depict that sustainability HRM practices are also majorly effected on the organizational identification factor along with the person-job fit variable because this approach positively enhanced the employees' engagement towards the company's operation and result in the boosting of their performance. But, there is only one hypothesis nullified regarding the effective mediating role of the organizational rationale for the sustainability factor. It is because such management justification is usually towards the company's profit and goal rather than considering the individual preferences. This factor enhances the negative impact of such advanced HRM practices among the employee's mind and reduces their performance efficiency.

5.3 Future Implications
This paper will add value to the decision-making process of the HR department within an Indonesian company and its state's organization to consider the employees' characteristics in its strategic planning and management of its human capital. Also, it is a productive social cause oriented research that will motivate the Indonesian and other region natives to consider their responsibilities in effective policymaking. Well, this data can also be utilized by the related business research scholars in their data evaluation and discussion portion. All of its values are based on the reality that helps to make efficient steps for future sustainable HR management.

5.4 Limitations and Future Researches
No, doubt, it is informative and useful research but there are some deficiencies within this paper like no mixed-method based versatile research outcomes are considered for analysis. Also, no economic interest and other incentives based mediating variables are considered in the sustainable HRM practices that can be utilized by the upcoming scholars in their related articles.

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DO TRADE, FDI AND GLOBALIZATION HURT ENVIRONMENTAL SUSTAINABILITY IN ASEAN NATIONAL GOVERNANCE, INDUSTRIALISATION AND ENVIRONMENTAL SUSTAINABILITY IN A GLOBALIZED BUSINESS ENVIRONMENT: A PANEL DATA ANALYSIS OF TRADE-OFF

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Abstract. Environmental pollution has become a major issue in different regions of the world due to industrialization and other activities. The environmental sustainability is facing serious damages and it needs to be rectified as soon as possible. In this scenario, the current study has been conducted with the motive to find out and study the impact of trade, FDI and globalization on the environmental sustainability of ASEAN countries. To achieve this objective, the researchers collected data for this purpose from the ASEAN countries of 28 years from reliable resources. After data collection, the researchers applied the most appropriate techniques and approaches to analyze the collected data such as unit root test, diagnostic tests, correlation test, PCSE and GMM estimation tests. The diagnostic tests suggested that the collected data is heteroskedastic, variables are autocorrelated and cross dependent but without multicollinearity. The results indicated that in the case of both PCSE and GMM estimation, all the independent variables i.e. trade; FDI and globalization have a significant and positive impact on environmental sustainability. This study has major practical implication that it will make the conditions of trade, FDI and globalization better in ASEAN and other countries and ultimately have a positive impact on the environment.

Keywords: Trade; FDI; Globalization; Environmental Sustainability; ASEAN Countries; GMM Estimation


Jel Codes: O1, O2

1 Introduction
With the fact that the global transborder flows have led to the displacement of national economic governance priorities (Weiss, 1999; Zeibote, Volkova, & Todorov, 2019), leading to a new form of inter-governmental connectedness and regulatory framework (Phillimore, 2013), has become eminent. Global governance, management and sustainability need integral and decisive governance of the global system (Burke & Stephens, 2018; Aktan, Turen, Tvaronaviciene, Celik, & Alsadeh, 2018), where all parties are represented in all aspects, including trade, foreign direct investment (FDI), environmental management and sustainability.
Due to the fact, the economy is an important element in globalization, trade, FDIs and the environmental sustainability have become widely studied areas by the academics, researchers and policymakers (Thanh, Phuong, & Ngoc, 2019; Humbatova, Tanriverdiev, Mammadov, & Hajiyev, 2020; Grzeszczyk, & Waszkiewicz, 2020). Globalization is regarded as a holistic term for the totality of the industry structure of a country (Chishti, Ullah, Ozturk, & Usman, 2020; Du, C. 2020). With the increasing globalization, the resulting rise in the scope of trade has been considered as beneficial for the economic growth and the GDP of the country (Andrew Adewale Alola, Bekun, & Sarkodie, 2019; Zheng & Walsh, 2019; Iqbal. Z., et al., 2020). However, the benefits of the increase in the income and economic progress come at a cost relative to the non-economic objectives, which includes the environmental quality (Can, Dogan, & Saboori, 2020; Dogan, Madaleno, Tiwari, & Hammoudeh, 2020; FanLv, & Zheng, L. 2020; Farooqi, 2020). A clear cut adverse consequence of globalization and trade is environmental degradation (Frankel & Rose, 2005).

Table 1: Environmental Performance Index (EPI) of ASEAN countries (2020)

<table>
<thead>
<tr>
<th>Country</th>
<th>EPI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>63.57</td>
</tr>
<tr>
<td>Cambodia</td>
<td>43.23</td>
</tr>
<tr>
<td>Indonesia</td>
<td>46.92</td>
</tr>
<tr>
<td>Philippines</td>
<td>57.65</td>
</tr>
<tr>
<td>Singapore</td>
<td>64.23</td>
</tr>
<tr>
<td>Thailand</td>
<td>49.88</td>
</tr>
<tr>
<td>Vietnam</td>
<td>46.96</td>
</tr>
<tr>
<td>Lao</td>
<td>42.94</td>
</tr>
<tr>
<td>Malaysia</td>
<td>59.22</td>
</tr>
<tr>
<td>Myanmar</td>
<td>45.23</td>
</tr>
</tbody>
</table>

The ASEAN region has been experiencing faster growth in the trade figures and Foreign Direct Investment (FDI) inflow and outflows consecutively for a number of years (Ling, Ab-Rahim, & Mohd-Kamal, 2020; Mahrinasari, Haseeb, & Ammar, 2019). The above graph shows the increasing trend of the increasing FDI in ASEAN region and it is projected that this trend will continue to rise (Khan & Ozturk, 2020; Nasir, Huynh, & Tram, 2019), owing to the improvement in the business investments and developments in the region (Ginting, 2019; Setboonsarng & Setboonsarng, 2019). But these advancements have played a detrimental role in maintaining the quality of the environment as shown by the following table. The index given in this table shows that these countries are no included among the top nations who are performing well considering the performance indicators of their environments and they need to adopt measures to improve their environmental sustainability. See Figure 1.
Studies have shown that the interest of the researchers and policymakers is gradually increasing in the factors that tend to have adverse impacts on the degradation of the environment, especially in the ASEAN region where the environmental quality is not very appropriate (Ling et al., 2020; Mahrinasari et al., 2019; Nasir et al., 2019). For this purpose, the factors of trade (Andrew A Alola, 2019), FDI (Joshua & Alola, 2020) and globalization (Bilgili, Ulucak, Koçak, & İlkay, 2020) have been identified using previous studies to delineate their impact on the environmental sustainability. Hence, there is a need to use data from these countries and analyze these factors on saving the environment from further deterioration. Keeping in mind this open area of research, the current study aims to evaluate how trade, FDI and Globalization hurt the environmental sustainability of the ASEAN countries by utilizing the panel data of trade-off from these countries. Moreover, the specific objectives of this research are:

- To examine the effect of trade on environmental sustainability
- To examine the effect of FDI on environmental sustainability
- To examine the effect of Globalization on environmental sustainability

This study has a significant contribution to the existing pool of literature content by examining the effects of trade, FDI and globalization factors on environmental sustainability using the panel data analysis. This study has implications for the researchers and the policymakers as it can help develop effective policies for regulating the trade, FDI and Globalization so that its harmful and detrimental effects on the environmental sustainability of countries can be reduced and addressed.

This paper has the following organization. The first section is the Introduction to the study and the second section details the literature review. The next section shows the complete research methodology, while the fourth section gives the panel data results. The paper ends with discussion, conclusion, limitations and implications of the study.

2 Literature Review

2.1 Trade

The developed countries around the world have been continuously working for saving the environment of the globe as it is one of the largest issues faced by mankind in the 21st century (Sarkis & Zhu, 2018). Countries are
constantly developing and redesigning their policies to save the world from further destruction and control the factors negatively affecting the environment (Baland, Bardhan, & Bowles, 2018). The scholars have been exploring the factors that have been contributing to this wreckage. In a study, the researchers used the dynamic ARDL-bound testing approach and examined the dilemma effect of trade and monetary policy covering a long period from 1990 to 2018 to see its impeccable effect on the atmosphere. The results highlighted that trade and monetary policy have a confounding effect and have drastically raised the level of carbon and other pollutants in the atmosphere, disturbing the natural ecosystem and destroying the environment greatly. Hence, environmental sustainability is at a threat from the trade and other policies made and implemented by the country’s government. However, the study showed that in the short run, no significant effect was noted, but in the long-run, this will have a more deteriorating impact.

The study pinpointed that government policies must be matched with the Sustainable Development Goals 2030 (Andrew A Alola, 2019). Another study utilizing panel data for empirical analysis covering ten years covering 114 countries was conducted to assess the impact of increased trade and investment by countries has on their environment for various income levels. The results revealed that trade and investment are negatively linked to the environmental sustainability of countries. Positive relationships among other political and economic factors were also confirmed with environmental sustainability. When the income levels were considered, a positive correlation was found, while for those with lower income levels, the correlation was negative. Hence, a significant causal relationship was confirmed between the trade and investment flows with the environmental sustainability which can help the countries develop their trade and economic policies keeping in mind the conservation of the environment, specifically for the least developed and the developing states (Chakraborty & Mukherjee, 2013).

Other contemporary authors have been researching these variables and proved that controlling the trade with strict policies is the need of the hour if the countries want to conserve their environments (Hamid, Shahid, Hameed, Amin, & Mehmoon, 2019; Jung, Kim, Malek, & Lee, 2016; Li, Xing, & Yu, 2018; Sarkodie, Adams, Owusu, Leirvik, & Ozturk, 2020) and it has been mandated prominently as a target in the WTO reforms (Birkbeck, 2019). These findings prove that there exists a negative correlation between trade and environmental sustainability. Hence, a significant relationship can exist among them and the following hypothesis is deduced:

**H1**: *Trade is significantly linked to Environmental Sustainability*

### 2.2 FDI

Both prior and recent studies have shown that increase in FDI considerably rise the degradation of the environment and hence is a threat to its sustainability (Pisani, Kolk, Ocelík, & Wu, 2019). In their research work, (Omri, Euchi, Hasaballah, & Al-Tit, 2019) examined the determinants of environmental sustainability in the country of Saudi Arabia by investigating whether the factors of trade and FDI have improved the environment of the country. The results showed that the threshold for both trade and FDI are very sensitive towards environmental sustainability and have significantly led to the degradation of the environment in Saudi Arabia after a specific threshold is surpassed. Hence, the study highlighted the need for augmenting the policy of these indicators to eradicate the pollution and achieve the improvement in the environment as desired. (Bokpin, 2017; Chakraborty & Mukherjee, 2013) have found out in their research that the FDI inflow negatively influences the environmental sustainability, while it is positively related to the FDI outflow, hence raising serious concerns for the investment policies of the country and their role towards the degradation of the environment.

In a similar study by (Lau, Choong, & Eng, 2014), conducted on a panel of 17 MENA (the Middle East and North Africa) states using data from 1974 through 2013 revealed that FDI is negatively related to the environmental sustainability. (Ali, Naveed, ul Hameed, & Rizvi, 2018; Omri, Nguyen, & Rault, 2014) carried out a similar study on the data from three regional sub-panels, constituting Central Asia, Europe, Latin America, North Africa, the Middle East and the Caribbean for 1990 – 2011 also proved these relationships. Other scholars have also suggested similar associations between FDI and the environment regarding the role of FDI in inevitably polluting
the country’s environment (Bende-Nabende, 2017; Hakimi & Hamdi, 2016; Rafindadi, Muye, & Kaita, 2018). These results show that FDI has significant relationship with environmental sustainability and countries must formulate rigid environmental laws and regulations to reduce the pollution levels and enhance the sustainability of the environmental stakeholders. So, the following hypothesis is finalized to represent the relationship:

\[ H2: \text{FDI is significantly linked to Environmental Sustainability} \]

### 2.3 Globalization

In the simplest words, first of all, globalization is a word that is used to explain that the world has become interdependent in all aspects, the economic aspect of all of the countries has become interdependent, the cultural beliefs are settling on the same page and imports and exports both are on their peaks. Globalization has become a very important factor just because it connects people even sitting across the borders and keeps the dealings going on. The world has become interconnected like a web and there is no difference in space and time left when it comes to communication and business. Globalization was recognized as a main leading factor for increasing trade and economic activities and improves the total productivity. Globalization has deemed necessary for the government to enforce the policies on an international level to reduce the trade barriers between the countries and increase the import of the efficient technologies (Shahbaz, Shahzad, Mahalik, & Sadorsky, 2018). While globalization has benefits, yet it also has harms to the environment as it aggravates the pollution levels and shifts the pollutants to the other countries in which the environmental policies are not rigidly implemented (Grabara, Hussain & Szajt, 2020).

This shows that globalization positively linked to the growth, but negatively related to environmental sustainability (Saint Akadiri, Alola, & Akadiri, 2019). Trade and globalization are the two factors that promoted individuals and businesses to cross the borders and today all production and service levels have become internationally known and accepted. The global exchange of commodities and even services has increased to such an extent that businesses are being supported more in foreign countries than they are being supported in their home country. Even after the wars and economic depressions, trade globalization is something that has increased to a great extent, this is something that does link to the sustainability of the environment. A balance between the environment and the operations of the business and trade is important, as far as the industries are pointed out in the sustainability of environment from the perspective of production, at the same time it has also been implied that the right kind of globalization activities can positively impact the environment whereas if the globalization activities going beyond the benefit of the environment can cause dangers to the environmental sustainability. The role of Globalization on the environmental sustainability has been investigated by scholars using the ARDL (Autoregressive Distributed Lag) testing approach and VECM (Vector Error Correction Model) (VECM) causality approach considering the case of Turkey with the periods of 1970-2014.

The finding of their study has shown that globalization has a negative effect on the carbon emission and degrades the environment in the long run only, though globalization itself has a positive and noticeable effect on the overall economic growth (Saint Akadiri, Alkawfi, Ügural, & Akadiri, 2019). In another research by (Shahbaz, Ozturk, Afza, & Ali, 2013), the interaction between globalization, carbon emission and economic growth were examined and it was provided that globalization greatly improves the innovations and technology and enhances the quality of the environment of it is managed properly (Dalle et al. 2020; Gultom et al. 2020). Studies have further confirmed that globalization is significantly linked to the environmental sustainability (Balsalobre-Lorente, Driha, Shahbaz, & Sinha, 2020; Bilgili et al., 2020; Chishti et al., 2020). Thus, this relationship is depicted with the following hypothesis:

\[ H3: \text{Globalization is significantly linked to Environmental Sustainability} \]
3 Methodology

3.1 Data and Sample

As it has been quite clear that the purpose to conduct the current study by the researcher was to find out whether trade, FDI and globalization have any impact on the environmental sustainability of ASEAN countries. The first and important step here is to collect the data that is useful and reliable for the study. In this regard, the researcher has selected a few ASEAN countries and has collected data about them from the databases such as World Bank Development Indicators and Global Economy. These sources ensure the reliability and accuracy of the collected data. The researcher has collected data from these sources about the particular aspects that are to be studied in the current research. The collected data comprises 28 years.

As far as the variables of the study are concerned, there is a single dependent variable i.e. environmental sustainability which has been denoted by ENS in the study and has been measured through the environmental sustainability index. There are three independent variables in the study. The first one is the trade which is the total exports and imports difference and is measured through US dollars. The second one is FDI which stands for foreign direct investment and has been measured in US dollars. The last independent variable is globalization which has been denoted by GLOB and has been measured through a globalization index. In addition to these independent and dependent variables, the researcher also has added a control variable i.e. per capita income which has been denoted by PCI and measured through US dollars. The estimation model that can be used in the current study is given as follows;

\[
ENS_{it} = \alpha + \beta_1 TRADE_{it} + \beta_2 FDI_{it} + \beta_3 GLOB_{it} + \beta_4 PCI_{it} + \sum_{j=1}^{4} q_j \text{CFE}_{dum_j} + \varepsilon_{it}
\]

In this equation, \( \alpha \) is a constant, \( I \) represents the country, \( t \) is the time of the year, \( \beta \) shows the coefficient of the variable, CFE\text{dum} means the dummy of country fixed effect. Moreover, FDI represents a foreign direct investment, GLOB shows globalization, PCI indicates per capita income.

3.2 Empirical Procedure

As we know that time fixed effect dummy has been used in the estimation model of this study, the reason behind its usage is that the time series has an impact on the cross-country results of regression and to lower that impact this fixed effect has been used (Hussain et al., 2020). In this way, the trends of the panel data can be easily controlled that might impact the overall results of the relationships between the variables. Besides, the use of time fixed effect also has the advantage that it identifies and probes the structural breaks which have the possibility of presence in the time series data (Medina, Caceres, & Corbacho, 2010).

In the first step, the researcher has applied panel unit root test to find out the stationary properties and stochastic properties of the variables. Moreover, the order of integration is also supposed to be found out by using this unit root test. There are various unit root tests used generally but the author has selected Levin Lin Chu unit root test for this study. This test is based on the null hypothesis which has the assumption that the data is non-stationary and there is a unit root present in the collected data (Levin, Lin, & Chu, 2002). The rejection of this null hypothesis leads towards the next step of the analysis. After the application of unit root test, the researcher has applied autocorrelation, heteroscedasticity and cross-sectional dependence tests along with multicollinearity test. These tests have been applied in the study so that any correlation, heteroscedastic effects, cross-sectional dependence and multicollinearity among the variables can be found out. If these tests are not applied, there might be inconsistency in the results of the study. For this purpose, the tests that have been applied include modified Wald and Breusch-Pegan/Cook-Weisberg heteroscedasticity test, VIF test of multicollinearity, Wooldridge autocorrelation test and Pesaran correlation test (Pesaran, 2004).

If the data contains any cross-sectional dependence and other such issues, it is necessary to use appropriate and authentic techniques to resolve these issues (Arellano & Bover, 1995; Blundell & Bond, 1998). Therefore, the
researcher in this study has applied Paris-Winsten regression test along with the PCSE estimation of the coefficients through the use of GMM estimation. The reason behind the use of two types of estimation is that the results obtained will have a higher degree of reliability and accuracy. As discussed earlier, the researcher has used both country and time fixed effects in the estimation model so that any heterogeneity issue can be effectively addressed. In GMM estimation, the lagged values are the basic tools that deal with the endogeneity issue. However, there are some prerequisites for it such as large sample size and stationarity of data (Bond, 2002). Another advantage of this estimation is that it reduces the small sample bias issues and thus improves the accuracy of the model and the results as well. The following model can be used for GMM estimation:

$$\hat{y}_{it} = \alpha_i + \gamma \hat{y}_{i,t-1} + \sum_{p=1}^{P} \beta_{ip} Z_{it} + \sum_{q=1}^{Q} \beta_{iq} \tilde{Z}_{it} + \sum_{r=1}^{R} \beta_{ir} \tilde{Z}_{r,t} + \epsilon_{it} \quad (2)$$

3.3 Results and Analysis

The first test that was applied by the researcher in this study was the LLC unit root test, the results of which have been presented vividly in table 2. The values for both level and first difference have been given in the table along with the significance of rejection and acceptance. As far as the level series is concerned, it is clear from the table that only FDI and globalization have rejected the null hypothesis of a unit root. The remaining three variables i.e. environmental sustainability, trade and per capita have accepted the null hypothesis. To resolve this issue of non-stationary variables, the researcher has applied the first difference on all the variables and the unit root was tested on this series. The first difference series indicate that all the variables have rejected the null hypothesis with 5 and 10 percent significance for different variables. This clears that at the first difference all the variables are stationary and there is no unit root. This result makes the data favourable to enter the next phase of the analysis i.e. diagnostic tests in this case.

Table 2: LLC unit root

<table>
<thead>
<tr>
<th>Constructs</th>
<th>ENS</th>
<th>Trade</th>
<th>FDI</th>
<th>Glob</th>
<th>PCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Level</td>
<td>-0.756</td>
<td>-2.489</td>
<td>-3.293*</td>
<td>-4.483*</td>
<td>-2.219</td>
</tr>
<tr>
<td>First difference</td>
<td>-4.399***</td>
<td>-7.394**</td>
<td>-5.309***</td>
<td>-7.459***</td>
<td>-5.388**</td>
</tr>
</tbody>
</table>

After the unit root test, the researcher had applied various diagnostic tests to find out the basic information about the data and the variables. These tests include autocorrelation, heteroscedasticity and cross-sectional dependence tests along with multicollinearity test. The results of all these tests have been reported in table 3. As per the heteroskedasticity results, it has been found out that the collected data has a significant amount of heteroskedasticity in it. Also, the autocorrelation test results have shown that the variables of the study are autocorrelated with each other.

Moreover, the cross-section dependence test results have also proved that the variables of the study are autocorrelated with each other. However, the results of multicollinearity test have shown that there is no multicollinearity among the variables of the study. To put it in a nutshell, the collected data is heteroskedastic, variables are autocorrelated and cross dependent but without multicollinearity. After all these tests, the next step was to perform correlation tests on the variables.

Table 3: Diagnostic checks

<table>
<thead>
<tr>
<th>Heteroscedasticity</th>
<th>Autocorrelation</th>
<th>Cross-section dependence</th>
<th>Multicollinearity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified wald</td>
<td>Wooldridge</td>
<td>Pesaran</td>
<td>VIF</td>
</tr>
<tr>
<td>Breusch-Pagan/Cook-Weisberg</td>
<td>F-statistic: 7.20*</td>
<td>Test statistic: 8.231**</td>
<td>Mean VIF: 1.67</td>
</tr>
<tr>
<td>$\chi^2$-value: 10.40**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\chi^2$-value: 8.49**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The information about the correlations among the variables has been obtained by applying correlation tests on the variables. The results of this test have been presented in the correlation matrix of table 4. According to these results, it is quite clear that there is no correlation between the variables of the study. Moreover, the general relationships between the variables have also been estimated through this test.

### Table 4: Correlation Matrix

<table>
<thead>
<tr>
<th>Variables</th>
<th>ENS</th>
<th>Trade</th>
<th>FDI</th>
<th>Glob</th>
<th>PCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENS</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade</td>
<td>0.373</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDI</td>
<td>0.298</td>
<td>0.388</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glob</td>
<td>0.498</td>
<td>0.643</td>
<td>0.466</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PCI</td>
<td>0.367</td>
<td>0.242</td>
<td>0.388</td>
<td>0.483</td>
<td>1</td>
</tr>
</tbody>
</table>

In the last, the researcher has applied PCSE and GMM estimation tests to find out the impact of independent variables on the dependent variables. The results of both these estimations have been given in table 5. As far as trade is concerned, it has a significant and positive impact on environmental sustainability in case of both PCSE and GMM estimation according to the results. In other words, with one percent increase in trade, environmental sustainability will enhance by 29.7% as per PCSE estimation while this increase will be 28.4% in case of GMM estimation. Similarly, FDI also has found to have a significant and positive impact on environmental sustainability in case of both PCSE and GMM estimation.

In this case, as the FDI is increased by one percent, the environmental sustainability will be enhanced by 19.8% for PCSE estimation while it will enhance by 20.3% for GMM estimation. In the same way, globalization also has found to have a significant and positive impact on environmental sustainability in case of both PCSE and GMM estimation. In this case, as globalization is increased by one percent, the environmental sustainability will be enhanced by 29.8% for PCSE estimation while it will enhance by 28.2% for GMM estimation. However, the impact of per capita income has an insignificant impact on environmental sustainability in both cases. In short, all the independent variables have a significant impact on environmental sustainability.

### Table 5: Results from PCSE estimation

<table>
<thead>
<tr>
<th>Dependent Variable = ENS</th>
<th>PCSE estimation</th>
<th>Sys-GMM estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade</td>
<td>0.297** (0.398)</td>
<td>0.284** (0.476)</td>
</tr>
<tr>
<td>FDI</td>
<td>0.198* (0.674)</td>
<td>0.203** (0.384)</td>
</tr>
<tr>
<td>Glob</td>
<td>0.298** (0.387)</td>
<td>0.282** (0.367)</td>
</tr>
<tr>
<td>PCI</td>
<td>0.032 (0.571)</td>
<td>0.063 (0.488)</td>
</tr>
<tr>
<td>Constant</td>
<td>3.278*** (0.943)</td>
<td>0.784** (0.498)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.789*** (0.877)</td>
<td>-</td>
</tr>
</tbody>
</table>

- Arellano-Bond test for AR (1) ($Pr W z$) - 0.673
- Arellano-Bond test for AR (2) ($Pr W z$) - 0.208
- Hansen test of over restrictions - 1.498
4 Discussion and Conclusion

4.1 Discussion

As the current study was designed and conducted with the core motive to explore and investigate the impact that is caused by trade, FDI and globalization on environmental sustainability in ASEAN countries. In this regard, the researcher has generated three hypotheses. The first hypothesis stated that trade has a significant impact on environmental sustainability. This hypothesis has been accepted as per the results which showed that this impact is significant and positive. When the trade between countries increases; technologies get exchanged, which improve the environmental conditions and ultimately the environmental sustainability. These results are in concordance with the past literature (Wiedmann & Lenzen, 2018). The second hypothesis stated that FDI has a significant impact on environmental sustainability. This hypothesis has also been accepted as the results have indicated that this impact is also significant and positive. When the foreign countries invest in a country in any sector, it increases and improves the technology of that country which is environment friendly and thus enhances environmental sustainability. This result also complies with the studies and researches conducted in the past (Bokpin, 2017). The last hypothesis stated that globalization has a significant impact on environmental sustainability. As per the results of PCSE and GMM estimation, this impact was found as significant and positive which leads to the acceptance of this hypothesis. Globalization leads to the exchange of ideas and technologies between different countries for the improvement in the environmental conditions. This leads to the environmental sustainability of these countries. This result is consistent with and agrees with the studies and literature from the past (Najam, Runnalls, & Halle, 2016). In the last, the control variable per capita income was found to have an insignificant impact on environmental sustainability due to insignificant results. In short, all the independent variables i.e. trade, FDI and globalization have a significant impact on environmental sustainability and thus all the hypotheses of the study have been accepted.

4.2 Conclusion

As the researcher of the current study has conducted the study to find out the impact of trade, FDI and globalization on the environmental sustainability of ASEAN countries, the researcher has collected data for this purpose from the ASEAN countries for 28 years from reliable resources and has applied a number of techniques and approaches for analysis purpose. The results of the analysis indicate that all the independent variables have a significant impact on environmental sustainability. These results lead towards the conclusion that the governments of the countries must give attention towards the enhancement of trade, FDI and globalization in their countries so that the latest technology and environment-friendly practices can be exchanged and ultimately it leads towards the environmental sustainability of the country.

4.3 Implications and Limitations

The major implication of practical context is that this study will guide the governments and companies to improve their practices and operations and adopt environment-friendly technology while performing those operations so that the harm caused by these activities to the environment can be reduced considerably and it will lead towards the environmental sustainability in the country. The policies must be devised that promote the use of environment-friendly practices. Moreover, theoretically, this study will provide literature and information to the researchers to be used by them in their studies and further research. As the sample size of the study is 28 years which is not large enough therefore other researchers are recommended to enhance the sample size so that better results can be obtained. Moreover, the other variables may also be used to enhance the scope of the study. Other countries or region must also be considered while conducting the study to obtain their perspective as well.
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BRIDGING THE WAY TOWARDS SUSTAINABILITY PERFORMANCE THROUGH SAFETY, EMPOWERMENT AND LEARNING: USING SUSTAINABLE LEADERSHIP AS DRIVING FORCE

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Abstract. In the current era, sustainable leadership plays a significant role to manage the companies with the society, environment, and long-term sustainable development goals that help them to gain the stakeholder's loyalty towards the company. This paper is an informative approach to critically inspect the number of factors that derive a sustainable performance of employees within the workplace. To fulfill this aim, structural leadership is considered as an independent variable, employee performance as a dependent variable, while psychological safety, structural empowerment, and organizational learning are act as mediators. The online survey-based quantitative research is considered to justify the hypothesis where the SFA and SEM focused statistical tests are implemented. The results depict that sustainable leadership favorably enhanced the organizational learning and structural empowerment-based employees' performance within a workplace as compared to their psychological safety factor. This informative data can be utilized by HR managers, policymakers, and the related field employees in the footwear sector that will definitely enhance their working efficiency. No doubt, it is a productive research, but lack of qualitative data may impact the authenticity and reliability of its results, and this weakness can be overcome by upcoming scholars.

Keywords: Sustainability Performance; Leadership; empowerment and learning


Jel Codes: M14

1 Introduction

In the early 1990s, the use of Chlorofluorocarbon (CFC) was banned for all the footwear products because it was deleterious to the conditions (Hwang & Kim, 2017). It has been estimated that the utilization of footwear products will double every 20 years. It results in increasing the sustainability of consumer products. Sustainable footwear products are those in which the material used is reduced drastically (Aversa, Petrescu, Petrescu, & Apicella, 2016). Sustainable leadership leads to the production of sustainable products (Jansson, Nordlund, & Westin, 2017). According to Zimek and Baumgartner (2017) sustainability performance refers to environmental, social, and economic sustainability. It is not limited to organizational boundaries, but it is also concerned with the upstream and downstream stakeholders of an organization. During the last few years, the sustainability performance of the footwear industry of Indonesia can be evaluated and determined by the emission of CO2, safety, and health of the organization, resource-saving, and the financial aspects (Sustiyatik, Susilo, & Ridwan, 2019). The given table 1 gives some important performance indicators priorities that the footwear industry of Indonesia considers in the past few years.
Sustainability performance is decreasing in the footwear sector because it does not consist of sustainable development goals or global goals (Kadar, Devadasan, & Balakrishnan, 2019). The performance of an organization depends on effective leadership that lacks in the footwear sector (Polese, Ciasullo, Troisi, & Maione, 2019; Geng, 2020). According to Connor, Delaney, and Rennie (2017), innovative management and leadership are important for organizations to achieve sustainable goals. The leaders should provide opportunities to the employees working in the footwear sector instead of providing the solutions (Plaskoff, 2017; Batool, A., et al., 2020; Goo, F., et al. 2020). The leaders should value the workers and should also understand their conflicts and tensions. The below table 1 shows the percentage of companies along sustainable leadership reporting during 2011-2016 (Kamarudin et al., 2020).

From the results and findings of previous studies, it can be indicated that significant efforts have been conducted regarding the total impact of sustainable leadership (SL) on the overall performance of sectors. A research study recently by Suriyankietkaew and Avery (2016) has evaluated the overall influence of effective as well as the influence of SL on the sustainable performance (SP) of the sector along with the mediating impact of employee empowerment. Though, the research effort has not been conducted regarding the footwear sector of Indonesia and its sustainability performance. None of the past research efforts has evaluated the significant part of SL on the performance of the footwear industry of Indonesia. So, the following study gives grounds for the clear meaning of
sustainable leadership and its impacts on SP. Furthermore, some past studies for example Bendell, Sutherland, and Little (2017) have demonstrated the impact as well as the association between employee empowerment (EE) and sector overall performance from different perspectives. Still, this research effort is positive and justified mainly because no other study has illustrated the direct mediating impact of organizational learning as well as structural empowerment in the linkage between sustainable leadership and SP of footwear sector of Indonesia. The stated research study has the following objectives and purposes,

- The inceptive purpose of the given study is to evaluate the overall impact of sustainable leadership on sustainability performance in the footwear sector of Indonesia.
- The secondary aim of the following research is to identify the mediating impact of psychological safety on the relationship b/w sustainable leadership and sustainability performance (SP) in the footwear industry of Indonesia.
- The third purpose of the current article is to examine the mediating impact of structural empowerment on the linkage between sustainable leadership and SP in the footwear industries of Indonesia.
- And the final purpose of the study is to identify the mediating impact of organizational learning on the relationship b/w SP and sustainable leadership in the footwear industry of Indonesia.

The given research is highly significant and admirable for the footwear industry of Indonesia to enhance the role of sustainability performance through safety measures. As it is important to mention that the given study has a wide scope in the footwear industry of Indonesia as well as in other sectors of the country. The HR professionals of the footwear industry can enhance the overall performance through effective sustainable leadership leaning qualities and using the driving forces (Al-Zawahreh, Khasawneh, & Al-Jaradat, 2019; BeltránPascual & Virseda, 2020). Moreover, the study is also significant for the top management, middle management, and other hieratical staff members for knowing the impact of structural empowerment as well as organizational learning on sustainable performance. The researchers of other sectors such as HR, manufacturing, service and banking sector can also take benefit from this article to learn the impact of SL on performance.

The current research article involves five major chapters incorporating the introduction of the study, review of the literature, study methodology, results and interpretation, discussion, and conclusion of the results. The first and basic chapter of the ongoing research is an introduction, which usually starts with the background of the topic and embraces the heading of problem statement and justification and rationale. The literature review is the second chapter of the given paper which summaries what has already been evaluated in the given sector and highlights some gaps and shortcomings in the current literature. The third section of the current study discusses the techniques that are used to gather data along with significant procedures and methods. This section also discusses all the tools that have been used to evaluate the collected data. The fourth chapter of the research contains all the results along with their interpretations and finally, the fifth chapter discusses the empirics and explains the significance of the work.

## 2 Literature review

### 2.1 Theory of sustainable leadership

Organizational SL practices and procedures generate durable, effective, and profitable outcomes (Selvarajah, Meyer, Jayakody, & Sukunesan, 2020). According to the given theory by proving an effective roadmap, significant practices to develop management approaches Bendell et al. (2017) sustainable leaders and management positively impacts and support the overall financial as well as operational performance of the sector in a sustainable way. According to the theory of sustainable leadership, sustainable practices such as focusing on learning as well as continuous enhancement (Barker & Hakegård, 2019). It promotes newness and sharing innovative ideas and concepts that develop an efficient environment where workers feel comfortable as well as experience innovative ideas which positively influence the overall performance process of the sector sustainably.
Furthermore, this theory also states that by implementing the above practices organizations significantly able to foster a psychologically safe environment for employees which remarkably impacts the overall operation as well as the financial performance of the sector sustainability (Shaw, 2018). Moreover, this theory also states that effective leadership and management in a sector is usually developing when the top management and leaders of the business manage their sector with the environment, society as well as long-term sustainable development objectives in mind which significantly supports the sustainable performance.

2.2 The relationship between Sustainable leadership and sustainability performance (SP)

Sustainable leadership is a very wide term as it refers to the management of the leaders who manage the companies with the environment, society, and long term goals for development in mind (Burawat, 2019). Suriyankietkaew and Avery (2016) in research explained that sustainable performance significantly refers to the triple bottom line, individuals, and planet gain. For sustainability in the companies and organizations, strong and sustainable leadership is very compulsory and it requires this sustainable leadership to promote business and make such policies to run the business without any hindrances and obstacles and leaving the rivals far behind in the marketing world. Organizations with sustainable leadership build a healthy environment for management and employees to work with harmony and enthusiasm. Employees under a sustainable leadership feel satisfaction, safety, surety, and chances of promotion and personal acknowledgment is also a part of (Barker & Hakegård, 2019). Sustainable leadership helps in managing internal and external issues with collaboration and understanding. Pham and Kim (2019) said that sustainable leadership is a key to success and a source of promoting development, education, progress, and also new policies to lead the business towards success and progress. The sustainability in leadership promotes unity, success, development, new phases for the organization to emerge its new industries (Suriyankietkaew, 2017). This is a fact that when there is a sustainable leadership in the organization or companies they take steps to progress only with a lot of profits and benefits. The qualities that an organization expresses through sustainable leadership are not just for the specific number of people but it benefits the nation and worldwide also. Under sustainable leadership, the employees feel a kind of satisfaction and they work with loyalty and try to excel their efforts (Koesmono, 2018). They manage to cope with the issues according to the situation and policies implemented by the management and also make it possible to adopt new ways and means of services to make the effort in playing a positive role. Thus a sustainable leadership has a very positive influence on maintaining a sensible and durable relationship to achieve the desired goals and success and for the employees as well to work with satisfaction and loyalty with a safe future. Therefore, the current paper recommends the below hypotheses,

H1: Sustainable leadership positively relates to sustainable performance.

2.3 The mediating role of psychological safety in the relationship b/w sustainable leadership and SP

A study by Chughtai (2016) manifests that psychological safety enhances the performance of the employees, and they feel easy in talking about their conflicts and share their ideas openly under psychological safety. They can easily and fearlessly raise the issues being faced in the organization regarding their jobs. The leader encourages the employees to focus on the activities of different opportunities and share their ideas and experiments with others in the organization (Deci, Olafsen, & Ryan, 2017). According to You (2020) sustainable leadership highly affects the sustainable performance within an organization by providing psychological safety. Psychological safety not only enhances the presentation at the individual level, but it also affects the performance of a company at the organizational level. Sustainable performance is determined in terms of the accomplishment of goals and return on the assets and resources (Agarwal & Farndale, 2017). According to Miao, Eva, Newman, and Cooper (2019) work engagement can be enhanced with the help of psychological safety, and its absence results in substantial loss of social and economic aspects to the workers as well as the organizations. The roots of sustainable leadership highlight the responsibilities of a company to the society. Sustainable leaders are
responsible for fulfilling the needs of the present generations. SL enables sectors to acquire faster, efficient, and more malleable than opponents (Yin, Ma, Yu, Jia, & Liao, 2019). Hence the above empirical discussion propose the following hypotheses,

**H2:** Psychological safety significantly mediates the association b/w sustainable leadership and sustainability performance.

2.4 The mediating impact of structural empowerment on the association b/w sustainable leadership and SP

Over the last few decades, sustainability is a very critical issue for many sectors and organizations majorly were a trade-off among social as well as economic performance is developing (Dedahanov, Bozorov, & Sung, 2019). According to Valsania, Moriano, and Molero (2016) that structural setting directly impacts the social as well as economic performance of the sectors, as, structural settings have an effective impact on the overall performance of the sector. It is evaluated that the combination of effective structural settings and empowerment and commitment between individuals empower sectors to bring a high degree of SP in terms of operations and economics. According to Reed (2019), structural empowerment incorporated as the structures such as policies and procedures within a sector that empower many employees and individuals to practice in an effective as well as an autonomous way to support the sector in achieving a high degree of sustainable performance. Another study by Asif, Qing, Hwang, and Shi (2019) manifests that with significant structural empowerment, a particular sector has a commitment to learning which generates sustainable leadership in the firm that further develops significant outcomes in terms of sustainability in overall performance. Furthermore, it is demonstrated that in a significant structural environment, employees of the sector would analyze issues and act significantly as well as independently and where their positive level of allegiance majorly lead to SP (Elsetouhi, Hammad, Nagm, & Elbaz, 2018). Based on the discussion above, the given study suggest the ensuing hypotheses,

**H3:** Structural empowerment positively mediates the relationship b/w SL and sustainable performance.

2.5 The mediating impact of organizational learning on the relationship b/w sustainable leadership and SP

Organizational learning is a process by which an organization takes steps to improve itself over time through gaining knowledge and experience and then the use of that experience to create understanding and knowledge (Sohi & Matthews, 2019). Finally, this obtained knowledge is transferred within the firm or the organization. Organizational learning is very important for organizations to develop strength and promotion through creation, retention and the transfer of knowledge within the organization will strengthen the organization as a whole (Greer & Egan, 2019). Organizational learning mainly consists of these three points as conceive, act, and reflect. Thus organizational learning plays a sensitive role in building a very strong connection between SL and SP. When an idea is conceived, then it is created and finally reflected. Through the process of conceives and active learning is reflected. Thus it has a mediating role in building a strong bond between sustainable leadership and sustainable performance. Organizational learning promotes ideas to build a positive environment for the management and for the employees to develop a healthy environment to develop the idea of promoting new products manufacturing and implementing new ideas within the organization (Tamayo-Torres, Gutiérrez-Gutiérrez, Llorens-Montes, & Martínez-López, 2016).

**H4:** Organizational learning positively mediates the association b/w sustainable leadership and sustainable performance

Research model is presented in Figure 1
The research method of this paper is majorly based on conducting quantitative research where different open-ended questions are asked from the related field participants. As, this paper majorly based on considering the footwear sector so the tested participants will be its management, related workers, policymakers and the management students. This is an advanced source of statistical outcome where online survey-based quantitative data is gathered. According to their demographic factors segregation, three factors are majorly considered as gender, education and age factors. The five-point Liker scale (from highly disagreed = 1 to highly agreed = 5) is used to ask the related questions from the targeted participants. In the initial stage, the 500 questionnaires are distributed among the stakeholders of this paper on which only 338 are interested to give a valid outcome that helps to make a constructive research analysis. In this paper, sustainable leadership is considered as an independent variable, sustainable performance is studied as a dependent variable, while there are three mediating variables named as psychological safety, organizational learning and structural empowerment.

Its demographic analysis based outcomes are given below; where the majority of the participants are postgraduates or having a master's degree (Arnett, 2018). According to the statistics, there are 13%
participants who having a graduation based academic background, 43% are the postgraduates, and 32% belong to the high professional master’s degree, while the remaining 12% belong to the field of education / academics. This factor shows that all the participants having HR management and related field-based experience, especially in the footwear industry. Well, in case of their gender based segregation, there are 177 males and 161 females. Well, there is a minor difference among the male and female participation in this research outcome like male to female ratio is 52: 48. Last, but not the least, is an age-based demographic factor, it becomes clear that the frequency of 21 to 30 years old individuals is 89 with 26%, while in 31-40 age group, its frequency is 31% and 29% frequency of participation belongs to the 41 to 50 years old people of the related field. While, the remaining 15% are older than 50 years. After collecting this dispersed data from the selected participants, the next step is to apply the SPSS based test on the hypothesis testing based mechanism of this paper. The confirmatory factor analysis and the structural equation modeling based research tests are implemented in order to make a versatile outcome (Hussain, Anwar & Razimi, 2020).

4 Analysis Interpretation

In this statistical analysis, the two-stage model oriented building process is implemented named as confirmatory factor analysis (CFA) which based on determining the number of factors and the loading of the measured variables based on the pre-established theory (Keith & Reynolds, 2018; Marsh, Guo, Dicke, Parker, & Craven, 2020). The second method is structural equation modeling (SEM) to test the validity of this paper hypothesis. The CFA directly accessed the measurement quality of the model and also measures the individual factor analyses for the performance and learning constructs (Chui, Lee, Mok, & Tsang, 2018). In the SEM-based analysis, the conventional estimation technique is used to test the relationship between the tested variables (Bandalos & Gerstner, 2016; Jöreskog, Olsson, & Wallentin, 2016). Its descriptive statistics based outcomes are shown in the following table 2.

Table 2: Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
</tr>
<tr>
<td>SustLead</td>
<td>338</td>
<td>1.00</td>
<td>4.90</td>
<td>3.5240</td>
<td>1.12990</td>
<td>-0.777</td>
</tr>
<tr>
<td>PsySafety</td>
<td>338</td>
<td>1.00</td>
<td>5.00</td>
<td>3.5337</td>
<td>1.11876</td>
<td>-0.733</td>
</tr>
<tr>
<td>StructEmp</td>
<td>338</td>
<td>1.00</td>
<td>5.00</td>
<td>3.4802</td>
<td>1.08539</td>
<td>-0.733</td>
</tr>
<tr>
<td>OrgaLearn</td>
<td>338</td>
<td>1.00</td>
<td>5.75</td>
<td>3.4357</td>
<td>1.08986</td>
<td>-0.239</td>
</tr>
<tr>
<td>SustPerf</td>
<td>338</td>
<td>1.00</td>
<td>5.00</td>
<td>3.4411</td>
<td>1.11019</td>
<td>-0.610</td>
</tr>
</tbody>
</table>

According to the above statistics, it becomes clear that the standard error value of this SPSS test is 3.5 where the sustainability leadership based independent variable shows a higher mean value. Also, its standard deviation value depicts that this factor has majorly deviated from its mean position that may reduce its direct influence on the sustainable performance factor. Well, both structural empowerment and organizational learning factors are less deviated from there mean position which shows that there is a great impact of these organizational factors on the performance level of the employees within a workplace. While, the psychological safety figures show their lesser impact on the employee performance factor. As far as their KMO and Bartlett's test-based statistical analysis, the following values show the real outcomes.
Table 3: KMO and Bartlett's Test

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</th>
<th>.947</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
<td>17569.943</td>
</tr>
<tr>
<td>df</td>
<td>741</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>

According to the Kaiser-Mayer-Olkin measure of sampling adequacy outcomes, it becomes clear that its value (0.947) is within the threshold range. Also, the significance value of this research outcome is less than 0.05 with the proper Chi-square value depicts that this model is a good fit to analyze the impact of sustainable leadership on the employees performance. It’s rotated component matrix-based table is shown in the following table 4.

Table 4: Rotated Component Matrixa

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL1</td>
<td>.737</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SL2</td>
<td>.784</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SL3</td>
<td>.850</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SL4</td>
<td>.849</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SL5</td>
<td>.846</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SL6</td>
<td>.862</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SL7</td>
<td>.836</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SL8</td>
<td>.833</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SL9</td>
<td>.842</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS1</td>
<td></td>
<td>.855</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS2</td>
<td></td>
<td>.851</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS3</td>
<td></td>
<td>.867</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS4</td>
<td></td>
<td>.842</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS5</td>
<td></td>
<td>.851</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE1</td>
<td></td>
<td></td>
<td>.817</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE2</td>
<td></td>
<td></td>
<td>.848</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE3</td>
<td></td>
<td></td>
<td>.829</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE4</td>
<td></td>
<td></td>
<td>.816</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OL1</td>
<td></td>
<td></td>
<td></td>
<td>.635</td>
<td></td>
</tr>
<tr>
<td>OL2</td>
<td></td>
<td></td>
<td></td>
<td>.672</td>
<td></td>
</tr>
<tr>
<td>OL3</td>
<td></td>
<td></td>
<td></td>
<td>.733</td>
<td></td>
</tr>
<tr>
<td>OL4</td>
<td></td>
<td></td>
<td></td>
<td>.818</td>
<td></td>
</tr>
<tr>
<td>OL5</td>
<td></td>
<td></td>
<td></td>
<td>.818</td>
<td></td>
</tr>
<tr>
<td>OL6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.799</td>
</tr>
<tr>
<td>SP1</td>
<td>.810</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP2</td>
<td>.843</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP3</td>
<td>.847</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP4</td>
<td>.858</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP5</td>
<td>.850</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP6</td>
<td>.841</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP7</td>
<td>.811</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP8</td>
<td>.789</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The above tabular description of all the items shows that all the matrix values are more than 0.7 means at their threshold range. This means that all the items are effectively loaded on this model that enhanced the productivity of this model to make a constructive outcome. Well, its convergent and divergent validity based outcomes are shown in the following table that is helpful enough to make a constructive outcome.

<table>
<thead>
<tr>
<th>Table 5: Convergent and Discriminant Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
</tr>
<tr>
<td>OL</td>
</tr>
<tr>
<td>SL</td>
</tr>
<tr>
<td>PS</td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>SP</td>
</tr>
</tbody>
</table>

According to the above items based description, it becomes concluded that there is no convergent or divergent issue faced by the tested items loading. Like, all the average variance extracted value is more than 0.5 and the related composite reliability factor is higher than 0.7 which means no convergent validity issue has been faced in this case. In addition to this, the decreasing order based bold letters output explore the non-existence of discriminant validity issues. This shows that all items are distinct from one another due to their diverse nature and related outcomes. See Table 6.

<table>
<thead>
<tr>
<th>Table 6: Model Fit Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFA Indicators</td>
</tr>
<tr>
<td>Threshold Value</td>
</tr>
<tr>
<td>Observed Value</td>
</tr>
</tbody>
</table>

This model fit indices is an important and informative approach to critically inspect the efficiency and authenticity of the factors uploading mechanism. According to the above-mentioned statistics, all the observed values of GFI, CMIN/DF, IFI, CFI, and RMSEA is within their related threshold range. Like the value of RMSEA is lower than 0.08 (0.072), the value of CFI is greater than 0.90 (0.932) while IFI also shows a similar outcome. In addition to this, GFI shows such observed value which is greater than 0.80 (0.812) and CMIN/DF having more than 3 based observed tested value (2.761). All these statistical evaluations depict that all the variables are effectively loading in the model which is a good fit. Its related figure is given below in Figure 3.
This figure 7 shows all the items effectively loaded. In addition to this, this structural equation modeling, based statistical outcomes are given below where their values justified the influence of sustainable leadership on the related variables. According to the direct effect based statistical outcomes, it becomes concluded that one percent change in the independent variable, sustainable leadership caused 53.1% change in the organizational learning, 51.3% in structural empowerment 45.8% change in the psychological safety and 46.6% change in the sustainability performance. According to the statistical outcomes of the above-mentioned figure, it becomes clear that the impact of sustainable leadership is much higher on the organizational learning and structural empowerment factor. While, the sustainable performance of employees in the footnote companies is 46.6% changed by sustainable leadership, 62.7% through organizational learning, 12.2% by structural empowerment, while 12.5% through psychological safety factors. Its effect and non-effect based outcomes are shown in the following table along with its graphical representation.

Table 7. Structural Equation Modeling

<table>
<thead>
<tr>
<th>Total Effect</th>
<th>SustLead</th>
<th>OrgaLearn</th>
<th>StructEmp</th>
<th>PsySafety</th>
</tr>
</thead>
<tbody>
<tr>
<td>OrgaLearn</td>
<td>.531**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>StructEmp</td>
<td>.513**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>PsySafety</td>
<td>.458**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SustPerf</td>
<td>.466**</td>
<td>.627**</td>
<td>.122**</td>
<td>.125**</td>
</tr>
<tr>
<td>Direct Effect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SustLead</td>
<td>.531**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>OrgaLearn</td>
<td>.513**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>StructEmp</td>
<td>.458**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>PsySafety</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5 Discussion and Conclusion

5.1 Discussion
According to the above-mentioned results based statistical analysis, it becomes clear that organizational sustainable leadership caused a major impact on the effective organizational learning and its structural empowerment factor. Such type of empowerment is the major factor to develop an efficient transformational leadership, new knowledge, innovations, exemplary professional practice, and effective empirical outcomes that motivate the employees to enhance their efficiency factors. Qaiser Iqbal with others in their cleaner production journal majorly worked on exploring the psychological empowerment of individuals in order to generate a sustainable performance and leadership based critical analysis. They stated that sustainable leadership has a substantial impact on the psychological safety of an individual, while it has a positive indirect impact on sustainable performance through the efficient psychological safety factor. According to them, there is a need to develop sustainable leadership within an organization in order to enhance the employee's loyalty towards the company's goal. The above-mentioned outcome also depicts the real figure of the direct impact of such efficient leadership on enhancing the employees' performance in a diverse competitive market (Iqbal, Ahmad, & Nasim, 2020).
In the current era, it becomes quite essential to consider the importance of corporate social responsibility in the efficient development of sustainable organizational development. In the social responsibility journal, the researchers stated that efficient employees’ performance in a workplace is based on empowering service learning for the CSR where the sustainable awareness-based community service enhanced the confidence and loyalty of employees towards the company (Huda et al., 2018). In addition to this, sustainable and collaborative leadership plays a major role to empower the working individuals towards the efficient growth of a company. Issac Mbeche Nyang’ac and others (2018) majorly worked on exploring such individual importance by considering an in-depth analysis of the operating activities. According to them, the perennial nature of the companion crops provides an efficient opportunity for continuous learning and stakeholder learnings where it requires formal institutional engagement and committed leadership for sustainable activities (Nyang’au, Kelboro, Hornidge, Midega, & Borgemeister, 2018). In this case, green marketing plays a significant role to create a positive perception regarding the goals and vision of the company in front of its stakeholders. In this case, efficient sustainable leadership plays a major significant role to develop the concept of psychological safety, organizational learning, and structural empowerment factors among its employees that result in the development of sustainable performance within a workplace (Ottman, 2017). This theoretical justification is also explored in the above statistical outcomes.

5.2 Conclusion
Thus, after critically evaluate all the CFA and SEM-based statistical outcomes, it becomes concluded that sustainable leadership caused a significant impact on the development of sustainable performance within an organization. According to the results, the mediating role of organizational learning and structural empowerment favorably enhanced the influence of sustainable leadership on the employees’ sustainable performance. While the existence of psychological safety deviates the hypothesis because it is very risky in front of management to secure their psychological perception towards the company’s goals. This paper is informative to critically enhance the understanding regarding sustainable leadership.

5.3 Future Implications
This data can be utilized by the related scholars to make some adjustments in their data collection mechanism. Also, its relevant information can add value in the managerial decision-making process regarding which type of leadership will be more efficient to gain employee loyalty towards the company’s operating activities. Also, it will be an informative approach in front of the policymakers to make efficient decisions regarding human resource management.

5.4 Limitations and Future Researches
In addition to its implication, there are some limitations of this paper like there is no work on considering the interview-based psychological analysis of the related participants that can add value in the critical evaluation of the psychological safety factor. There is an opportunity in front of upcoming scholars to critically investigate its deficiencies and develop a versatile outcome.
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https://link.springer.com/chapter/10.1007/978-981-10-8034-0_5


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ENHANCING SOCIAL PERFORMANCE OF NGOS OPERATION IN INDONESIA THROUGH EXTERNAL POSITIVE PRESSURE: MEDIATING ROLE OF ORIENTATION DIMENSIONS AND SUSTAINABLE PRACTICES

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Abstract. In the Indonesian market, excessive pressure faced by the local NGOs in their social cause oriented operating activities and this paper is majorly based on exploring those external factors that positively enhanced the social performance of such organizations within this developing nation. In most cases, the environmental-friendly practices are initiated by a company in order to become a more sustainable organization in the advanced competitors and customer market. This paper is based on online survey-based quantitative research where the 355 participants based valid outcomes are studied and evaluated through structural equation modeling statistical test implementation. According to this model results, external pressure caused a major favorable influence on the development of strategic sustainability orientation and sustainable entrepreneurship practice that motivate the organizational management to enhance their social performance within the Indonesian state. This data is informative for the Indonesian social workers, the business community and other related NGO’s to consider the external environmental factors in their effective decision-making process. Also, the related field scholars can utilize this information in their discussion portion. No doubt, this is informative research, but still, there are some deficiencies within this paper like lack of psychological (interview), etc, which can be covered by the upcoming scholars.

Keywords: Social Performance; External Positive Pressure; Orientation Dimensions; Sustainable Practices


Jel Codes: M1

1 Introduction
The NGOs of Indonesia have made their mission to pursue those companies that violate environmental laws (Masterpole, Teleposky, Thompson, & Zaghloul, 2019). In the late 1990s, the NGOs and the companies of Indonesia were not protected by the government, and corporate social responsibility played an essential role for the companies at that time to help them in securing them from society (Laraswati et al., 2020; Goo, et al., 2020). The importance of trust on NGO’s in Indonesia can be evaluated through given graph below which shows that almost 62% of people in Indonesia trust upon NGO’s as compared to other sectors and firms (see Figure 1).
Indonesia became the first country to present the obligatory legal requirements in CSR in July 2007 (Uda, Schouten, & Hein, 2018). During the period of the 1980s to 1990s, high profile operations were launched by NGOs against MNCs. The organizations and firms have more assets to invest in social performance if they retain more solid financial performance. The implementation of sustainability creativities help in improving the social and environmental performance of the firms and also provides a competitive benefit by attaining an innovative set of competencies (Dzhengiz & Niesten, 2019; Goo, S., 2020; Granada & Mejia, 2020; Prawoto, & Basuki, 2020).

Moreover, the given table provides all the fundamental external pressure as well as factors that act on the performance of NGOs in Indonesia during the last few years (see Table 1).

**Table 1:** External factors affecting NGOs performance

<table>
<thead>
<tr>
<th>External factors</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political</td>
<td>Such as new legislation</td>
</tr>
<tr>
<td>Economic</td>
<td>Such as inflation and unemployment</td>
</tr>
<tr>
<td>Environmental</td>
<td>Weather conditions majorly affecting sustainable performance</td>
</tr>
<tr>
<td>Competitive</td>
<td>Influence of a rival NGO</td>
</tr>
</tbody>
</table>

According to Arizona, Wicaksono, and Vel (2019), major issues regarding the social performance of NGOs is limited financial resources and business experience. It is difficult for NGOs to manage environmental and social issues (JAIWONG, 2019). The level of participation in SMEs in the organizations of Indonesia is low (Ati, Baga, & Satria, 2019). The level of social pressure from the NGOs is high in the industries of Indonesia that results in lower financial performance. It can hurt the reputation and brand equity of those industries. Moreover, the financial performance of a company is adversely linked with social performance (Galudra, 2019).

Over the last few years, different studies and their researchers have examined the direct impact of external pressure on the social as well as the entrepreneurial performance of different sectors (Distelhorst, Hainmueller, & Locke, 2017). Recent research by Kholis, Fatma, Maksum, and Bukit (2016) has made a comprehensible vision and evidence as small business and sectors involves every entrepreneur plays a very positive role to improve as
well as sustain the existing value of the firm or sector. The past efforts lack in describing the direct impact of external pressure on the social performance of any particular NGO mainly through sustainable entrepreneurial orientations and practices (Maria & Meiliana, 2018). The current study keenly identifies as well as examined how external pressure directly influences the social performance of NGOs that are operating in Indonesia. The current research paper has very detailed as well as a clear description of improving the social performance of NGOs operating in Indonesia mainly through the mediating role of strategic sustainable orientation and entrepreneurial practices. The following research article also focuses on the point that how the external pressure influences the overall entrepreneurial performance of NGOs operating in Indonesia. The study objectives of the current research are given below,

- The commencing objective of the study is to identify the direct influence of external pressure on social performance in NGOs operating in Indonesia.
- The second major aim is to illustrate the mediating impact of strategic sustainability orientation on the association between external pressure and social performance in NGOs operating in Indonesia.
- The third goal of the current paper is to describe the mediating role of sustainable entrepreneurial orientation in the linkage between social performance and external pressure in NGOs operating in Indonesia.
- The final objective of the given research is to evaluate the mediating act of sustainable entrepreneurial practices on the connection between external pressure and social performance in NGOs operating in Indonesia.

The significant impact of external pressure as well as some factors plays a direct role in the creation and progress of sustainable social performance for NGOs operating in Indonesia (Rahman, 2019). According to Borgert, Donovan, Topple, and Masli (2020) there is a clear vision that sustainable entrepreneurial practices and orientations are a major source of developing an effective relationship between external factors and performance dimensions and all the worthwhile NGOs in any region. Moreover, there is a clear concept that organizations and NGOs have their worth and importance in the life of entrepreneurs. Majorly through sustainable EO and practices bring harmony between the individuals of the organizations. Therefore, the given research is very significant for the top management of different NGOs operating in Indonesia.

The research study covers five significant chapters including the introduction chapter which describes the detailed background of the given topic, problem statement, purpose of the research, questions regarding the research, and the scope of the study findings and their implications. The chapter of the literature review describes the compositions of the previous studies that are concerned with the dependent as well as the independent variables of the study. The study methodology chapter describes different techniques used in collecting the data. The data analysis techniques are described in the section of data analysis. The last chapter consists of the discussion, implications, conclusion, limitations, and upcoming recommendations regarding the study.

2 Literature review

2.1 Theory of external pressure

In the context of an organization, external pressures are some factors that can majorly have a straight impact on the sector social performance which are typically related to the social issues and the government regulations as well as the strength of effective competition (Basaglia, Camotim, & Silvestre, 2019). According to the theory of EP, there are some major types of pressures and forces that can affect the social as well as the operational performance of an organization including normative, mimetic, and coercive (Sharma, Yadav, & Sharma, 2017). According to Fan and Zhao (2017), external pressure majorly comes from sector constituents such as operations members, professional agencies, and some regulatory bodies that directly influence the performance of organizations. This theory also states that external pressures majorly come from organization initial competitors
that have significantly adopted some effective practices (Salahshour & Fallah, 2018). The theory of external pressure also describes those pressures initiates from the orders that stem from combine societal expectations propose that organizations match up to shared values to secure their level in the sector and also prolong “social legitimacy” (Shen & Xiang, 2018). The given theory considered coercive external pressure as a significant sustainability predecessor. This is mainly because coercive pressure involves social-related political impacts exerted by other organizations as well as governmental policies on which the organization and NGO depends.

### 2.2 Relationship b/w external pressure and social performance (SP)

Muhammad Auwal, Mohamed, Nasir Shamsudin, Sharifuddin, and Ali (2020) in research explained that the pressure is generally a feeling or the use of persuasion or intimidation to make someone do something. External pressures (EP) come from external sources, things outside of one's control (Adebajo, Teh, & Ahmed, 2016). External pressures are sources that may affect social performance (Dubey et al., 2017). Usually, there are three main types of EP in any organization (normative, mimetic, and coercive) external pressure may come from the sector constituents, detailed as the supply chain (SC) members, professional agencies, regulatory factors, and most influential force power of NGOs. There is a procedure adopted by the firms to overview the uncertainties of the organizations to evaluate the difficulties and shortcomings and problems. External pressure is generally taken as both positive and negative also to analyze this influence as a positive one, as it creates kind of competition, creativity, and also unity among all the members of the team to meet the challenges and the demands and also to adopt such modern tools and strategies are adopted (Shaukat, Qiu, & Trojanowski, 2016). EP influences the social performance of the relationship with the customers, management, production, supply chain, and the availability of the sources to avail in times will make the production of the organization effective. Compliance and the issues are solves as the priority. Coercive pressure involves the external political activities as the pressure from the government or the relevant firms affecting the performance of the organizations. Thus, there is a direct relationship between external pressure and SP. The factors affecting the social performance and the influence of EP are very influential and strong (Kim et al., 2016). Consequently, EP sometimes effects in such a way that it damages the customer's relationship with the organization and also the production. EP also affects the environment of the organization as it creates a potential for the workers and also affects their potential negatively. The study is very effective in explaining the EP as a source of empowering the organizations to make their efforts positive. Customer value and the demand for the supply chain are also fulfilled. Accordingly, the above entire discussion leads to the generation of the hypotheses below,

**H1:** External pressure positively influences the social performance of NGOs.

### 2.3 The mediating impact of strategic sustainability orientation (SSO) on the relationship between external pressure and SP

External pressure can help an organization in attaining and improving its sustainable practices by providing those organizations a strategic sustainability orientation (SSO) (Emamisaleh & Rahmani, 2017). It also enables an organization to implement SEP that helps in generating the desired and required performance. According to Wijethilake (2017), SSO and EP stimulate an essential role in the success of SEP and the external pressure comes from NGOs, professional agencies, and supply chain members. According to a recent study by Papadas, Avlonitis, Carrigan, and Piha (2019) SSO refer to the strategy of an organization that helps in capturing different decision-making styles and practices. Long-lasting business performance can be attained by a high level of sustainability and SSO (Charan & Murty, 2018). It is proved by the theory of external pressure that the social production of an organization is related to the regulations of the government as well as social issues that affect the operational performance of that organization. Another study by Dubey et al. (2017) explained that SSO has played a vital role in encouraging the firms to develop effective strategies and policies for managing EP, SP, environmental and social impacts of their firm’s activities. SSO allows the herbal-based industrialists to prepare themselves well to be more competitive and economical in the future (Bamgbade et al., 2019). So, build on the entire above arguments the study suggests the following hypotheses,
H2: Strategic sustainability orientation remarkably mediates the relationship b/w EP and social performance.

2.4 The mediating role of sustainable entrepreneurial orientation (SEO) in the relationship between external pressure and SP

The overall concept of sustainability relating to NGOs' business perspective constitutes three important types including social, environmental, and economic (Adel & Habib, 2018). Imran et al. (2018) in research characterized that sustainability as a significant concept that NGOs and other organizations around the globe are keenly adopting to improve their social performances. They also illustrated that though firms appreciate sustainable orientation, they usually incorporate them (Kamarudin et al., 2020). Out of given sustainability types, literature has highlighted the social aspect majorly because of its direct impacts on the overall performance of the organization (Genc, Dayan, & Genc, 2019; Vinichenko, Melnichuk, & Karácsényi, 2020; Sabir & Hussin, 2020). Entrepreneurial orientation (EO) is an organizational-level strategic orientation that majorly captures a firm strategy developing practices, managerial ideas, and organizational behaviors that are majorly entrepreneurial (Roxas, Ashill, & Chadee, 2017; Wichitsathian, & Nakruang, 2019; Iqbal, A., et al., 2020) Omer, & Aljaaidi, 2020; Betáková, Havierniková, Okręglicka, Mynarzová, & Magda, 2020).

During the last few years, EO has become one of the most crucial factors that dominate the social performance of the organization, especially NGOs. This is mainly because EO has been indicating to be an important predictor of NGO social performance mainly through external pressure with a meta-analysis of past few studies showing a relationship between social performance and external factors(Kantur, 2016). According to Ayuso and Navarrete-Báez (2018), EO is very significant for the social performance of the firm because it reflects managerial views and informs the firm efforts required to develop an effective social performance that creates value for the existing environment. In short, effective and sustainable EO represents the proclivity of NGO's decision making to emphasize entrepreneurial processes within the organization. Therefore, a sustainable level of EO can majorly support and positively mediates the relationship between EP and the SP of the organization (Hussain et al., 2020). The above relationship and mediation impact of sustainable EO is supported by the theory of external pressure this is because external factors sometimes affect the level of sustainability EO which further affects the social performance of the sector. Hence, construct the justification in the above discussion, this research study postulate that:

H3: Sustainable entrepreneurial orientation has a positive mediating in relationship between external pressure and SP.

2.5 The mediating impact of sustainable entrepreneurial practices (SEP) on the linkage between external pressure and SP

Sustainable Entrepreneurial (SE) stands for a business-driven concept of sustainability which focuses on increasing both socially as well as business value and in other words shared value (DiVito & Ingen-Housz, 2019). SE refers to the creation, discovery, and exploitation of entrepreneurial opportunities and chances that play a positive contribution to sustainability by generating social and environmental advantages and gains in society. Sustainable business practices can sometimes prove miracles for the reputation of the brand and to the bottom line. Such sustainable entrepreneurial practices make a linkage between the EP and SP. Such SE creates a strong link in making a positive relationship as EP involves all the factors in making the development. According to Mayanja, Ntayi, Munene, Wasswa, and Kagaari (2020), the mediating role of this sustainable entrepreneurial practice SEP is very effective and influences very positively as external pressure motivates the employees to perform their abilities and perform their skills and management makes such policies to continue their production without any obstacles and hindrances. Thus, the above argument leads to the creation of the below hypotheses,

H4: Sustainable entrepreneurial practice has a significant mediating role in enhancing the relationship between external pressure and SP.
Research model is presented in Figure 2.

![Research Model Diagram]

**Figure 2**: Research Model

3 **Methodology**

3.1 **Data Collection and Sample**

This study is majorly based on exploring the impact of external pressure on the social performance of an organization. In order to justify the tested hypothesis, the online survey-based statistical outcomes are considered for critical evaluation (Hopewell et al., 2018; Leavy, 2017; Silverman, 2016). The quantitative research method is used in the data collection mechanism where majorly those participants are considered who belong to Indonesian NGOs and organizational community individuals. In the data collection mechanism, external pressure is studied as an independent variable, social performance is considered as social performance, while the strategic sustainability orientation, sustainable entrepreneurship practice, and sustainable entrepreneurial orientation acts as mediators that strengthen the relationship between the independent and dependent variables of this paper. In this online-survey based closed-ended questions, total 450 questionnaires were supplied to the participants on which only 355 of them gave valid responses that help to nullify or justified the hypothesis of this study. This sample data is then segregated based on its demographic statistics in its gender-based demographic statistics where it
becomes concluded that 55% are males and 45% are females in this data collection statistics. There is a 10% difference between both genders which shows that mostly males are giving correct information regarding the performance sustainability factor.

Well, in case of age factor, the frequency of participants is much higher who are within the age limit of 22 to 35 in this NGO field, like 116 participants are less than 25 years old (33%), 138 participants are within the age group of 25 to 35 (39%), 86 are from 35 to 45 years old (24%), while 15 are more than 45 years old with only 4% of the overall percentage. While, in the experience based segregation, 14% participants (48 in numeric) are less than 2 years’ experience in the related field in Indonesia, 43% are 2 to 5 years’ experience with 154 participants, 34% are 5 to 8 years based experience and have 119 in quantity. Last, but not the least, there are 10% of those participants (34 in numbers) who have more than 8 years' experience in the related field. After critically evaluate the demographic sample based critical analysis, it becomes clear that the majority of the participants are having a high post in the Indonesia NGOs and having full understanding of the importance of sustainable organizational strategies in the stakeholders market.

3.2 Measures
The five points Likert scale is used to critically inspect the preferences of the related-field participants towards the importance of sustainable practice within an organization. To measure the appropriate statistical analysis, KMO and Bartlett’s test is used to identify the model fitness and the reliability of all the variables in the model. Also, the convergent and discriminant validity test-based statistical outcomes will be generated that helps to identify any error or issue in the items loading mechanism and resolve the related ones. After this, the confirmatory factor analysis (CFA) and the structural equation modeling (SEM) based informative SPSS tests will be implemented that outcomes help to justify the relationship among the tested variables and add value in the research outcomes. All these statistics will add value to this methodology to make a constructive and authentic outcome.

4 Analysis Interpretation
After collecting all the relevant statistical data and applying the SPSS test model, it's time to make an analytical interpretation of the related tested variables of this paper. Its descriptive statistics depict that the standard error value of this test is constantly 0.129 which is quite affordable, while the standard deviation value of sustainable entrepreneurial orientation is least (0.99) as compared to other ones which mean this factor is less deviated from its means position and caused a major impact on strengthening the relationship among the external pressure and social performance. While the external pressure and sustainability entrepreneurship practice values have highly deviated from their mean position which shows that due to the influence of other controlling variables within an organization directly impact their influential power on the efficient social performance of an individual. Its tabular description is shown in the following table 2.

Table 2: Descriptive Statistics

<table>
<thead>
<tr>
<th>Statistic</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterpres</td>
<td>355</td>
<td>1.00</td>
<td>5.00</td>
<td>3.1380</td>
<td>1.17337</td>
<td>-.197</td>
<td>.129</td>
</tr>
<tr>
<td>StrSusOri</td>
<td>355</td>
<td>1.00</td>
<td>5.00</td>
<td>3.3843</td>
<td>1.09517</td>
<td>-.507</td>
<td>.129</td>
</tr>
<tr>
<td>SusEntOri</td>
<td>355</td>
<td>1.00</td>
<td>5.00</td>
<td>3.3324</td>
<td>.99260</td>
<td>-.355</td>
<td>.129</td>
</tr>
<tr>
<td>SusEntPre</td>
<td>355</td>
<td>1.00</td>
<td>5.00</td>
<td>3.5528</td>
<td>1.17307</td>
<td>-.578</td>
<td>.129</td>
</tr>
<tr>
<td>SocialPerf</td>
<td>355</td>
<td>1.00</td>
<td>5.00</td>
<td>3.2493</td>
<td>1.04007</td>
<td>-.120</td>
<td>.129</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>355</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
After the descriptive statistics, this KMO and Bartlett’s test based descriptions are given below in Table 3.

Table 3: KMO and Bartlett's Test

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</th>
<th>.939</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
<td>9733.647</td>
</tr>
<tr>
<td>df</td>
<td>210</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>

According to the above-mentioned table, it becomes clear that all the KMO values are within the threshold range like its value is 0.939. While Bartlett's test of sphericity values are also quite significant to justify this point that this model is a good fit to justify the tested hypothesis. The rotated matrix-based statistical outcomes are shown in the following table 4.

Table 4: Rotated Component Matrixa

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP1</td>
<td>.807</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP2</td>
<td>.852</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP3</td>
<td>.833</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSO1</td>
<td></td>
<td>.757</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSO2</td>
<td></td>
<td>.760</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSO3</td>
<td></td>
<td>.808</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEO1</td>
<td></td>
<td>.827</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEO2</td>
<td></td>
<td>.831</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEO3</td>
<td></td>
<td>.834</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEP1</td>
<td>.918</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEP2</td>
<td>.921</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEP3</td>
<td>.849</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEP4</td>
<td>.897</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEP5</td>
<td>.916</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEP6</td>
<td>.899</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEP7</td>
<td>.886</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP1</td>
<td>.795</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP2</td>
<td>.844</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP3</td>
<td>.805</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP4</td>
<td>.859</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP5</td>
<td>.866</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The above table depicts that rotated component matrix values are more than 0.7 means at their threshold range where all the items are effectively loaded within this model. This is model is an informative
approach to critically investigate the impact of the external pressure on social performance. After this, its convergent and discriminant validity based statistical outcomes are given below in Table 5.

Table 5: Convergent and Discriminant Validity

<table>
<thead>
<tr>
<th></th>
<th>CR</th>
<th>AVE</th>
<th>MSV</th>
<th>SEP</th>
<th>EP</th>
<th>SSO</th>
<th>SEO</th>
<th>SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEP</td>
<td>0.928</td>
<td>0.920</td>
<td>0.352</td>
<td><strong>0.959</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP</td>
<td>0.902</td>
<td>0.755</td>
<td>0.520</td>
<td>0.522</td>
<td><strong>0.869</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSO</td>
<td>0.918</td>
<td>0.788</td>
<td>0.520</td>
<td>0.593</td>
<td>0.721</td>
<td><strong>0.888</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEO</td>
<td>0.899</td>
<td>0.747</td>
<td>0.332</td>
<td>0.492</td>
<td>0.402</td>
<td>0.576</td>
<td><strong>0.864</strong></td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>0.927</td>
<td>0.722</td>
<td>0.258</td>
<td>0.508</td>
<td>0.403</td>
<td>0.467</td>
<td>0.505</td>
<td><strong>0.849</strong></td>
</tr>
</tbody>
</table>

All the average variance extracted values are from 0.7 to 0.85 means more than 0.5 and also its composite reliability values are within the range of 0.9 (more than 0.7), which shows that there is no convergent validity issue occurred in this testing model. In addition to this, the bold letter based statistical values show that there is no discriminant validity issue occurred within this mechanism. All the item values are different from the other ones which show that there is no confusion is made regarding the effective uploading mechanism. In addition to this, the model fit indices are shown in the following table 6.

Table 6: Model Fit Indices

<table>
<thead>
<tr>
<th>CFA Indicators</th>
<th>CMIN/DF</th>
<th>GFI</th>
<th>IFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Value</td>
<td>≤ 3</td>
<td>≥ 0.80</td>
<td>≥ 0.90</td>
<td>≥ 0.90</td>
<td>≤ 0.08</td>
</tr>
<tr>
<td>Observed Value</td>
<td>2.717</td>
<td>0.879</td>
<td>0.968</td>
<td>0.968</td>
<td>0.070</td>
</tr>
</tbody>
</table>

According to the above mentioned CFA indicators based statistics, it becomes clear that the CMIN/DF value is 2.717 means lower than 3 and the observed value of GFI is 0.879 means higher than 0.80. In addition to this, the observed values of CFI and IFI are 0.968 (greater than 0.90), and the RMSEA based observed value is 0.070, lower than the standard value 0.08 which means at their threshold range. All these values depict that this model is a good fit and no more confusion is faced regarding uploading the items. Well, the graphical representation of this statistical outcomes is given below in Figure 3.
The important structural equation modeling based statistical evaluation is shown in the following table where the values can easily explore the relationship among the tested variables in Table 7.

**Table 7: Structural Equation Modeling**

<table>
<thead>
<tr>
<th>Total effect</th>
<th>Exterpres</th>
<th>SusEntPre</th>
<th>SusEntOri</th>
<th>StrSusOri</th>
</tr>
</thead>
<tbody>
<tr>
<td>SusEntPre</td>
<td>.482**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SusEntOri</td>
<td>.364**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>StrSusOri</td>
<td>.591**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SocialPerf</td>
<td>.393**</td>
<td>.231**</td>
<td>.331**</td>
<td>.180**</td>
</tr>
<tr>
<td>Direct Effect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exterpres</td>
<td>.482**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SusEntPre</td>
<td>.364**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SusEntOri</td>
<td>.591**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SocialPerf</td>
<td>.055</td>
<td>.231**</td>
<td>.331**</td>
<td>.180**</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exterpres</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SusEntPre</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SusEntOri</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>StrSusOri</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SocialPerf</td>
<td>.338**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

The above table shows that external pressure caused a major impact on the sustainable entrepreneurial practice like a one percent change in the independent variable cause a drastic change in the dependent variable. According to the above statistical outcomes, the existence of external pressure cause a 48.2% change in the sustainable entrepreneurial practice, 36.4% in the sustainable environmental orientation, 59% in strategic sustainability.
orientation, and 39.3% in social performance factor. This shows that the influence of external pressure is much higher on the strategic sustainability orientation within an organization. While the social performance of the organization within an Indonesia market is greatly dependent on the external environmental pressure on the management to do that particular work. While, the existence of sustainable entrepreneurship practice causes a 23% deviation on the social performance factor of an organization, while sustainable entrepreneurship orientation causes a 33% change, and strategic sustainability orientation causes 18% change on the major dependent variable of this study. Its graphical representation is given below in Figure 4.

5 Discussion and Conclusion

5.1 Discussion
According to the above mentioned statistical analysis of the tested outcomes, it becomes clear that there is a positive influence of external pressure on the effective development of the social performance of non-government organizations in NGOs. This related concept was also justified by the Abdullahi Muhammad Auwal with others in their journal of small business & entrepreneurship that within an environment, many external market factors motivate the organizational management to make some effective policies to boost their positive relationship with the stakeholders. According to them, such small and medium enterprises majorly contributed to environmental degradation and the majority of the entrepreneurial activities of an organization are dependent on their customer-oriented effective policies. In this case, the sustainable entrepreneurship practice caused a resolution of many ecological problems within a state like it may be addressed the climate change issue, safety concerns, and the public health-related issues (Muhammad Auwal et al., 2020). No doubt, this is an effective way to earn a competitive advantage in the market by directly fulfilling the needs and desires of the target market. In the Indonesia market, this type of advanced strategic approach has a major influence on the organizational strategic approach to survive in the advanced competitive market (ANTONG, 2017; Wilhelm, Blome, Bhakoo, & Paulraj, 2016).

This shows that there is a strong relationship between the green supply chain management and the operational performance level of an organization. Ruoqi Geng and others stated that such green supply chain management
results in enhancing the confidence level of the customers and employees towards the company's performance (Geng, Mansouri, & Aktas, 2017). The reason is that such strategic approach enhanced the sustainable performance of an organization and secure the company’s future to effectively survive in the continuously changing environment (Zaid, Jaaron, & Bon, 2018). In the majority of the developed states, it becomes quite necessary in front of the high demanding company to consider the customer preferences and other socio-economic factors in their decision-making process so that their management becomes able to sell their products and services. This shows that how much the external pressure from the stakeholders motivates the company's management to make some active change in their operating activities (Habib, Bao, & Ilmudeen, 2020; Pusparini, Soetjipto, Rachmawati, & Sudhartio, 2018). All these theoretical concepts also justify the hypothesis that there is a great influence of the external sustainable environment provoking pressure on the Indonesian NGO’s management to make some active changes in their operating activities.

5.2 Conclusion
Thus, it becomes concluded that there is a direct impact of external stakeholder's pressure on the social performance-based strategic approach of an organization in the Indonesian market. In order to justify this outcome, the SEM-based statistical analysis made on the online-survey data whose outcomes depicted that the impact of external pressure on the strategic sustainability orientation and sustainable entrepreneurship practice is much higher than the other variables because these two are the major burring issue within the Indonesian market that majorly influence on the social performance-based organizational behavior within this state.

5.3 Future Implications
No doubt, this is informative research for the local NGOs and other SEMs within the Indonesian state to critically evaluate the importance of sustainability factors for their effective performance within this state. This data will help the related scholars to ponder on the studied environmental factors to make some changes in the social activities within this developed state.

5.4 Limitations and Future Researches
There is a lack of psychological data (interview) based critical evaluation to justify the hypothesis and also the advanced education-based environmental pressure is not considered in the variable selection that may impact the authenticity of this paper. These gaps can be covered by upcoming scholars.

References


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ACHIEVING DIFFERENT DIMENSIONS OF PERFORMANCE THROUGH SUSTAINABLE ENTREPRENEURIAL ORIENTATION: MEDIATING ROLE OF CUSTOMER FUNCTIONAL VALUE CREATION

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Abstract. In this paper, there is a brief description of the sustainable entrepreneurial orientation in the Indonesian market and its influence on the achievement of different dimensions of performance within this state. This paper is based on five major variables for hypothesis testing like sustainable entrepreneurial orientation act as an independent variable, customer functional value creation as a mediator; while social performance, environmental performance, and marketing performance are studied as dependent variables. In the data collection mechanism, online survey based quantitative research is considered where the major participants are the potential entrepreneurs in the Indonesian market. In order to justify the hypothesis, the confirmatory factor analysis (CFA) and structural equation modeling (SEM) oriented statistics tables are considered for evaluation. According to the statistics, it becomes concluded that there is a significant impact of sustainable entrepreneurial orientation on the social performance and environmental performance within this developing state, while the customer functional value creation based mediator effectively boost their relationship. Well, in case of the diverse marketing performance, it may be difficult in front of entrepreneurs to sustain their customer values with the same brand for a long run. To resolve this, there is a need to make a continuous innovation based effective leadership in their strategic approach. The managerial and practical implications of this paper may enhance value in the effective decision among process and also motivates the policymakers to make long-lasting decisions. Lack of mixed research and innovation-oriented transformational leadership based deficiencies can be overcome by upcoming scholars in their research journals.

Keywords: Sustainable Entrepreneurial Orientation; Customer Functional Value Creation; Indonesia


Jel Codes: M1

1 Introduction
Sustainable economic development is impossible without viable organizations. In the 21st century, the main focus of the entrepreneurs is to provide the customers with the better value of the product that results in satisfying the customers as well as increases the productivity of an organization (Ridha & Wahyu, 2017; Černevičiūtė, & Straždas, 2018; Fedulova, Voronkova, Zhuravlev, Gerasimova, Glyzina, & Alekhina, 2019; Kheyfets, & Chernova, 2019; Korshenkov, & Ignatyev, 2020).

An organization follows a strategy that helps in penetrating for a value that flows among the competitiveness and the dynamism of the markets (Nurshafira & Alvian, 2018; Nuryakin, & Maryati, 2020; Kizatova, Azimova, Iskakova, Makhmudov, & Bekturganova, 2020; Pogodina, Muzhzhavleva, & Udaltsova, 2020; Mazzoni, 2020).
Multiple strategic orientations play a vital role in making the concept of the dimensions precise, i.e., as SEO for SO and EO. According to Teece, Peteraf, and Leih (2016), dynamic capabilities allow an organization to improve its performance through its effective strategy. Sustainable entrepreneurial orientation has some impact on the customer functional value creation as it will enable an organization to achieve better and superior performance (Eshima & Anderson, 2017; Ualzhanova, Zakirova, Tolymbek, Hernandez & Chumaceiro, 2020).

The below table 1 enlists the top dynamic capabilities of potential entrepreneurs in Indonesia.

Table 1: Dynamic capabilities of Entrepreneurs

<table>
<thead>
<tr>
<th>Types of capabilities</th>
<th>Dynamic creating and information</th>
<th>Transferring networks</th>
<th>Establishing and sharing networks</th>
<th>Establishing flexible labor relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing</td>
<td>Sharing data allows entrepreneurs to examine effective techniques.</td>
<td>The sharing network allows entrepreneurs to quickly determine new market networks.</td>
<td>The flexibility of employees allows entrepreneurs to determine the effective production process.</td>
<td></td>
</tr>
<tr>
<td>Seizing</td>
<td>Entrepreneurs can easily design a firm to be more competitive.</td>
<td>Entrepreneurs can incorporate network to offer new services.</td>
<td>It can effectively classify the workforce based on the market.</td>
<td></td>
</tr>
<tr>
<td>Transforming</td>
<td>Entrepreneurs will effectively make a more positive transaction cost.</td>
<td>Easily develop new marketing connections.</td>
<td>Effectively diversify market-based on its segmentation.</td>
<td></td>
</tr>
</tbody>
</table>

There is a lack of the relationship between the performance and entrepreneurial orientation that is mediated by ESO in the firms (X. Jiang, Liu, Fey, & Jiang, 2018). The resources being used cannot be used for the long-term to increase the value of the products because these resources are tangible; thus dynamic and intangible resources should be used to increase the value of the product and the productivity of an organization (Shirokova, Bogatyreva, Beliaeva, & Puffer, 2016; Suci, 2017; Hu, Z., et al., 2020). There is a lack of resources so that different dimensions of the performance cannot be achieved through SEO.
Based on the results of different previous studies it comes to the knowledge that a lot of efforts have been done in the past few years by different analysts regarding entrepreneurial orientation (EO). For example, a recent study by Dembek, York, and Singh (2018) has evaluated the overall impact of sustainable entrepreneurial orientation (SEO) on the customer functional value creation (CFVC). This indicates that much of the studies have been completed in the past in terms of SEO and its direct impacts on the overall performance. Though, the research has not been conducted regarding Indonesia in terms of potential entrepreneurs to enhance the social and marketing performance of any particular sector. Hence, the given paper is new and positive understand the role of SEO in improving the social abilities of entrepreneurs to mobilize social performance. Additionally, in past years, different scholars such as (Jia & Zhang, 2020) have analyzed the role as well as the impact of SEO on the EP of the sector in different regions and arena. Nevertheless, this study proves to be new and justified because no other study and analyst try to evaluate the mediating role of CFVC in enhancing the association between SEO and marketing performance and SP. The following research has the given objectives,

- To identify the connection between sustainable EO and social performance in potential entrepreneurs in Indonesia.
- The second objective is to evaluate the interdependence between sustainable EO and environmental performance in potential entrepreneurs in Indonesia.
- The third aim is to examine the direct impact of SEO on the marketing performance of potential entrepreneurs in Indonesia.
- The fourth goal of the study is to evaluate the mediating impact of customer functional value creation on the association between sustainable entrepreneurial orientation and social performance in potential entrepreneurs in Indonesia.
- The fifth objective is to analyze the mediating role of customer functional value creation in the link between SEO and environmental performance in potential entrepreneurs in Indonesia.
- The last objective of the paper is to evaluate the mediating impact of customer functional value creation on the relatedness between SEO and marketing performance in potential entrepreneurs in Indonesia.

The given study findings prove to be very supportive as well as significant for potential entrepreneurs in Indonesia, as according to Hermanto and Suryanto (2017) Indonesian youngsters show some good interest in becoming entrepreneurs and serve their country’s different sectors as well economy. Indonesia is an effective and influential country hence current study is very significant for potential entrepreneurs in Indonesia (Anggadwita & Palalić, 2020). This is mainly because according to Suci (2009), entrepreneurship has huge importance for Indonesia. After all, it is an effective activity that is significant for the country’s life. During the last few years, entrepreneurship gives a lot of significance to Indonesia due to its positive and remarkable benefits to the overall economy of the country, therefore; the given article proves to be supportive for many entrepreneurs in Indonesia. The research study comprises of five sections in which the introduction chapter describes the background of the study, rationale and justification, problem statement, research questions and objectives, and the scope of the study. The literature review describes the information related to a different type of variables. The data collection techniques are discussed in the chapter of the research methodology. Moreover, the data analysis techniques are prescribed by the data analysis section. The last chapter is related to the overall discussion and future recommendations related to the study.

2 Literature review

2.1 Theory of Entrepreneurial orientation (EO)

From a theoretical perspective, EO can summarize the performance decisions, actions, and styles in the overall process of an organization’s business strategy (Wales, 2016; Kanwal, et al., 2020). This theory states that potential entrepreneurs are commonly seen as a significant innovator, and according to Arzubiaga, Kotlar, De
Massis, Maseda, and Iturralde (2018) a brand new source of services as well as goods and ideas which brings some positive changes in the social, environmental, and marketing performance of different sectors. According to Covin and Wales (2019), potential entrepreneurs play a positive role in any sector, mainly by using efficient abilities and initiative essential to anticipate requirements and bring significant new concepts and innovative ideas to market to improve marketing performance. Furthermore, entrepreneurship is one of the resources this theory categorized as integral to the performance, and the other three being natural resources, capital as well as labor (Wang, Thornhill, & De Castro, 2017). An oriented entrepreneur combines the first three of these to produce a significant performance in terms of social and marketing (Acosta, Crespo, & Agudo, 2018; Ahmed, S., et al., 2020). Besides, they typically develop a business plan, hire staff and acquire financing as well as a resource with a major aim of improving environmental and social performance through proving leadership and significant management for the business or sector (Kamarudin et al., 2020).

2.2 The relationship between sustainable entrepreneurial orientation (SEO) and social performance

Sustainable entrepreneurial orientation of an organization is positively related to the process of determining the entrepreneurial behavior of an organization from time to time (Luu & Ngo, 2019). SEO enhances the performance of the employees within an organization and also defines different ways to improve the internal resources of that organization (Cheah, Amran, & Yahya, 2019). According to Cho and Lee (2018), strategic configurations and business skills can result in increasing the performance of an organization, and SEO is considered as a dynamic capability that also raises a firm’s performance. It is proved by the theory based on the entrepreneurial orientation that the relationship of SEO and SP is varied from a significant or non-significant relationship to a moderate correlation (Brändle, Berger, Golla, & Kuckertz, 2018). According to (X. Jiang et al., 2018) the relation of social performance and sustainable entrepreneurial orientation is reliant on the indicators that use to evaluate social performance. The relationship between SEO and social performance is correlated to the moving ahead of the opponents in the market and gaining the benefit of emerging and developing opportunities. Therefore, the given research suggests the following hypotheses,

H1: There is a significant relationship between SEO and social performance.

2.3 The interrelation between sustainable entrepreneurial orientation and environmental performance

According to Ayuso and Navarrete-Báez (2018), EO is a crucial concept when executives are crafting strategies and processes in the need of incorporating something innovative and exploiting opportunities to improve environmental performance (EP) that different sectors cannot exploit. SEO refers to the approaches, process, and decision making ways of entrepreneurs for different businesses and organizations that act entrepreneurially. Hooi, Ahmad, Amran, and Rahman (2016) clarifying the SEO construct and linking it to the EP and manifest that any firm’s level of EO can majorly be evaluated by identifying how it relates to the five types and dimensions including autonomy, innovativeness, risk-taking, competitive aggressiveness and proactiveness which play a significant role in improving the existing EP of the firm. According to Peters and Kallmuenzer (2018) autonomy is an important aspect of EO which majorly refers to whether an individual or group of entrepreneurs within a firm has the freedom to develop effective environmental ideas and then see it through to realization which further enhances the EP of the firm as well creative ecological ideas of entrepreneurs. Based on the observations of the theory of EO it comes to the knowledge that firms that offer high autonomy, entrepreneurs are offered independence need to bring new environmental ideas to fruition (W. Jiang, Chai, Shao, & Feng, 2018). Moreover, when entrepreneurs and their teams are unhindered by firm norms and values, they can be more significantly evaluate and champion brand new environmental ideas. Hence, based on all the above arguments the current study suggests the following hypotheses,

H2: There is a positive relationship between SEO and environmental performance.

2.4 The association between sustainable entrepreneurial orientation and marketing performance

Ensuing the suggestions of certain analysts concerning the significance of SEO and considering numerous strategic orientations (SO) with aim of enhancing marketing performance (MP) and facing some environment
challenges Santra (2018) the current study integrates EO and MP of the firm, majorly in a multiple SO and SEO, vulnerable to business marketing performance mainly under sustainable performance and captures within SEO as a study direction. Between the observations and arguments the combination of SEO and marketing performance, the justification to manage different type of orientations identify alliance within the concept of the significant competence practice, which manifests that the higher presentation in terms of marketing can majorly emanate from the strategic as well marketing configuration and the collection of current entrepreneurs proficiency in a sustainable way (Qureshi, Aziz, & Mian, 2017). Therefore, according to the findings of (Sung & Park, 2018) SEO is majorly formulated as a powerful ability as well as capabilities, whose actions are mainly for improving the MP of the firm through effective entrepreneurs efforts. According to Said, Alam, Zulkarnain, Abdullah, and Herda (2016) innovativeness is an important aspect of SEO which generally refers to the introduction of brands and services in the market which positively relates to the overall marketing performance. In short, taking all the arguments in to account present so far, the given hypotheses are suggested.

**H3:** Sustainable entrepreneurial orientation significantly relates to marketing performance.

### 2.5 The mediating impact of customer functional value creation (CFVC) on the relationship between SEO and social performance

Customer value plays a decisive role in the association of social performance and SEO by implementing multiple strategic orientations to enhance the performance of an organization. According to the Zhang, Guo, Hu, and Liu (2017) this relationship is presented as the verification of the existence of formations that are formed with the help of the elements and features of the organizational environment, structure, strategies, process and the capacities that helps in explaining and determining the relationship between the SEO and social performance. According to Zhao et al. (2017), sustainable development strategies positively depend on the ability of an organization to alter the sustainable development principles into CFVC. Customer functional value can be identified with the help of functional remunerations that are derived from the value professed by the customer (Carlson, Wyllie, Rahman, & Voola, 2019). It is proved by the theory of entrepreneurial orientation that the manufacturing of value is directly linked with the obtained results of an organization.

**H4:** Customer functional value creation significantly mediates the association between SEO and social performance.

### 2.6 The mediating role of customer functional value creation in the relationship between SEO and environmental performance

The association between the environmental performance of an organization and sustainable entrepreneurial orientation is mediated by customer functional value in a positive way that enhances the sustainability and performance of an organization. According to Buli (2017), SEO manages approximately 58.6% of the variability of the performance of an organization with the help of customer functional value creation and plays a positive role in the environment of the organization. It is supported and proved by the theory of entrepreneurial orientation that CFVC not only enhances the culture and environment of the organization but also increases the productivity and market-rate of a company. According to Ukpabi, Karjaluoto, Olaleye, and Mogaji (2019) CFVC enable an organization to increase productivity by using the existing resources efficiently and decreases the level of pressure on the organization. It helps in increasing the growth of the organization that is based on sustainable entrepreneurial orientation. The SEO strategies are restricted in their conceptual domains and are limited to possible performance results.

**H5:** CFVC positively mediates the relationship between SEO and environmental performance.

### 2.7 The mediating impact of customer functional value creation on the association between SEO and marketing performance

During the last few years, several types of research agree that the entrepreneurial capabilities and skills play a remarkable role in creating value for the customers in the long term significance of the firm Mahmoud, Hinson, and Anim (2018) as long as it is the origin of its aggressive advantage. According to a firm-level model mainly
based on customer value creation (CVC) suggests by Jääskeläinen and Heikkilä (2019) customer value is the objective as well as the approach of significant relevance in marketing management, as long as it allows entrepreneurs to develop superior and significant performance in terms of marketing. Besides CVC mainly becomes a core process and tool for understanding customers' beliefs and perceptions Seno, Pimenta, Hilletofth, and Eriksson (2019) which help entrepreneurs to enhance the current marketing performance of the firm. Thus, based on the arguments and suggestions by previous studies, the current research recommends the following hypotheses,

**H6:** Customer functional value creation positively mediates the relationship between SEO and marketing performance.

Research model is presented in Figure 2.

![Figure 2: Research Model](image)

### 3 Methodology

Firstly, the literature review based theoretical data critically discussed that help to develop the conceptual model and formulate the hypothesis (Hameed, Basheer, Iqbal, Anwar, & Ahmad, 2018; Ul-Hameed, Mohammad, & Shahar, 2018). To justify the above proposed hypothesis, a quantitative method of research is used whose close-ended questions based data collection will help to critically inspect the point of view of different potential entrepreneurs within the Indonesian market. To collect the relevant data sample, majorly those participants are considered who having full understanding regarding this market and their experienced-based professional approach will help to make a firm decision that either the tested hypothesis is justified or not. Due to a limited number of quantitative studies that address the customer function value creation from the professional perspective, we majorly conducted an online survey-based effective and convenient instrument to collect and review their understanding regarding the tested hypothesis. In this paper, three major variables are critically discussed named as independent, mediator and dependent variables, where sustainable entrepreneurial orientation is an independent variable, customer functional value creation is a mediator, while the social performance, environmental performance, and marketing performance are act as dependent variables in this study. The five-point Likert scale (strongly disagreed = 1, disagreed = 2, neutral = 3, agreed = 4, strongly agreed = 5) is used to test the relationship among the tested variables.
Before conducting an online survey, a valid questionnaire of this paper was considered by the professionals and scholars who expressed their point of view towards hypothesis and related variables. For the data collection, 500 online questionnaires distributed among the professional entrepreneurs in Indonesia, and only 317 of them showed their active response to the tested hypothesis. All of their demographics analysis is based on their age, gender, and education-based characteristics. According to the statistics, there are 166 males and 151 females, this shows that 52% of participants’ population is male while the remaining 48% percent are female quota in this hypothesis testing. After this, their educational background based segregation shows that there are 38 graduates, 137 post-graduates, 106 master degree holders, while remaining 36 having other educational degrees. According to the percentage-based analysis, overall 12% of respondents are undergraduates, 43% are postgraduates along with some working experience, while the remaining 45% of the overall respondents are master or other advanced degree holders in the business field. As far as their age-based demographic analysis is concerned, it becomes clear that 25% are within the age group of 21 to 30 years old, 29% are from 31 to 40 years old, 31% are 41 to 50 years old, while the remaining 16% are more than 50 years old. After the proper data collection mechanism, the survey data is analyzed by using the SPSS software for the descriptive statistics and R software (Partial Least Square Path Modelling package) to effectively run the statistical tests. To measure the hypothesis, the confirmatory factor analysis (CFA) and structural equation modeling (SEM) based statistical tests are adopted to identify the authenticity of the tested variables and their relationship between one another (Marsh, Guo, Dicke, Parker, & Craven, 2020; Phakiti, 2018).

4 Analysis Interpretation

KMO and Bartlett’s test used to indicate the suitability of the data for the structure detection, while the Kaiser-Meyer-Olkin measure regarding sampling adequacy indicates how much variance occurred in tested variables due to underlying factors (Napitupulu, Kadar, & Jati, 2017; Ramdani, 2018). Also, Bartlett’s test of this paper helps to identify how the variables are unsuitable and unrelated to the structure detection. The descriptive statistics of this SPSS software-based analysis are shown in the following table 2.

Table 2: Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUFVC</td>
<td>317</td>
<td>1.00</td>
<td>4.90</td>
<td>3.555</td>
<td>1.09865</td>
<td>-.819</td>
</tr>
<tr>
<td>SociPerf</td>
<td>317</td>
<td>1.00</td>
<td>5.00</td>
<td>3.492</td>
<td>1.15204</td>
<td>-.664</td>
</tr>
<tr>
<td>EnvirPerf</td>
<td>317</td>
<td>1.00</td>
<td>5.00</td>
<td>3.557</td>
<td>1.10298</td>
<td>-.782</td>
</tr>
<tr>
<td>MarkPerf</td>
<td>317</td>
<td>1.00</td>
<td>5.00</td>
<td>3.561</td>
<td>1.07992</td>
<td>-.836</td>
</tr>
<tr>
<td>SusEntOr</td>
<td>317</td>
<td>1.00</td>
<td>5.00</td>
<td>3.441</td>
<td>1.10553</td>
<td>-.616</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>317</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the above-mentioned statistics, the standard deviation value of social performance is maximum and after this, the environmental performance value highly deviated from the mean position. It means on these two dependent variables, the sustainable entrepreneurial orientation caused a maximum significant impact. While the marketing performance value least deviates from its means that shows there is less customer functional value creation in this performance level. See Table 3.

Table 3: KMO and Bartlett’s Test

<table>
<thead>
<tr>
<th>Kais-Meyer-Olkin Measure of Sampling Adequacy.</th>
<th>.943</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
<td>12333.923</td>
</tr>
<tr>
<td>df</td>
<td>496</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>
The above mentioned 0.943 based Kaiser-Meyer-Olkin statistics depict that this model is a good fit because of its KMO value. Also, the significance value is lower than 0.05 with a significant difference and approximate chi-square value which means all the values are within their threshold range. After this, the rotated component matrix-based statistical outcomes are given below. According to the following table, the rotated component matrix value of each item is more than 0.7. It means this model is a good fit. See Table 4.

Table 4: Rotated Component Matrix

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV1</td>
<td>.771</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV2</td>
<td>.747</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV3</td>
<td>.817</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV4</td>
<td>.837</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV5</td>
<td>.821</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV6</td>
<td>.826</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV7</td>
<td>.809</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP1</td>
<td></td>
<td>.773</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP2</td>
<td></td>
<td>.802</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP3</td>
<td></td>
<td>.808</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>SP4</td>
<td></td>
<td>.847</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP5</td>
<td></td>
<td>.871</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP6</td>
<td></td>
<td>.878</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>EP1</td>
<td></td>
<td></td>
<td>.799</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP2</td>
<td></td>
<td></td>
<td>.829</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP3</td>
<td></td>
<td></td>
<td>.879</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP4</td>
<td></td>
<td></td>
<td>.800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MP1</td>
<td></td>
<td></td>
<td></td>
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<td>MP2</td>
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<tr>
<td>SE11</td>
<td>.824</td>
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</table>

In order to ensure the instrument properties, the measurement model was assessed before the structural model adoption. The validity and reliability of the measurement model are done by using the average variance extracted (AVE), Cronbach's alpha, and Fornell's composite reliability that helps to justify the
point that either it's a good-fitting model or not (Crego & Widiger, 2016). Its related outcomes are shown in the following table 5.

| Table 5: Convergent and Discriminant Validity |
|-------------------------------|----------------|----------------|--------------|----------------|----------------|----------------|--------------|--------------|
|                              | CR         | AVE          | MSV          | MaxR(H)     | MP           | CV            | SP           | EP           | SE           |
| MP                            | 0.923      | 0.749        | 0.305        | 0.925        | **0.865**    | 0.865         | 0.552        | 0.858        |
| CV                            | 0.951      | 0.737        | 0.309        | 0.971        | 0.552        | **0.876**     | 0.556        |              |
| SP                            | 0.952      | 0.768        | 0.309        | 0.991        | 0.527        | 0.545         | 0.858        |              |
| EP                            | 0.940      | 0.796        | 0.297        | 0.992        | 0.487        | 0.511         | 0.527        | 0.892        |
| SE                            | 0.925      | 0.783        | 0.231        | 0.994        | 0.455        | 0.481         | 0.313        | 0.407        | **0.885**    |

According to the above mentioned statistical outcomes, the average variance extracted value is more than 0.5 and the composite reliability is more than 0.7 which shows that no convergent validity issue has occurred in this factor uploading mechanism. Also, the descending order based bold figures shows that there no occurrence of discriminant validity issue within this mechanism so every variable differs from the other ones due to their characteristics. The model fit indices based outcomes are shown in the following model fit indices table 6.

| Table 6: Model Fit Indices |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CFA Indicators              | CMIN/DF    | GFI         | IFI         | CFI         | RMSEA       |
| Threshold Value             | ≤ 3         | ≥ 0.80      | ≥ 0.90      | ≥ 0.90      | ≤ 0.08      |
| Observed Value              | 2.530       | 0.817       | 0.944       | 0.944       | 0.070       |

The above table shows that all the observed values of CFA indicators are within their threshold range so no more confusion remains in the effective uploading mechanism. According to the above table, GFI observed value is 0.817 (greater than 0.80), the CMIN/ DF value is 2.530 (lower than 3), and the RMSEA value is 0.070 (lower than 0.08). While, both IFI and CFI based indicators show 0.944 value which is greater than 0.90, so it becomes clear that this model is a good fit for uploading all the items. Its graphical representation and the SEM table are given below in Figure 3 and Table 7.
According to the above mentioned structural equation modeling based mechanism, it becomes clear that there is a connectively among the tested variables like one percent change in the independent variable, sustainable entrepreneurial orientation, caused a 48% change in the customer functional value creation, 44% in the market performance, 40% in the environmental performance and 35 in the social performance-based variables, it means that there is a great influence of the independent on the mediators and dependent variables, but a little bit lower in the effective social performance of an organization. After this, the customer functional value creation caused a major direct impact on the efficiency of the tested variables. Like, this factor caused a 43% deviation in the market performance, 37% in the environmental performance, and 50% in the social performance factor. Overall, the social performance is highly deviated due to this mediator individually which must be considered by the Indonesian entrepreneurs in their effective decision-making process. Its graphics are displayed in the following figure 4.
5 Discussion and Conclusion

After critically evaluate the above-mentioned statistics, it becomes clear that there is a direct impact of sustainable entrepreneurial orientation on social performance and environmental performance due to the effective role of customer functional value creation. But in case of the Indonesian market performance, many external variables reduce the influence of sustainable entrepreneurial oriented on this factor, but individually the customer functional value creation caused a major impact on the major performance level. According to Ana Crido-Gomis and others, efficient customer functional value creation is usually developed through a sustainable entrepreneurial orientation approach. They concluded that a sustainable entrepreneurial orientation not only caused a positive and direct impact on the firm performance, but it also boosts customer loyalty and their functional co-creation towards the company's operation (Criado-Gomis, Iniesta-Bonillo, Cervera-Taulet, & Ribeiro-Soriano, 2019). The other related scholars also majorly worked on exploring the importance of sustainable entrepreneurial orientation in the Indonesian market perspective that there is more opportunity in front of profit-oriented risk-takers to earn a sustainable growth by directly fulfilling the customer's desires. Rinto, Yustiana and Suriana (2019) majorly worked on depicting the association between the market orientation, learning orientation, entrepreneurial orientation, technological orientation, and access to finance factors that impact on Indonesian SME’s performance.

Their study justified that new skills and knowledge are required to improve the existing and future organizational performance that helps to retain the company’s position in the advanced competitive market (Syahdan, Djaelani, & Mahdi, 2020). The similar outcomes derived by Irsyan, Rofiaty, and Djumahir in their international journal of innovative management where they investigated the impact of transformational leadership and entrepreneurial orientation on the advanced organizational performance by considering innovation as a major mediator. According to them, these are an effective way to create a value creation among customers and also suggest to maximize and optimize the intangible resources associated with entrepreneurial orientation and encourage those innovations that boost the business performance in the consumer market (PUTRA, ROFIATY, & DJUMAHIR, 2020). This is an effective learning mechanism which secured the future of the profit earning organizations to effectively perform their task in an innovative style (Anwar, Khan, & Khan, 2018; Haryanto, Haryono, & Sawitri, 2017). The above-mentioned outcomes also justified this theoretical explanation by valid statistics that the social
and environmental performance of an organization in the current Indonesian market majorly dependent on the advanced entrepreneurs who having full knowledge regarding customer preferences and capable enough to make some advanced changes.

Thus, after critically evaluate both primary and secondary data regarding the tested hypothesis, it becomes concluded that being an entrepreneur or a businessman, it is quite essential to consider the customer functional value co-creation factors to boost their social, environmental, and marketing performance in Indonesia. The reason is that such external environmental factors cause a major change in the preferences level of the targeted consumers and it is a major need in front of an entrepreneur to utilize this situation in his own concerns and develop a sustainable orientation within this developed state through an efficient strategic approach. This paper is based on quantitative data based informative research on which the SEM-based statistics depicts that both social performance and environmental performance of any sustainable entrepreneurial approach can easily gain market share, but the diverse and continuously changing market performance may impact the expected results outcomes.

5.1 Future Implications
In addition, this is productive research that may add values in the Indonesian business management's decision making procedure towards sustainable orientation and also motivates its customers to understand their responsibility. The managerial/ practical implications provide a better understanding regarding sustainable entrepreneurial orientation and also helpful to propose solutions. The related academic researchers can consider this analysis for their hypothesis generation and data consideration.

5.2 Limitations and Future Researches
In this paper, lack of mixed research and deficiency of innovation influence on the customer functional value creation may impact the authenticity of this paper which can be covered by the upcoming analyst in their researches.

References


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IS PATTERN OF GOVERNMENT SPENDING RELATED WITH ENVIRONMENTAL SUSTAINABILITY IN ASEAN COUNTRIES? ROLE OF DEBT SERVICING, DEVELOPMENT EXPENDITURE AND SOCIAL INVESTMENT

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Abstract. Environmental sustainability has become a very important concept with the increase of pollution of various types in the environment and governments are taking various steps to sustain the environment of their countries. In the similar context, the researcher intends to conduct this study with the aim that the impact of debt servicing, development expenditure and social investment on environmental sustainability in ASEAN countries can be analyzed effectively. In this regard, the researcher has collected data from ASEAN countries i.e. Brunei, Cambodia, Indonesia, Laos, Thailand and Philippines for 30 years. With the aim to ensure the reliability and accuracy of data and the results, the researcher has obtained the secondary data from the sources such as World Bank Development Indicators and Global Economy. Various approaches have been used to analyze this data. These approaches include cross sectional dependence test, panel unit root test, panel cointegration test and Kónya Panel Casualty test. The results obtained from the analysis indicated that all the independent variables i.e. debt servicing, development expenditure and social investment have significant impact on the environmental sustainability of ASEAN countries. Furthermore, causal relationships have also been identified among various variables of the study. The implications, limitations and future research indications have been discussed by the researcher in the last of the study.

Keywords: Debt Servicing; Development Expenditure; Social Investment; Environmental Sustainability; ASEAN Countries


Jel Codes: E01, H5

1 Introduction

The developing countries of the world have been facing the issue related to government spending and its potential impacts by adding an extra burden on the economic growth and the environment of the country (Mitchell, 2005; Okoro, 2013). The debt servicing of the least developed countries is particularly strong as they do not want to print more money and opt for borrowing the money from other countries, as a result of which a large volume of debt burden is accumulated and have to work on continuously making debt servicing payments to those from where the money has been borrowed. This badly affects the country’s fiscal position. When the domestic financial resources are insufficient to meet the demands, extra funding is required and in such case, debt borrowing can boost the economic growth (Ngasamiaku, 2020; Nguyen, 2019; Sasongko, Huruta, & Wardani, 2019). According to the ‘Theory of Economics’, a reasonable amount of borrowings can speed up the economic growth, but taking debts beyond that will have negative affects (Matuka & Asafo, 2018; Medina, 2018). The following table 1 shows the debt service ratio of the ASEAN nations over a period of years.
Table 1. Debt service ratio (%) of ASEAN countries

<table>
<thead>
<tr>
<th>Country</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>1.4</td>
<td>1.4</td>
<td>1.42</td>
</tr>
<tr>
<td>Indonesia</td>
<td>35.4</td>
<td>25.2</td>
<td>24.08</td>
</tr>
<tr>
<td>Philippines</td>
<td>7.0</td>
<td>6.2</td>
<td>6.3</td>
</tr>
<tr>
<td>Thailand</td>
<td>5.9</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td>Laos</td>
<td>8.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td>14.7</td>
<td>6.78</td>
<td>5.17</td>
</tr>
<tr>
<td>Myanmar</td>
<td>4.7</td>
<td>4.1</td>
<td>4</td>
</tr>
</tbody>
</table>

The government expenditure consist of the payments of the non-repayable nature in relation to the capital and the current expenses, added to the net lendings and are expressed as a share of the GDP of that country (Bank, 2018). It creates a rise in the GDP and extra spending on other than valuable sectors, like health and education, can also negatively affect the country’s economy and the environment (Ngasamiaku, 2020). The extra government spending can build up budget deficits (Kubickova, 2019). The spending on the development and the associated inflation is a major problem for the emerging economies of Asia (Nguyen, 2019). Hence, this paper uses the panel data from the ASEAN countries to study the effect of components of government spending on the environmental sustainability. The following table shows the government spending in the different ASEAN nations, out of which Brunei and Vietnam account for the highest government expenses (Figure 1).

Figure 1. Government expenditure (% of GDP) in ASEAN nations (2017 – 2018)
Source: Asian Development Outlook 2019

Studies have shown that sustainable development in economy and environment has been gaining wide interest since many decades. The impact of the government expenditure on the country’s economic growth has been widely researched (Nguyen, 2019; Okoro, 2013; Jia & Lu, 2020) and attention must be paid to analyze its impact.
on the environmental sustainability (Guo, ul Haq, Pan, & Khan, 2019; Halkos & Paizanos, 2013; Jia, S., et al., 2020). So, for this purpose, panel data from ASEAN nations is used to empirically analyze the role of various components of government spending in the form of Debt servicing, development expenditure and social investments related to environmental sustainability in these countries. More specific research objectives for this study are the following:

- To examine the role of debt servicing on environmental sustainability
- To examine the role of development expenditure on environmental sustainability
- To examine the role of social investments on environmental sustainability

This paper contributes to the literature body by investigating the role of government spending on the environmental sustainability, using panel data from ASEAN countries, from the perspective of debt servicing, development expenditure and social investments. Also, this paper has practical contributions to the policy on the Government spending by which they can make their environmental quality and performance sustainable (Hussain et al., 2020).

The organization of the current paper is given as ahead. The paper commences with a precise Introduction and a detailed review of literature on the variables of interest. Research Methodology and Research results follow the literature review. The paper concludes by providing the discussion on the basis of research findings and also pin points the limitations and implications of this study.

2 Literature review

2.1 Debt Servicing

The degradation of environment has been a major cause of the climate changes and the global warming (Asongu & Odhiambo, 2019; Majeed & Ozturk, 2020; Wang & Dong, 2019). These notions are disturbing the natural ecological system of the world and are a leading concern for the scientists (Nadakavukaren & Caravanos, 2020; Siero et al., 2019). In the study of (Guo et al., 2019), various predictors of environmental degradation were determined and the impact of government expenditure in the form of debts was analyzed on the financial development and environmental sustainability for Venezuela using time series data. The findings showed that government expenditure positively predicted the environmental degradation, and hence is a threat to the environmental sustainability. This implies that the governments must take steps urgently for a sustainable environment (Guo et al., 2019). In another study of similar context by (Halkos & Paizanos, 2013), the government expenditure was investigated for a panel of 77 countries with the data for 1980–2000 and evaluated the direct and indirect effects on pollution. The results indicated that the government spending had an indirect impact on pollution through rise in income and the direct effects reinforced the same findings. The study highlighted the need for policy implications to control the pollution levels for a sustainable environment (Halkos & Paizanos, 2013). Previous studies by (Daniels, 1992; Rugumamu, 1993) have pointed the value of policies and regulations for the environmental protection from pollutants on long term to ensure sustainability. In a study by (Boly et al., 2019), the significance of the pillar of sustainability are discussed from the context of economy and environment (Becerra & Martinez, 2020). The environmental quality is measured as the capacity of the nature to grow and prosper by absorbing the waste and pollutants resulting from the initiation of economic activities. In the study, the impact of government debt was explored on the environmental quality, with specific reference to the carbon emission. The results of the study have found that in the short and the long run, government debt and the environmental debt are inter related and complement each other. The budget deficit adds fuel to the pollution in addition to the actual spending which generates debt burden. Using time series data for the time period of 1990-2011, the study explained that in the long term, increment in the government debt ratio leads contributes significantly up to 74% to the cumulative carbon emissions per capita and hence damages the environment and
restrains it from sustainability (Boly et al., 2019). The countries are in the practice of incurring conservative cost figures that exclude substantial debt servicing, inflation and environmental damages (Sovacool & Walter, 2018). These empirical studies have proved that environment is the basic entity of society and protecting it is very vital for the generations to come (Lawn, 2003). The results have confirmed that the government spending and the expenditure is a main factor for the environmental sustainability and determines the quality of the environment (Frederik & Lundström, 2001; Heyes, 2000; Islam & López, 2013). This discussion shows that the government debt servicing and the environmental sustainability are linked to each other and the environment is influenced by the debt servicing. This, the following hypothesis is deduced:

**H1: Debt Servicing has significant linkages with Environmental Sustainability**

### 2.2 Development Expenditure

The increase in the government expenditure using the debt is likely to deteriorate the quality of environment till this expenditure is done in terms of the development activities, otherwise it will probably increase the emission of carbon dioxide and other green house gases (Bernauer & Koubi, 2006; Ch, S. A., et al., 2020). (López, Galinato, & Islam, 2011; Qambar & waheed, 2020) has suggested that if this expenditure is done to improve the life quality of the people through development actions, it will probably provide less harm to the environment. Using various techniques, the effect of expenditure on development was assessed and the results dictated that this expenditure predicts stress on the environment and increases the pollution as economic activities are also enhanced. Taking from another perspective, the development expenditure changes the composition of the country’s economy and can positively affect the environment by generating human capital in place of the physical capital, which is expected to negatively influence the environmental conditions. This way the efficiency of the labor is enhanced and income levels are improved. Hence, mixed views are present for the effect of development expenditure on the environment. The carbon emission and use of energy as a result of the development activities is likely to be threatful for the sustainable environment (Guo et al., 2019). Other studies have also shown that the expenditure done by the local and the central governments for the development of countries by maintaining the ecological security and promoting the economic stability also affects the environment (Fan, Fang, & Zhang, 2019; Haibo, Ayamba, Agyemang, Afriyie, & Anaba, 2019; Leal Filho et al., 2019). This highlights the need for the government to develop policies regarding the development activities in a country for sustainable environmental and sustainable economy. Thus, the following hypothesis represents this relationship:

**H2: Development Expenditure has significant linkages with Environmental Sustainability**

### 2.3 Social Investments

The investment in social welfare and activities promote the value of the shareholder and enhances the reputation among the stakeholders (Newport, Chesnes, & Lindner, 2003) and develops social capital for environmental sustainability (Ali, Naveed, ul Hameed, & Rizvi, 2018; Goodland & Daly, 1996). These social initiatives help to manage the corporate sustainability issues through the delivery of the social investment programs (White, 2009). When the government spends on the social programs, then environmental issues can be led to sustainability (Richardson, 2009). The notion of sustainability is considered to be a 3 legged stool which encompass the concerns for environment, society and the economy (Newport et al., 2003). Hence, the social activities by the government aimed at improving the quality of life of its citizens intrinsically are linked to the economy and the environment. When one domain is changed, it has an enduring impact on the other domains. If a human being cannot live in a clean and healthy environment, the social well being and a vibrant economy cannot be achieved. Hence, the economic, social and environment aspects are inter dependent concepts, which come under the umbrella concept of sustainable development. For ensuring sustainable development, factors like social investment, poverty reduction and safety & care for the communities must be developed and ensured. The social investment by the Government is an important prerequisite for any country’s economic development. The two main sectors for the social investment by the government include the areas of education and health (Torjman, 2000). Hence, when government invests in these sectors, policies must be devised which can ensure the vibrancy
of the economy and the sustainability of the environment. The increase in the Government expenditure on the social welfare and investments is expected to positively affect the environment (Guo et al., 2019), though as a whole the government expenditure negatively predicts the environmental quality (Lopez & Palacios, 2010). The social investments are for the good of the people and results in lower levels of carbon emission and pollution (Ngasamiaku, 2020). Hence, the studies predict that the government expenditure component of social investment greatly influences the environment (Kulin & Johansson Sevä, 2019; Rydzewski, 2019; Ziolo & Ghoul, 2019). Thus, this relationship is depicted with the following hypothesis:

**H3:** Social Investment has significant linkages with Environmental Sustainability

### 3 Data and Methods

#### 3.1 Data

After introducing the background of the study, the problem which is intended to be resolved by this study and discussing various studies that have been conducted in the past literature in the similar context, the researcher has moved to the next step in which the data collection and estimation process will be discussed in detail. As far as data collection is concerned, the researcher has collected data from ASEAN countries i.e. Brunei, Cambodia, Indonesia, Laos, Thailand and Philippines for 30 years. With the aim to ensure the reliability and accuracy of data and the results, the researcher has obtained the secondary data from the sources such as World Bank Development Indicators and Global Economy. As the current study is intended to find out the impact of debt servicing, development expenditures and social investments on the environmental sustainability of ASEAN countries, therefore the data collected is about these aspects.

#### 3.2 Model

After discussing the detailed data collection process, the researcher has introduced the units through which the variables of the study have been measured in the research process. Among these variables, the dependent variable, environmental sustainability has been taken in context of environmental sustainability index. In addition, all the dependent variables i.e. debt servicing, development expenditures and social investments have been measured in context of US dollars that are being spent by the government for the aforementioned purposes. Furthermore, there are two control variables among which, inflation has been measured through an index named as consumer price index CPI while the other control variable, economic growth has been measured through the GDP growth in a country. For analysis purpose, the researcher has generated the following equation or model of regression;

\[
ES_{it} = \alpha + \beta_1 DS_{it} + \beta_2 DE_{it} + \beta_3 SI_{it} + \beta_4 IN_{it} + \beta_5 EG_{it} + \epsilon_{it}
\]

In this equation, ES represents environmental sustainability, DS represents debt servicing, DE represents development expenditures, SI represents social investment, IN represents inflation and EG represents economic growth. In the last, \( \epsilon_{it} \) represents error.

#### 3.3 Estimation Procedure

This section contains the detailed discussion about the major techniques and approaches used for the data analysis purpose. These approaches include cross sectional dependence test, panel unit root test, panel cointegration test and Kónya Panel Casualty test. These techniques have been discussed in this section in detail.

#### 3.3.1 Cross Section Dependence Test

The cross sectional dependence test has been used by the researcher to find out if there is any cross sectional dependence between the variables. In case, if this test is not applied and the dependence is not checked, the results might be doubtful (Breusch & Pagan, 1980). Therefore, it is recommended to use this test based on the following equation;

\[
CG_{BP} = T \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{B}_{ij}
\]

In case, if the value of N is large, the above model might not provide desired results so the following model might be considered (Pesaran, 2004);
The results of the test are based on null and alternate hypothesis where null hypothesis indicates that there is no cross sectional dependence between the variables. In addition, a slope homogeneity test has also been applied with null hypothesis indicating that the slope is homogeneous.

### 3.3.2 Panel Unit Root Test

After the application of cross sectional dependence test and slope homogeneity test, the next test applied by the researcher is unit root test so that the order of integration and stochastic properties of the variables can be analyzed (Pesaran & Yamagata, 2008). CIPS unit root test has been used based on the following equation:

\[
\Delta Y_{it} = \alpha_i + b_i Y_{it-1} + c_i Y_{t-1} + d_i \Delta Y_{t-1} + e_{it}
\]

The version of the equation considering the cross sectional dependence is given as:

\[
CIPS = \frac{1}{N} \sum_{t=1}^{N} CADF_t
\]

In this equation CADF indicates cross sectional version of ADF test (Pesaran, 2007). It is also based on null and alternate hypothesis where null hypothesis involves non stationarity while alternate hypothesis involves stationarity.

### 3.4 Panel Cointegration Test

The next test applied by the researcher is panel cointegration test with the motive that the cointegrating relationships between the variables can be identified. The particular cointegration test used in this study is Westerlund and Edgerton bootstrap LM panel cointegration test and it considers the cross sectional dependence of the data (Westerlund & Edgerton, 2007). The following equation can be considered for this test:

\[
LM_{NT}^+ = \frac{1}{NT^2} \sum_{t=1}^{N} \sum_{t=1}^{T} \omega_i^2 e_{it}^2
\]

In this test, the null hypothesis involves the absence of cointegrated relationships while the alternate hypothesis involves the presence of cointegrated relationships between the variables. In addition to cointegration test, the researcher has also applied AMG estimation test so that the impacts of independent and control variables in different ASEAN countries can be found out.

### 3.4.1 Kónya Panel Causality Test

In the last, the researcher has applied the panel casualty test by Konya so that the casual relationships between the variables can be identified. This test has been preferred because there is no issue of cross sectional dependence in this test (Kónya, 2006). The null hypothesis of this test indicates that there are no casual relationships and alternate hypothesis indicates the opposite idea. The following equation can be used for this test:

\[
FS_{N,t} = \alpha_{2,N} + \sum_{t=1}^{ly2} \beta_{2,t-1} OS_{N,t-1} + \sum_{t=1}^{lx2} \delta_{2,t-1} FS_{N,t-1} + \epsilon_{2,t}
\]

## 4 Results and Analysis

### 4.1 Results of Cross Section Dependence Test

In table 2, the results of two basic tests used by the researcher in the current study have been reported. The first one is cross sectional dependence test and the other one is slope homogeneity test. As far as the results of cross sectional dependence test are concerned, it is very clear that the values associated with all the variables of the study for CD_{BP}, CD_{LM} and CD have rejected the null hypothesis of no cross sectional dependence thus indicating that the variables are having cross sectional dependence with each other. In the same way, the results of slope homogeneity test have made it clear that the null hypothesis has been rejected in case of both delta and adjusted
Delta as the p-value is supporting the results obtained. The results of both these tests show that other various tests can now be applied on the collected data.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CDur</th>
<th>CDslm</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES</td>
<td>183.477*</td>
<td>89.394*</td>
<td>34.245*</td>
</tr>
<tr>
<td>DS</td>
<td>193.334*</td>
<td>88.938*</td>
<td>44.243*</td>
</tr>
<tr>
<td>DE</td>
<td>188.384*</td>
<td>68.487*</td>
<td>45.244*</td>
</tr>
<tr>
<td>SI</td>
<td>167.783*</td>
<td>96.748*</td>
<td>32.334*</td>
</tr>
<tr>
<td>IN</td>
<td>173.993*</td>
<td>87.388*</td>
<td>56.244*</td>
</tr>
<tr>
<td>EG</td>
<td>182.383*</td>
<td>88.988*</td>
<td>46.283*</td>
</tr>
</tbody>
</table>

**Slope Homogeneity Tests Results**

<table>
<thead>
<tr>
<th>Tests</th>
<th>LM Statistics</th>
<th>t-value</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta</td>
<td>43.39</td>
<td>3.294</td>
<td>.000</td>
</tr>
<tr>
<td>Adj Delta</td>
<td>24.30</td>
<td>2.489</td>
<td>.000</td>
</tr>
</tbody>
</table>

### 4.2 Results of Panel Unit Root Test

In table 2, the results obtained by the application of panel unit root test i.e. CIPS have been reported by the researcher. The results are quite evident as at the level series only three variables have rejected the null hypothesis of unit root in the data. These variables include environmental sustainability, debt servicing and economic growth. This indicates that at level series, the collected is non-stationary. Now the researcher has applied the same test after first differencing the variables and the results have been shown in the same table. It is evident that all the variables of the study have rejected the null hypothesis in this case thus indicating that at first difference, the collected data is stationary. The detailed results can be viewed in the table 3.

#### Table 3: CIPS Panel Unit Root Test Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>At Level</th>
<th>First Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES</td>
<td>-4.1398*</td>
<td>-8.2994**</td>
</tr>
<tr>
<td>DS</td>
<td>-3.3843*</td>
<td>-9.3004**</td>
</tr>
<tr>
<td>DE</td>
<td>-1.0982</td>
<td>-9.2093**</td>
</tr>
<tr>
<td>SI</td>
<td>-2.3983</td>
<td>-9.3984**</td>
</tr>
<tr>
<td>IN</td>
<td>-2.3984</td>
<td>-7.3984**</td>
</tr>
<tr>
<td>EG</td>
<td>-3.398*</td>
<td>-9.8387**</td>
</tr>
</tbody>
</table>

### 4.3 Results of Panel Cointegration Test

In table 4, the results of LM bootstrap cointegration tests have been reported for both constant and constant plus trend. It is quite evident that in both the cases, the p-value is less than the significant value thus suggesting the rejection of null hypothesis in both cases. This means that the variables of the study are having cointegrated relationships with each other.

#### Table 4: LM Bootstrap Panel Cointegration Test Results

<table>
<thead>
<tr>
<th>Conditions</th>
<th>LM statistics</th>
<th>Bootstrap p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-5.678</td>
<td>0.937</td>
</tr>
<tr>
<td>Constant + Trend</td>
<td>4.399</td>
<td>0.467</td>
</tr>
</tbody>
</table>

### 4.4 Results of AMG Estimation

AMG estimation results reported in table 5 are the most critical results in the study as they are directly assisting the researcher achieve the objectives of the study. In other words, these results are showing that what and how and independent variable impacts the dependent variable. It can be seen that the impact of debt servicing on
environmental sustainability is positive and significant for all the countries of the panel except for Brunei. In the same way, the impact casted by development expenditures on environmental sustainability is also significant and positive for all countries except for Laos, for which the impact of development expenditure is positive but insignificant. As far as social investment is concerned, its impact on environmental sustainability is positive and significant for all the countries of the panel. In case of the control variable inflation, its impact on environmental sustainability is significant in case of only two countries i.e. Laos and Thailand. In the last, there is another control variable i.e. economic growth, the impact of which on environmental sustainability for all the countries is positive and significant. It must also be noted here that the overall impact of all independent and control variables on environmental sustainability is positive and significant for the whole panel.

### Table 5: AMG Estimation Results

<table>
<thead>
<tr>
<th>Countries</th>
<th>DS</th>
<th>DE</th>
<th>SI</th>
<th>IN</th>
<th>EG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>0.033</td>
<td>0.232**</td>
<td>0.222**</td>
<td>0.003</td>
<td>0.223**</td>
</tr>
<tr>
<td>Cambodia</td>
<td>0.182*</td>
<td>0.230**</td>
<td>0.147*</td>
<td>0.063</td>
<td>0.238**</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.293*</td>
<td>0.193*</td>
<td>0.112**</td>
<td>-0.043</td>
<td>0.219*</td>
</tr>
<tr>
<td>Laos</td>
<td>0.283*</td>
<td>0.003</td>
<td>0.233**</td>
<td>0.100*</td>
<td>0.246**</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.330**</td>
<td>0.211**</td>
<td>0.199**</td>
<td>0.288**</td>
<td>0.215*</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.200**</td>
<td>0.283**</td>
<td>0.128**</td>
<td>0.036</td>
<td>0.220**</td>
</tr>
<tr>
<td>Penel</td>
<td>0.483**</td>
<td>0.322**</td>
<td>0.247***</td>
<td>0.234**</td>
<td>0.283**</td>
</tr>
</tbody>
</table>

4.5 **Results of Kónya Panel Causality Test**

In table 6, the results obtained by the casual test have been reported in detail. According to these results, it is clear that there is unidirectional casualty between debt servicing and environmental sustainability. On the other hand, development expenditures and environmental sustainability have bidirectional casualty running between them. However, in case of social investment and environmental sustainability, there is unidirectional casualty running from ES to SI. As far as debt servicing and development expenditure are concerned, they are also having bidirectional casualty running between them which is the case also observed in case of development expenditure and social investment. However, there is unidirectional casualty found between debt servicing and social investment running from SI to DS.

### Table 6: Kónya Panel Causality Test Results

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES does not Granger Cause DS</td>
<td>5.3299</td>
<td>0.0003</td>
</tr>
<tr>
<td>DS does not Granger Cause ES</td>
<td>3.3283</td>
<td>0.0554</td>
</tr>
<tr>
<td>ES does not Granger Cause DE</td>
<td>6.7288</td>
<td>0.0002</td>
</tr>
<tr>
<td>DE does not Granger Cause ES</td>
<td>6.0883</td>
<td>0.0024</td>
</tr>
<tr>
<td>ES does not Granger Cause SI</td>
<td>6.0398</td>
<td>0.0023</td>
</tr>
<tr>
<td>SI does not Granger Cause ES</td>
<td>2.1208</td>
<td>0.2878</td>
</tr>
<tr>
<td>DS does not Granger Cause DE</td>
<td>7.0873</td>
<td>0.0353</td>
</tr>
<tr>
<td>DE does not Granger Cause DS</td>
<td>4.7288</td>
<td>0.0002</td>
</tr>
<tr>
<td>DS does not Granger Cause SI</td>
<td>2.2874</td>
<td>0.5398</td>
</tr>
<tr>
<td>SI does not Granger Cause DS</td>
<td>4.2822</td>
<td>0.0003</td>
</tr>
<tr>
<td>DE does not Granger Cause SI</td>
<td>3.2422</td>
<td>0.0035</td>
</tr>
<tr>
<td>SI does not Granger Cause DE</td>
<td>7.2874</td>
<td>0.0045</td>
</tr>
</tbody>
</table>
5 Discussion and Conclusion

5.1 Discussion

The discussion of the results obtained in the current study is based on the three hypotheses that have been generated by the researcher in literature review section of the study. Among these hypotheses, the first one stated that debt servicing has significant impact on environmental sustainability. This hypothesis has been accepted as per the results obtained by data analysis because these results have shown that debt servicing has significant impact on environmental sustainability for the selected panel. When a government maintains the debt service ratio and spends on the technology, it will result in less pollution and thus the environmental sustainability is increased. The similar results have been obtained in the similar past studies (Ndubuisi, 2017). The next hypothesis that development expenditure has significant impact on environmental sustainability has also been accepted as per the results because its impact was found as significant. When the government spends on the development of infrastructure of the country, it enhances the technology and also lowers the level of pollution thus resulting in environmental sustainability. This result is in accordance with the past literature vividly (Özokcu & Özdemir, 2017). The last hypothesis of the study was that social investment has significant impact on environmental sustainability of the country and this hypothesis is also proved true based on the results obtained by the researcher. When the government spends considerably on the social projects of the country, it helps reduce the environmental pollution and enhance in environmental sustainability is observed. This result is in consistency with the studies conducted in the past (Mehrara, Soufiani, & Rezaei, 2016). Moreover, the impact of the control variables inflation and economic growth has also been found as significant. As the economic growth of a country is increased, it results in more environment friendly projects and practices in the country. In this way the environmental sustainability is increased. These results have been affirming with the literature from the past (Scherer et al., 2018).

5.2 Conclusion

As the current study was designed for the analysis of the impact casted by debt servicing, development expenditure and social investment on the environmental sustainability of ASEAN countries, the researcher collected the required data from six ASEAN countries i.e. Brunei, Cambodia, Indonesia, Laos, Thailand and Philippines for 30 years and analyzed it by using certain techniques and approaches that were relevant to the data. The results obtained from the analysis indicated that all the independent variables have significant impact on the environmental sustainability of ASEAN countries. On the basis of these results, it can be concluded that the governments must spend for the up gradation of technology and infrastructure so that the pollution from the environment can be reduced effectively and the environmental sustainability can be enhanced.

5.3 Implications and Limitations

The most important implication of the current study is for the government of ASEAN and other countries i.e. the study will guide them about the advantages of debt servicing, development expenditure and social investment in context of environmental sustainability so that the governments can take appropriate steps and to devise policies and regulations in this regard. In addition, the researchers will find the literature and other related information from the current study and can use it in their research and may improve the research as well in future. For this purpose, the researchers must consider other countries or group of countries by collecting their data so that the similar situation can be analyzed there. In addition, the researchers must also consider the aspects other than environmental sustainability so that vast literature can be obtained in this regard. Moreover, the researcher might also consider techniques and approaches other than those that have been used in the current study so that more accurate and authentic results can be obtained through analysis.
References


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SEEING TOURISM INVESTMENT, TOURISM GROWTH AND IMMIGRATION FROM HARM AND BENEFIT PERSPECTIVE: IMPLICATIONS FOR ENVIRONMENTAL SUSTAINABILITY IN ASEAN COUNTRIES

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Abstract. There are various culprits for the increase in environmental pollution that are affecting the environment and atmosphere in one way or the other. In this context, the researcher has designed this study so that the impact of tourism growth, tourism investment and immigration on the environmental sustainability of ASEAN countries can be studied and analyzed. For this purpose, the researcher has carefully collected the authentic data about the aforementioned aspects of the study from the authentic databases such as World Bank Development Indicators and Global Economy. The data was collected for consecutive 30 years from the ASEAN countries. After collecting data, the researcher has applied panel unit root test, panel cointegration test, coefficient estimation test and panel Granger Casualty test for analysis purpose. The results have indicated that all the independent variables i.e. tourism investment, tourism growth, immigration have significant impact on environmental sustainability. Moreover, these variables are also found to have the causal relationships among each other either unidirectional or bidirectional. The major implication of this study is that it will guide the tourism industries and immigration departments of the countries to apply careful practices so that the environment is not disturbed due to environmental pollution and the environmental sustainability is not disturbed.

Keywords: Tourism Growth, Tourism Investment; Immigration; Environmental Sustainability; ASEAN Countries; Panel


Jel Codes: O10, O20, O30

1 Introduction

Tourism industry is a strategic driver of the economy of the countries of the world (Islam & Nugroho, 2019; Öztürk, Ihtiyar, & Aras, 2019; Singgalen, Sasongko, & Wiloso, 2019; Dunets, Vakhrushev, Sukhova, Sokolov, Utkina, & Shicipyakh, 2019; Chkalova, Efremova, Lezhnin, Poluhkina, & Sheresheva, 2019; Gavurova, Suhanyi, & , Rigelsky, 2020), which has been contributed to 10.2 % of the world GDP (WTTC, 2017) and has created more than 290 million jobs around the world (Travel, 2017), mainly leading to the region’s development and growth (Kongbuamai, Bui, Yousaf, & Liu, 2020; Thang, 2019) as shown in the following table. Based on the ASEAN Tourism Strategic Plan 2011-2015, the region has put forward another strategic plan for 2016 – 2025, in which the goal is to strive for increased contribution to the region’s economic growth through developing the tourism sector. The plan demands that a strategic approach is required to strengthen these investments through quality, community participation, marketing, HR development, safety and security to render the region emerging as a sustainable tourism destination (Öztürk et al., 2019; Secretariat, 2015). (See Table 1)
Table 1: Top 5 ASEAN countries for tourism 2017 (Annual GDP contribution)

<table>
<thead>
<tr>
<th>Country</th>
<th>USD Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>28.2</td>
</tr>
<tr>
<td>Malaysia</td>
<td>13</td>
</tr>
<tr>
<td>Singapore</td>
<td>13.9</td>
</tr>
<tr>
<td>Thailand</td>
<td>36.4</td>
</tr>
<tr>
<td>Vietnam</td>
<td>12.7</td>
</tr>
<tr>
<td>ASEAN (projected value for 2027)</td>
<td>222.8</td>
</tr>
</tbody>
</table>

The number of tourists coming to the ASEAN countries is gradually increasing (Fereidouni & Alizadeh, 2020; Kamil, Pratama, & Arief, 2019), confirming the growth of the Tourism sector, evident from the following figure 1. Though the economic impact of the growth and investments in the tourism sector has been in spotlight, yet the researchers have found that it negatively impacts the environmental quality of the countries (Benner, 2019; Pulido-Fernández, Cárdenas-García, & Espinosa-Pulido, 2019). The real world implications on the notion have suggested that these tourists who are responsible for producing positive outcomes for the economy of a tourist destination adversely affect the environment owing to factors, like the green house gas emissions, water & energy use and the ecological footprint (Saint Akadiri, Alola, & Akadiri, 2019). The economic diversity of these nations shows that this region is available for further investments in tourism and is capable of inviting more tourists and immigrants (Öztürk et al., 2019).

![Tourism growth (millions)](image)

**Figure 1:** Tourism Growth in ASEAN countries (millions)

Since tourism and the immigration has been the topic of debate for the researchers due to their economic benefits, yet there is a need to identify their problematic impact on the conservation and sustainability of the environment (Eluwole, Saint Akadiri, Alola, & Etokakpan, 2020; Mihalic, 2016; Shaheen et al., 2019) in order to save them from pollution and destruction to an irrecoverable point (Ehigiamusoe, 2020; Khan et al., 2020). This research is specifically carried for the ASEAN nations as the growing number of tourists and immigrants are a potential threat to their environment (Azam, Alam, & Hafeez, 2018; Brahmasrene & Lee, 2017; Mehmood, & Farooqi, 2020). Keeping this research area in view, the primary objective of this paper is to see if tourism investment, tourism growth and immigration harm or benefit the environmental sustainability in the ASEAN countries. The paper has specific research objectives as well, which are:

- To analyze the effect of tourism investment on environmental sustainability
• To analyze the effect of tourism growth on environmental sustainability
• To analyze the effect of immigration on environmental sustainability

This paper contributes to the body of knowledge by investigating the factors of tourism growth, tourism investment and immigration on the environmental sustainability by exploring these factors from the context of ASEAN countries. This paper has implications in the formulation of a comprehensive policy making so that a good balance can be maintained between tourism and environment. It provides guidelines for the adjustment of the tourism and immigration policy to reduce the degradation of environment.

This paper has the following organization. After the Introduction to the topic, the detailed literature review of the variables is presented. Preceding this, the research methodology and research results are provided. Towards the end of this paper, the discussion, conclusion, limitations and the research implications are given.

2 Literature review
2.1 Tourism Investment
The start of the 21st century has marked the momentum for investment and development on the tourism sector and its effects on the environment for the agenda of the tourism policy in a country. Hence, it’s high time that the investments in tourism sector and environmental sustainability be kept in equilibrium with the sustainability and growth following the notion of ecotourism for both the developing and the developed countries. A synergy needs to be capitalized for optimizing tourism investment and environmental sustainability (Zaman, Shahbaz, Loganathan, & Raza, 2016; Zeb, N., et al., 2020). A study has examined the role of tourism on the environmental sustainability targets utilizing the ARDL (Autoregressive Distributed Lag) test for Turkey and has found out that with the rise in the income level, the number of international tourists has increased considerably. As a consequence, the per capita carbon emissions have also increased for the short and long run, deteriorating the environment (Preixens, Rodriguez & Batllé, 2020). Hence, though tourism has positive outcomes for economic growth, yet it has negative effect on the environmental sustainability (Saint Akadiri et al., 2019). (Wood, 2017) have discussed the sustainable tourism in his book and has assessed the current and the future value of the tourism investment decisions. The author has stated that effective management of tourist is essential by the travel and tourism companies to eradicate or reduce their bad effects on the surrounding environment. In a study by (Zaman et al., 2016), the tourism development index has been constructed using the principal component analysis (PCA) and least square regression, considering the factors of tourism investment, tourism expenditures and receipts. The results of their study have shown there exist a positive relationship between per capita income, tourism investment and tourism growth with carbon emissions, compromising the environmental quality, hence driving policy for ensuring the sustainable tourism around the world. Other studies have also reinforced these results and have concluded that increase in the investment activities of tourism attract more tourist which results in increased levels of the use and consumption of energy and GHG emissions, disturbing the eco- system of the environment for a more sustainable tourism development (Kazak, 2017; Sörensson & Jansson, 2016; Zarębski, Kwiatkowski, Malchrowicz-Mośko, & Oklevik, 2019; Dalle et al. 2020; Jia, S., et al., 2020). These findings show that investments in tourism are positively linked to environmental sustainability. The following hypothesis shows this relationship:

H1: Tourism Investment is significantly associated with environmental sustainability

2.2 Tourism Growth
There is no doubt that tourism growth is important for any country that seeks development and growth, there is also no doubt in the fact that tourism growth significantly contributes into the total revenue and increase in it means economic growth is going to enhance as well. Now a days, even in the least visited country, tourism is
recorded to contribute 5% in the GDP for sure and that is the only reason that countries are becoming more and more serious in the case of their tourism industry. Countries are investing more and more in the development of their infrastructure and are increasing the number of inbound tourists. Tourism industries are working to preserve the previously visited places and are also working to build new ones. Moreover, the tourism industries are also working to improve the facilities for the tourists and are also working to provide more facilities to the tourists so that the inbound tourism can enhance and the customers can become regularly visiting customers. Where the tourism industry is highly helpful in increasing the revenues, at the same place, this industry is impacting the environment in a great way as well. Activities of tourism growth have been increasing the deterioration of environment as well. Analyzing the tourism policy of European countries, the researchers have evaluated the association of growth and environmental sustainability. The discourse analysis suggested that countries’ must attempt to reduce the damages to the environment (Torkington, Stanford, & Guiver, 2020). In a cross- country study using the panel data model, the examination of contribution of the tourism policies and tourism growth was done (Joshi, Poudyal, & Larson, 2017; Jiang, H., et al., 2020). The study suggested that tourism growth has contributed greatly to the world GDP and the economic growth by adding more job opportunities and employment (Scowsill, 2017). Inspite of this economic advantage, a similar study has shown that the growth in tourism has a close and significant relationship with the environmental preservation practices and obligations (Susanto, 2019). The importance of the tourism economy was explored as a catalyst for prosperity and growth by bringing foreign revenue into the country (Oh, 2005) for sustaining long term and improving balance of payments (Phiri, 2016), but it has implications for the protection of coasts, the carbon emission, and stabilization of soil. The use and consumption of energy shows the links with the target of environmental sustainability using panel data of the top ten countries of the world which are considered as most polluted. The findings of the study using panel co-integration tests showed that increase in the tourism factors leads to environmental degradation. The environmental sustainability implies that the world must be kept cleaner and healthier using various measures for the present and the future generations to come (Eluwole et al., 2020). The growth in the tourism sector implies that more tourists will be travelling to these destinations and consequently, additional volumes of pollution and waster will be released into the atmosphere due to extra consumption of energy (KhairatP0F & Maher, 2012). The tourism activities involve more avenues of accommodation and transportation which also use a large volume of energy that can have negative effects on the atmosphere by releasing carbon di oxide and other gases (Shaheen et al., 2019). Fossil fuels are increasingly burned which are also detrimental for the environment by generating climate changes which disturb the world’s natural eco- system. As per a survey, 5 % of the world’s carbon emissions are due to the tourism industry (Sörensson & Jansson, 2016; Zhang & Gao, 2016). The level of the carbon emissions is expected to drastically increase to 43.2 billion metric tonnes by the year 2040 if not controlled (Zaman & Abd-el Moemen, 2017). These studies have confirmed that tourism growth has close relationship with the environmental sustainability (Shaheen et al., 2019; Sörensson & Jansson, 2016). Hence, the following hypothesis can be deduced to show this association:

H2: Tourism growth is significantly associated with environmental sustainability

2.3 Immigration

Immigration is a threat to the environmental sustainability in addition to opening new opportunities for employment and avenues for economic progress. With the increasing number of immigrants, it is difficult to achieve targets of low carbon emission levels and being energy efficient so that a cleaner environment can be ensured. Using a panel of the largest economies of the European Union, the results showed that both carbon emission and migration are positively linked to each other. Hence, in order to ensure a sustainable environmental quality, policy must be amended to balance the number of immigrants and the environment (Andrew Adewale Alola, Yaçınier, Alola, & Saint Akadiri, 2019). Another study analyzed the effect of immigration on the population, system of health care, economy and environmental sustainability. The results of the empirical analysis
proved that the number of immigrants greatly improved the GDP, however it enhances the pollution levels and has a notable impact on the environment in the European countries (Grau Grau & Ramírez López, 2017). The increment in the flow of immigrants is a major outcome of the countries’ globalization and results in considerable developments of the communications and transport sector, which has added the pollutants to the environment leading to the global warming and climate change (Grau & López, 2017). Immigration and environmental sustainability are closely knitted to each other in a negative correlation (Cafaro & Staples III, 2009; Ma, 2020; Solarin & Bello, 2020). Hence, this shows that countries must redesign their immigration policies to protect the environment from the after effects of increased globalization, urbanization and degradation. The following hypothesis is made to represent this relationship:

H3: Immigration is significantly associated with environmental sustainability

3 Methodology
3.1 Data
The current research has been designed in such a way so that the impact that is faced by environmental sustainability from the tourism investment, tourism growth and immigration in ASEAN countries can be analyzed and determined. In light of this purpose, the researcher has carefully collected the authentic data about the aforementioned aspects of the study i.e. tourism investment, tourism growth, immigration and environmental sustainability, from the authentic databases such as World Bank Development Indicators and Global Economy. The data was collected for consecutive 30 years from the ASEAN countries. After the collection of data, various tests and techniques have been applied on it for analysis purpose whose details have been discussed in the next section.

3.2 Model Specification
The details about the measurement units of the variables of the study have been given in this section. As it is clear that there is only one dependent variable, environmental sustainability which has been denoted by ENS and measured through the use of an index named as environmental sustainability index. Moreover, the first independent variable, tourism investment has been denoted through TIN and has been measured in context of US dollars. The second independent variable, tourism growth is based on the number of tourists visiting the ASEAN countries and this variable has been represented through TGR in the study. The last independent variable, immigration is taken in the context of the number of people emigrating from other countries to ASEAN countries and this variable has been shown through IMM. Apart from these variables, there is a control variable as well i.e. GDP that has been measured in context of economic growth of a country. Based on all these variables, the following regression model can be applied in the study;

\[ ENS_{it} = \alpha + \beta_1 TIN_{it} + \beta_2 TGR_{it} + \beta_3 IMM_{it} + \beta_4 GDP_{it} + \epsilon_{it} \]

Here, ENS is the environmental sustainability, TIN is the tourism investment, TGR is the tourism growth, IMM is the immigration, GDP is the economic growth and \( \epsilon_{it} \) is the error term.

3.3 Estimation Procedure
3.3.1 Panel Unit Root Test
First of all, in order to find out the stationary properties and panel stationarity of the variables of the study, the researcher has applied panel unit root test in the study. Among various tests that are applied for this purpose, the researcher has preferred Levin Lin Chu LLC test in this study (Levin, Lin, & Chu, 2002). This test involves null and alternate hypothesis where the assumption of null hypothesis is that there is unit root in the panel data and it is non stationary while the assumption of alternate hypothesis is that there is no unit root and the data is stationary (Levin & Lin, 1993). If the variables reject this hypothesis, it will result into the fact that data is stationary and the order of integration is I (1). The following model is used for panel unit root test;
\[ \Delta y_{i,t} = a_t + \rho y_{i,t} - 1 + \sum_{j=1}^{p_t} a_j \Delta y_{i,t-j} + \epsilon_{i,t} \]
Here, \( \Delta y_{i,t} \) represents the difference of the term \( \Delta y_{i,t} \) specific for ith country and the time period of t.

3.3.2 Panel Cointegration Test

The researcher, after panel unit root test, has applied Pedroni cointegration test so that the long run relationships among the variables can be identified. Pedroni test is actually a residual based cointegration test which is based on the null hypothesis with the assumption of no cointegrated relationships between the variables (Pedroni, 1999). This test also overcomes the assumption of homogeneity that is caused by Kao cointegration test. Moreover, there are two statistics that are used in pedroni test (Pedroni, 2001). The first one involves the residuals on within dimension or homogeneous panel cointegration and the second one is based on between dimension or heterogeneous group mean. In this regard, the following model can be used in the study,

\[ y_{i,t} = \alpha_i + \delta_i t + \beta_1 x_{1i,t} + \beta_2 x_{2i,t} + \cdots + \beta_n x_{ni,t} + \epsilon_{i,t} \]

3.3.3 Estimating the Coefficient with FMOLS

In order to find out and estimate the panel cointegration regression, the researcher has applied the coefficient estimation technique i.e. FMOLS or fully modified ordinary least square, which is the most common technique used for this purpose. This technique is a non parametric technique and has the ability to rule out the issues such as serial correlation as well as endogeneity that are generally caused by the presence of cointegrating relationships between the variables (Pedroni, 2000). This test provides information about how much impact an independent variable has on the dependent one. The following model can be considered for this test;

\[ \hat{\beta}_{FM} = \left( \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{it} - \bar{x}_i)^2 \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{it} - \bar{x}_i) \bar{E}\bar{N}S_{it} - T \delta_{eu} \]

In this equation, \( \bar{E}\bar{N}S_{it} \) is the transformed variable of ENS caused by endogeneity while \( \delta_{eu} \) represents here the serial correlation correction.

3.3.4 Panel Granger Casualty Test

When the cointegrated relationships are found among the variables, there is high degree of possibility that there are various casual relationships among the variables. In order to detect the presence of these casual relationships, the researcher has applied Dumitrescu and Hurlin Granger Casualty test. This test provides information about any unidirectional and bidirectional casual relationship present among the variables. The null hypothesis for this test shows that there is no casual relationship and vice versa (Dumitrescu & Hurlin, 2012).

4 Results and Analysis

4.1 Results of Panel Unit Root Test

The first test that was applied in order to find out the order of integration and stationary properties of the variables was IPS unit root test, the results of which have been given in the table 2. These results are both for level and first difference series in case of intercept as well as intercept plus trend. Let us first consider the level series, it can be seen that only two variables have rejected the null hypothesis at intercept while only three variables have rejected the null hypothesis at intercept plus trend. On the other hand, when the variables were first differenced, it can be seen that all of the variables of the study have rejected the null hypothesis in case of both intercept and intercept plus trend. These results make it quite clear that at level series, the data was non stationary and there was unit root but once the first difference has been applied, the data has become stationary without having the unit root.
Table 2: Panel Unit Root Test – Im, Pesaran and Shin (IPS)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>1st difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>Intercept + Trend</td>
</tr>
<tr>
<td>ENS</td>
<td>-2.6834</td>
<td>-2.3994</td>
</tr>
<tr>
<td>TIN</td>
<td>-0.3974</td>
<td>-0.3994</td>
</tr>
<tr>
<td>TGR</td>
<td>-3.3974**</td>
<td>-4.4095**</td>
</tr>
<tr>
<td>IMM</td>
<td>-2.3874</td>
<td>-3.4993*</td>
</tr>
<tr>
<td>GDP</td>
<td>-4.3987**</td>
<td>-4.3984**</td>
</tr>
</tbody>
</table>

4.2 Results of Panel Cointegration Test

After unit root test, the researcher had applied the Pedroni cointegration test for the recognition of any cointegrated relationships between the variables of the study. The results of this test have been reported in table 3. As per these results, the within dimension or homogenous panel has two statistics out of four that have rejected the null hypothesis of no cointegration. In the exact same way, it can also be estimated that in between dimension or heterogeneous group all of the three statistics have rejected the null hypothesis of no cointegration. Overall, it can be stated that five out of total seven statistics have rejected the null hypothesis of no cointegration thus confirming that there are cointegrated relationships between the variables of the study.

Table 3: Cointegration Test – Pedroni Panel

<table>
<thead>
<tr>
<th>Test</th>
<th>Statistics</th>
<th>t-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Within Dimension)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel v-Statistic</td>
<td>-0.2983</td>
<td>-1.4092</td>
</tr>
<tr>
<td>Panel β-Statistic</td>
<td>-0.3094</td>
<td>-1.4871</td>
</tr>
<tr>
<td>Panel t-Statistic (non-parametric)</td>
<td>-2.4992***</td>
<td>-4.7634*</td>
</tr>
<tr>
<td>Panel t-Statistic (adf): (parametric)</td>
<td>-4.3094**</td>
<td>-4.4523**</td>
</tr>
<tr>
<td>(Between Dimension)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group β-Statistic</td>
<td>-1.9421**</td>
<td>-7.3094*</td>
</tr>
<tr>
<td>Group t-Statistic (non-parametric)</td>
<td>-0.384*</td>
<td>-4.4983*</td>
</tr>
<tr>
<td>Group t-Statistic (adf): (parametric)</td>
<td>-2.493*</td>
<td>-3.3984*</td>
</tr>
</tbody>
</table>

4.3 Results of Estimating the Coefficient with FMOLS

The most crucial test of the study i.e. FMOLS estimation has its results given in the table 4. According to these results, it can be seen that tourism investment has significant and negative impact on environmental sustainability because the p-value is less than 0.05. This means that with the increase in one percent of tourism investment, the environmental sustainability will decrease by 22.3%. In the same way, the impact of tourism growth has negative and significant impact on environmental sustainability and it suggests that with one percent increase in tourism growth, the environmental sustainability will be decreased by 12.4%. The last independent variable i.e. immigration is also found to have a negative and significant impact on environmental sustainability and it indicates that with one percent increase in migration, the environmental sustainability will be decreased by 22%. In the last, the control variable is having positive and significant impact on environmental sustainability. In other words, when the economic growth is increased by one percent, the environmental sustainability will also be increased by 38.2%. The value of R square indicates that 88.2% change in environmental sustainability is caused by all these variables and the remaining change is caused by some other variables.
Table 4: FMOLS Estimation

<table>
<thead>
<tr>
<th>Estimator</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIN</td>
<td>-0.223**</td>
<td>0.387</td>
<td>0.000</td>
</tr>
<tr>
<td>TGR</td>
<td>-0.124*</td>
<td>0.478</td>
<td>0.005</td>
</tr>
<tr>
<td>IMM</td>
<td>-0.220*</td>
<td>0.574</td>
<td>0.003</td>
</tr>
<tr>
<td>GDP</td>
<td>0.382*</td>
<td>0.433</td>
<td>0.000</td>
</tr>
<tr>
<td>Adj. R Square</td>
<td>0.882</td>
<td>0.765</td>
<td>0.000</td>
</tr>
<tr>
<td>F-Value</td>
<td>56.180</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D.W. Stat</td>
<td>2.12</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The results of multicollinearity have been presented in table 5. According to these results, it is quite clear that the values for VIF (variance inflation factor) for all the variables are very close to 1 which indicates that there is no issue of multicollinearity in these variables.

Table 5: Multicollinearity Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIN</td>
<td>1.298</td>
<td>.298</td>
</tr>
<tr>
<td>TGR</td>
<td>1.209</td>
<td>.367</td>
</tr>
<tr>
<td>IMM</td>
<td>1.402</td>
<td>.298</td>
</tr>
<tr>
<td>GDP</td>
<td>1.298</td>
<td>.498</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>1.084</td>
<td>-</td>
</tr>
</tbody>
</table>

4.4 Results of Panel Granger Casualty Test

The results of Granger casualty have been presented in the table 6. According to the table, bidirectional casualty is running between tourism investment and tourism growth, tourism growth and economic growth, tourism growth and environmental sustainability, economic growth and environmental sustainability. Moreover, unidirectional casualty is running from immigration to tourism investment, from economic growth to tourism investment, from economic growth to tourism growth, from immigration to economic growth and from tourism investment to ENS. In this way, the Granger casualty runs among various variables in the way as discussed above.

Table 6: Casualty Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>TIN</th>
<th>TGR</th>
<th>IMM</th>
<th>GDP</th>
<th>ENS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIN</td>
<td>-</td>
<td>.068*</td>
<td></td>
<td>.054</td>
<td>.100*</td>
</tr>
<tr>
<td>TGR</td>
<td>.072*</td>
<td>-</td>
<td>.076</td>
<td>.076</td>
<td>.054*</td>
</tr>
<tr>
<td>IMM</td>
<td>.077*</td>
<td>.017</td>
<td>-</td>
<td>.087**</td>
<td>.057</td>
</tr>
<tr>
<td>GDP</td>
<td>.038*</td>
<td>.036**</td>
<td>.103</td>
<td>-</td>
<td>.077*</td>
</tr>
<tr>
<td>ENS</td>
<td>.038</td>
<td>.076*</td>
<td>.037</td>
<td>.098*</td>
<td>-</td>
</tr>
</tbody>
</table>

5 Discussion and Conclusion

5.1 Discussion

It has been quite clear from the earlier discussions that the current study was conducted with the sole motive to find out the impact of tourism growth, tourism investment and immigration on the environmental sustainability of ASEAN countries. In continuation of this purpose, the researcher has generated three hypotheses so that these can be tested and results can be obtained. The first hypothesis was that tourism investment has significant impact on environmental sustainability. This hypothesis was accepted as the results indicated that this impact was significant. When the investment in tourism sector is increased, it attracts more tourists and thus the environment
is polluted in this way disturbing the environmental sustainability. This result is in consistency with a past study (Canteiro, Córdova-Tapia, & Brazeiro, 2018). The second hypothesis was that tourism growth has significant impact on environmental sustainability. This hypothesis has also been accepted because the results indicated this impact as significant. When the tourism growth is increased, the number of tourists is also increased and various activities that are associated with tourism result in increase in environmental pollution thus disturbing the balance of environmental sustainability. This result complies with the past literature (Saint Akadiri et al., 2019). The last hypothesis of the study was that immigration has significant impact on environmental sustainability and this hypothesis has also been accepted as per the results. When immigration towards a particular country is increased, it results in the increase in population of that country and thus decreasing the environmental sustainability. This result is in accordance with the researchers of similar context conducted in the past (Andrew A Alola, 2019). Moreover, the impact of a control variable i.e. economic growth GDP has also significant impact on environmental sustainability because when the economic growth is increased, the technologies get advanced that work to reduce the pollution and thus the environmental sustainability is improved. In short, it can be stated that all the hypotheses of the study have been accepted.

5.2 Conclusion
In order to achieve the objective of the current study i.e. to analyze the impact of tourism growth, tourism investment and immigration on the environmental sustainability of ASEAN countries, the researcher has collected data about these variables from the ASEAN countries for 30 years and analyzed that data by applying certain appropriate techniques and approaches. The results obtained from these techniques and approaches indicate that all the hypotheses of the study have been accepted. Thus it can be concluded that the tourism activities and immigration must be given attention and taken out carefully by analyzing all the aspects regarding to them so that they might not impose harmful impacts on the environment.

5.3 Implications and Limitations
The theoretical implication of the current study is that thus study has a lot of information and literature about the aspects regarding tourism and immigration along with their impact on environment which might be useful for the researchers and authors. Moreover, the practical implication of the study is that it will guide the tourism industries and immigration departments of the countries to apply careful practices so that the environment is not disturbed due to environmental pollution and the environmental sustainability is not disturbed. The government must introduce policies and regulations that are favorable for both the tourism and immigration departments and the environment of the country. This study has been conducted in context of ASEAN countries and other researchers are recommended to go for other countries so that their perspective is also obtained in the similar context. In addition, the researchers might also go for any area other than environmental sustainability and increase the literature in this regard. The literature review may also be improved by using more researches and studies in similar context.

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A PRODUCT OF SOCIAL MISSION, SUSTAINABLE ENTREPRENEURIAL AND MARKETING ORIENTATION: ENHANCING SOCIAL ENTREPRENEURIAL SELF-EFFICACY IN INDONESIAN EDUCATION SECTOR

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Abstract. In the current era, there is a major need to make some effective development in the social entrepreneurship based strategic approach in business development. This paper is an informative approach based on critically consider the number of external factors that enhanced the self-efficacy of social entrepreneurship in the education sector of Indonesia. In this paper, social mission orientation, sustainability entrepreneurial orientation, and marketing orientation are act as an independent variable, risk management as a moderator, while social entrepreneurial self-efficacy is studied as a dependent variable. An online survey-based quantitative research method is used for data collection. After implementing the structural equation modeling (SEM) and moderation analysis based statistical testing, it becomes concluded that risk management acts as a strong moderator which enhance the influence of sustainability entrepreneurial orientation and marketing orientation on the social entrepreneurial self-efficacy. But the social mission orientation does not majorly impact on self-efficacy because of its higher risk factor. This is an attractive approach in front of the Indonesian education sector to enhance their understanding regarding the efficient social entrepreneurship that helps them to make a long-lasting decision. No doubt, this is a challenging and informative paper but there are some limitations like lack of mixed method based versatile research and lack of value co-creation factor may impact the authenticity of this paper which can be overcome by the upcoming related field scholars.

Keywords: Social Mission; Sustainable Entrepreneurial and Marketing Orientation


JEL Codes: O20, O31

1 Introduction

In 1994, a curriculum was prescribed to help the education sector of Indonesia to act confidentially and confidently in curricular decision making to enhance its self-efficacy beliefs (Brown, 2018). New market entry opportunities can be determined with the help of entrepreneurial orientation (EO), and it also helps in maintaining the sustainability, culture, environment, and economy of an organization (Novianti & Nurlaelawati, 2019; Wichitsathian, & Nakruang, 2019). There are several higher learning institutes in Indonesia, and the Dutch people consider these institutes beneficial and advantageous instead of other learning institutions (Setiawan & Saputri, 2019).
According to Yulianti, Denessen, and Droop (2019), EO acts as a bridge between value co-creation and the performance of the market, and it has a positive impact on market orientation as well as self-efficacy. Sustainability symbolizes an innovative mission to conserve long-term firm survival and to generate social values. Social mission orientation in an organization helps in influencing the eagerness through an effectual, sustainability orientation (SO), and innovativeness (Parker, 2017). Risk management plays an important role in strengthening the relationships among pro-activeness and SO (Assegaf, 2017).

The given Table 1, listed top risks facing by the Indonesian education sector in the past few years.

<table>
<thead>
<tr>
<th>Table 1: Top risks facing by the education sector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2015</strong></td>
</tr>
<tr>
<td><strong>Student recruitment</strong></td>
</tr>
<tr>
<td><strong>Research funding and quality</strong></td>
</tr>
<tr>
<td><strong>Government rules and landscape</strong></td>
</tr>
</tbody>
</table>

There is not only a lack of entrepreneurial sustainability, market orientation, and social mission in the education sector of Indonesia but also a lack of entrepreneurial abilities and self-efficacy in the workers of that sector (Saidek & Islami, 2016). Self-efficacy and sustainability should be enhanced by increasing their capability and capacity because it will result in satisfying the employees from their jobs that will result in increasing the level of self-efficacy (Ma'arif, 2018). Manzo, Lestari, and Atirennu (2019) Also describe that the values and opportunities should be created to meet social needs and to increase social entrepreneurship. There is a lack of motivation among the employees of the education sector of Indonesia (Sulisworo, 2016).

Establish on the outcomes of previous efforts, it comes to the knowledge that significant efforts have been conducted in the previous year’s regarding social entrepreneurial self-efficacy (SES) from different perspectives. An effort recently by Amri, Bird, Ronan, Haynes, and Towers (2017) has evaluated the role of SES and value co-creation to determine the crucial differences among sustainability entrepreneurial orientations SEO and additions to the market. So, this indicates that much of the efforts have been completed in the last few years concerning SES (Grabara, Hussain & Szajt, 2020). Though, the research has not been conducted concerning the Indonesian education sector and its overall performance in terms of entrepreneurial orientation (EO). Moreover, none of the past researches has evaluated the significant role of marketing orientation in improving the existing performance in terms of SES. Hence, the results as well as findings of the given study prove to be very helpful for the education sector of Indonesia in understanding the behavior of SEO and marketing attitude on SES. Besides, a recent study by Elmira and Suryadarma (2020) has analyzed the impact of SEO in different conditions and perspectives. Consequently, the following effort is remarkable and justified certainly because no other study has evaluated the mediating impact of risk management in enhancing the association between SEO and SES. The major goals of the current article are given below:

- The fundamental objective of the study is to examine the relationship between social mission orientation and social entrepreneurial self-efficacy (SES) in the education sector of Indonesia.
- The second goal of the paper is to evaluate the association between sustainability entrepreneurial orientations (SEO) an social entrepreneurial self-efficacy (SES) in the education sector of Indonesia.
The next objective is to identify the direct impact of marketing orientation on the social entrepreneurial self-efficacy in the education sector of Indonesia.

The fourth target is to determine the mediating impact of risk management (RM) on the linkage between social mission orientation and SES in the education sector of Indonesia.

The fifth aim is to analyze the mediating impact of RM on the connection between sustainability entrepreneurial orientations (SEO) and social entrepreneurial self-efficacy (SES) in the education sector of Indonesia.

The final objective of the paper is to identify the mediating role of risk management in the connection between marketing orientation and social entrepreneurial self-efficacy in the education sector of Indonesia.

The current study is very significant as it evaluates the worth and value of social mission orientation and its role in the sustainable entrepreneurial and marketing orientation in enhancing social entrepreneurial and a positive influence in improving self-efficacy. This study is very helpful for the managers, owners, and the market salesmen as it expresses the points and sources to maintain sustainability in the production sector and also a kind of information and knowledge about the market place to start work with complete awareness about the market and its demands. The scope of this study is very wide as it helps in keeping a balance in the education sector.

The structure of the given research is as follows; it starts with the introduction of the study which generally provides a brief statement of the origin of the issues and certain problems. The initial chapter of the study also states the significance of the findings along with the scope of the research. The chapter of the literature review or theoretical framework mainly deals with related concepts and statements. Furthermore, the chapter of the methodology includes the study design and procedures of data gathering from different education institutions. The section of data analysis summarizes the data gathering and presents its complete analysis it a table form. And, finally, the chapter of conclusion and discussion gives an overview of the study findings.

2 Literature review

2.1 Theory of social entrepreneurial orientation (SEO)
According to Liu and Huang (2020), social entrepreneurship is a practice by groups and individuals, start-up firms, and entrepreneurs in which they majorly generate, fund as well as execute solutions to social and ecological problems. According to the theory of SEO, social entrepreneurship in different sectors offers an altruistic way of entrepreneurship that mainly empower entrepreneurs so that they can focus on the advantages that sectors and societies may reap (Martínez-Climent, Rodríguez-García, & Zeng, 2019). According to this theory, social entrepreneurs of education sectors recognize immediate social issues and challenges and also keen to understand the significant context of problems that crosses some rules, policies as well as discipline (Turpin & Shier, 2020). Besides gaining a huge understanding of how a problem concerns to society allows social entrepreneurs to generate some innovative as well as effective solutions and empower available resources to affect a significant scale of society and this all develop majorly due to effective risk management (Alarifi, Robson, and Kromidha (2019). Moreover, Parveen, Jaafar, and Ainin (2016) in research analyzed that from the basic corporate type of business, these types of entrepreneurial orientation (EO) ventures focus on increasing social gains as well as social entrepreneurship self-efficacy, rather than increasing financial benefits (Hussain et al., 2020).

2.2 The relationship between social mission orientation (SMO) and social entrepreneurial self-efficacy (SES)
A mission is an important task that people individually or a group of people perform to achieve the desired goal (Liu & Huang, 2020). social mission orientation generally deals with a specific environment to obtain the goals.
Social mission orientation SMO deals with creating an environment to work with collaboration and generating a friendly environment (Studdard et al., 2017; Iqbal, Z., et al., 2020). According to Brändle, Berger, Golla, and Kuckertz (2018) social mission focus on developing such an environment in which every individual is involved in playing a positive role and collaboration to perform their duties. The social mission involves all the employees, managers, management, supply chain system, employees, and all those shareholders and stakeholders as well (Ip, Wu, Liu, & Liang, 2017). Under such SMO there is a positive establishment of social entrepreneurship through the means of self-efficacy (Aziz, Abdul Rahim, & Bukhari, 2017; Sajid, S., 2020). Self-efficacy is self-determination or the qualities to tackle all the issues and manage all the aspects leading the team of the workforce to achieve all the goals. There is a perfect and very positive influence of the social mission orientation SMO and also the social entrepreneurial self-efficacy SES. Self-efficacy makes everyone believe in his own abilities and duties in order to perform best. Thus every member of the firm or the organization plays a vital and very significant role to lead his firm far beyond the progress and development (Gerleve & Flattan, 2019). Therefore, the given study recommends the following hypotheses,

**H1:** There is a consequential relationship among social mission orientation and social entrepreneurial self-efficacy.

### 2.3 The association between sustainability entrepreneurial orientation (SEO) and SES

Sustainability entrepreneurial orientation is a term that deals with the ability to know and managing the matters regarding business and also the ability to make decisions and accept the challenges to face the competitors. The companies or the organizations evaluate the skills and the deficiencies to make plans to achieve sustainability and also a strong workforce to achieve the desired goals (McGee & Peterson, 2019). To maintain sustainability, business management makes such policies and strategies that may help them to stable their position and they can lead to success and achievement. In making possible such policies and strategies there must be a relationship between SES. Besides, self-efficacy is a feeling of thinking innovations, positivity, creation, and also the ability to deal with the challenges of the modern age (Mei et al., 2017). Social entrepreneurial self-efficacy leads every individual towards success and achievement and a positive response when every individual is acknowledged and their efforts are appreciated with a positive ideology to make every possible effort to do best for the betterment of the company. Hence, the entire discussion leads to the below hypotheses,

**H2:** There is a positive relationship between sustainability entrepreneurial orientation and SES.

### 2.4 The relationship between marketing orientation (MO) and SES

The marketing orientation is an entrepreneurial as well as a business approach where the focus of entrepreneurs is on determining individuals' requirements, wants, and meeting them (Newman, Obschonka, Schwarz, Cohen, & Nielsen, 2019). Different previous studies such as (Studdard et al., 2017) manifest that when a sector has a MO approach, it mainly focuses on developing and delivering services that satisfy customer requirements to be social entrepreneurial and to be profitable through SES. Successful marketing-oriented sectors discover and meet the fundamental desires of its customers through its high self-efficacy entrepreneurs. MO is a customer-centered process to service design that majorly involves identifying what customers or clients view as their quick needs and personal preferences within a certain service category (Shahab, Chengang, Arbizu, & Haider, 2019). On the other hand, self-efficacy is an ability which generally mirrors an entrepreneur’s beliefs in his capabilities to finish a social task, and solve issues or complete a certain set of tasks. SES was suggested as a new idea and variable to evaluate entrepreneurs' behavior towards social tasks such as MO that influence customers' perceptions, efforts, beliefs, and levels of input (Kumar & Shukla, 2019; Kong & Zhao, 2020). In short, owing positive self-efficacy benefits education sector entrepreneurs accept the social environment and persist in their jobs and develop an effective MO plan than those within-significant levels of self-efficacy. SES viewed as a significant and supportive variable to check the marketing performance of entrepreneurs, has some processes that develop further generation and significant application. Such as, self-efficacy is viewed to be a major evocator of entrepreneurs' self-
confidence in experiencing challenges that advantages education experts successfully provide services in the altering education market. In short, the below hypotheses were suggested by the study,

**H3:** There is a significant relationship between marketing orientation and social entrepreneurial self-efficacy.

### 2.5 The mediating role of risk management in the relationship between SMO and SES

Risk management plays a vital role in SES in the education sector because self-efficacy can be attained by the establishment of social, physical skills, and complex cognitive and of an individual through different experiments and experiences. According to (Darmanto & Yuliari, 2018; Li, & Xu, 2020), the self-efficacy of an individual can be developed with the help of self-perception of his abilities and skills, and it results in achieving the goal efficiently. Perceptions and risk decision-making play a mediating role in the relation of SES and SMO by motivating the entrepreneurs to influence risk management. The outcomes of the risk management depend on the environment of the organization, either it will be positive or negative. Risk responses help to determine the results of risk management in an organization, and the influencing factors are more focused instead of the internal mechanism of an organization (Khalid, Bashir, & Saqib, 2018). The entrepreneurs are encouraged to share their ideas that are concerned with creating new social values, planning to fulfill the tasks and goals, and addressing how to let these ideas meet the social needs if a social mission is adopted in an organization (Gómez-Fernández & Albert, 2020). Hence, the current research proposes the following hypotheses,

**H4:** Risk management plays a significant mediating role in improving the association between SMO and SES.

### 2.6 The mediating impact of risk management in the connection between SEO and SES

Opposed to EO, risk management (RM) according to Liu and Huang (2020) is the mechanism of identifying, evaluating, and managing threats and risks to an institutional capital as well as finances. Besides, these risks and threats could come from a category of sources such as financial uncertainty, strategic management inaccuracies, and some type of legal liabilities. According to Zeb, ASajid, and Iqbal (2019), IT security risks, and other data-regarding threats and the threat management approaches to alleviate them, have become a major priority for digital entrepreneurs. Appropriately, a risk management process significantly includes institutions processes for identifying and managing education-related risks to its digital assets such as proprietary data and intellectual property (IP). Moreover, by executing a successful RM plan and addressing the several potential threats and the education sector can improve the sustainability level of EO and in this way, the self-efficacy of their entrepreneurs becomes significantly high. This is mainly because a significant RM plan will help an education institution develop procedures as well as mechanisms to avoid potential data risks, reduce their impacts should they happen, and fight with the outcomes. Therefore, the above discussion leads to the development of the following hypotheses,

**H5:** Risk management positively mediates the association between SEO and SES.

### 2.7 The mediating role of risk management in the relationship between MO and SES

Risk management in any organization has a very significant role to maintain the emergencies or issues regarding production and the supply chain and also deals with the external as well as internal matters (Raoof, Qureshi, & Jabeen, 2019). Risk management overviews all the aspects that play a very positive and effective role in managing all affairs to make the possibility of a continuous process of the flow of business and also skills and abilities to deal with the rivals in every field. Risk management plays a mediating role in developing a very strong bond with the marketing orientation and social entrepreneurial self-efficacy (Ahmed, Islam, & Usman, 2020). Marketing orientation makes the management able to make such policies and ideas that suit the organization. Risk management team makes it possible for the organization to produce what suits and best for the market demand and socially acknowledged and accepted with a self-efficacy to deal with an unexpected situation or crisis and also to develop the production and the involvement of every individual to make the organization more established with a lot of innovations and energetic workforce.

**H6:** Risk management positively mediates the association between marketing orientation and SES.
Research model is presented in Figure 1.

![Research Model Diagram](image)

**Figure 1: Research Model**

3 **Methodology**

3.1 **Data Collection**

To inspect the influence of social mission orientation, sustainability entrepreneurial orientation, and marketing orientation on the social entrepreneurial self-efficacy, a quantitative research based informative method is used. In order to collect the relevant data, random online surveys were distributed among the related educational field participants in Indonesia. As, the major aim of this paper is to enhance the self-efficacy based social entrepreneurial activities within the educational field of Indonesia, so majorly its administration department, owners, infield working managers, and investors are considered to collect the opinion regarding this research hypothesis. So, a five-point Likert scale was used in the questionnaire based data collection process (Wu & Leung, 2017), where social mission orientation, sustainability entrepreneurial orientation, and marketing orientation are considered as independent variables, social entrepreneurship self-efficacy act as a major dependent variable, while risk management act as a moderator within their relationship.
3.2 Sampling
Firstly, the confirmation from the educational field professionals and scholars was collected before the random distribution of online survey. After this, 400 close-ended questions oriented questionnaires distributed among the educational field professionals on which approximately 386 were those who gave valid responses towards the asked questions. This 386 valid response based sample data is then categorized on the base of gender, age and experience. Like according to its descriptive statistics, 214 participants are males (55% of total percentage) and the remaining 172 are females with 45%. According to this outcome, it becomes clear that the percentage of actively participated males is 10 times more than females. After this, the age-based demographic segregation depicts that 32% of the overall selected Indonesian participants are less than 25 years old, 40% of them are within the age limit of 25 to 35 years old, 24% are from 35 to 45 years, while only 4% having more than 45 years old age. In case of their educational field based division, it becomes clear that only 14% of total having less than 2 years’ experience, while 43% having 2 to 5 years based in-field management experience and 34% have 5 to 8 years based experience level, and only 10% of them are more than 8 years’ experience in the educational field experience in the Indonesian market. All the above-selected sample based participants' evaluation depicts that maximum of the tested respondent is young, energetic, high potential, and new ideas containing individuals who having full information regarding this industry and all its consequences.

3.3 Measurement
In order to measure the authenticity and accuracy of this research, the original scales were selected from the well-known educational journals. The descriptive statistics and factor loading based statistical tests will be implemented that helps either to justify or nullify the hypothesis, as shown in the following heading (Ringle, Sarstedt, Mitchell, & Gudergan, 2018; Sardeshmukh & Vandenb., 2017). Also, the structural equation modeling (SEM) and moderation analysis based informative outcomes will be generated that helps to justify the relationship among the tested variables (Hayes, 2017; Ramayah, Cheah, Chuah, Ting, & Memon, 2018).

4 Analysis Interpretation
Moderation analysis is a behavioral science that involves the use of linear multiple regression analysis or the causal modeling that easily quantify the impact of risk management based moderating variable in the multiple regression analyses. Also, structural equation modeling is an effective technique to study the relationship among the tested independent and dependent variables. The descriptive statistics of the related SPSS test discussed in the following Table 2.

Table 2: Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>RiskMang</td>
<td>386</td>
<td>1.00</td>
<td>5.00</td>
<td>3.2934</td>
<td>1.02036</td>
<td>-0.214</td>
<td>0.124</td>
</tr>
<tr>
<td>SESelfEff</td>
<td>386</td>
<td>1.00</td>
<td>5.00</td>
<td>3.3426</td>
<td>0.96749</td>
<td>-0.385</td>
<td>0.124</td>
</tr>
<tr>
<td>MarkOri</td>
<td>386</td>
<td>1.00</td>
<td>5.00</td>
<td>3.5719</td>
<td>1.14494</td>
<td>-0.610</td>
<td>0.124</td>
</tr>
<tr>
<td>SuEOri</td>
<td>386</td>
<td>1.00</td>
<td>5.00</td>
<td>3.2055</td>
<td>1.19030</td>
<td>-0.491</td>
<td>0.124</td>
</tr>
<tr>
<td>SpMOri</td>
<td>386</td>
<td>1.00</td>
<td>5.00</td>
<td>3.3826</td>
<td>1.12001</td>
<td>0.491</td>
<td>0.124</td>
</tr>
</tbody>
</table>

According to the above-mentioned statistics, it becomes clear that the value of social entrepreneurial self-efficacy is less deviated from its mean position as compared to the other once, it means there are some external variables whose influence reduces the impact of the risk management factor in the relationship. Well, the sustainability entrepreneurial orientation highly deviates from its mean position which shows that this variable has little
influence on the development of self-efficacy based strategic approach. Its KMO and Bartell’s test based descriptions are shown in the following Table 3.

**Table 3: KMO and Bartlett's Test**

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</th>
<th>.938</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
<td>7968.661</td>
</tr>
<tr>
<td>Df</td>
<td>171</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>

According to the above statistics, the KMO value is 0.938 means within the threshold range. Also, its significance value is 0.00 lower than 0.05 with the appropriate chi-square value, which means this model is a good fit for the critical evaluation of variables. Well, the rotated component matrix-based statistical outcomes are discussed below in Table 4.

**Table 4: Rotated Component Matrixa**

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM1</td>
<td>.822</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RM2</td>
<td>.873</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RM3</td>
<td>.835</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RM4</td>
<td>.805</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE1</td>
<td></td>
<td>.831</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE2</td>
<td></td>
<td>.765</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE3</td>
<td></td>
<td>.795</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE4</td>
<td></td>
<td>.825</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO1</td>
<td>.918</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO2</td>
<td>.866</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO3</td>
<td>.837</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO4</td>
<td>.887</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO5</td>
<td>.915</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO6</td>
<td>.896</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO7</td>
<td>.879</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EO1</td>
<td></td>
<td></td>
<td>.842</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EO2</td>
<td></td>
<td></td>
<td>.864</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO1</td>
<td></td>
<td></td>
<td></td>
<td>.800</td>
<td></td>
</tr>
<tr>
<td>SO2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.774</td>
</tr>
</tbody>
</table>

The above matrix-based statistics depict that all of their rotated component values are more than 0.7 means all the variables are effectively uploaded in the tested mechanism. According to the following convergent and discriminant validity values, it becomes clear that there is no major issue faced in loading all the tested items (see Table 5).
Like, all the average variance extracted values of each tested item are more than 0.5, while the composite reliability values are more than 0.7. Also, all the bold letters-based variables identification expose the major difference between the tested variables. After these values critical interpretation, it becomes concluded that there is no convergent and discriminant validity issue occurred within this testing model (see Table 6).

### Table 5: Convergent and Discriminant Validity

<table>
<thead>
<tr>
<th></th>
<th>CR</th>
<th>AVE</th>
<th>MSV</th>
<th>EO</th>
<th>RM</th>
<th>SE</th>
<th>MO</th>
<th>SO</th>
</tr>
</thead>
<tbody>
<tr>
<td>EO</td>
<td>0.869</td>
<td>0.769</td>
<td>0.465</td>
<td>0.877</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RM</td>
<td>0.916</td>
<td>0.731</td>
<td>0.319</td>
<td>0.377</td>
<td>0.855</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.895</td>
<td>0.682</td>
<td>0.340</td>
<td>0.405</td>
<td>0.565</td>
<td>0.826</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>0.910</td>
<td>0.875</td>
<td>0.341</td>
<td>0.521</td>
<td>0.503</td>
<td>0.511</td>
<td>0.936</td>
<td></td>
</tr>
<tr>
<td>SO</td>
<td>0.879</td>
<td>0.784</td>
<td>0.465</td>
<td>0.682</td>
<td>0.490</td>
<td>0.583</td>
<td>0.584</td>
<td>0.885</td>
</tr>
</tbody>
</table>

After this, the above confirmatory factor analysis based observed values show that all of them are within their related threshold range. For example, the observed value of CMIN/DF is 2.2 means lower than 3, also the GFI value is less than 0.80 (within the standard threshold range). While, the both IFI and CFI values are 0.979 (greater than 0.90), and also the RMSEA value is 0.056 which is lower than 0.08, so it becomes concluded that this testing model is a good fit to implement the SEM based statistical analysis and all the variables are effectively uploaded on the tested model. Its graphical representation is shown in the following figure 2.

**Figure 2: CFA**
After its CFA figure, the statistical information regarding the relationship between the tested independent, dependent and moderating variables are displayed in the following Table 7.

<table>
<thead>
<tr>
<th>Table 7: Structural Equation Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct</strong></td>
</tr>
<tr>
<td>SESelfEff &lt;-- SpMOri</td>
</tr>
<tr>
<td>SESelfEff &lt;-- SuEOri</td>
</tr>
<tr>
<td>SESelfEff &lt;-- MarkOri</td>
</tr>
<tr>
<td>ZSESelEff --&lt; RMMSMO_Int3</td>
</tr>
<tr>
<td>ZSESelEff --&lt; RMSEO_Int2</td>
</tr>
<tr>
<td>ZSESelEff --&lt; RMMO_Int1</td>
</tr>
</tbody>
</table>

According to the above-mentioned statistics, it becomes clear that there is a direct influence of all the independent variables and moderator on the social entrepreneurial self-efficiency factor. Like, one percent change on the tested independent variable cause a positive impact on the development of an advanced education system. The above results depict that the outcome of social entrepreneurial self-efficiency is 49% change with the influence of social mission orientation, 45% due to sustainability entrepreneurial orientation, and 43% due to marketing orientation. Also, the risk management-based mediator boosts the relationship between both the major variables. According to the statistics, a combination of risk management with social mission orientation causes a 39% deviation in the self-efficacy factor, while its combination with sustainability entrepreneurial orientation results in 40%, and with marketing orientation causes a 38% deviation on the resultant value of social entrepreneurial self-efficacy. Its figure is given below in Figure 3.

![Figure 3: SEM](image_url)

In order to make its moderation analysis, the following figure depicts that with the passage of time, the influence of risk management enhanced the influence of market orientation on the self-efficacy factor. But in the initial stage, its influence is not much affected the tested relationship. Its graphical representation is given below in Figure 4.
After this in case of sustainability entrepreneurial orientation, the initial phase of risk management favorable impact on the desirable outcomes, but at the maximum point, its excess amount may create some threatening situation in front of management to stabilize their position in the diverse market. Its figure has been given below in Figure 5.

Last, but not the least, in case of social mission orientation; the moderator does not cause a major influence on this factor's impact on social entrepreneurial self-efficacy. So, this situation is uncontrollable in front of management to maintain their social mission. Its related graph is given below in Figure 6.
Discussion and Conclusion

After critically evaluating the statistical outcome, it becomes clear that marketing orientation and sustainability entrepreneurial orientation cause a major influence on the development of social entrepreneurial self-efficacy within the educational community in Indonesia. Chih-Hsing Sam Liu and Chiung-Eu Huang (2020) majorly designed a social entrepreneurial theory and studied a mediated-moderation model of the mutual relationship among the critical attributes of this theory by testing the buffering role of social entrepreneurial self-efficacy in the market and also the value co-creation processes. In their outcomes, they concluded that by utilizing the innovativeness, a social mission orientation directly influences the proactiveness, and also the risk management and effectual sustainability orientation strengthen the relationship between the proactiveness and sustainability orientation (Liu & Huang, 2020). According to the above-mentioned analysis, it becomes clear that in the Indonesian educational industry, the risk management-based moderator effectively boosts the self-efficacy factor, but the social mission orientation is such a variable that does need this management role in its performance. In the previous researches, the researchers majorly worked on exploring the importance of social entrepreneurial antecedents on boosting the relationship between social entrepreneurial intent and prior experience in the education field. According to them, experience-based social issues within a developing state directly affect the moral obligation, empathy, perceived social support and social entrepreneurial self-efficacy. Because these are the actual motivation in front of a social entrepreneur to make some advanced changes in the traditional business activity (Barton, Schaefer, & Canavati, 2018; Lacap, Mulyaningsih, & Ramadani, 2018; M C., 2020). In the entrepreneurial intension, the personality traits, family factors, and self-efficacy play a major role in the development of an advanced entrepreneurial approach in the complex environmental situation. In addition to this, the extroversion, consciousness, and openness to experience enhanced the relationship (Farrukh, Khan, Khan, Ramzani, & Soladoye, 2017). In addition to this, in the Asia Pacific Journal of Innovation and Entrepreneurship, Tran and Korflesch majorly worked on the conceptual model of social entrepreneurship intention on exploring the social cognitive career theory. According to these scholars, it's a new concept that may give a new direction to consider social entrepreneurship (Tran & Von Korflesch, 2016).
It becomes concluded from the above-mentioned data that the existence of knowledge management positively boosts the direct impact of marketing orientation and the sustainability entrepreneurial orientation on the social entrepreneurial self-efficacy within the educational department in Indonesia. This paper is informative based on valid statistical data of the selected participants. According to the SEM and moderating analysis based statistics, it becomes concluded that social mission orientation in the Indonesian market caused the least impact on the social entrepreneurship self-efficacy factor due to the influence of external factors.

5.1 Future Implications
This is informative research in front of the education field-oriented business community, the policymakers, and also the entrepreneurs to critically consider the importance of social entrepreneurship and its influential variables. This paper also has ethical and academic implications in the Indonesian market perspective. The upcoming scholars can utilize this data for the analysis based discussion portion.

5.2 Limitations and Future Researches
Also, there are some limitations of this paper-like lack of mixed research method for data collection and the deficiency of value co-creation factor in hypothesis building may impact the authenticity of this paper. There is an opportunity in front of future researchers to overcome this gap in their future articles.

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IMPLICATIONS OF ENVIROPRENEURIAL ORIENTATION FOR GARMENTS BRANDS IN INDONESIA: CAN SUITABILITY BE ACHIEVED THROUGH GREEN MARKETING, ECO-LABELING AND GREEN WASHING STRATEGIES?

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Abstract. In the current era, the global green trends are creating new opportunities and challenges in front of the entrepreneurs worldwide with customers now willing to pay extra for green products and services and more environmentally aware. In considering this phenomenon, the current study majorly focuses on the positive influence of enviropreneurial orientation on sustainable performance's development within the garment industry in Indonesia. Three major strategies act as mediators named as green marketing mix strategy, eco-labeling strategy, and greenwashing strategy, to boost the relationship between independent and dependent variables. An online survey-based quantitative research is adopted for data collection purpose and after this, the confirmatory factor analysis (CFA) and structural equation modeling (SEM) based statistical tests are implemented for analysis. According to the results, there is a significant impact of enviropreneurial orientation on the development of sustainability performance of such garment industry due to the productive influence of eco-labeling strategy and greenwashing strategy. This paper will add value in the effective environment-oriented marketing campaigns and the operating activities based decision-making process of selected Indonesian garment companies. But lack of customer perception and deficiency of other environment affected industrial data may impact the authenticity of tested hypothesis of this paper. This gap can be overcome by the upcoming scholars.

Keywords: Enviropreneurial Orientation; Green Marketing; Eco-Labeling and Green Washing Strategies


Jel Codes: O1, O32

Introduction

Indonesia is famous for an attractive sector of clothing and textiles (Wichitsathian, & Nakruang, 2019; Aldianto, Novani, Anggadwita, Budi, & Wirawan, 2020). In 2012, the garments brands of Indonesia offered for about 1.1 million jobs (Vickers, 2017). China helps Indonesia in increasing the productivity of its garments sector as China is the core source of clothing products coming into Indonesia (Bristi & Al-Mamun, 2019; Malik, B., et al., 2020). According to Majid, Pahlevi, Laba, and Sobarsyah (2019), the issues of environmental responsibility are concerned with large organizations as well as small organizations. The development level of enviropreneurial orientation within a small organization will result in advancing the strategic fitness of that organization towards environmental issues (Chowdhury, 2017, Wichitsathian, Nakruang, 2019; Aleem, U., 2020; Li, X., et al., 2020). Sustainability in the clothing sector in Indonesia can be achieved through green marketing, greenwashing strategies, and eco-labeling (Tanujaya & Wurangian, 2019; Li, Yang, 2020). The managers of small organizations are offered valuable understandings so that they can improve their green marketing plan (see Table 1).
Table 1: Key ecological responsibility issues

<table>
<thead>
<tr>
<th>Ecological issues</th>
<th>Scope of issues</th>
<th>Implications globally and in Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air quality</td>
<td>Manufacturing as well as transport emissions and greenhouse gas emissions or offensive odors.</td>
<td>Human health problems lower the quality of life for people living in Indonesia and climate change with a variety of anticipated effects.</td>
</tr>
<tr>
<td>Water quality</td>
<td>Sewage pollutions or effects and nutrient impacts.</td>
<td>Pollution majorly affects the chemistry of waterways.</td>
</tr>
</tbody>
</table>

Hill and Pane (2018) explore that the major problem with the clothing sector of Indonesia was that it was not focusing on environmental sustainability; as a result, the level of its sustainability performance became low. The CSR performance was not being followed by the garments brand of Indonesia from 2001 to 2015 (Bristi & Al-Mamun, 2019). There was a lack of eco-labeling, green marketing, and greenwashing strategies in the clothing sector before (Hamja, Maalouf, & Hasle, 2018). The interdisciplinary approach was not being used by the textile industry of Indonesia that results in a lack of opportunities (Rahman, 2019). (See Table 2).

![Ecological Performance of Garments Sector](image)

Figure 2: Ecological Performance

It is well known that enviropreneurial orientation (EO) plays a very pivotal part in improving the existing performance of the company or any particular sector (DiVito & Bohnsack, 2016). Therefore, during the last few years, different scholars made huge efforts in evaluating the performance of different sectors through the role of EO, such as a study by DiVito and Bohnsack (2017) examine the direct impact of EO on the entire presentation of small business sectors and organizations. The previous different studies lack in evaluating the sustainability
performance (SP) of the garments sector of Indonesia through the direct influence of EO and its related concepts. Therefore, the current study proves to be remarkable for many garments sectors as well as small firms in Indonesia in improving their sustainability performance. Additionally, in the previous years, different analysts such as (Raza, Frooghi, Binti Rani, & Qureshi, 2018) have identified the role of EO and the relationship with brand and product performance in different arenas and manners. Though the current effort and study is especially important as well as justified certainly because no other analyst and study have evaluated the SP of garments sector of Indonesia through the mediating part of marketing mix strategy and greenwashing practices. The current research has the following objectives,

- The initial objective of the study is to identify the overall impact of enviropreneurial orientation (EO) on the sustainability performance in garments brands in Indonesia.
- The secondary aim of the study is to evaluate the mediating impact of green marketing mix strategy (GMMS) on the relationship between EO and sustainability performance in garments products in Indonesia.
- The third aim of the following research is to analyze the mediating role of Eco-labeling strategy in the association between EO and sustainability performance in garments brands in Indonesia.
- Moreover, the final objective is to examine the mediating impact of greenwashing strategy on the linkage between EO and sustainability performance in the garments sector in Indonesia.

The research's first significance is to delve into the relationships among certain EO factors (including innovative and proactive) and garments brands' performance results for the garments firms and sectors. The current study considers the findings majorly from an environmental perspective, concerning EO, and from the capabilities as well as resource mobilization (RM) of different garments firms. The findings of the current paper confirm that EO proves to be extremely helpful in improving the sustainable performance of garments products. Therefore, the given study has an extremely broad scope in the garments sector of Indonesia (Bilan et al., 2020; López, 2020).

The given research thesis consists of five essential chapters majorly counting introduction, review of literature, research methodology, results, and their interpretation and conclusions and discussion. The initial chapter of the given paper provides an introduction mainly manifesting the background of the study along with a description of the problem as well as justification. The second chapter of the paper reviews past studies and efforts in EO and green marketing with a conclusion evaluating gaps and problems. The chapter of methodology explains all the methods used in the study along with their purposes. And finally, the chapter of the discussion conclusion gives all the implications and limitations of the findings of the study.

**Literature review**

**Theory of Enviropreneurial orientation**

EO has been considered as part of the significant abilities as well as factors for different production industries, providing them a significant variety of environmental responsibilities (Namagembe, Ryan, & Sridham, 2017; Wichitsathian, & Nakruang, 2019). According to Khan, Royhan, Rahman, Rahman, and Mostafa (2020) EO represents a decision-making practice for developing as well as implementing ecological, environmental, and green positive actions to stimulate sustainability performance (SP). According to the theory of EO, ecopreneurship majorly represents the mechanism or basic principles of entrepreneurship that a particular sector used to develop a system that solves critical ecological problems through the use of effective green marketing (Song-Turner & Polonsky, 2016). According to Papadas, Avlonitis, and Carrigan (2017) ecopreneurs who made significant efforts according to EO are not only driven for profit but also for improving the existing environmental performance of the sector. Ecopreneurship also is known as eco-capitalism, is becoming a significant factor and as the latest market-based standard for seeking good time for enhancing contexture performance as well as develop sustainability in the performance of products (Kirchoff, Tate, & Mollenkopf, 2016). According to this theory, a lot of sectors can use ecopreneurship concepts to incorporate sustainable brand design majorly through eco-labeling
strategy and this can happen at any level of the business mainly including logistics as well as manufacturing mechanisms (Wisker & Kwiatek, 2018).

The relationship between Enviropreneurial orientation and sustainability performance (SP)

EO or ecopreneurship is well described as the mechanism of fundamentals of entrepreneurship applied to develop businesses that consider environmentally favorable marketing ventures with a specific aim of generating profits by the means of exchange that satisfies a firm’s financial and SP (Khan et al., 2020). Nowadays the customers are more aware of the green environment and they pay more to maintain such an environmentally friendly atmosphere and they invest in green products. Thus such strategies and policies are appreciated which fulfills the demands of the customers to make green products to enviropreneurial orientation and the business performance improves by adopting such strategies (Khan, Royhan, Rahman, Rahman, & Mostafa, 2019). Research by Mullens (2018) explained that in SME, enviropreneurial orientation allows the managers or the owners to make such decisions or strategies which can lead the organizations according to the sustainability performance. The policies made by the owners of the business or the managers with a complete observation and study enables the SME to sustain its position and also to face the competencies (Papadas et al., 2017). When the policies and strategies are made by examining the enviropreneurial orientation takes a very positive influence as it is according to the demands and needs of the environment (Lučić, 2020). Such environment-friendly policies and steps play an incredibly positive role in establishing a sustainable performance in the external and internal sectors. Sustainability of the performance can be more effective when there is an appositive association between EO and sustainability presentation (Kamarudin et al., 2020). The owners or the managers aware of the demands and the needs of the customers according to the enviropreneurial orientation can lead the SME to sustainability and this sustainability influences the performance very effectively (Jaini & Hussin, 2019). Thus a sustainability performance has a very positive relationship in helping the owners of the SMEs to make such policies and implement them to keep a balance and increase the level by meeting the needs of the customers and keeping the environment friendly and following the policies of keeping the environment green and friendly (Svensson, Padin, & Eriksson, 2016). Moreover, According to Choudhury, Rao, and Mishra (2019) to maintain the SP and the managers must have full awareness and develop such activities to attract more customers through the means of enviropreneurial orientation EO. Therefore, based on the above discussion the current study suggests the following hypotheses.

H1: Enviropreneurial orientation significantly impacts sustainability performance.

The mediating role of green marketing mix strategy in the connection between EO and sustainability performance

According to Khan et al. (2020), the concept green marketing strategy (GMS) refers to the significant practice of generating and promoting products as well as brands based on their actual or perceived environmental sustainability (PES). The significant examples of GMS for improving product performance mainly include promoting the minimized emissions related to a garment product manufacturing process, and the use of post-consumer recycled materials for a garments product packaging (B. Eneizan, Abdulrahman, & Alabboodi, 2018). A study by B. M. Eneizan, Wahab, Zainon, and Obaid (2016) demonstrates that certain production companies of the garment sector also may market themselves as being ecologically conscious firms by donating a portion of their profits to significant environmental activities to stay sustainable in the market place. Mushtaq, Zubair, Khan, and Khurram (2019) in research characterized GMS as the process of promoting brands based on their environmental advantages which initiate sustainable product performance in the market. Such a brand may be ecologically friendly in it and manufactured in environmentally friendly conditions and this majorly include garments product that is manufactured sustainably through the effective degree of EO and also develops from renewable materials which further improve the SP of the product (Hojnik, Ruzzier, & Manolova, 2018). Moreover, a green marketing mix strategy (GMMS) is the collection of manageable and strategic green marketing strategies that a sector used to generate the desired response from its target market and customers as well. The marketing strategies and tools that are used by different companies under GMMS include garment products, price,
place, and promotion which sustainably influence the process of SP (Dangelico & Vocalelli, 2017). Hence, the above discussion leads to the development of the following hypotheses,

**H2:** Green marketing mix strategy significantly mediates the relationship between EO and product sustainability performance.

The mediating impact of Eco-labeling strategy on the relationship between EO and sustainability performance

A significant and rising concept in sustainability performance research is the impact as well as the positive part of eco-labels in affecting customers in their buying overall conclusions. According to Khan et al. (2019), eco-labels are certain Eco statements announcing that a brand or product has specific green properties as well as environmentally friendly features. Another study by Khan et al. (2020) also demonstrates that eco-labels are a certain kind of green statement that represents a labeling system for garments products and other custom products. Furthermore, eco-labeling strategies are voluntary schemes as well as practices that transmit knowledge about the ecological benefits of the stated products mainly with the help of certain signs or symbols at the point of which directly influence the SP of the product (Birou, Green, & Inman, 2019). Past studies indicate that eco-labeling is a significant marketing mix strategy for different production sectors as it proves the eco-friendly properties of brands mainly concerning problems like energy consumption as well as health (Aslam, Waseem, & Khurram, 2019). Thus, eco-labeling strategies or practices help sectors to improve their overall SP along with the effective use of their EO process and practices. Moreover, eco-labeling strategies significantly permit customers to easily as well as confidently understand the green properties of a product, which positively affects the SP of the product. The above mediating impact of eco-labeling is also supported by the theory of EO because the theory of EO demonstrates that eco-labels play a deciding role in representing the effort of enviropreneurs. Hence, the given study proposes the following hypotheses,

**H3:** The mediating role of Eco-labeling plays a positive role in enhancing the connection between EO and sustainability performance.

The mediating role of greenwashing (GW) strategy in the relationship between EO and sustainability performance

Greenwashing strategy plays an enabling role in the association between SP and the enviropreneurial orientation of an organization and also increases the financial performance of that company (Bamgbade, Kamaruddeen, & Nawi, 2017). Greenwashing results in increasing the interests of the society in the impact of the potentials and the assets on the conditions of small organizations (Nguyen, Yang, Nguyen, Johnson, & Cao, 2019). According to Blome, Foerstl, and Schleper (2017) resources, skills, and capabilities of an organization, are beneficial for the ecological environment can lead to an increase in productivity and helps in fulfilling the organizational goals. A set of marketing mix components is required by different activities of an organization to represent its values to the customers and achieve better results of economic performance. According to Szabo and Webster (2020), the greenwashing strategy helps in fulfilling the demands and needs of the buyers by enhancing sustainability performance and ecopreneurship. The organization should be responsible for the environment and the customers to develop quality services and products by applying strategic messages while stimulating its activities and attaining competitive advantage (Shou, Shao, Lai, Kang, & Park, 2019). It is proved by the theory of enviropreneurial orientation that EO affects a crucial effect on the development and execution of environmental, ecological, economic, and greenwashing strategy.

**H4:** Greenwashing strategy has a positive impact on the relationship between EO and sustainability performance.

Research model is presented in Figure 2.
Material and Methods

Sample and Data Collection
Indonesia is such a type of countries which have many populations and suffered a lot due to climate change. The small firms within this state play a major role in its economic development phase and started implementing the green marketing mix and the eco-labeling strategies in their business operations (Haryanto, 2018). To critically evaluate the influence of environmental orientation for the garment brand within this state, a quantitative research-based data collection method is considered. The online survey focused advanced research mechanism is used where the questionnaires are randomly distributed among the infield workers, managers, and other related professionals to explore their point of view regarding the green marketing, greenwashing and eco-labeling based strategies. A purposive sampling method is used to justify the tested hypothesis (Etikan, Musa, & Alkassim, 2016). The independent variable of this study is enviropreneurial orientation, the dependent variable is sustainability performance, while the green marketing mix strategy, eco-labeling strategy, and greenwashing strategy based mediating variables enhanced the relationship between the two studied variables. The unit of analysis is the garment firms’ managers/ owners who having full understanding the studied variables. The five-point Likert scale (strongly agreed = 1, agreed = 2, neutral = 3, strongly disagreed = 4, disagreed = 5) is used to
gain correct and relevant information regarding the tested variables and hypothesis (Wu & Leung, 2017). The demographics of the selected individuals are discussed in the following paragraphs.

Firstly, the point of view of different scholars and related field professionals was considered before the random distribution of the questionnaires. In the initial stage, 500 questionnaires were randomly mailed to the Indonesian garment company’s managers, owners, and related employees, where 415 of them shown their active and valid response towards this research hypothesis. According to its demographic characteristics, it becomes clear that there are 229 professional males (55%) and 186 professional females (45%) who give authentic outcomes in this analysis. Well, in case of their age segregation, the frequency of fewer than 25 years old individuals is 128 (with 31%), well 176 participants are from 25 to 35 years old (with 42%), 95 of them are within the age group of 35 to 45 years old (with 23%), and the remaining 16 are more than 45 years old (with 16%) in the overall participants. This shows that the maximum number of participants are young employees and in-field managers who are within the age limit of 23 to 35 years old. Last, but not the least, in their experience-based division, 16% of the overall participants are having less than 2 years’ experience in the related garment industry. While 175 (42%) participants are having 2 to 5 years-based experience and 136 (33%) spent 5 to 8 years in the related field. Only 39 (with 9.4%) of the overall participants having more than 8 years’ experience in this Indonesian business industry. This shows that majority of participants of this paper are active managers and front-door employees who directly deal with the consumers.

Measure

In order to examine the hypothesis and the research model of this paper, the variance based structural equation modeling method will be used along with the partial least square (PLS) technique (Aimran, Ahmad, Afthanorhan, & Awang, 2017). In the case of construct validity, SEM motivates the measurement of latent variables by using the manifest variables, indicators, or items. In a second-generation based multivariate technique, this model allows to justify the relationship between the independent and dependent variables (Hair Jr, Hult, Ringle, & Sarstedt, 2016). In this quantitative research-based analytical approach, the PLS technique-oriented analytical outcomes establish the relationship between the construct and test the related hypothesis.

Analysis Interpretation

After the proper data collection mechanism, it is time to critically interpret the analytical outcomes of the tested variables. Its descriptive test-based statistics are shown in the following table that helps to identify the authenticity of this model. According to the mentioned values of tested items, it becomes concluded that the standard error value is 0.12 constant in all the variables. Well, the stated standard deviation values show that a sustainable performance-based dependent item is less deviated from its mean position. It means that the independent variable along with mediators does not cause a major impact on this tested variable. While the greenwashing strategy highly deviates from its mean position and other mediators also deviate from their standard position. Also, the environmental orientation value depicts that its items are less deviated from its mean position after the dependent variable means this factor has the power to directly influence the efficiency of sustainability performance. Its statistics are shown in the following table 2.
The above-mentioned statistics of KMO and Bartlett’s test (Table 3) depicts that this model is a good fit for hypothesis testing. It is because the KMO value is within the threshold range with the proper significance value of 0.000 and appropriate chi-square value. The rotated component matrix-based items are discussed in the following table 4.
The above values show that all the rotated component matrix of the tested items is more than standard 0.7 means within their threshold range. These numerics depict that all the variables are effectively loaded in this tested model that helps to make a proper relationship among the tested variables.

Table 5: Convergent and Discriminant Validity

<table>
<thead>
<tr>
<th></th>
<th>CR</th>
<th>AVE</th>
<th>MSV</th>
<th>GS</th>
<th>EO</th>
<th>GM</th>
<th>EL</th>
<th>SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS</td>
<td>0.938</td>
<td>0.750</td>
<td>0.314</td>
<td>0.866</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EO</td>
<td>0.936</td>
<td>0.745</td>
<td>0.342</td>
<td>0.480</td>
<td>0.863</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GM</td>
<td>0.953</td>
<td>0.801</td>
<td>0.341</td>
<td>0.443</td>
<td>0.461</td>
<td>0.895</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EL</td>
<td>0.968</td>
<td>0.835</td>
<td>0.341</td>
<td>0.496</td>
<td>0.480</td>
<td>0.584</td>
<td>0.914</td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>0.946</td>
<td>0.688</td>
<td>0.342</td>
<td>0.560</td>
<td>0.585</td>
<td>0.481</td>
<td>0.488</td>
<td>0.830</td>
</tr>
</tbody>
</table>

The above mentioned informative table 5 based convergent and discriminant validity values show that the tested average variance extracted value is more than 0.5 while its composite reliability value is more than 0.7 which means there is no convergent validity issue occurred within the item uploading mechanism. In addition to this, there is also no discriminant validity issue occurred within this model because each item is statistically different from the other ones and it can be seen in the bold letters. After this, the model fit indices based informative description is shown in the following table 6.

Table 6: Model Fit Indices

<table>
<thead>
<tr>
<th>CFA Indicators</th>
<th>CMIN/DF</th>
<th>GFI</th>
<th>IFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Value</td>
<td>≤ 3</td>
<td>≥ 0.80</td>
<td>≥ 0.90</td>
<td>≥ 0.90</td>
<td>≤ 0.08</td>
</tr>
<tr>
<td>Observed Value</td>
<td>2.291</td>
<td>0.871</td>
<td>0.964</td>
<td>0.964</td>
<td>0.056</td>
</tr>
</tbody>
</table>

According to the indices, all the observed values of confirmatory factor analysis indicators like CMIN/DF, CFI, IFI, GFI, and RMSEA are within their threshold range. For example, the observed value of CMIN/DF indicator
value is 2.291, lower than 3; GFI value is 0.871, greater than 0.80; RMSEA value is 0.056, lower than 0.08; while both IFI and CFI based confirmatory factor analysis indicators show the same value of 0.964, greater than 0.90. It means its a good fit model for factors uploading and all the items are effectively uploaded in this test model. Its graphical representation is given below in Figure 3.

![Graphical representation of the model](image-url)

**Figure 3:** CFA

**Table 7: Structural Equation Modeling**

<table>
<thead>
<tr>
<th>Total Effect</th>
<th>EnvirOri</th>
<th>GrWoS</th>
<th>GrMMS</th>
<th>EcoLab</th>
</tr>
</thead>
<tbody>
<tr>
<td>GrWoS</td>
<td>.463**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>GrMMS</td>
<td>.432**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>EcoLab</td>
<td>.462**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SusPerf</td>
<td>.585**</td>
<td>.274**</td>
<td>.085</td>
<td>.152**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Direct Effect</th>
<th>EnvirOri</th>
<th>GrWoS</th>
<th>GrMMS</th>
<th>EcoLab</th>
</tr>
</thead>
<tbody>
<tr>
<td>GrWoS</td>
<td>.463**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>GrMMS</td>
<td>.432**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>EcoLab</td>
<td>.462**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SusPerf</td>
<td>.351**</td>
<td>.274**</td>
<td>.085</td>
<td>.152**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indirect Effect</th>
<th>EnvirOri</th>
<th>GrWoS</th>
<th>GrMMS</th>
<th>EcoLab</th>
</tr>
</thead>
<tbody>
<tr>
<td>GrWoS</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>GrMMS</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>EcoLab</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SusPerf</td>
<td>.234**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>
Structural equation modeling (Table 7) is a major portion of this analytical interpretation that explored the concept of how strong a relationship exists among tested variables. According to the above statistics, it has been shown that one percent deviation in the enviropreneurial orientation variable caused 46% change in the greenwashing strategy, 43% in the green marketing mix strategy, 46% in eco-labeling strategy, and 59% in the sustainable performance-based dependent variable. This statistical outcome justified the first hypothesis that there is a significant relationship between enviropreneurial orientation and sustainable performance. All the items directly effect the dependent variable as if greenwashing strategy caused a 27% deviation; green marketing mix strategy causes 9%, while the eco-labeling strategy causes a 15% deviation on the sustainability performance-based outcomes. Its visual representation is shown in the following figure 4.

![Figure 4: SEM](image)

Discussion and Conclusion

Discussion
The above statistical outcomes depict that majority of professional considered this enviropreneurial orientation variable as a major factor that directly affect the sustainability performance. In this situation, the green working and eco-labeling based strategic approach boost their relationship and result in the favorable outcomes in the form of a garment industry within the target customer market. Eijaz Ahmad Khan with others (2019) critically examines the impact of enviropreneurial orientation on the effective business performance of the small-medium enterprises within a developing state. Well, the global green trend creates a challenging situation in front of the entrepreneurs to maintain their company’s market position and create a productive awareness among the targeted customers related to green products and services. In this aim, eco-labeling strategies and green marketing mix play a significant role to give a direction to the environment affected business community to ponder on the customer affected environmental variables (Khan et al., 2020). In Indonesia, the concept of green business performance based corporate social responsibility plays a significant role to enhance the customer loyalty-based market share of the company within this state. This green business performance is considered a key strategy to
achieve and maintain a sustainable competitive advantage. There are many factors that boost such performance-based efficiency within this state organization; named as top management support, price, product development, distribution, and marketing communication in the operating activities of a company (Batu & Kusumawardhani, 2018).

Szerena Szabo and Jane Webster also explored the positive influence of the enviropreneurial orientation-based greenwashing in enhancing the customer preferences towards the company’s products. According to them, the efficient greenwashing based sustainable strategic approach not only enhanced the environmental and product perception but also cause major happiness among consumers towards the company's operation (Szabo & Webster, 2020). In addition, the green marketing based strategic approach enhanced the green eating behavior and efficacy within an organization. Because the self-efficacy theory and legitimacy theory based strategic approach of the company's management effectively examine the customer preferences towards the environment and develop an efficient strategy (Muposhi & Dhurup, 2017). The above statistics also show that such environmental orientation along with the eco-labeling strategy and the greenwashing strategy positively enhanced the sustainability performance of an organization. These two are the major green marketing strategies that motivate the developing nation companies to advanced their operating activities by directly fulling the environment oriented needs and desires of the targeted customers (MOLETE, 2018).

Conclusion
After critically inspect the implications of the enviropreneurial orientation for the Garment Brands in the Indonesian market, it becomes clear that such advanced orientation positively enhanced the sustainability performance of this brand community within this state. To critically justify this outcome, the structural equation modeling-oriented SPSS test is implemented on its online survey-based quantitative data. According to the results, the presence of greenwashing strategy and eco-labeling strategy enhanced the relationship between the enviropreneurial orientation and sustainability performance of this industry within this state. While, the mediating role of the green marketing mix strategy is somehow affected their studied relationship, but its influence is less than the other two.

Future Implications
This paper is an informative approach in front of the marketing manager, operational manager, sales manager and other frontline workers of the Indonesian Garment industry to consider the importance of enviropreneurial orientation for the development of the sustainable performance of their operations based decision-making process. In addition, this company has an ethical and social implication in the Indonesian market perceptive. The related marketing field scholars can also utilize its relevant information in their discussion and analytical portion.

Limitations and Futures research
In this paper, only the garment industry and its environmental orientation approach are studied, but if other environment affected business sectors like electronics, diesel oil, etc are studied also then more applicable outcomes generated. In addition, there is a lack of customer perception regarding the company's enviropreneurial orientation based strategic approach. There is an opportunity in front of future scholars to cover the research gap.

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REGRESSING CLIMATE CHANGE, AGRICULTURAL GROWTH AND FOOD PRODUCTION ON ECONOMIC SUSTAINABILITY: GATHERING AND ANALYZING DATA FOR ASEAN COUNTRIES

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Abstract. The agricultural sector plays a great role in the economy of several countries and their economic sustainability is also majorly dependent on the agricultural performance of the country. There are various aspects related to agriculture sector that might have the impact on economic sustainability in one way or the other. In continuation of this issue, the researcher has conducted this study so that the impact casted by climate change, agricultural growth, and food production on the economic sustainability of the ASEAN countries can be studied effectively. For this research, the researcher has gathered relevant data from six ASEAN countries i.e. Brunei, Cambodia, Indonesia, Laos, Thailand, and Philippines. The period for which the data has been collected comprises of 29 years. For analysis of this data, the researcher has applied tests such as panel unit root test, panel cointegration test, AMG estimation and panel casualty test and has obtained the desired results. The results make it clear that the independent variables i.e. climate change, agricultural growth and food production have significant impact on economic sustainability for most of the selected ASEAN countries. Moreover, various variables have also shown unidirectional and bidirectional casualty among them.

Keywords: Climate Change; Agricultural Growth and Food Production; Economic Sustainability; ASEAN Countries


Jel Codes: Q01

1. Introduction

The sustainability issue has its foundation in both the fields of science and economics (Guest, 2010). The context of economic sustainability refers to the sustained high growth by the governments in the form of solutions to the social and the financial issues. Rising up a sustainable economy under the paradigm of social, cultural and environmental crisis in the form of climate change is very challenging (Jänicke, 2012). As the world population is expected to cross 10 billion by the year 2050 (Nations, 2019; Specht et al., 2014), one of the most important goals of UN sustainable development is the eradication of hunger from the populations of the world countries by ensuring zero hunger levels by the year 2030. The drastic climate change around the globe has caused a rise in the temperatures and is the leading cause of droughts, heat waves, floods, storms and higher carbon emission in the atmosphere (Agovino, Casaccia, Ciommi, Ferrara, & Marchesano, 2019). These changes and the increase in the demand for the food and other agricultural products have posed major challenge for achieving the objective of economic sustainability (Gliessman, 2014; Maleksaeidi & Karami, 2013). The vulnerability of the countries for the changes in the climate, the associated production of the food and other agricultural products make it viable for these countries to adapt to the strategies that can help them cope with these issues and achieve economic sustainability (Ahmed, Thompson, & Glaser, 2019). (See Table 1).
### Table 1: Share of Agriculture to total GDP in ASEAN countries in 2018

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>12.5</td>
</tr>
<tr>
<td>Malaysia</td>
<td>7.3</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.5</td>
</tr>
<tr>
<td>Thailand</td>
<td>6.2</td>
</tr>
<tr>
<td>Vietnam</td>
<td>14.3</td>
</tr>
<tr>
<td>Laos</td>
<td>14.5</td>
</tr>
<tr>
<td>Cambodia</td>
<td>16.3</td>
</tr>
<tr>
<td>Myanmar</td>
<td>24.6</td>
</tr>
<tr>
<td>Philippines</td>
<td>8.1</td>
</tr>
<tr>
<td>Brunei</td>
<td>0.8</td>
</tr>
</tbody>
</table>

The ASEAN (Association of South East Asian Nations) region is one of those which is badly affected from the climate changes as shown by the Climate Risk Index in which five of the top 25 countries, Thailand, Myanmar, Vietnam, Cambodia and the Philippines, belonged to the ASEAN region (Eckstein, Künzel, Schäfer, & Winges, 2019; Khan, Y., et al., 2020). In a research on the ASEAN countries, the need for a national policy was highlighted which would incorporate strategies for controlling the adverse situation projected due to the climate change, improving the food production in these countries as the countries strive for the reduction of the harvesting loss and confirming the provision of food and the stability of the agricultural sector (Lassa, Lai, & Goh, 2016). See Figure 1.

![Real GDP Growth](image)

**Figure 1:** Real GDP growth (annual percentage change) in ASEAN countries

Studies have suggested that countries need to proactively develop policies and strategies to combat with the negative effects of climate change so that the growth in agriculture and food production can be enhanced to make the countries economically sustainable (Lassa et al., 2016; Nishimura, Ambashi, Iwasaki, & Maeda, 2019; Tol, 2018; Hussain, S., et al., 2020). Hence, addressing this open research theme, the current paper has the primary aim of gathering and analyzing the data for the ASEAN countries by regressing the climate change, agricultural...
growth and food production on the economic sustainability. More specifically, this paper has the following research objectives:

- To evaluate the impact of Climate change on economic sustainability
- To evaluate the effect of agricultural growth on economic sustainability
- To evaluate the effect of food production on economic sustainability

This paper has significant contribution to the literature of sustainability by investigating the impact of climate change, food production and agricultural growth towards economic sustainability for the ASEAN nations. Practically, the current paper has contribution to building appropriate and effective policy recommendations for the governments of the countries for managing the climate change and optimizing the resources for food production and agricultural growth to make their economies prosper superiorly for sustainable development.

The structure of this paper is organized as ahead. The paper starts with the Introduction and moves forward to the literature review. Next, the research methodology and results are given. Based on these results, this paper concludes with discussion, research limitations and theoretical and practical implications of the study.

2. Literature review

2.1 Climate Change
Climate change is a big threat to the economic stability and the sustainability of a country (Ding et al., 2016; Huong, Bo, & Fahad, 2019; Ninan & Inoue, 2017; Moumen, El Idrissi, Tvaronavičienė, & Lahrach, 2019. Mikhaylov, Moïseev, Aleshin, & Burkhardt, 2020; Li, Yun, et al., 2020). The heat waves, as a result of the global warming, make it difficult for the people to work efficiently and hence the productivity is reduced. The unpredictable cyclones and the hurricanes damage the communities and devastate a large number of people who are affected from them and are left with poverty and other issues. The droughts destroy the farms and the harvests, which is projected to hinder the UN goal of fulfilling the food demands of the people. If the measures for controlling the climate change are not taken properly, then the negative effects of climate change are expected to forcibly push more than 100 million of the population into complete poverty by the year 2030. The climate change will be restraining the budget and the public debt system of the countries by disabling the economy through lower incomes and higher prices (Barange et al., 2014; Corrás-Arias, 2020; Ruth, Coelho, & Karetnikov, 2007; Urry, 2015). Climate change disrupts the capacity of the natural resources which are utilized by the industries. For instance, the water resources are markedly reduced and it has detrimental impact on the major industries of power, oil, chemicals, fertilizer, textile, mining and metallurgy (Haseeb et al., 2021). The climate change also disturbs the energy and other resource patterns of their consumption. The increase in the air temperature demand more use of the water and other cooling technologies, hence the entire economical system is disturbed. This shows that in the long run, the changes in climate will negatively impact the society and the economy of countries, resulting in hotter and poorer states (Tol, 2018). From the early works of (McKay, 1980; Wigley, Richels, & Edmonds, 1996; Zenghelis, 2006), the climate change is being considered as vigorously exerting negativity on the economic welfare for the long term. However, a climate change policy sensibly designed can help eradicate these effects (Goulder & Mathai, 2000; Li, z. et al., 2020). The economic impacts of climate change are diverse and complex (Nordhaus, 2013; Wong, 2015) and need immediate attention (Tol, 2018). This discussion shows that the climate changes are substantially related to the economic sustainability, represented by the following hypothesis:

**H1: Climate Change is significantly linked to economic sustainability**

2.2 Agricultural Growth
The growth in the agricultural sector is the backbone for the progress of economy as it contributes a major portion to the country’s GDP and ensures that the basic necessities are fulfilled for the mankind and can initiate the
industrialization process for the country (Bartoli, Hamelin, Rozakis, Borzęcka, & Brandão, 2019). Many developed countries have already availed its benefits. Hence, for the developing and least developed countries, it can play a strategic role for their economic development. Specifically, for those nations where the real income per capote is considerably low, the growth in agriculture can prove helpful. There are many ways in which agricultural growth can contribute to economic growth. Firstly, it provides the food to people and raw materials to the non-agricultural sectors of society. Secondly, it has the capability to create demand for the production of goods in the non-agricultural sector using the purchasing power of the rural population by enabling them to sell the extra goods in the market. Another benefit is that it can provide the investable surplus for investment into the non-agricultural sector. The growth in the agricultural sector can enable the country to earn the foreign revenue by exporting the surplus food and agricultural products. Lastly, it can bring the uneducated and non-skilled labor of the country to start earning by working in the agricultural activities and can reduce or alleviate poverty from the society. Hence, this sector can build up the economic capacity of a country and lead it towards sustainability (Ansari & Khan, 2018; Hayat, Ali, Mateen, & Bilal, 2019). However, the growth of Agriculture is confronted with three common challenges by the countries. The first challenge is the increase in the instability of the agricultural growth figures, where as the second challenge is the change in the geographical structure of agricultural production. The last challenge is the substantial rise in the agricultural costs (Ding et al., 2016). Hence, such technologies must be adapted so that the adverse effects of climate change can be mitigated and sustainable agricultural growth can be promoted (Tol, 2018). The growth in the agricultural production has many economic benefits and can highly foster regional economic development, however it is important to ascertain the non-economic effects, which include the extra use of water and the GHG emissions which need to be managed and controlled effectively (Sun et al., 2019). In a similar study carried out by (Sertoglu, Ugural, & Bekun, 2017), the scholars have declared the agricultural sector to be a panacea for the country’s economic progress and prosperity. The effective management of the agriculture system of a country promises its economy’s success or loss. This study examined the effect of the agricultural sector growth on the economy of Nigeria using time series data (Haseeb et al., 2020). The results revealed that the country’s GDP is highly dependent on the agricultural sector and its growth in the long run and the agricultural output has a positive relationship with the economic conditions. Hence, it is important that the government of the countries develop policies that aim at diversifying and allocating budget in this sector for economic sustainability (Sertoglu et al., 2017). These findings depict that the agricultural growth has positive links to the economic sustainability. Hence, this association can be shown as follows:

H2: Agricultural growth is significantly linked to economic sustainability

2.3 Food Production

The production of the food makes it possible for the country to feed its population on its own without importing food material from the foreign countries which has a major impact on the economy by the reservation of the foreign currency which otherwise would have been given in exchange for the food (DiCarolis et al., 2017). Studies by (Nair, 2018; Tait, Saunders, Guenther, & Rutherford, 2016) also portrays the importance of food production for the sustainable economy. (Nishimura et al., 2019) has also emphasized on the value of harnessing various technologies by which the food production can be improved through modernizing the production processes and efficient utilization of the materials, so as to have lasting impact on the country’s social and economic growth. In terms of the ever increasing population of the world, global efforts for increasing the food production and improving the agricultural sector are being made. These technological innovations and inventions have the capacity to make the food production sustainable. The ASEAN nations have devised a Work Plan for improving the economic status of these countries through various measures, like increase the volume of crops, the livestock and other food production through enforcing the use of modern farming practices to support the quality and the quantity of food (Yong & Montesclaros, 2017). Hence, the support from government is needed to make sure that the country’s food production remains stable and sustainable so that risks can be avoided and prices of food items can be stabilized for competitive market situation. Research is necessary to promote the food
production to cope with the increasing demand. In case there gets an imbalance between the demand and supply of food, then the prices will fluctuate, incomes may fall and economic impact of food production can be questioned (Rossi, Johnson, Hendrickson, & Scott, 2014; Upton, 1993). This discussion reveals that by increasing the food production, economic sustainability can be ensured and that a significant relationship can exist between them. So, this relationship is expressed in the following hypothesis:

\[ H3: \text{Food Production is significantly linked to economic sustainability} \]

3. Data and Methods

3.1 Data

The motive behind the current study, as clear from the earlier sections, is to find out and analyze the impact that climate change, agricultural growth and food production impose on economic sustainability of ASEAN countries. The researcher has gathered relevant data from six ASEAN countries i.e. Brunei, Cambodia, Indonesia, Laos, Thailand and Philippines. The period for which the data has been collected comprises of 29 years. The major sources of data collection include World Bank Development Indicators and Global Economy which are considered to be the most authentic databases.

3.2 Model Specification

As far as the measurement units of variables of the study are concerned, the dependent variable i.e. economic sustainability has been measured suing an index named as index of sustainable economic welfare. In addition, the independent variable, climate change has been measured in context of the units of CO2 per million units of air. In the same way, the other independent variable, agricultural growth has been measured through the units of agricultural output per unit area. The last independent variable, food production has been measured through the production of crop per unit area. In addition to all the aforementioned variables, the researcher has also used a control variable i.e. population growth which has been measured through the number of people in a country. The following regression equation can be used in this regard;

\[ ES_{it} = \alpha + \beta_1 CC_{it} + \beta_2 AG_{it} + \beta_3 FP_{it} + \beta_4 PG_{it} + \epsilon_{it} \]

In this equation, ES represents economic sustainability, CC represents climate change, AG represents agricultural growth, FP represents food production, PG represents population growth. In the last, \( \epsilon_{it} \) is the term that represents error.

4. Estimation Procedure

4.1 Cross Sectional Dependence Test

First of all, the cross sectional dependence test has been applied so that the cross dependent relations among the variables can be identified because without this test, the results might not be accurate (Breusch & Pagan, 1980). This test has been used based on the following equation;

\[ CG_{BP} = T \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \frac{P_{ij}^2}{T} \]

However, this model has a drawback that it cannot be used if \( N \) is very large (Pesaran, 2004). So an alternative model can be used which is given as follows:

\[ CG_{LM} = \sqrt{\frac{1}{N(N-1)} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} T \frac{P_{ij}^2}{T} - 1} \]
The null and alternate hypothesis are used in this test where the null hypothesis involves that no cross sectional dependence has been observed while alternate hypothesis involves that cross sectional dependence has been found. The rejection of null hypothesis is based on the p-value. Apart from this test, the researcher has used another test i.e. homogeneity test whose null hypothesis is based on homogeneous slopes while alternate hypothesis is based on heterogeneous slopes.

4.2 Panel Unit Root Test
After cross sectional dependence and homogeneity test, panel unit root test has been employed by the researcher. The purpose of applying this test was to find out the order of integration of the variables and also to explain the stationary properties possessed by the variables. The researcher has used CIPS unit root test whose benefit is that it resolves the issue of cross sectional dependence found among variables (Pesaran & Yamagata, 2008). The following equation can be used for this test:

$$\Delta Y_{i,t} = \alpha_i + b_1 Y_{i,t-1} + c_1 \Delta Y_{t-1} + d_1 \Delta \bar{Y}_t + e_{i,t}$$

The version of the equation that considers the cross sectional dependence is as follows:

$$CIPS = \frac{1}{N} \sum_{i=1}^{N} CADF_i$$

In the above equation, CADF shows the cross sectional version of ADF test (Pesaran, 2007). The null hypothesis of this test presents that there is unit root in the data while it is non stationary. On the other hand, the alternate hypothesis presents that there is no unit root and the data is stationary.

4.3 Panel Cointegration Test
After the identification of order of integration and stationary properties of the collected data, the researcher has to explore of there is any cointegrated relationship between the variables or not. For this objective, the researcher has employed the panel cointegration test introduced by Westerlund and Edgerton. This test is named as LM bootstrap test of cointegration. Just like CIPS, this test also has the ability to resolve the issues regarding cross sectional dependence (Westerlund & Edgerton, 2007). The following equation can be used for this test:

$$LM_{N}^+ = \frac{1}{NT^2} \sum_{i=1}^{N} \sum_{t=1}^{T} \sum_{i=1}^{T} \bar{w}_{it}^2 e_{it}^2$$

Just like unit root test, this test also has null and alternate hypothesis having the assumption of no cointegration and presence of cointegration respectively. The p-value is the decision maker of rejection of the null hypothesis. Moreover, for further estimating the cointegrated relationships between the variables, the researcher has used AMG estimation test so that the impacts of variables over one another can be identified.

4.4 Panel Casualty Test
Based on the cointegrated relationships, it was a possibility that there might be casual relationships between the variables as well, therefore the researcher has applied Kónya casualty test in this study. This test has the major benefit that it resolves the issues of cross sectional dependency between the variables. The null hypothesis involves no casualty while alternate hypothesis involve casual relationships (Kónya, 2006). The following equation can be used for this test:

$$FS_{N,t} = \alpha_{2,N} + \sum_{i=1}^{I} \beta_{2,N,i} OS_{N,i-1} + \sum_{i=1}^{I} \delta_{2,N,i} FS_{N,i-1} + e_{2,N,t}$$

5. Results and Analysis
4.5 Results of Cross Sectional Dependence test
The cross sectional dependence as well as homogeneity issues of the collected data were analyzed by applying the tests, the result of which has been given in table 1. The values for CD<sub>BP</sub>, CD<sub>LM</sub> and CD have been given separately for all the variables. It is very clear from the table that all the variables have rejected the null hypothesis that there is no cross sectional dependence among them. This leads to the result that all the variables of the study are cross dependent. On the other hand, the results of slope homogeneity represent that the values of both delta and adjusted delta have rejected the null hypothesis and it leads to the conclusion that the coefficients of the study are heterogeneous. In this way, the results of both slope homogeneity and cross sectional dependence make the collected data favorable to enter the next phase of the research (Table 2).

### Table 2: Cross-Section Dependence and Slope Homogeneity Tests Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>CD&lt;sub&gt;BP&lt;/sub&gt;</th>
<th>CD&lt;sub&gt;LM&lt;/sub&gt;</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES</td>
<td>183.203*</td>
<td>65.005*</td>
<td>29.299*</td>
</tr>
<tr>
<td>CC</td>
<td>172.100*</td>
<td>78.300*</td>
<td>35.204*</td>
</tr>
<tr>
<td>AG</td>
<td>166.103*</td>
<td>87.499*</td>
<td>38.394*</td>
</tr>
<tr>
<td>FP</td>
<td>153.532*</td>
<td>67.388*</td>
<td>46.388*</td>
</tr>
<tr>
<td>PG</td>
<td>180.394*</td>
<td>88.399*</td>
<td>25.394*</td>
</tr>
</tbody>
</table>

**Slope Homogeneity Tests Results**

<table>
<thead>
<tr>
<th>Tests</th>
<th>LM Statistics</th>
<th>t-value</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta</td>
<td>34.67</td>
<td>5.367</td>
<td>.000</td>
</tr>
<tr>
<td>Adj Delta</td>
<td>29.87</td>
<td>4.887</td>
<td>.000</td>
</tr>
</tbody>
</table>

#### 4.6 Results of Panel Unit Root Test

After the basic tests i.e. slope homogeneity and cross sectional dependence, the researcher has applied CIPS test with the intention to explore the order of integration and stationarity of the variables. The results of this test can be viewed in the table 2. As per these results, the values for two series i.e. level and first difference has been given. It can be seen that at level series only four variables have rejected the null hypothesis of unit root of data and economic sustainability has accepted the null hypothesis. On the other hand, as soon as the researcher has first differenced the variables, it comes out that all the variables have rejected the null hypothesis of unit root of data. Thus it can be concluded that there is no unit root and the collected data is stationary and there is no unit root (Table 3).

### Table 3: CIPS Panel Unit Root Test Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>At Level</th>
<th>First Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES</td>
<td>-2.993</td>
<td>-5.293**</td>
</tr>
<tr>
<td>CC</td>
<td>-3.383*</td>
<td>-6.984**</td>
</tr>
<tr>
<td>AG</td>
<td>-3.849*</td>
<td>-8.368***</td>
</tr>
<tr>
<td>FP</td>
<td>-5.349*</td>
<td>-9.392**</td>
</tr>
<tr>
<td>PG</td>
<td>-4.229*</td>
<td>-8.838**</td>
</tr>
</tbody>
</table>

#### 4.7 Results of Panel Cointegration Test

According to the results of LM bootstrap panel cointegration test presented in table 3, it is evident that for both constant and constant plus trend, the p-value is less than the significant value leading towards the rejection of null hypothesis of no cointegration in both the cases. Thus it can be concluded that the variables of the study are having cointegrated relationships among them.

### Table 4: LM Bootstrap Panel Cointegration Test Results

<table>
<thead>
<tr>
<th>Conditions</th>
<th>LM statistics</th>
<th>Bootstrap p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-4.387</td>
<td>0.846</td>
</tr>
<tr>
<td>Constant + Trend</td>
<td>2.497</td>
<td>0.872</td>
</tr>
</tbody>
</table>

#### 4.8 Results of AMG Estimation
The most crucial test of the study i.e. AMG estimation is having its results in the table 4 of the study. In this table, the coefficients and their rejection for all the countries selected for data collection purposes have been presented vividly. It can be seen that climate change has significant impact on economic sustainability for Brunei, Laos and Thailand while for the other three countries its impact is insignificant. As far as the impact of agricultural growth is concerned, its impact is significant on economic sustainability for all the selected ASEAN countries. In the same way, for food production, the impact on economic sustainability has been found as significant for all the countries except for Cambodia. In the last, the impact of population growth on economic sustainability is also significant for all the selected companies except for Indonesia. As far as the overall results are concerned, it is clear from the table that as the climate change changes by one percent, the economic sustainability will change by 27.7% overall. In the same way, with change in agricultural growth, food production and population growth, the economic sustainability will change by 45.2%, 45.6% and 45.4% respectively.

Table 5: AMG Estimation Results

<table>
<thead>
<tr>
<th>Countries</th>
<th>CC</th>
<th>AG</th>
<th>FP</th>
<th>PG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>0.204**</td>
<td>0.168**</td>
<td>0.265**</td>
<td>0.246**</td>
</tr>
<tr>
<td>Cambodia</td>
<td>0.097</td>
<td>0.145*</td>
<td>0.087</td>
<td>0.212**</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.045</td>
<td>0.293**</td>
<td>0.167**</td>
<td>0.043</td>
</tr>
<tr>
<td>Laos</td>
<td>0.137**</td>
<td>0.341**</td>
<td>0.265**</td>
<td>0.257**</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.178**</td>
<td>0.262**</td>
<td>0.273**</td>
<td>0.232**</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.029</td>
<td>0.133**</td>
<td>0.277***</td>
<td>0.363**</td>
</tr>
<tr>
<td>Penal</td>
<td>0.277**</td>
<td>0.452**</td>
<td>0.456***</td>
<td>0.454***</td>
</tr>
</tbody>
</table>

4.9 Results of Casualty Test

The pair wise results of casualty test have been given in the table 5 of the study. According to the table, economic sustainability and climate change have no casual relationship between them. However, economic sustainability and agricultural growth are having bidirectional casualty between them. Economic sustainability and food production are having unidirectional casualty running from economic sustainability to food production. In the same way, climate change and agricultural growth are also having unidirectional casualty running from agricultural growth to climate change. Similarly, climate change and food production are having unidirectional casualty running from climate change to food production. In the last, agricultural growth and food production are also having unidirectional casualty running from food production to agricultural growth.

Table 6: Kónya Panel Causality Test Results

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES does not Granger Cause CC</td>
<td>1.3293</td>
<td>0.0649</td>
</tr>
<tr>
<td>CC does not Granger Cause ES</td>
<td>3.2343</td>
<td>0.4391</td>
</tr>
<tr>
<td>ES does not Granger Cause AG</td>
<td>5.2994</td>
<td>0.0007</td>
</tr>
<tr>
<td>AG does not Granger Cause ES</td>
<td>8.3433</td>
<td>0.0000</td>
</tr>
<tr>
<td>ES does not Granger Cause FP</td>
<td>4.2033</td>
<td>0.0033</td>
</tr>
<tr>
<td>FP does not Granger Cause ES</td>
<td>3.2994</td>
<td>0.3124</td>
</tr>
<tr>
<td>CC does not Granger Cause AG</td>
<td>3.2043</td>
<td>0.0532</td>
</tr>
<tr>
<td>AG does not Granger Cause CC</td>
<td>5.2943</td>
<td>0.0053</td>
</tr>
<tr>
<td>CC does not Granger Cause FP</td>
<td>7.2033</td>
<td>0.0042</td>
</tr>
<tr>
<td>FP does not Granger Cause CC</td>
<td>2.2843</td>
<td>0.2044</td>
</tr>
<tr>
<td>AG does not Granger Cause FP</td>
<td>2.0294</td>
<td>0.2944</td>
</tr>
<tr>
<td>FP does not Granger Cause AG</td>
<td>4.8284</td>
<td>0.0058</td>
</tr>
</tbody>
</table>
5. Discussion and Conclusion

5.1 Discussion
Three hypotheses have been made by the researcher based on the past literature so that these hypotheses can be tested using various techniques and tools. These hypotheses have been made based on the purpose of the current study i.e. to find out the impact casted by climate change, agricultural growth and food production on the economic sustainability of the ASEAN countries. In this regard, the first hypothesis that climate change has significant impact on economic sustainability of ASEAN countries has been accepted as the impact of climate change has been found significant for most of the countries selected. When the climatic conditions get better, it enhances the productivity of crops and other agricultural outputs and thus enhances the economic sustainability. This result is consistent with the past literature and can be explained on this basis (Clapp, Newell, & Brent, 2018). The next hypothesis was that agricultural growth has significant impact on economic sustainability of ASEAN countries and this hypothesis has also been accepted because the results have indicated that agricultural growth has significant impact in all the selected ASEAN countries. When the agricultural growth increases, it not only fulfills the needs of the local people but the exports are also increased resulting in the enhancement of economic sustainability. This result is in accordance with the similar studies and researches that have been conducted in the past by various researchers (Azam & Shafique, 2017). The last hypothesis was that food production has significant impact on economic sustainability of ASEAN countries. As the results have shown that this impact is significant for most of the selected countries, it can be stated that this hypothesis is also accepted. When the food production increases, the exports of the country are also increased providing growth and development to the economy of the country. This result is also in concordance with the past literature (Nepal & Paija, 2019; Tait et al., 2016). Moreover, the researcher has also added a control variable i.e. population growth and its impact have also been found as significant.

5.2 Conclusion
In order to achieve the objective of the current study i.e. to find out the impact casted by climate change, agricultural growth and food production on the economic sustainability of the ASEAN countries, the researcher collected 29 years data from six ASEAN countries about the concerned variables and applied a number of appropriate and essential tests and tools for analysis purpose. The results have indicated that the impact of all the independent variables i.e. climate change, agricultural growth and food production have significant impact on economic sustainability in most of the selected ASEAN countries. The the conclusion can be drawn on the basis of these results that the agricultural sector must take steps to enhance the agricultural growth and food production. Moreover, the environment must be kept pollution free to bring positive changes in it so that the economy of the country might growth and develop leading towards the economic sustainability.

Implications and Limitations
As far as the practical implication of the study is concerned, it has information and guidance for the agricultural sector to improve their practices by various means to promote economic sustainability. In addition, it will also provide guidance about the making of policies and regulations to enhance agricultural growth and food production and also to bring positive changes in the climate to enhance economic sustainability. Theoretically, it will provide literature to the researchers and authors about the particular aspects used in the current study that might be helpful for further research. The sample size of the study is 29 and it is recommended for the other researchers to increase the sample size to get better results. The countries and regions other than ASEAN must be considered so that their context can also be covered for the study.
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IS IT RIGHT TO SEE POLLUTION AS AN INEVITABLE BY-PRODUCT OF SUSTAINABLE ECONOMIC GROWTH? ANALYZING IMPACT OF WATER, PLASTIC AND AIR POLLUTION FOR ASEAN COUNTRIES

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Abstract. In the developing and underdeveloped countries, economic growth comes usually with the price of pollution in the form of byproduct. The pollution is of various types such as water pollution, plastic pollution, air pollution etc. and all of them are majorly caused by the economic activities in different sectors of the country. In this context, the current study has been designed so that the impact casted by water, plastic and air pollution on the sustainable economic growth of the ASEAN countries can be studied. Therefore, the researcher has collected the information from ASEAN countries for the period of 30 years about the variables included in the study. The collected data has been analyzed by conducting tests such as panel entity root test, coefficient estimation test, panel cointegration test and Granger casualty test and the outcomes have been obtained. The results have clearly indicated that the effect of water, plastic and air pollution on sustainable growth of economy has been found as substantial and positive. Moreover the impact of control variables i.e. population and literacy rate has also been found as significant and positive. In addition, casual relationships between the variables have also been observed as per the Granger Casualty test results.

Keywords: Water; Plastic; Air Pollution; Sustainable Economic Growth; ASEAN Countries


Jel Codes: O1, O53

1. Introduction

Pollution is considered as a global ecological issue which in the form of air, haze, water and plastic material pollution does not only pose a major risk for the health of its citizens, but also negatively impacts the environment of the country (Borhan & Ahmed, 2017; Muniz, da Gloria, de Melo, Liberato, Wahnfried, & Vieira, G. 2018; Cardoso, Swan, & Mendes, 2018. Hao et al., 2018; Zamil, Furqan, & Mahmood, 2019; Tvaronavičienė, & Ślusarczyk, 2019; Mazzoni, 2020). As a consequence, the economic welfare and development is compromised (Lazár, Minea, & Purcel, 2019). Many countries have enforced laws and policies to control and reduce the pollution to safe levels. If urgent attention is not paid by the government, the pollution levels are projected to dangerously rise to above 50 % by the year 2030 and disrupt the entire eco- system of the globe. The dense
population of the urban cities and rural irrigation returns filled up with fertilizers and pesticides are polluting the habitats and the aquatic environment (Borhan & Ahmed, 2017). See Figure 1. The implementation of appropriate pollution controlling policies can stabilize these levels which can damage the human health at mass and foster eco-economic growth (Hou, An, Song, & Chen, 2019; Organization, 2016).

Figure 1. Projected Increase in the global health care cost due to air pollution (Billions)

Owing to the catastrophic and acute rise in the pollution levels, all the ten ASEAN nations have signed the Basel Convention, which is a treaty to control the inter-country transmission of the hazardous pollutants (Ibitz, 2012; Lian & Robinson, 2002). The plastic has intensively contaminated the rivers and other water bodies (Garcia, Fang, & Lin, 2019; Hisham & Florent, 2019), degrading them to reach unsafe levels of the Water Quality Index (WQI) due to the growth in population and urbanization (Garcia de Oliveira, Fang, & Lin, 2019; Prisandani & Amanda, 2019). See Table 1. Haze, smoke, carbon and other GHG emissions have destroyed the natural composition of air, hence, rising the Air Pollution Index of these countries very high, on average. All these pollution factors have taken a toll on the human lives and have reduced their productivity and increased the cost on the healthcare, giving another blow to the economy.

Table 1: Increase in the plastic waste in ASEAN region (Tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>836,529</td>
</tr>
<tr>
<td>2018</td>
<td>2,265,962</td>
</tr>
</tbody>
</table>

Based on the above discussion, it is important that the impact of pollution be examined on the economic growth of a country. Scholars have also highlighted the need for such studies for developing policy implications in the ASEAN region, which consists of emerging economies with the highly polluted areas of the world (Chontanawat, 2020; Haseeb, Kot, Hussain, & Jermsittiparsert, 2019; Thanh, Phuong, & Ngoc, 2019). In order to bridge this research discrepancy, this study aims to see if pollution is an inevitable by-product of sustainable economic development by analyzing the impact of water, plastic and air pollution by using panel data from the ASEAN nations. Also, the specific research objectives for the current study are as follows:
To analyze how water pollution affects the sustainable economic growth
To analyze how plastic pollution affects the sustainable economic growth
To analyze how air pollution affects the sustainable economic growth.

This research has substantial significance to the literature and practice. Theoretically, this paper investigates the water, air and plastic pollution contributing to sustainable economic growth and development using panel data techniques. Practically, this study provides insight into policy making for enforcing comprehensive laws and regulations to control the pollution by water, air and plastic and determining the monetary value of environmental quality for ensuring a sustainable economy.

The organization concerned with this paper is provided as follows. Starting with Introduction, the paper moves to the review of the literature on the variables. Next, the complete methodology for research is given, using which the findings of the study are deduced and presented. The last section concludes this study with the discussion, also highlighting the research limitations and research implications.

2. Literature review

Water Pollution
The world’s water resources are particularly limited and scarce sand are more vulnerable to the pollutants and the associated destruction (Markantonis et al., 2019). Water pollution is considered to be a challenge for the quality of the world’s eco- system. While the industries are accounted for significant boosters of the country’s economy (Sakamoto, Ahmed, Begum, & Huq, 2019), their extensive spread in the suburbs of the cities and towns are contaminating the river and streams with the dirty water emitted from them (Wanhong, Fang, Fan, Maiqi, & Tiansen, 2019). As more resources and inputs are being utilized to manufacture more goods, their tendency to produce greater air pollutants and solid waste are induced, resulting in environmental degradation (Khan, 2019). Water pollution has become a serious threat to the water resources, the quality of which is being deteriorated day by day, disrupting the ecological systems of ground water and the offshore waters. The safety of the agricultural products growing from such water and the drinking water used by people are also compromised, leading to complete loss of the welfare of society and the economy. This problem is now spreading wide across the countries and strict laws need to be governed and enforced to address this challenge soon before the situation gets completely out of control and the risk factors could not be mitigated in the long run (Liu, 2019). (Melloul & Collin, 2003) has stated that in order to develop and maintain sustainable development, efficient management of the water resources and social requirement be coordinated. (Ali, Naveed, ul Hameed, & Rizvi, 2018; Hamid, Shahid, Hameed, Amin, & Mehmood, 2019; Judova & Janský, 2005) has pin pointed that the presence of high rate of pesticide drained as waste water into the water bodies are a major source of agricultural pollution. (Simon, Brüggemann, & Pudentz, 2004) has also suggested that water environment and its economic impact be dealt with by maintaining a balance among the water resources and social economy if the goal related to the sustainable development is to be accomplished. Contemporary scholars have investigated the relationship between urbanization, air pollution and growth of economy. Their findings revealed that the pollution sources massively distresses the quality of the atmosphere (Liang & Yang, 2019). In a similar study by (Liu, 2019), using the data from 2008 – 2017 for China, the impact of water pollution was explored on the regional economic development. Their findings showed that water pollution is alleviated with the economic development. As the income levels increase, the per capita GDP and the discharge for industrial waste water also increases initially. However, in the long run, a negative correlation is seen between the pollution levels and the GDP, implying that water pollution and economic growth are negatively linked to each other (Liu, 2019). The results of the previous studies indicate that an adverse correlation can exist among water pollution and sustainable growth of economy. Hence, the following hypothesis is deduced:

H1: Water Pollution has significant relationship with Sustainable economic growth.
Plastic Pollution
Plastic waste is a global problem ranging from the Arctic to Antarctic (Cressey, 2016). The fragments of the plastic are illegally dumped on the ground and are later blown into the lakes and streams, from where it goes to the rivers and the oceans (Van Sebille, Spathi, & Gilbert, 2016). Hence, the plastic effluence can be seen in both the fresh water and the marine environment, posing a threat to the bio diversity and economy. Most of the plastic dump has created both from land and ocean based sources (Van Sebille et al., 2016). Plastic is produced in large quantities, i.e., around 300 million tonnes globally (Cressey, 2016). This non-degradable plastic contaminates and is not easily biodegraded while floating in the marine areas even for longer time periods. It is estimated that about five trillion plastic pieces are found in the oceans of the world (Eriksen et al., 2014). The chemicals used for manufacturing polymer plastic are hazardous materials derived from raw crude oil and are divided into minor micro plastics, huge micro plastics, meso-plastics and macro-plastics (Kibria, 2017). The main plastics used for packaging around the world include polypropylene, polyethylene, polystyrene, polyvinyl chloride and polyurethane. Many developed countries are using the plastics categorized as solid waste (Rochman et al., 2013). When this material is not properly filtered or disposed off then this is dumped openly into the aquatic waterways and is transported with the tides or wind (Kibria, 2017). A worrisome level of the plastics are found on land and in the rivers every year (Blettler, Abrial, Khan, Sivri, & Espinola, 2018; Jambeck et al., 2015) due to the human recreational activities (Wang, He, & Sen, 2019; Cristófoli & Fronti, 2020). Hence, for environmental concerns, the contamination by plastic has to be reduced through generating long term measures for eradication (Stafford & Jones, 2019) and economic growth can be made possible by adopting green measures (Avery-Gomm, Walker, Mallory, & Provencher, 2019). These findings imply that plastic pollution has significant linkages to the development of economy of a country. So, hypothesis for showing this relationship is:

H2: Plastic Pollution has significant relationship with Sustainable economic growth.

Air Pollution
The bad quality of the outside air has detrimental impact on the health, labor productivity and agricultural yields which can cause the economic costs to increase considerably. Hence, the air pollution takes a toll on the human lives and the sustainable economy (Tasri & Karimi, 2019; Kamarudin et al., 2020). Previous research studies have examined the effect of air pollution and economic development by depleting the natural ozone layer. They found that the urban air quality will decline with the rising GDP per capita, implying that an undesirable relationship occurs between them (Selden & Song, 1994; Jabarullah, 2019). Another study by (Cole, 2000) has investigated the effect of environmental pollution on the economy of developing and developed countries and found that the emissions from the manufacturing concerns and industries change the composition of the air and atmosphere and revealed that with rise in the income level, industrial pollution also increases which can have negative impact on the economic conditions (Cole, 2000). In a similar study by (Sun & Gu, 2008), the influence of the air pollution on the health of people and economic development of community was explored. The results showed that growth in the index for environmental pollution was more in the urban areas and it worsened the health conditions and the economic situation of that community (Sun & Gu, 2008). In a recent study, it was postulated that the rise of haze and smoke in the atmosphere has contaminated the air quality and reduces visibility and its negative impacts are observable for the economic development and growth using OLS (Ordinary Least Square) method. Panel data was employed for the time period of 2013 – 2015 (Haseeb et al., 2021), it was found that negative correlation exists among the environmental pollution and GDP per capita and the economic development. The study proved that the air pollution with higher concentration of pollutants with PM 2.5 can significantly affect the economic development and its sustainability, however reducing these levels can benefit the growth and development of society and economy at large (Hao et al., 2018). Other studies have also revealed similar results, implying that air pollution significantly affects the economic growth (Azam, Khan, & Ozturk, 2019; Tasri & Karimi, 2019; Wu, Pu, & Li, 2020). These findings indicate that air pollution and sustainable economic growth are significantly linked to each other. For this relationship, the following hypothesis is given:
H3: Air Pollution has significant relationship with Sustainable economic development.

3. Data and Methods

Data
Being one of the most important and critical steps of a research process, the researcher has collected the data required for this particular study from the most authentic databases for example World Bank Development Indicators and Global Economy. The records from these data bases ensures the reliability and accurateness of the results obtained by the application of different experiments and approaches on the data. The information for this specific study was collected from the ASEAN countries about the aspects for instance water pollution, plastic pollution, air pollution and sustainable economic growth based on the purpose of this study i.e. to find out the impact of water, plastic and environmental pollution on sustainable growth of economy in ASEAN countries. The time period for which data has been collected is 30 years and the details of measurement units has been given in the next section.

Model Specification
As far as the measurement units are concerned, the measurement unit of water pollution is taken as concentration of pollutants dissolved milligrams per liter. In the same way, plastic pollution has been measured in context of millions of metric tons per year. The last independent variable, air pollution has the measurement units of micrograms per cubic meter. As far as the dependent variable, sustainable economic growth is considered; it has been measured as the GDP growth in a country. Furthermore, the researcher has chosen two control variables as well i.e. literacy rate and population which have been measured through the number of people and percentage of literate people in the country respectively. The researcher has come up with the following regression model to be used for the analysis purpose:

\[ SEG_{it} = \alpha + \beta_1 WAP_{it} + \beta_2 PLP_{it} + \beta_3 AIP_{it} + \beta_4 POP_{it} + \beta_5 LIT_{it} + \epsilon_{it} \]

In the above equation, SEG represents sustainable economic growth, WAP represents pollution, PLP shows plastic pollution, AIP denotes air pollution, POP shows population, LIT represents literacy rate while \( \epsilon_{it} \)is the term that shows any error.

Estimation Procedure
Panel Unit Root Test
In the initial step, with the aim to study and analyze the stationary properties of the data and to determine the integration order of the variables of the study, the researcher has applied the test of panel unit root in the study. These aspects are necessary to be evaluated before the application of further tests in the study and test of panel unit root is the best option for this purpose. There are various tests that come under unit root such as ADF, LLC and IPS etc. which are based on null and alternate hypothesis. As far as null hypothesis is concerned, it assumes that there exists a unit root in the collected data that makes it non stationary (Im, Pesaran, & Shin, 2003). On the other hand, if the alternate hypothesis is considered, it has the assumption that there does not exist any unit root in the data that makes it inactive. The rejection and acceptance of these hypotheses are based on the value of p. This test can be applied using the following model;

\[ \Delta y_{it} = a_t + p y_{it-1} + \sum_{j=1}^{p-1} a_j \Delta y_{it-j} + \epsilon_{it} \]

Here, \( \Delta y_{it} \) shows the difference of the term \( y_{it} \) involving \( i^{th} \) country and the time period of \( t \).

Panel Cointegration Test
After studying the stationary conditions and the order of integration of the variables, the subsequent stage is to explore whether there exist any cointegration among the variables or not. To study this aspect, the most appropriate test that is being used by the researchers is known as panel cointegration test such as Kao and Pedroni cointegration test. These conducted tests are also centered on the alternate and null hypothesis. In case of null hypothesis, the assumption concludes that there is no cointegration present amongst the variables while in case of alternate hypothesis the situation is different i.e. cointegration is present between the variables. Two types of statistics are used for this purpose i.e. within dimension or homogeneous panel and the other one is between dimension or heterogeneous group. The rejection of null hypothesis depends on the significance level of these statistics values (Levin & Lin, 1993). The following equation can be used in order to use this test;

\[ y_{i,t} = \alpha_i + \delta_{i,t} + \beta_1 X_{1i,t} + \beta_2 X_{2i,t} + \ldots + \beta_n X_{ni,t} + \varepsilon_{i,t} \]

**Coefficient Estimation Test**

The most critical test that has been applied in the study is refereed as coefficient estimation test that provides the information about the impact that is casted by one variable over the other and the direction of that impact as well i.e. positive or negative. In this regard, different techniques are used for example dynamic and fully modified ordinary least square i.e. FMOLS and DOLS (Pedroni, 2001). The following equation can be used while applying this test.

\[ \hat{\beta}_{FM} = \left( \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - \bar{x}_t)^2 \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - \bar{x}_t) \hat{\delta}_{t} - T \delta_{eu} \]

In the above equation, \( \hat{\delta}_{t} \) is represented as the transformed dependent variable because of endogeneity while \( \delta_{eu} \) is because of the serial correlation correction.

**Granger Casualty Test**

At last, the researcher has applied the test of Granger Casualty so that the presence of any casual relationship between the variables can be probed effectively. For this purpose, Dumitrescu and Hurlin Granger Casualty Test is the best option which provides information about the unidirectional and bidirectional casual relationships between the variables (Dumitrescu & Hurlin, 2012). Just like other tests, it also has null and alternate hypothesis with null hypothesis assuming no casual relationship and vice versa. The following equation may be used in this regard;

\[ x_t = \sum_{i=1}^{\infty} a_i x(t-i) + c_1 + \mu_{1(t)} \]

\[ x_t = \sum_{i=1}^{\infty} a_i x(t-i) + \sum_{j=1}^{\infty} b_j y(t-j) + c_2 + \mu_{2(t)} \]

4. **Results and Analysis**

**Results of Panel Unit Root Test**

The results obtained by the application of test of panel unit root have been reported in the table 2. In the table, results for two series have been given i.e. level and first difference. Let consider them one by one. As far as the level series is concerned, it is quite clear that only three variables i.e. sustainable economic growth, air pollution and population have prohibited the null hypothesis continuously.

Similarly, same three variables have prohibited the null hypothesis in continual plus trend. All the remaining variables have acknowledged the null hypothesis. On the other hand, in case of first difference series, all the variables in both constant and constant plus trend have prohibited the null hypothesis. This specifies that in the
level successions the data was not stationary but when the first difference was applied on it, it became stationary. It can also be stated that in this series, the direction of integration of the variables is I (1).

Table 2: Unit Root Test

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Level</th>
<th>1st Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant</td>
<td>Constant+ Trend</td>
</tr>
<tr>
<td>SEG</td>
<td>-2.0203*</td>
<td>-2.2844*</td>
</tr>
<tr>
<td>WAP</td>
<td>-0.5289</td>
<td>-0.2442</td>
</tr>
<tr>
<td>PLP</td>
<td>-0.2048</td>
<td>-0.2944</td>
</tr>
<tr>
<td>AIP</td>
<td>-4.2034**</td>
<td>-4.2233*</td>
</tr>
<tr>
<td>LIT</td>
<td>-0.2994</td>
<td>-0.2944</td>
</tr>
</tbody>
</table>

Results of Panel Cointegration Test

Afterwards the identification of order of integration, the next test in the research was applied to explore the cointegration among the variables and the outcomes obtained have been presented in the table 3. As far as the within dimension or homogenous panel results are concerned, it is clear that three statistics values i.e. v, rho and PP have forbidden the null hypothesis of absence of cointegration. Correspondingly, if the between dimension or heterogeneous group results are considered, it is clear that two out of three statistic values i.e. rho and PP have rejected the null hypothesis of absence of cointegration. In short, it can be summarized and briefly elaborated that as five values out of seven values have not accepted the null hypothesis, the final result is that cointegration is present among the variables. The comprehensive results of the tests and the results can be viewed and evaluated in the following table.

Table 3: Panel Cointegration Test

<table>
<thead>
<tr>
<th></th>
<th>Weighted Statistic</th>
<th>Weighted Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative hypothesis: common AR coefs. (within-dimension)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel v-Statistic</td>
<td>-3.24929*</td>
<td>0.0262</td>
</tr>
<tr>
<td>Panel rho-Statistic</td>
<td>2.20334*</td>
<td>0.0068</td>
</tr>
<tr>
<td>Panel PP-Statistic</td>
<td>-2.28334*</td>
<td>0.0401</td>
</tr>
<tr>
<td>Panel ADF-Statistic</td>
<td>0.19388</td>
<td>0.3092</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative hypothesis: individual AR coefs. (between-dimension)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group rho-Statistic</td>
<td>5.03592*</td>
<td>0.0000</td>
</tr>
<tr>
<td>Group PP-Statistic</td>
<td>-4.12917**</td>
<td>0.0000</td>
</tr>
<tr>
<td>Group ADF-Statistic</td>
<td>-3.12299</td>
<td>0.4512</td>
</tr>
</tbody>
</table>

Kao test

<table>
<thead>
<tr>
<th></th>
<th>Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADF</td>
<td>-4.6387*</td>
<td>0.0452</td>
</tr>
</tbody>
</table>
Results of Coefficient Estimation Test
The results of the most critical and decisive test have been presented in the table 4 both for pooled and grouped versions of coefficient estimation. Let us consider the results in context of each variable separately. First of all the impact of water pollution has been found as significant in both the versions and it can be stated that with one percent increase in water pollution, the sustainable economic growth will be enhanced by 26.3% for pooled and 25.8% for grouped version. In the same way, the impact of plastic pollution has also been indicated as substantial and with rise of one percent of plastic pollution, the sustainable economic growth will face and increase of 12.2% in pooled and 13.3% in grouped version. Similarly, the third independent variable i.e. air pollution has also significant impact on sustainable economic growth as per the table. When there is one percent increase in air pollution or environmental pollution, sustainable growth of economy will show and increase of 12.8% in pooled and 12.5% in grouped version. Apart from these variables, the impact of control variables i.e. population and literacy rate have also been found as efficient and significant. It can be stated that as population increases by one percent, sustainable economic growth will face an increase of 22.8% for pooled and 23.3% for grouped version. Similarly, with one percent increase in literacy rate, sustainable economic growth will have an increase of 23.6% for pooled and 22.4% for grouped version. In short all the control and independent variables have major and affirmative impact on sustainability of economic growth.

Table 4: Coefficient Estimation Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Pooled</th>
<th>Grouped</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Beta 0.263**</td>
<td>Beta 0.258**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SE 0.212</td>
<td>SE 0.488</td>
</tr>
<tr>
<td>WAP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beta 0.122*</td>
<td>Beta 0.133**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SE 0.543</td>
<td>SE 0.485</td>
</tr>
<tr>
<td>PLP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beta 0.128*</td>
<td>Beta 0.125*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SE 0.677</td>
<td>SE 0.794</td>
</tr>
<tr>
<td>AIP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beta 0.228**</td>
<td>Beta 0.233**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SE 0.521</td>
<td>SE 0.474</td>
</tr>
<tr>
<td>POP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beta 0.236**</td>
<td>Beta 0.224**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SE 0.561</td>
<td>SE 0.387</td>
</tr>
<tr>
<td>LIT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beta 0.765***</td>
<td>Beta 0.774***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SE 0.866</td>
<td>SE 0.993</td>
</tr>
<tr>
<td>Adj. R Square</td>
<td></td>
<td>Beta 0.263**</td>
<td>Beta 0.258**</td>
</tr>
</tbody>
</table>

5. Results of Granger Casualty Test
Finally the casual relationships among different variables have been studied through Granger Casualty test. In context of Granger Casualty test results showed in the table 5, it can be stated that casualty runs between the pollution of water and sustainability of economic growth, environmental pollution and sustainable economic growth, population and sustainable economic growth, plastic pollution and water pollution, air pollution and water pollution, population and plastic pollution, population and air pollution and finally literacy rate and air pollution. Thus it can be concluded that various variables have casual relationships between them.
Table 5: Granger Casualty Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>EGS</th>
<th>WAP</th>
<th>PLP</th>
<th>AIP</th>
<th>POP</th>
<th>LIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGS</td>
<td>0.773</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAP</td>
<td>0.388*</td>
<td>0.674</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLP</td>
<td>0.356</td>
<td>0.309*</td>
<td>0.876</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIP</td>
<td>0.583*</td>
<td>0.294*</td>
<td>0.566</td>
<td>0.753</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POP</td>
<td>0.112*</td>
<td>0.499</td>
<td>0.398*</td>
<td>0.388*</td>
<td>0.687</td>
<td></td>
</tr>
<tr>
<td>LIT</td>
<td>0.299</td>
<td>0.388</td>
<td>0.378</td>
<td>0.384*</td>
<td>0.291</td>
<td>0.780</td>
</tr>
</tbody>
</table>

Discussion and Conclusion

Discussion
The results that have been obtained by the application of various tests and techniques on the collected data for fulfilling the purpose of the current study have been discussed in this section. The researcher had designed three hypotheses in the literature review section so that they can be tested. The first hypothesis that was generated by the researcher was that water pollution has significant impact on sustainable economic growth. As the results found this impact significant and efficient thus it can be stated that this hypothesis has been accepted. Water pollution increases by more industrial practices that have the positive impact on the economic growth. This result is affirmative with the studies of similar context from the past (Khalid & Khaver, 2019). The next hypothesis was that plastic pollution has significant impact on sustainable economic growth and the results presented this impact as significant too leading towards the acceptance of this hypothesis. This result is in consistence with the past literature (Beaumont et al., 2019). The last hypothesis of the study was that air pollution has significant impact on sustainable economic growth. The results proved that this impact is also significant and thus the last hypothesis was also accepted. The increase is air pollution is majorly caused by the heavy industrial activities in different sectors of the country thus increasing the economic growth of the country. This result is in accordance with the literature found in the past (Bagoulla & Guillotreau, 2020). Moreover, two control variables i.e. population are also found to have a significant impact on sustainable economic growth. When the population of a country is increased, more people get jobs in different industrial sectors of the country and work there resulting in increase in sustainable economic growth. Similarly, when the literacy rate is increased, more educated and skilled people work for the country leading towards the sustainable economic growth of the country. In a nutshell, all the hypotheses of the study have been accepted (Muda, 2017).

Conclusion
In order to achieve the objectives of the current study i.e. to explore the impact casted by water, plastic and air pollution on the sustainable economic growth of the ASEAN countries, the researcher collected data from ASEAN countries for 30 years about the variables involved in the study. The results obtained by the application of the tests and techniques on the collected data indicated that all the independent variables i.e. water, plastic and air pollution have significant impact on sustainable economic growth and it leads to the conclusion that the countries must work on the adoption of new technology and refined practices in different sectors of the country so that the pollution can be reduced effectively in spite of the increasing sustainable economic growth.

Implications and Limitations
The basic practical implication of the current study is that it will guide the industrial sector of the ASEAN countries to take steps and adopt new technology and refine practices in different sectors of the country so that the pollution can be reduced effectively in spite of the increasing sustainability if economic growth. It will also guide the policy makers to devise environment friendly policies and regulations for the ASEAN country. In addition, the theoretical implication of the study is that it will provide literature and information to the other researchers for
further research purposes. It is recommended to add more countries and regions for this research so that their perspective of the problem can be addressed efficiently. In addition, other variables may also be considered so that new literature can be created further.

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SEEKING FOR SUSTAINABLE ELECTRONIC BRANDS' PERFORMANCE: ROLE OF PERCEIVED GREENWASHING AND PERCEPTION DIMENSIONS

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Abstract. In Indonesia, the majority of electronic firms are striving to enhance their environmental position by presenting their environmental efforts to the public. This paper is an informative approach to critically investigate the number of factors that play a major role to enhance the positive impact of the perceived greenwashing on sustainable brand performance. According to the SEM-based statistical outcomes, it becomes concluded that the effective objective response and product perception directly boost the relationship between the tested independent and dependent variables, but the diverse environmental perception plays a minor role in the development of sustainable brand performance. This paper is, no doubt, an informative approach in front of the electric company's management, the local consumers, and the Indonesian administration to evaluate the current situation and their responsibility towards the environmental sustainability factor. This is productive research but also carries some limitations like no qualitative or mixed method of research is used, and also the management point of view is not considered to make a versatile research analysis, which can impact its authenticity factor. This research gap can overcome by upcoming scholars in their related journals.

Keywords: Sustainable Electronic Brands' Performance; Perceived Greenwashing and Perception Dimensions; Indonesia


Jel Codes: O1, O53

1. Introduction

The production of electronic brands in Indonesia started in the mid of the 1980s and the growth of this industry increased from 1985 as they focused on the upstream activities (Shin, 2019). Large industrial areas were built in Indonesia by the Japanese investors during the 1990s (Suryana, Mayangsari, & Novani, 2017). According to Andadari, Priyanto, and Haryanto (2016), the growth of the production of electronic brands in Indonesia was decreased in the 2000s because of the development of China. Its electronic sector is rapidly growing for more than two decades (Djohan & Brahmana, 2017). Indonesia is still working to improve its performance of electronic brands by applying green marketing strategies to gain competitive advantages (Rostiani & Kuron, 2019). Sidharta, Priadana, and Affandi (2019) in the research said that Greenwashing (GW) can have a negative impact on an organization as it can affect the profitability of an organization as well as harm its ethical behavior. According to Berrone, Fosfuri, and Gelabert (2017) individual, external and organizational issues are concerned with greenwashing. The below table 1 contains some GW terms that are used by different sectors of Indonesia during the last few years.
Table 1: Top greenwashing practices

<table>
<thead>
<tr>
<th>Greenwashing practices</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluffy language</td>
<td>Terms or words with no clear understanding, e.g. eco-friendly.</td>
</tr>
<tr>
<td>Suggestive pictures</td>
<td>Green descriptions or images that indicate green impacts.</td>
</tr>
<tr>
<td>Irrelevant claims</td>
<td>Emphasizing single small green attributes when everything else is un-green.</td>
</tr>
<tr>
<td>Gobbledygook</td>
<td>Jargon or data that only an environment expert could understand.</td>
</tr>
</tbody>
</table>

The major challenge faced by the electronic industry of Indonesia is to make products according to consumer needs at a low cost (Umam & Sommanawat, 2019). It is challenging to maintain sustainability in such an enterprise (Manurung & Danil, 2017). The electronic sector should be regulated by the organizations to audit their supply base. There is a lack of recycling and efforts to take back in the electronic industry of Indonesia (Hendrayati & Gaffar, 2016). Rules and regulations are required to solve this issue. There is also a lack of human rights programs, sustainability, and responsibility in the electronic sector (Fernando & Carlos, 2020; Knox, 2017). The below figure 1 also shows the priorities of individuals in Indonesia in different sectors.

Figure 1: Ratio

Over the last few decades, different researches and their analysts describe the importance of greenwashing in improving the overall performance of electronic products and other electronic services (Oral, 2019). Recently empirical research by Ivada and Fauzi (2020) has evaluated the overall influence of green marketing along with greenwashing on the environment as well as product and brand perceptions. The recent efforts in the arena of green marketing (GM) and greenwashing lack in evaluating the overall impact of GW through the mediating impact of objective responses on the sustainable performance of electronic brands (Retnawati, Irmawati, & Leong, 2019; Yunus et al., 2019; Nuryakin, Maryati, 2020). This given paper aims at investigating the direct influence of perceived GW on the performance of electronic brands in Indonesia. Moreover, over the past few years, different scholars such as Sajilan, Ghani, Maimunah, and Lestari (2019) have examined the impact as well as the connection between GW and brand performance in different sectors and areas. Consequently, the given research is important and justified mainly because no other effort has been made in improving or seeking sustainable electronic brand performance in the electronic industry of Indonesia. The current effort is new and proves to be supportive because no other study in the last few years has evaluated the mediating role of environmental as well as product perceptions in stimulating the electronic brand performance (EBP) in Indonesia. Based on the above justification the given study has the following objectives,
The foremost aim of the research is to identify the direct impact of perceived greenwashing on electronic brand performance in the electronic industry of Indonesia.

The second objective is to evaluate the mediating impact of environmental perception on the linkage between perceived GW and electronic product performance in the electronic industry of Indonesia.

The next purpose is to analyze the mediating role of product perception in the relationship between perceived GW and electronic brand performance in the electronic industry of Indonesia.

The last goal of the study is to examine the overall mediating impact of objective response on the association between perceived GW and sustainable brand performance in the electronic industry of Indonesia.

The overall findings of the current study prove to be significant and supportive of the electronic brand industry of Indonesia, as Indonesia has been a leading electronic product manufacturing country hence this research is very significant for the electronics sector. The results provided by this research have a wider scope and significance for many electronic brands and products to analyze the sustainable performance of particular electronic brands. Moreover, this paper has a remarkable opinion in examining how product perceptions and objective responses play a direct part in sustaining the overall performance of electronic products. Generally, the structure of a thesis comprises the following chapters as Introduction, literature review, methodology, findings, or results, and the final chapter is discussion and implications. The first part deals with the overview of the thesis's basic points or the main idea. This chapter answer the question as to why, how, and what. A literature review is the evaluation of the previous studies on the topic and expressing the gaps that are going to be observed. This chapter expresses the methodology and practices to gather information and data accurately. Findings indicate that what new has been found concerning the present study. The final chapter discussion and conclusion generally consist of the idea and the interpretation of the data and comments about the results.

2. Literature review

Theory of Greenwashing

During the last few years, it comes to the knowledge that different organizations, as well as sectors, view green marketing (GM) from a different point of view, as intentional greenwashing (sometimes known as the evil greener), no greenwashing and unintentional GW (Seele & Gatti, 2017). According to the theory of GW, it is a mechanism of transmitting false impressions or proving knowledge about how sector products and brands are more environmentally sound and effective (Guo, Tao, Li, & Wang, 2017). According to Sun (2018) company’s and different sectors use this process to enhance as well as stimulate their sustainable brand performance. This theory also states that sectors involved in this process of GW behavior might develop claims their brands are majorly from recycled materials or have every as well as earth savings advantages (Testa, Boiral, & Iraldo, 2018). While some of the GW claims might be partly true to strictly enhance the sustainable performance of products, sectors engaged in GW usually elaborate their claims or the advantages in an attempt to mislead customers of their brands. Moreover, this theory also demonstrates that variables like environmental and product perceptions affect the degree of GW used by different sectors to achieve sustainability in terms of brand performance (Guo, Zhang, Wang, Li, & Tao, 2018).

The relationship between perceived greenwashing (PGW) and sustainable brand performance (SBP)

Many firms have a vision of promoting their brands and products by attracting a large number of customers with a scope of long term business policies with a handsome amount as profit (Akturan, 2018). Recent research by Pimonenko, Bilan, Horák, Starchenko, and Gajda (2020) the firms or the companies do so to represent their ecological contributions to the public. To attain this, they are implementing GM strategies to help attain competitive advantages and appealing the ecologically aware customers. such organizations claim to be very environmentally friendly, can be categorized as greenwashing. To cope with this ideology, the firms have various
strategies and planning has to attract a large number of customers to make the best sale of their product. Consequently, modern strategy by the firms and companies applied to make their products more valuable, nature-friendly, healthy, and useful for the customers (Guo et al., 2017). Thus such strategies have a very positive impact on the customers, as they are attracted to such products that claim as nature-friendly, pure. But in fact, these products as they claim don’t fulfill their promises (Chen, Huang, Wang, & Chen, 2020). Dealing the customers with such a strategy is called greenwashing (Hussain et al., 2020). It’s a way to attract the customers through fake means or by deceiving the customers and also those firms or companies which are nature friendly and produce natural products (More, 2019). This false claim may sometimes become a competitive advantage for the real companies who are already producing according to the demand of the customers. According to Majláth (2017), this creates a difficult situation when a new product claiming such qualities with acquiring several customers as they believe as what is claimed. Such a rush to a new product creates competition for sustainable brand performance. Greenwashing is the other name of whitewashing, such advertisement and strategy to deceive and misleading customers creates a kind of controversy (Siano, Vollero, Conte, & Amabile, 2017). These impacts a very negative influence on the market as it becomes difficult for companies to face such misleading marketing strategies. Greenwashing GW is a misleading marketplace where reality is a hidden secret consequently, greenwashing influences on the profitability of the companies and their resources may also increase (Cowan & Guzman, 2018). These green washing impacts very negatively on the production of sustainable brands and their performance may be affected by such activities and strategies. The given hypotheses is thus recommends,

H1: Perceived greenwashing positively relates to sustainable brand performance.

The mediating impact of environmental perception on the relationship between perceived GW and SBP

Environmental perceptions (EP) have a more significant impact on the relationship of perceived GW and durable brand performance as the perceptions of the consumers regarding greenwashing are dependent on ecological opinions (Zhang, Li, Cao, & Huang, 2018). According to the study by Nguyen, Yang, Nguyen, Johnson, and Cao (2019) the individuals who see their surroundings more ecologically and organically have higher environmental attitudes, perceptions as well as beliefs (Chen et al., 2020). The environmental perceptions have become an essential part of the organizations that the users are willing to alter their behavior and the products to protect the environment of the organization (Schmuck, Matthes, & Naderer, 2018). The positive environmental beliefs of the customers help the electronic sector to improve their abilities and to increase their productivity. According to De Jong, Harkink, and Barth (2018) perceived greenwashing has a positive impact on green risk but a negative impact on the green value. Perceived greenwashing is highly concerned with the lower product attitudes of an organization. The perceived value of an organization is positively related to its performance. The higher level of perceived greenwashing will result in decreasing the environmental perception that results in failing the trust of the consumers on the environmental attitudes of an organization (Zaidi, Yifei, Bhutto, Ali, & Alam, 2019). It will also reduce the purchase rate, as the customers perceive that the utilization of such brands will damage their reputation related to the environment. It also results in establishing an undesirable relation between purchase objectives and green marketing. Therefore, based on above entire arguments this study suggests the following hypotheses,

H2: An environmental perception positively mediates the association between PGW and sustainable brand performance.

The mediating role of product perception (PP) in the relationship between perceived GW and SBP

According to Pacheco (2019) when customers use and experience particular products in a real-life condition, then their perception of the products and brands is not only based on sensory properties but also the preconceived thoughts about brand characteristics. If these pre-conceived thoughts are incorporate what the brand is, they are generally stated as product perception or the perceptual expectations, which directly influence the performance of products. According to Zhang et al. (2018), a customer of electronic products collects data about a product and interprets the data to make a purposeful perception about an electronic brand and this referred to the product perception of customers. Moreover, when a customer sees GW claims and promotions about a certain electronic product, then this generates an effective perception as well as an impression about the brand which positively influences the overall process of product performance in a sustainable way (Nguyen et al., 2019). The overall
process of PP initiates majorly when a customer sees or gets knowledge about a certain brand through the company’s greenwashing process and this process continues until the customer initiates to develop a perception about the product. Furthermore, a study by Chen et al. (2020) manifests that everything that a sector does through GW affects product perception among customers which further influences sustainable product performance. Consequently, this research suggests the following hypotheses,

**H3:** Product perception significantly mediates the relationship b/w perceived GW and sustainable electronic brand performance.

The mediating impact of objective responses on the relationship between perceived GW and SBP

Objective response in business is well defined as a measurable response and a response that can be categorized or counted (Schmuck et al., 2018). Greenwashing strategy influences very rapidly and makes a very strong influence and achieves a strong place in the marketing sector. The consumer’s trust in the product may cause a rise in the production of that firm. Such achievement of an organization or company creates a downfall for the other competitors and this competitive disadvantage leads the other companies to end (Peiris & Nishadi, 2019). Such false and misleading of the business creates a very negative impact. Sustainability of brands with a good name in the production field may get the effect but this may not affect a long time. The fake and false advertisement and publicity are not a matter at all and this causes a sudden end of such misguiding products. Szabo and Webster (2020) in research explained that the response level of the customers may enable in maintaining the position of brands as they work in the environmentally friendly scenario and take care of their customers to provide those nature-friendly products instead of greenwashing that claims only but in fact, proves nothing and thus objective response enables to maintain a level of sustainable brand performance. Thus objective responses are a measurement to deal with such a situation.

**H4:** The mediating role of objective response plays a positive role in the relationship between perceived GW and SBP. Research model is presented in figure 2.

![Figure 2: Research Model](image)
3. Methodology and Measurement

3.1. Data Collection and the Sample
In this research, an online survey-based research method is used to test the hypothesis and research framework where the unit of analysis is based on the consumer-level. This research study is majorly based on Indonesian consumers who have related experience to purchase information and electronic products in Indonesia. The questionnaires of this research were randomly mailed to the consumers related to the electronic brands within this state to critically consider their perception level regarding sustainable brand performance. Well, in the current era, the information and the electronic products have to comply with the international standards on environmental regulations such as Waste Electronic and Electronic Equipment (WEEE) Directive, Montreal Convention, Integrated Product Policy (IPP) Directive, Kyoto Protocol, Energy Using Product and Restrictive of the Use of Uncertain Hazardous Substance in EEE (RoHS) Directive, so the majority of the consumers are expected to purchase such electronic products and information that can fulfill their green desires (Hwang & Kim, 2017; Low, 2016). We visited six experts and the related scholars before maintaining to the respondents. Then, the questionnaires were randomly mailed to the 400 related field consumers where only 349 shown their interest in this paper and give a valid outcome.

According to its demographic factors based segregation, it becomes concluded that majority of them are males (55%) as compared to the females (45%). Like in order to give a valid response in this random survey, 193 male consumers show their experience based response on the tested hypothesis, while the remaining 156 are females. According to their age factor, 115 participants are less than 25 years old, 137 are within the age group of 25 to 35 years old and 82 are from 35 to 45 years old, while only 15 of them are more than 45 years old. This depicts that approximately 96% of the overall respondents are from 22 to 45 years old who actively participated in the collection of related information and the electronic products in Indonesia. Well, in the case of their experience based demographic segregation, it becomes the frequency of 2-8 years based electronic products using individuals is much higher than the other ones. According to the statistics, 14% respondents of this random online survey having less than 2 years’ experience in the Indonesian electronic products, 44% are having 2 to 5 years based experience, 39% of them having 5 to 8 years’ experience, while only 9% of them have maximum information regarding these electronic brands due to more than 8 years' experience.

3.2. Measurement of Construct
The questionnaire items of this research are rated by means of "five-point Liker scale from 1 to 5" rating from strongly disagreement to strongly agreement. The respondents are requested to figure out the specific electronic products and information of a particular Indonesian firm that is more impressive for him or her. In this test, Perceived Green Washing is studied as an independent variable, Sustainable Brand Performance as a dependent variable, while the Environmental Perception, Product Perception, and Objective response are considered as mediating variables. To critically test the hypothesis, Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) based SPSS statistical tests are implemented, and their related outcomes are shown in the following heading (Phakiti, 2018).

3.3. Analysis Interpretation
This research study specifically used the SEM in order to test the relationship among the hypothesis and also applies the AMOS 17.0 to obtain the empirical results through the maximum likelihood estimation (MLE) based method (Ma, Pi, Dong, & Chen, 2017; Sarstedt, Ringle, & Hair, 2017). In addition to this, this is an informative approach to utilize goodness of fit test (x2 test) that helps to the normality of data with respect to tested items in the questionnaire (Hayes, Montoya, & Rockwood, 2017). Its descriptive statistics are shown in the following table 2.
According to the above-mentioned statistics, all the variables containing fixed minimum and maximum values along with the standard error of 0.131. The standard deviation value-based analysis depicts that the value of perceived greenwashing based independent value is less deviated from its mean position that means this factor is strong enough to make a direct impact on the development of sustainable brand performance, which is highly deviated from such environment-oriented activities in the operating activities of an electric company. In addition, the standard deviation value of the mediators is a little bit deviated from their mean position. After this, the KMO and Bartlett's test-based statistical outcomes are shown in the following table 3.

The above Kaiser-Meyer-Olkin measure of sampling adequacy depicts that its value is within the threshold range so this model is a good fit to test the hypothesis. This outcome is also justified due to the 0.000 significance value of the Bartlett’s test, which is lower than standard 0.05.
The above rotated component matrix based statistical outcomes (Table 4) depict that these values are within the threshold range because all of its values are more than 0.7. This shows that all the variables are effectively loaded in this model. After this, the convergent and discriminant validity based statistics are shown in the following table 5.

Table 5: Convergent and Discriminant Validity

<table>
<thead>
<tr>
<th></th>
<th>CR</th>
<th>AVE</th>
<th>MSV</th>
<th>OP</th>
<th>GW</th>
<th>EP</th>
<th>PP</th>
<th>BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP</td>
<td>0.866</td>
<td>0.763</td>
<td>0.560</td>
<td>0.874</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GW</td>
<td>0.925</td>
<td>0.717</td>
<td>0.258</td>
<td>0.505</td>
<td>0.847</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP</td>
<td>0.853</td>
<td>0.745</td>
<td>0.560</td>
<td>0.748</td>
<td>0.422</td>
<td>0.863</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td>0.845</td>
<td>0.734</td>
<td>0.360</td>
<td>0.600</td>
<td>0.473</td>
<td>0.343</td>
<td>0.857</td>
<td></td>
</tr>
<tr>
<td>BP</td>
<td>0.929</td>
<td>0.936</td>
<td>0.381</td>
<td>0.617</td>
<td>0.508</td>
<td>0.536</td>
<td>0.524</td>
<td>0.968</td>
</tr>
</tbody>
</table>

According to the above-mentioned table, it becomes clear that the average variance extracted value is more than 0.5, while all the composite reliability values are more than 0.7 that means there is no convergent validity issue existed in this model. In addition to this, the descending order based bold letters shows that there is no occurrence of any discriminant validity issue among the tested items and each one differs from the other ones. Its model fit indices based outcomes are given below those issues the effective uploading of all the items on this model (Table 6).

Table 6: Model Fit Indices

<table>
<thead>
<tr>
<th>CFA Indicators</th>
<th>CMIN/DF</th>
<th>GFI</th>
<th>IFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Value</td>
<td>≤ 3</td>
<td>≥ 0.80</td>
<td>≥ 0.90</td>
<td>≥ 0.90</td>
<td>≤ 0.08</td>
</tr>
<tr>
<td>Observed Value</td>
<td>2.914</td>
<td>0.901</td>
<td>0.975</td>
<td>0.974</td>
<td>0.074</td>
</tr>
</tbody>
</table>

All the observed values of the tested items are within their threshold range, as mentioned in the above figure. According to the CFA indicators, the observed value of CMIN/DF is 2.914 which is lower than 3 and the GFI shows the 0.901 based observed value that is greater than 0.80. After this, the RMSEA observed value is also appropriate with 0.074 and within the threshold range, while the IFI and CFI value are 0.975 (greater than 0.90
standard value). It means all the variables are effectively uploaded in this tested model and there is no confusion remains regarding justifying the relationship, as shown in the SEM-based table. Its graphical representation is shown in the following figure 3 and table 7.

![Figure 3: CFA](image)

Table 7: Structural Equation Modeling

<table>
<thead>
<tr>
<th>Total Effect</th>
<th>PGreenW</th>
<th>ObjePerc</th>
<th>ProdPerc</th>
<th>EnviPerc</th>
</tr>
</thead>
<tbody>
<tr>
<td>ObjePerc</td>
<td>.452**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>ProdPerc</td>
<td>.471**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>EnviPerc</td>
<td>.353**</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SBrandP</td>
<td>.512**</td>
<td>.240**</td>
<td>.232**</td>
<td>.212**</td>
</tr>
</tbody>
</table>

Direct Effect

<table>
<thead>
<tr>
<th>PGreenW</th>
<th>ObjePerc</th>
<th>ProdPerc</th>
<th>EnviPerc</th>
</tr>
</thead>
<tbody>
<tr>
<td>ObjePerc</td>
<td>.452**</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>ProdPerc</td>
<td>.471**</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>EnviPerc</td>
<td>.353**</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SBrandP</td>
<td>.219**</td>
<td>.240**</td>
<td>.232**</td>
</tr>
</tbody>
</table>

Indirect Effect

<table>
<thead>
<tr>
<th>PGreenW</th>
<th>ObjePerc</th>
<th>ProdPerc</th>
<th>EnviPerc</th>
</tr>
</thead>
<tbody>
<tr>
<td>ObjePerc</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>ProdPerc</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>EnviPerc</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>SBrandP</td>
<td>.293**</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

According to the above-mentioned statistics of SEM, it becomes clear that there is a strong relationship between the perceived greenwashing and sustainable brand performance. The above numerics depict that one present change in the mean value of perceived greenwashing causes a drastic change in the selected mediators and dependent variables. Like such change cause a 45% change in the mean value of objective responses, 47% on product perception, 35% on the environmental perception, and 51% on the sustainable brand performance. This
shows that show much its green services-oriented new idea influenced the brand performance within its stakeholders. In addition, the mediators play a significant role in strengthening the influence of perceived greenwashing on sustainable brand performance. According to the above-mentioned statistics, 24% change in the sustainable brand performance is due to the occurrence of objective response, 23% change due to product perception, and 21% due to environmental perception. If these mediators are effectively controlled then productive outcomes will be generated within a company's operation. Its graphics are displayed in the following figure 4.

![Figure 4: SEM](image)

4. Discussion
The above-mentioned statistics explores the fact there is a significant relationship between the perceived greenwashing and sustainable brand performance within an Indonesian market. Szereene Szabo and Jane Webster in the latest year (2020) majorly worked on exploring this concept by considering the impact of green marketing on the environment and product perceptions. According to them, firms are usually striving to improve their environmental position that enhanced the people's perception regarding their operating activities. Such types of green marketing strategies help to gain a competitive advantage and enhanced the ecologically conscious consumers to retain with the brand. This shows that the perceived greenwashing not only related to environmental and product perception, but also enhanced the consumers' happiness when the interaction occurred through websites (Szabo & Webster, 2020). Lucia Gatti with others depicted that greenwashing is a new concept in the business field which majorly based on aggressing the environmental issues faced by the companies in the developing and developed states. The corporate social responsibility theory is helpful to facilitate the diffusion of greenwashing in such a productive way that enhanced the management and customer relationship in a quite sustainable way. According to them, greenwashing is a better approach to make a combination of mandatory and voluntary aspects, and develop such a paradigm that promote the effective and creative corporate CSR initiatives (Gatti, Seele, & Rademacher, 2019). In 2016, John Kennedy Lewis also justified the greenwashing concept that it is an effective approach to enhance the performance of the supply chain based multinational companies because it helps to create such entrepreneurial projects that fulfill the customers environmental desires in a quite authentic and efficient way (Lewis, 2016). The above mentioned SPSS software-based statistical values depict that an efficient perceived greenwashing cause a major influence on the sustainable brand performance, the product perception and the objective response in the customer market, while the external environmental perception-based risky variable may reduce the efficient perception regarding the greenwashing concept in an Indonesian competitive market. In this case, it becomes a quite challenging situation in front of the company’s management to meet the targeted customer preferences towards their advanced green products (Elliot, 2019).
4.1. Conclusion and Future Implications

Thus, after critically evaluating the SEM test-based statistical outcomes, it becomes concluded that in the Indonesian market, the perceived greenwashing caused a significant impact on the sustainable brand performance of the electric company to retain its position in the advanced competitive market. In order to justify this major hypothesis, the CFA and SEM-based statistical tests are implemented on the tested variables whose outcomes depict that an appropriate product perception and objective response favorable enhanced such a new greenwashing concept among the consumers towards the electric company’s product and services in this developing nation. While, the existence of diverse and continuously changing environmental perception can impact on the development of sustainable brand performance within this state, due to the existence of external controlling variables. This informative research majorly focused on considering the Indonesian consumers’ perception regarding this advanced green marketing concept, and concluded that in the current global change-provoking environment, it is quite essential in front of the electric company’s management to focus on the target consumer perception regarding their services. The upcoming scholars, business management, the state’s authority can utilize its productive outcomes, and other electronic field-oriented decision makers to make such greenwashing based strategies and policies that directly hit the needs and desires of the targeted customers.

4.2. Limitations and Futures researches

In addition to its application, there are some limitations within its analytical portion like lack of qualitative or the mixed approach in the research design mechanism and lack of electric company’s management perception regarding this greenwashing factor may affect the authenticity and reliability of this paper. For upcoming scholars, there is an opportunity to fulfill this research gap.

References


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http://repository.petra.ac.id/17690/


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**Open Access**
GROSS ROOT LEVEL HURDLES FOR ENVIRONMENTAL SUSTAINABILITY IN ASEAN COUNTRIES: ANALYZING POVERTY, FERTILITY RATE AND LITERACY RATE THROUGH PANEL

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Abstract. Different countries of the world are taking steps and measures to acquire the environmental sustainability as it is becoming necessary with every passing day. There are various factors that might affect it in one way or the other. Poverty rate, literacy rate and fertility rate are such factors that might play role in this regard. Therefore, to analyze the impact of these three factors i.e. poverty rate, literacy rate and fertility rate on environmental sustainability, the researcher has conducted this study for ASEAN countries. In this regard, the researcher has collected data for 29 years from ASEAN countries for the analysis purpose. To ensure the authentic and accurate results, the data has been collected from reliable resources. The collected data was subjected to various tests and techniques. The major techniques that have been adopted in this study include panel unit root test, panel cointegration test, coefficient estimation test and Granger Casualty test. The results obtained from the analysis suggested that the impact of all the independent variables i.e. poverty rate, fertility rate and literacy rate on environmental sustainability has been found as significant. Moreover, casual relationships among different variables of the study have also been observed as per the results.

Keywords: Poverty Rate; Literacy Rate and Fertility Rate; Environmental Sustainability; ASEAN Countries; Panel


Jel Codes: O1, O53

1. Introduction

Though ASEAN countries form an emerging economic zone of the world (Lai, Tey, & Ng, 2017; Nazeer & Furuoka, 2017; Xu & Islam, 2019) and in the recent years the economic growth has been commendable (Kongbuamai, Bui, Yousaf, & Liu, 2020), yet the environmental condition of this region is badly affected. A survey of the Climate Risk Index indicates that out of the 25 nations who top this list include 5 ASEAN countries, namely; Thailand, Cambodia, Philippines, Vietnam and Myanmar (Eckstein, Künzel, Schäfer, & Winges, 2019). The academic research and policy making have been considering the different factors that can lead to building a sustainable environment so that it can be protected against degradation and destruction (Hosta & Zabkar, 2020; Mitra & Paul, 2018; Tewfik, Latif, & Salheen, 2019). See Table 1.
Table 1: Literacy Rate in ASEAN countries (2018)

<table>
<thead>
<tr>
<th>Country</th>
<th>Literacy rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>97.21</td>
</tr>
<tr>
<td>Cambodia</td>
<td>77.14</td>
</tr>
<tr>
<td>Indonesia</td>
<td>95.66</td>
</tr>
<tr>
<td>Lao</td>
<td>84.66</td>
</tr>
<tr>
<td>Malaysia</td>
<td>94.85</td>
</tr>
<tr>
<td>Myanmar</td>
<td>75.55</td>
</tr>
<tr>
<td>Philippines</td>
<td>98.18</td>
</tr>
<tr>
<td>Singapore</td>
<td>97.95</td>
</tr>
<tr>
<td>Thailand</td>
<td>93.77</td>
</tr>
<tr>
<td>Vietnam</td>
<td>94.8</td>
</tr>
</tbody>
</table>

Research suggests that among these factors, poverty plays a significant role in the environmental degradation (Mitra & Paul, 2018). Therefore, by reducing poverty the valuable natural resources can be saved from damages (Nabi et al., 2020; Shuai, Cheng, Tao, Shuai, & Wang, 2019; Tefvik et al., 2019). The literacy rate of ASEAN nations is relatively high as is shown in table 1.1. and this seems to be a positive factor for the environment as with education, advanced technologies can be built and awareness for environmental protection and responsibility is generated (Kaya & Elster, 2018). With the increasing urbanization and female labor force participation (Subramaniam, Loganathan, & Devadason, 2018), there has been shown a significant decline in the fertility rates (Nabi et al., 2020) which has led to another major challenge of the ageing population (Xu & Islam, 2019) and the environmental quality (Abdullah, Bakar, & Abdullah, 2013; Brauner-Otto, 2014; Hartani, Bakar, & Haseeb, 2015), as can be seen from the figure 1. Hence, it is the need of the hour that development policy must be prescribed emphasizing the exacerbation of poverty for better economic prospects and conservation of environment in the ASEAN countries.

![Fertility rate per woman](image_url)

**Figure 1.** Fertility Rate per woman (2018) *Source: UN Populations division, World Population Prospects 2019*
Research suggests that immediate attention has to be paid to the environmental issues so that it can be stopped from further destruction before it is too late. Many studies have put forward to look for factors that can harm the environment (Schleicher, Schaafsma, & Vira, 2018; Shuai et al., 2019). Hence the indicators of poverty, literacy rate and fertility rate are used to analyze how the environment can be made sustainable. Hence, bridging these gaps, this paper examines the grass root hurdles for the environmental sustainability in the ASEAN countries by analyzing the poverty, fertility rate and the literacy rate of these countries through panel data. The study has specific research objectives, which are:

- To examine the impact of poverty on the environmental sustainability
- To examine the impact of fertility rate on the environmental sustainability
- To examine the impact of literacy rate on the environmental sustainability

The theoretical significance of this study is that it explores the impacts of poverty, literacy rate and fertility rate on the environmental sustainability using panel data analysis. The practical significance of this study is for the policy implications to eradicate the poverty, control the population growth and maintain the literacy rate in order to ensure a sustainable environment.

This paper is structured with the first section presenting the Introduction to topic and the second section provides an in depth review of the literature and previous studies for the variables of study. The third section shows the concise research methodology and the forth section presents the results of the panel data analysis. The paper ends with discussion and research implications, while pinpointing the limitations of the study.

2. Literature review

Poverty

The academia and policy have suggested that poverty and environmental degradation are linked to each other and the dominant view is that poverty increases the environmental degradation (Mitra & Paul, 2018). Research suggests that by alleviating poverty, the environmental degradation can be reduced and controlled. (Brundtland & Khalid, 1987) have claimed the Brundtland Commission Report (1987) to be a master piece of the measures for environmental conservation (Duraiappah, 1998). Other international think tanks, like Chief Executive of Asian Development Bank in the United Nations Environment Program (Heywood, 1995; Martinez, 2020) and World Development Report (Bank, 1993) has highlighted the importance of environment (Mitra & Paul, 2018). The two main causes of poverty are the lack of educational facilities and the improper enforcement of the policies for poverty eradication. The international organizations have declared that poverty leads to deteriorating the environmental conditions and quality (Bolwig, Ponte, Du Toit, Riisgaard, & Halberg, 2010; Mitra & Paul, 2018). Due to the lack of adequate resources and the inaccurate information about the poor people, these people over use these resources as they become available to them when their survival is at danger as they need the basic resources as necessities and they are among those who are stricken most by the pollution in the environment. This shows that poverty and environment are inter related issues and that poverty adds to the stress on the environment. The economic activities have their foundations on the natural resources. When a pressure comes on the natural resource, environmental system is disrupted. A normal trend of the places where poverty levels are high is that the death rates and fertility rates are relatively high (Nabi et al., 2020). There are issues of proper disposal of the human waste which further leads to unhealthy living conditions. The fragile lands are acquainted with further pressure and the natural resources are exploited. The poor people who work in the farms have insufficient information of the modern agricultural techniques and they lack the advanced agricultural machinery so there is a decrease in the crop yield (Arabi, 2017). These environmental problems damage the environment and increase the chances of environmental catastrophes, like deforestation, soil erosion and land degradation (Way, 2016). There is a decline in the food and other valuable resources, leading to inflation. Hence, the worsening and degradation of
environmental quality due to poverty decline the environmental sustainability (Mitra & Paul, 2018; Schleicher et al., 2018). This demands that the governments must develop policy recommendations which can reduce the poverty levels from grass root level so that environment can be protected and saved from further damage. This indicates that a negative correlation can exist between poverty and environmental sustainability. Other studies have shown similar results for the effect of poverty on the environment (Razzaq et al., 2019; Shuai et al., 2019; Tewfik et al., 2019). So, the following hypothesis shows this association:

\[ H1: \text{Poverty is significantly related to Environmental Sustainability.} \]

**Fertility rate**

The Social scientists have been investigating the relationship between the population and the environment (Brauner-Otto, 2014; Molnar, 2010). In addition to this, they have strongly linked climate change to this association (Dunlap, 2010). These studies have also focused on how population and health of people is affecting the environmental quality and health (Ghimire & Mohai, 2005; Yu & Liu, 2007). The connection of fertility and environment is more prevalent in the rural communities of the developing nations where the people have more interaction with the natural environment and the fertility rate is also relatively high (Dunlap, 2010; York, Rosa, & Dietz, 2003). The natural environment is a critical part of the society in these localities (Brauner-Otto, 2014; Razzaq et al., 2019; York et al., 2003). At the same time, these localities may be home to important forests or other valuable environmental component. So, the rising population may be a source for their destruction. The sociologists and economists argue that the rapid rise in the population and the high fertility rate of a country affects its economic outcomes. The developing countries are characterized by global economy but are confronted with the issues of the demographic change and its impact on the economy. Many early scholars have generally agreed to the view that by improving the economic conditions, the birth rates are reported to decline and poverty can be reduced (Ahituv, 2001; Birdsell & Griffin, 1988). These studies have proposed a causal relationship among the demographic change and the economic growth (Alola, Bekun, & Sarkodie, 2019; Fox, Klüsener, & Myrskylä, 2019; Liu, B., et al., 2020; Siddique et al., 2020) and many countries are now formulating policies to control the high fertility to up lift the economic development by improving the living standards through industrialization and urbanization, better education and health facilities that can change the entire paradigm of the society and economy (Heer, 1968).

The fertility rates of ASEAN nations have been beginning to decline with the passage of years due to many reasons, including the rise in the participation of the females in the labor force (Abullah et al., 2013; Hartani et al., 2015; Liu, C., 2020). Comparing the overall total fertility rate (TFR) of ASEAN countries which was 5.5 in the year 1970, the current TFR is 2.11 which show a steep decline. In a conference held at Singapore in 2019, the Minister for Manpower argued that the ideal replacement level of TFR is 2.1 and according to the data from World Bank, the ASEAN countries of Singapore, Brunei, Vietnam, Malaysia and Thailand have TFR below the finalized replacement level. This implies that in order to maintain the size of the population, the number of children are insufficient. This continuous decrease can have a toll on the country’s economy (Lai et al., 2017; Subramaniam et al., 2018). These countries are also facing the issue of ageing population. In the year 2015, 7.7 % of the population is above 65 years of age in the ASEAN nations. The reports show that by the year 2035, this rate is projected to double. Hence, these nations have to ponder over their decreasing fertility rates to transit from the aged society. As a result, spending on the insurance and healthcare will also drastically increase (Xu & Islam, 2019). The fall in the fertility rate is characterized by rapid urbanization which has converted many green lands into buildings, hampering the natural greenery and the forest quality and creating haze in the atmosphere (Nazeer & Furuoka, 2017). The decrease in the fertility rate is owing to the shift in the mental model of the people focusing from ‘quantity’ to ‘quality’, in which the parents prefer to raise less number of children and providing them with better facilities and improved quality of life. Hence the low birth rate and disappearing work force can depress the economy of the region and can also tamper down the natural resources and environment.
(Subramaniam et al., 2018). This indicates that fertility rate can have significant negative association with the environmental sustainability. So, this relationship is shown in the following hypothesis:

\[ H2: \text{Fertility Rate is significantly related to Environmental Sustainability.} \]

**Literacy rate**

ASEAN nations are a part of the emerging economies that has led to dramatic economic development and growth (Kongbuamai et al., 2020; Farooq, et al., 2020) and one prime factors is the high literacy rate of these countries. For this purpose, the ASEAN countries have developed a comprehensive road map for achieving the mission of a green and clean environment and promote the sustainability in the environment through education and participation of public (Yee & Rahman, 2019). The education helps the people enhance understanding of the skills and the values through formal and informal means so that an ecologically sustainable environment and society can be developed (Center, 2018; Naeem, et al., 2020). This shows that education and literacy are main factors for comprehension of the knowledge for the issues that might impact the nation and the environment for sustainable development (Esa, 2010). Scholars have suggested that education about environment that starts from the primary level will have lasting impact on the environment. This fosters the value of education for maintaining the environmental quality through environmental planning (Ergen & Ergen, 2011). Hence, higher the educational level of the people, higher will be the literacy rate and this can have a significant effect on the environment of the country by expansion of opportunities to people for working on technology factors that can reduce the pollution and save environment from damage (Kaya & Elster, 2018). The nature of work has also changed from less labor intensive to more use and consumption of energy which can also damage the environment (Nazeer & Furuoka, 2017). This discussion yields when the literacy rate of a country improves, the environmental sustainability can be enhanced and that a positive association can exist among them. Thus, this relationship is presented in the following hypothesis:

\[ H3: \text{Literacy Rate is significantly related to Environmental Sustainability.} \]

### 3. Data and Methodology

This section contains the detailed information about the data collection process adopted by the researcher and the methods or techniques that have been used in order to analyze the collected data. The major techniques that have been adopted in this study include panel unit root test, panel cointegration test, coefficient estimation test and Granger Casualty test. These techniques have been discussed in this section in detail.

**Data Collection**

First of all, the data collection procedure has been explained by the researcher that has been adopted for this particular study. As in the current scenario, the researcher wants to analyze the impact of poverty rate, fertility rate and literacy rate on the environmental sustainability of the ASEAN countries. This is the reason why the researcher has gathered data about these variables from ASEAN countries. The databases or data sources that have been used by the researcher include World Bank Development Indicators and Global Economy. These databases ensure the accuracy and authenticity of the collected data that ultimately enhances the accuracy of the obtained results. The data has been gathered for 29 years from the ASEAN countries.

**Model Specification**

Next, the researcher has discussed the measurement units or indicators that have been used to express the collected data. In this regard, environmental sustainability, being the dependent variable has been measured through an index named as environmental sustainability index. Moreover, if the independent variables are considered, the poverty rate has been measured in context of the income of the people of a country in US dollars, fertility rate has been measured in context of the number of births per 1000 women and finally the literacy rate has been measured in context of the percentage of literate people in the country. In addition to these dependent and
There are two control variables in the study as well. These include population (the number of people of a country) and economic growth (GDP of the country). All these variables have been collected in the form of a regression model as follows;

\[
EN_{i,t} = \alpha + \beta_1 P_{i,t} + \beta_2 F_{i,t} + \beta_3 L_{i,t} + \beta_4 P_{i,t} + \beta_5 G_{i,t} + \varepsilon_{i,t}
\]

In this equation, ENS shows environmental sustainability, POV denotes poverty rate, FER represents fertility rate, LIT represents literacy rate, POP shows population and GDP indicates economic growth. In the last, \(\varepsilon_{i,t}\) shows error.

**Panel Unit Root Test**

In the methodology of the current study, the researcher has firstly applied the panel unit root test with the motive to explore the stationary properties and order of integration of the variables of the study. Moreover, the stochastic properties of the variables may also be analyzed by using unit root test. There are a number of tests that come under this category such as LLC, IPS, ADF etc. having different qualities and advantages. These unit root tests are based on the null and alternate hypothesis where null hypothesis refers to the presence of unit root and the alternate one refers to the stationary variables (Im, Pesaran, & Shin, 2003). The unit root test is based upon the following equation;

\[
\Delta y_{i,t} = a_i + \rho y_{i,t-1} - 1 + \sum_{j=1}^{p} a_j \Delta y_{i,t-j} + \varepsilon_{i,t}
\]

Here, \(\Delta y_{i,t}\) indicates the difference of the term \(\Delta y_{i,t}\) specific for \(i^{th}\) country and the time period of \(t\).

**Panel Cointegration Test**

After the application of unit root tests to identify the order of integration, the next step in this regard is to apply the panel cointegration test. The purpose of the application of this test is to recognize if there is any cointegrated relationship between the variables or not. The results of the cointegration test is based upon the null and alternate hypothesis where null hypothesis refers to no cointegration while the alternate hypothesis refers to the presence of cointegrated relationships (Levin & Lin, 1993). Two distinct statistics are tested in this test i.e. homogeneous panel and heterogeneous group statistics also called as within dimension and between dimension respectively. The following equation is the basis of this test;

\[
y_{i,t} = a_i + \beta_1 X_{1,i,t} + \beta_2 X_{2,i,t} + \cdots + \beta_n X_{n,i,t} + \varepsilon_{i,t}
\]

**Coefficient Estimation Test**

The next step after the application of panel cointegration test is to find out what impact and in which direction is casted by the independent variables on the dependent variable. In this regard, the coefficient estimation technique has been used for two different versions i.e. pooled and grouped versions (Pedroni, 2001). The tests such as FMOLS and DOLS are usually used in this regard as they resolve the issues regarding endogeneity and serial correlation thus providing the accurate results. The following equation can be used for this test.

\[
\hat{\beta}_{FM} = \left( \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - \bar{x}_t)^2 \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - \bar{x}_t) \hat{y}_{i,t} - T \hat{\delta}_{eu}
\]

Here, \(\hat{\delta}_{eu}\) is the transformed dependent variable because of endogeneity while \(\hat{\delta}_{eu}\) represents here the serial correlation correction.

**Granger Casualty Test**

After figuring out the impact of independent variables over the dependent variable, the last step in the study is to explore any casual relationship that might be present between the variables because of the cointegrated relationships. The researcher has employed Dumitrescu and Hurlin Granger casualty test to achieve this objective. The null hypothesis of this test refers to no casualty while alternate refers to the casualty between variables (Dumitrescu & Hurlin, 2012). The following equation might be used;
4. Results and Analysis

Results of Panel Unit Root Test

The results of panel unit root test, the first test used in the study, have been presented in the table 2. There are two series in the table i.e. level and first difference and their results have been categorized into constant and constant plus trend. If the level series is concerned, it is clear that in the constant; only three variables have rejected the null hypothesis i.e. environmental sustainability, population and economic growth. In the same way, in constant plus trend, again the same three variables have rejected the null hypothesis (Kamarudin et al., 2020). This shows that in level series, the data is non stationary and to resolve this issue the researcher has applied first difference on the variables. It can be seen that after first differencing, all the variables in both cases i.e. constant and constant plus trend have rejected the null hypothesis. This indicates that after first differencing the variables, the data became stationary. In a nut shell, it can be stated that the data is non stationary at level series while it becomes stationary in first difference series.

Table 2: Unit Root Test

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Level</th>
<th>1st Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant</td>
<td>Constant+ Trend</td>
</tr>
<tr>
<td>ENS</td>
<td>-3.2983*</td>
<td>-3.6298*</td>
</tr>
<tr>
<td>POV</td>
<td>-0.2993</td>
<td>1.8298</td>
</tr>
<tr>
<td>FER</td>
<td>-2.2893</td>
<td>-2.2984</td>
</tr>
<tr>
<td>POP</td>
<td>-3.2844*</td>
<td>-3.2273*</td>
</tr>
<tr>
<td>GDP</td>
<td>-2.7774*</td>
<td>-2.9993*</td>
</tr>
</tbody>
</table>

Results of Panel Cointegration Test

The results obtained by the panel cointegration test have been reported in the table 3, according to which, the within dimension section that three out of four statistics i.e. v, rho and PP have rejected the null hypothesis of no cointegration for these statistics are less than 0.05. Only the ADF statistic has accepted the null hypothesis as the p-value is greater than 0.05. In the similar fashion, in the between dimension is considered, all the three statistics have rejected the null hypothesis of no cointegration because of the p-value lower than 0.05. As overall six out of seven statistics have rejected the null hypothesis, it can be stated that there are cointegrated relationships present between the variables.

Table 3: Panel Cointegration Test

<table>
<thead>
<tr>
<th>Weighted Statistic</th>
<th>Weighted Prob.</th>
<th>Weighted Statistic</th>
<th>Weighted Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel v-Statistic</td>
<td>-3.1929*</td>
<td>0.0003</td>
<td>4.3007</td>
</tr>
<tr>
<td>Panel rho-Statistic</td>
<td>3.7314*</td>
<td>0.0039</td>
<td>3.6092</td>
</tr>
<tr>
<td>Panel PP-Statistic</td>
<td>-2.3324**</td>
<td>0.0377</td>
<td>-6.1008</td>
</tr>
</tbody>
</table>
Panel ADF-Statistic

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1298</td>
<td>0.1873</td>
</tr>
<tr>
<td>-1.4398</td>
<td>0.3263</td>
</tr>
</tbody>
</table>

Alternative hypothesis: individual AR coefs. (between-dimension)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group rho-Statistic</td>
<td>6.0402*</td>
</tr>
<tr>
<td>Group PP-Statistic</td>
<td>-5.1397*</td>
</tr>
<tr>
<td>Group ADF-Statistic</td>
<td>-4.3949*</td>
</tr>
</tbody>
</table>

Kao test.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2.36789</td>
<td>0.0304</td>
</tr>
</tbody>
</table>

Results of Coefficient Estimation Test

The results of the most critical test i.e. coefficient estimation test have been presented in the table 4. The results for both pooled and grouped versions can be viewed clearly in the table. The first variable is poverty rate. It can be seen that the impact of this variable has been found as negative and significant on environmental sustainability in both pooled and grouped versions. In other words, with one unit increase in this variable, the environmental sustainability will be reduced by 21.1% as per pooled version and 21.2% as per grouped version. As far as fertility rate is concerned, its impact on environmental sustainability has been found as significant for both pooled version and grouped version. It indicates that with the increase in fertility rate, the environmental sustainability will be decreased by 28.8% for pooled version and 26.3% for grouped version. The next variable is literacy rate and its impact on environmental sustainability has been found as significant and positive for both pooled and grouped versions. It can be stated that with the increase in one unit of literacy rate, the environmental sustainability will be enhanced by 28.1% for pooled version and 29.3% for grouped version. In the last, the results for the control variable, population show that its impact on environmental sustainability is insignificant but the impact of the other control variable, economic growth has been found as significant. In the last, the R square value suggests that the variation in environmental sustainability is 70.2% because of these factors for pooled version and 71.9% for the grouped version. The remaining variation is because of various other factors that might impact the environmental sustainability.

Table 4: Coefficient Estimation Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Pooled</th>
<th>Grouped</th>
</tr>
</thead>
<tbody>
<tr>
<td>POV</td>
<td>Beta</td>
<td>-0.211**</td>
<td>-0.212**</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.287</td>
<td>0.488</td>
</tr>
<tr>
<td>FER</td>
<td>Beta</td>
<td>-0.288*</td>
<td>-0.263**</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.877</td>
<td>0.884</td>
</tr>
<tr>
<td>LIT</td>
<td>Beta</td>
<td>0.281**</td>
<td>0.293*</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.673</td>
<td>0.298</td>
</tr>
<tr>
<td>POP</td>
<td>Beta</td>
<td>0.036</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.573</td>
<td>0.687</td>
</tr>
<tr>
<td>GDP</td>
<td>Beta</td>
<td>0.182*</td>
<td>0.190*</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.638</td>
<td>0.572</td>
</tr>
<tr>
<td>Adj. R Square</td>
<td>Beta</td>
<td>0.702***</td>
<td>0.719***</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.767</td>
<td>0.892</td>
</tr>
</tbody>
</table>
Results of Granger Casualty Test
The results obtained by the last test applied in the study i.e. Granger Casualty test have been reported in the table 5 for all the variables. It can be seen that casualty is running from poverty rate to environmental sustainability, literacy rate to environmental sustainability, population to environmental sustainability, economic growth to environmental sustainability, fertility rate to poverty rate, population to poverty rate, economic growth to poverty rate, population to fertility rate and finally population to literacy rate.

Table 5: Casualty Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>ENS</th>
<th>POV</th>
<th>FER</th>
<th>LIT</th>
<th>POP</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENS</td>
<td>0.836</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POV</td>
<td>0.388*</td>
<td>0.847</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FER</td>
<td>0.284</td>
<td>0.463*</td>
<td>0.801</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIT</td>
<td>0.428*</td>
<td>0.349</td>
<td>0.299</td>
<td>0.837</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POP</td>
<td>0.429*</td>
<td>0.567*</td>
<td>0.367*</td>
<td>0.532*</td>
<td>0.838</td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>0.541*</td>
<td>0.283*</td>
<td>0.294</td>
<td>0.211</td>
<td>0.283</td>
<td>0.789</td>
</tr>
</tbody>
</table>

Discussion and Conclusion

Discussion
Three hypotheses have been generated corresponding to to objective of the study i.e. to find out and analyze the impact casted by poverty rate, fertility rate and literacy rate on the environmental sustainability of ASEAN countries. These hypotheses and the results associated with them have been discussed in this section in detail. The first hypothesis was that poverty rate has significant impact on environmental sustainability. The results of the coefficient estimation test indicated that poverty rate has negative and significant impact on environmental sustainability thus accepting the hypothesis. When the poverty rate is increased, the environment suffers from various types of pollution thus disturbing the environmental sustainability of the country. This result is in concordance with the studies found in the past literature (Szewrański, Świąder, Kazak, Tokarczyk-Dorociak, & Van Hoof, 2018). The next hypothesis was that the fertility rate has significant impact on environmental sustainability the country. As the results shown that there is negative and significant impact of fertility rate on environmental sustainability thus this hypothesis will also be considered as accepted. This result has been consistent with the past studies (Alola et al., 2019). The last hypothesis was that the literacy rate has significant impact on the environmental sustainability of the country and this hypothesis was also accepted as per the results which indicated that this impact is also significant and positive. As the literacy rate is increased, more people get better jobs and work on technology to lower the pollution factor from the environment thus increasing the environmental sustainability. This result is in consistency with the studies conducted by the other researchers (Kaya & Elster, 2018). In addition, the impact of population, the control variable on environmental sustainability was found as insignificant but the impact of the other control variable i.e. economic growth has shown significant and positive impact on the environmental sustainability. When the economic growth of a country increases, the governments take steps and spend on technology to decrease the environmental pollution so that the environmental sustainability increases. This result confirms with the results presented by various studies conducted in the past (Özokcu & Özdemir, 2017).

Conclusion
In continuation of the aim of the study i.e. to find out and analyze the impact casted by poverty rate, fertility rate and literacy rate on the environmental sustainability of ASEAN countries, the researcher has collected data for 29 years from ASEAN countries for the analysis purpose. To ensure the authentic and accurate results, the data has been collected from reliable resources. The collected data was subjected to various tests and techniques.
major techniques that have been adopted in this study include panel unit root test, panel cointegration test, coefficient estimation test and Granger Casualty test. The results obtained from the analysis suggested that the impact of all the independent variables i.e. poverty rate, fertility rate and literacy rate on environmental sustainability has been found as significant. Thus the conclusion can be drawn that the countries must control the poverty rate and fertility rate and enhance the literacy rate so that the environmental sustainability of the country can be increased.

**Implications and Limitations**

The theoretical implication of the current study is that it will provide literature and information to the other researchers who might find it useful for their studies and for future research as well. In addition to this, the practical implication of the study is that it will guide the governments and relevant sectors to control the poverty rate and fertility rate and enhance the literacy rate so that the environmental sustainability of the country can be increased. In this regard, favorable policies and regulations must also be devised and implemented. The researchers must increase the size of sample for the study and also consider other countries and regions for study purpose.

**References**


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CAN LIFE QUALITY DIMENSIONS ALTER ECOLOGICAL FOOTPRINT FOR SUSTAINABILITY OF ASEAN COUNTRIES? ROLE OF PER CAPITA INCOME, HAPPINESS AND HUMAN DEVELOPMENT

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Abstract. The role of people or humans is critical for the environment as the various activities by the humans might impact the environment in one way or the other because of pollution and other wastes. The life quality of humans is an important aspect related to this aspect and this is the reason why the researcher has planned this study. The major objective of the study is to find out how the three dimensions of life quality i.e. per capita income, happiness and human development impact the ecological footprint in ASEAN countries. To achieve these objectives, the researcher has collected data about the life quality dimensions and the ecological footprint from the ASEAN countries and the data comprises of 30 years in total. As the researcher intends to provide accurate and authentic results for the literature, the gathered data has come from the most authentic data sources which include World Bank Development Indicators and Global Economy. The results obtained by the analysis of the collected data indicates that the impact of all the independent variables of the study i.e. per capita income, happiness and human development have significant impact on ecological footprint.

Keywords: Per Capita Income; Happiness; Human Development; Ecological Footprint; ASEAN Countries


Jel Codes: O1, O53

1. Introduction

It is important to improve the behavior of human beings on the environment to endure progress in human development (Otto & Pensini, 2017; Zamil et al., 2019; Monni et al., 2017; Monni et al. 2018; Moumen et al., 2019).

The happiness of the people of a country leads to the enhancement of the ecological footprints that increase the sustainability of ASEAN countries. The welfare of humanity is completely dependent on the healthy assets of ecology. Capita's income and human development help in increasing the level of ecological footprints with the increase of economic development. Sustainable happiness has a positive impact on the environment and the economy of a country and it also results in decreasing environmental degradation and increasing sustainability in ASEAN countries (Charfeddine, Al-Malk, & Al Korbi, 2018). The given table 1 enlists some significant pillars of human development that directly affect environmental sustainability,
Table 1: Features of sustainable human pillars

<table>
<thead>
<tr>
<th>Pillars of sustainable development</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethical guiding principle</td>
<td>Like social as well as democracy justice.</td>
</tr>
<tr>
<td>Global equity</td>
<td>Environmental benefits to be equitably distributed over the current generation.</td>
</tr>
<tr>
<td>Physical sustainability</td>
<td>Overall global ecological balance</td>
</tr>
<tr>
<td>Anthropocentric</td>
<td>Places individuals and their welfare above concepts of ecology.</td>
</tr>
</tbody>
</table>

The people of ASEAN countries are not living with happiness as there is an increase in environmental degradation because of increased economic values (Shadman, Sadeghipour, Moghavvemi, & Saidur, 2016). The emission of greenhouse gases and carbon dioxide has been increasing day by day due to industrialization that increases air pollution are disturbs the quality of an environment. The ecological footprint is not providing the residents of ASEAN countries with particular goods and services to support a better lifestyle. According to Liu, Zhang, and Bae (2017), people are not being provided with the necessary resources and facilities so that they can enjoy the quality of life. Natural resources are being used in ASEAN countries that negatively impacts on the ecology of a country. The consumption of resources and environmental pollution should be reduced (Vithayasrichareon, Nguyen, & Liu, 2016).

By exploring some past researchers' work, it comes to the knowledge that a lot of efforts have been done in the past concerning ecological footprints (EFs) in different regions. Nevertheless, an effort has not been done concerning ASEAN states and the impact of the life quality of their individuals on the sustainability level of EFs. Hence, the present research is new as well as remarkable to understand the impact of per capita income on the sustainability of EFs. Besides, in previous years, several other analysts such as (Hashimoto, Oda, & Qi, 2018; Batool, et al., 2020) have also investigated the influence of human life quality on the EFs level in different perspectives and countries. Though, the findings of the present effort are supportive as well as justified certainly because no other study has investigated the overall significant impact of human development and happiness on EFs. At the same time, the study also investigates the direct relationship of per capita income with EFs for the sustainability of ASEAN nations. None of the studies has evaluated the role of life quality dimensions; hence, the present effort is original as well as positive for ASEAN states in terms of EFs. Following the above justification, the present study has the following objectives,

- The initial purpose is to investigate the direct impact of per capita income and ecological footprints for sustainability in ASEAN states.
- The second aim of the study is to evaluate the direct relationship of happiness with the ecological footprint for sustainability in ASEAN nations.
- The third objective of the research is to identify the impact of human development on the ecological footprint for sustainability in ASEAN countries.

It is well known that each research study is important and valuable in its context (Saucier, 2018). The given research study is highly significant and important to analyze and ensure the different dimensions of ecological footprints. The researcher, business analysts, and politicians also can analyze the direct impact of per capita income, the role of human development, and happiness on life dimensions sustainability of ASEAN countries. Additionally, the given study has also a wider scope in ASEAN countries and different other countries of the globe as well that explained the extent to which the research areas are explored. The study has covered the different dimensions and it highly impacts on sustainability performance.
As, the basic structure of typical research is the sequence of introduction, literature, the method used, results, and discussion and each section addresses a unique objective (Bell, Bryman, & Harley, 2018; Sabir & Hussin, 2020). The current research has also consisted of five chapters with the same sequence. In the introduction chapter, the background and research objectives along with significance and scope have discussed. The second foremost chapter consists of the literature of previous studies along with essential theory. The third chapter contains a method for the collection of data and the fourth chapter contains results and its interpretation. Finally, the last chapter of the research includes the overall discussion of the results, limitations of the current study, future implications, and wide conclusions to conclude the study.

2. Literature review

2.1 Theory of Sustainable Ecological footprint (SEF)
Ecological development is shorthand mainly for committing to well-being for all individuals and sustainable implies that such significant development must happen within what the earth’s ecosystems can absorb year after year (Wu, Wei, Lam, Liu, & Li, 2019). Ecological institutions and sectors need to secure individuals' well-being within the means of nature by improving the life-style of peoples through ecological awareness (Peng, Li, Elahi, & Wei, 2019). However, this is how this theory proposes the conditions for sustainable ecological development (SED) in their landmark suggestion. According to this theory, one simple way to evaluate ecologically sustainable development types is mainly by using EF and human development (Zhang, Dzakpasu, Chen, & Wang, 2017). This is mainly because these indicators apply to several humans and geographic scales, and this theory can majorly be used to track SED progress at different scales (Wascher, Jeurissen, Jansma, & van Eupen, 2017).

According to this theory ecological footprint is an explanation of the ecological influence a individuals or group of individuals have on the earth (Yue, Shen, & Yuan, 2019), and the bigger the footprint the more the impact. The theory of the SEF can mainly be used as a sustainable development indicator to indicate how individuals and their lifestyles play a crucial role in reducing their in-significant impacts on the environment (LIANG et al., 2017). According to this theory, the basics of sustainable EF need individuals to make EFs as small as possible mainly through effective life-styles dimensions (Amaral, Martins, & Gouveia, 2016).

2.2 The relationship between per capita income and ecological footprint
According to Aşıcı and Acar (2016), per capita income (PCI) is an evaluation of the amount of money and wealth earned by individuals in a nation as well as geographic region. A study by Baabou, Grunewald, Ouellet-Plamondon, Gressot, and Galli (2017), manifest that PCI can mainly be used to identify the average per individual income for an area or region and also to analyze the standard of living as well as the quality of life of the population that generally impacts the level of EFs. Moreover, another study by Uluçak and Lin (2017) determines that PCI counts each male, female, and child’s as a member of the population that is also part of the ecological footprint. This stands indifference to other basic evaluations of a region’s prosperity, mainly such as household income, which consider all individuals residing under one roof as a household, and the family income, which also consider as a family those related by birth or adoption and marriage who live mainly in one house (Destek, Uluçak, & Dogan, 2018). Moreover, the overall impact of income growth on environmental as ecological quality has been evaluated substantially in the past literature, and according to one of the significant theories or hypotheses, known as EKC, there is a direct nexus between income growth and ecological aspects. Ecological footprints increase and better as income increases mainly up to an income approach or threshold. Also, the EKC model, which is one of the significant models of ecological modernization, proposes that the impacts of income growth on the EFs are mainly carried out using some channel known as scale. Research by Szigeti, Toth, and Szabo (2017), asserts that the significant scale impact tend to induce in the premier levels of economic growth
An increase in EF after a specific level of income, at home, can significantly be attained without changing the insignificant consumption designs and processes. Destek and Sarkodie (2019) in a research list some different processes of how income may positively affect ecological practices such as significant allocative impact which improves EFs as income rises of the individuals of the country. Therefore, the given research propose the below hypotheses,

H1: There is a significant relationship between per capita income and ecological footprints.

2.3 The nexus between happiness and ecological footprint

The happier people are willing to work for the development of their ecological footprint to increase the sustainability of their country. The researchers such as Yangka and Newman (2019) elaborates that people can be happier if they are being provided with their desired resources and facilities that can help them in leading a good lifestyle. The theory of ecological footprint states that the types of ecologically sustainable development can be evaluated with the help of human development and EF. The research conducted by Yangka (2019) explains that the happiness of people nourishes the relationship between ecological resilience and human flourishing. Udemba (2020) also in a study elaborates that the people should be provided with the positive discussions related to happiness and a healthier lifestyle that will result in increasing the efforts among the people to increase sustainability and alter the ecological footprint. The happiness of people within a country is highly concerned with their well-being and sustainability. People should be provided by innovative resources instead of present natural resources to increase the economy of a country (Lv, 2017; Liu, M. 2020). Different policies and strategies interrelated with environmental and physical aspects should be made to develop a better future for upcoming generations (Liu & Yue, 2020). EF plays a vital role in developing a clearer and effective picture of sustainability correlated with an ecological footprint as well as outsourcing the pollution and the waste (Baabou et al., 2017). The countries with low-income results in an increase in sustainable development and countries with high income lead to a decrease in sustainable development. According to the Biswas (2020), the countries which are richer and provide all the resources to their residents to keep them happy so that the ecological footprint can be altered to increase sustainability. Consequently, the study proposes the following hypotheses,

H2: There is a significant relationship between happiness and ecological footprints.

2.4 The relationship between human development and ecological footprint

Human development according to (Destek & Sarkodie, 2019), is referred to as the mechanism of enlarging individual’s opportunities and freedoms and also enhancing they're well being. According to Long et al. (2020), human development (HD) is mainly about the actual freedom normal individual have to decide who to be, what to do, and also how to live according to ecological rules. HD grew out of global debates on the associations between EFs and development during the late 1980s, by the early 1990s there were significantly loud calls to dethrone development, economic development had emerged as both a significant goal and indicator, of regional development in several states, even though GDP was never used as an evaluation of well-being (Charfeddine & Mrabet, 2017; Dalle et al., 2020; Vergara, 2020). In the early 2000 development debate initiates mainly using alternative focuses to go beyond the gross domestic product, mainly including putting significant emphasis on the level of employment and then whether individuals had their basic requirements met (Mrabet & Alsamara, 2017). These concepts helped pave the way for the HD concept and its impact on ecological regulations, and according to (Ulucak & Bilgili, 2018), HD is about expanding the well-being of individual life, rather than the significance of the economic growth in which individuals live. HD is a process that is mainly focused on developing fair as well as equal opportunities and choices for all individuals which, positively impact the level of EFs. The HD process focuses on enhancing the lifestyles of individuals which leads to greater as well as equal opportunities for
all and which further automatically leads to better EFs (Baloch, Zhang, Iqbal, & Iqbal, 2019). According to Lin et al. (2018) HD is all about giving individual more freedom and chances to live lives they want for which directly influence the overall process of EFs significantly. Hence, the present research recommends the following hypotheses,

H3: There is a favorable relationship between human development and ecological footprints.

3. Methodology

3.1 Data and Sample

Once the background of the study and problem as well as the literature review has been discussed by the researcher in the study, the next most crucial step is to explain the methods that have been applied by the researcher to collected data and to analyze the collected data. In this regard, the purpose of the study is very critical as the data collection is based upon that purpose. As far as the purpose of this study is concerned, it is to find the influence that is caused by the dimensions of life quality i.e. per capita income, happiness and human development on the ecological footprint of ASEAN countries (Hussain, Anwar and Razimi, 2020). Thus based on it, the researcher has collected data about the life quality dimensions and the ecological footprint from the ASEAN countries and the data comprises of 30 years in total. As the researcher intends to provide accurate and authentic results for the literature, the gathered data has come from the most authentic data sources which include World Bank Development Indicators and Global Economy. The measurement units and indexes through which the variables of the study have been measured are discussed as follows.

3.2 Model Specification

As in the current study, the three dimensions of life quality i.e. per capita income, happiness and human development have been taken as the independent variables, the first dimension, per capita income has been measured through US dollars. The second dimension, happiness has been measured in context of an index named as happiness index and finally the last dimension, human development has also been measured through an index named as human development index. Moreover, the only dependent variable of the study, ecological footprint has been measured through the units of global acres per person. Furthermore, the researcher has also taken two control variables i.e. education and gross capital formation. Among these, education has been taken as the percentage of literate people in the country while the gross capital formation has been taken as the percentage of GDP of the country. In this way all the variables have been measured and their data has been employed. The researcher has generated the following regression equation for the study;

\[ EFP_{it} = \alpha + \beta_1 PCI_{it} + \beta_2 HAI_{it} + \beta_3 HUD_{it} + \beta_4 EDU_{it} + \beta_5 GCF_{it} + \sum_{j=1}^{4} q_j CFE_{dum j} + \varepsilon_{it} \]

In this equation, \( \alpha \) is a constant, I represents the country, t is the time of the year, \( \beta \) shows the coefficient of the variable, \( CFE_{dum} \) means the dummy of country fixed effect. Moreover, EFP represents ecological footprint, PCI shows per capita income, HAI indicates happiness index, HUD represents human development, EDU shows education, GCF indicates gross capital formation and \( \varepsilon \) is the error term.

3.3 Empirical Procedure

As given in the regression model, country and time fixed effect dummies have been used so that the time series impact on the cross country results can be reduced to get better results. The trends associated with panel data can also be controlled through these dummies. The collected time series data might have the structural breaks that can
be effectively identified through the time fixed effect dummy (Medina, Caceres, & Corbacho, 2010). The first test that has been applied by the researcher in the current study is panel unit root test so that the order of integration of the variables and the stationarity of the data can be estimated. Among various types of unit root test, the researcher has used LLC unit root test to fulfill the purpose. The null hypothesis of this test refers to the non stationarity of the data (Levin, Lin, & Chu, 2002). Once the order of integration of the variables has been identified, the next step is to apply certain diagnostic checks such as autocorrelation, heteroscedasticity and cross sectional dependence tests along with multicollinearity test. In case, these tests are ignored, it might have impact on the results of the study therefore modified Wald and Breusch-Pegan/Cook-Weisberg heteroscedasticity test, Wooldridge autocorrelation test, VIF test of multicollinearity and Pesaran correlation test have been applied (Pesaran, 2004).

As per diagnostic checks, if there is any issue identified in the collected data, then the counter techniques must be used to get the accurate and authentic results (Arellano & Bover, 1995; Blundell & Bond, 1998). In such a case, the researcher has applied two types of estimation i.e. PCSE estimation as well as GMM estimation techniques to provide highly accurate results in the study. The time and country fixed effects can be used to control the heterogeneity in the data and in the same way endogeneity can be addressed by using the lagged values in GMM estimation if the sample size is large enough and the data is stationary (Bond, 2002). The following model has been used by the researcher for GMM estimation;

\[ \hat{y}_{it} = \alpha_t + \gamma \hat{y}_{i,t-1} + \sum_{p=1}^{P} \beta_p Z^p_{it} + \sum_{q=1}^{Q} \beta_q Z^q_{it} + \sum_{r=1}^{R} \beta_r Z^r_{it} + \epsilon_{it} \]

4. Results and Analysis

The results of the first test applied by the researcher i.e. LLC panel unit root test have been given in the table 2 with different values of level and first difference series for all the variables of the study. As far as the level series is concerned, it is quite clear from the table that only three variables have rejected the null hypotheses of non stationary data. These variables include environmental sustainability, human development and gross capital formation; all the remaining variables have accepted the null hypothesis. This shows that at level series the collected data is non stationary because there is unit root in it. On the other hand, if the variables are subjected to first difference, it comes out that all the variables of the study have rejected the null hypotheses of non stationary data. This rejection of null hypothesis leads towards the fact that in first difference, the data has become stationary and is eligible to be used in the study. In a nutshell, it can be stated that the data has been found as non stationary at level series but has been found as stationary at first difference series. The detailed results can be viewed in the table 2.

Table 2: LLC unit root

<table>
<thead>
<tr>
<th>Constructs</th>
<th>EFP</th>
<th>PCI</th>
<th>HAI</th>
<th>HUD</th>
<th>EDU</th>
<th>GCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>-2.299*</td>
<td>-1.317</td>
<td>-0.287</td>
<td>-3.997*</td>
<td>-0.398</td>
<td>-4.422*</td>
</tr>
</tbody>
</table>

The results obtained by the application of different diagnostic checks such as heteroskedasticity, autocorrelation, cross sectional dependence and multicollinearity have been given in the table 3 along with the information about the null hypothesis rejection and acceptance. In this regard, the first test i.e. heteroskedasticity test results indicate that there is significant heteroskedasticity in the collected data. Moreover, it is also clear from the table that there
is no autocorrelation among the variables of the study. As far as cross sectional dependence test is concerned, the null hypothesis rejection shows that there is cross sectional dependence between the variables. In the last, the multicollinearity aspect has not been found among the variables as per the results. In short, it can be stated that the variables are having heteroskedasticity and cross sectional dependence among them but do not have autocorrelation and multicollinearity among them. The results of each of these diagnostic checks can be viewed in the table 3.

Table 3: Diagnostic checks

<table>
<thead>
<tr>
<th>Heteroskedasticity</th>
<th>Autocorrelation</th>
<th>Cross-section dependence</th>
<th>Multicollinearity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified wald</td>
<td>Wooldridge</td>
<td>Pesaran</td>
<td>VIF</td>
</tr>
<tr>
<td>Breusch-Pagan/Cook-Weisberg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>χ2-value: 10.388**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>χ2-value: 4.203*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The correlation matrix indicates whether there is any correlation present among the variables or not. In this regard, the results have been reported in the correlation matrix in table 4 of the study. The table has made it quite clear that there is no correlation among the variables and the impacts of these variables can also be viewed in the correlation matrix.

Table 4: Correlation Matrix

<table>
<thead>
<tr>
<th>Variables</th>
<th>EFP</th>
<th>PCI</th>
<th>HAI</th>
<th>HUD</th>
<th>EDU</th>
<th>GCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENS</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCI</td>
<td>.366</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAI</td>
<td>.288</td>
<td>.289</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HUD</td>
<td>.493</td>
<td>.294</td>
<td>.323</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDU</td>
<td>.299</td>
<td>.344</td>
<td>.299</td>
<td>.288</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GCF</td>
<td>.394</td>
<td>.289</td>
<td>.200</td>
<td>.299</td>
<td>.233</td>
<td>1</td>
</tr>
</tbody>
</table>

In the last, the researcher had applied two important estimation techniques so that the impact casted by the independent and dependent variables can be analyzed in context of magnitude as well as direction i.e. positive or negative. Starting from the first independent variable, per capita income, its impact on ecological footprint has been found as significant and positive for both types of estimations. In other words, it can be stated that with one percent increase in per capita income, ecological footprint will enhance by 20.3% as per PCSE estimation while this increase will be 20% in case of GMM estimation. In the similar way, the second independent variable, happiness index is also found to have significant and positive impact on ecological footprint in case of both PCSE and GMM estimation. In this case, as the happiness index is increased by one percent, the ecological footprint will be enhanced by 29.4% for PCSE estimation while it will enhance by 19.3% for GMM estimation. In the exact same way, the last independent variable, human development also has found to have significant and positive impact on ecological footprint in case of both PCSE and GMM estimation. In this case, as human development is increased by one percent, the ecological footprint will be enhanced by 22.1% for GMM estimation. Similarly, the impact of the first control variable, education is also found to have significant and positive impact on ecological footprint in case of both PCSE and GMM estimation. In this case, as education level is increased by one percent, the ecological footprint will be enhanced by 22.8% for PCSE estimation while it will enhance by 20.2% for GMM estimation. However, the impact of the other control variable, gross capital formation has insignificant impact on ecological footprint. In short, all the independent variables have significant impact on ecological footprint. See Table 5.
Table 5: Results from PCSE estimation

<table>
<thead>
<tr>
<th>Dependent Variable = EFP</th>
<th>PCSE estimation</th>
<th>Sys-GMM estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI</td>
<td>0.203** (0.390)</td>
<td>0.200** (0.390)</td>
</tr>
<tr>
<td>HAI</td>
<td>0.294* (0.300)</td>
<td>0.193** (0.395)</td>
</tr>
<tr>
<td>HUD</td>
<td>0.193* (0.305)</td>
<td>0.221* (0.384)</td>
</tr>
<tr>
<td>EDU</td>
<td>0.228* (0.384)</td>
<td>0.202* (0.388)</td>
</tr>
<tr>
<td>GCF</td>
<td>0.044 (0.488)</td>
<td>0.036 (0.399)</td>
</tr>
<tr>
<td>Constant</td>
<td>2.884** (0.345)</td>
<td>0.847* (0.288)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.701** (0.388)</td>
<td>-</td>
</tr>
<tr>
<td>Arellano-Bond test for AR (1) ($Pr W_z$)</td>
<td>-</td>
<td>0.288</td>
</tr>
<tr>
<td>Arellano-Bond test for AR (2) ($Pr W_z$)</td>
<td>-</td>
<td>0.299</td>
</tr>
<tr>
<td>Hansen test of overid restrictions</td>
<td>-</td>
<td>0.204</td>
</tr>
</tbody>
</table>

5. Discussion and Conclusion

5.1 Discussion
The researcher intended to study the impact of three dimensions of life quality i.e. per capita income, happiness and human development index on the ecological footprint and in this context; three hypotheses were made by the researcher based on the review of the literature from the past. When the first hypothesis that per capita income has significant impact on ecological footprint was tested, the results indicated that this impact is significant and thus the hypothesis has been accepted. When the per capita income of the people increases, it increases the demands of the people regarding land and water and thus the ecological footprint is increased. This result is inconsistent with the past literature (Khan, Qianli, SongBo, Zaman, & Zhang, 2017). When the second hypothesis that happiness index has significant impact on ecological footprint was tested, the results also proved that this impact is significant and thus the hypothesis came as accepted. When the happiness index is increased, the people’s requirements for natural resources are increased and thus the ecological footprint is increased. This result is completely in accordance with the studies conducted by the other researchers in the past. The last hypothesis was that human development has significant impact on ecological footprint. This hypothesis was also accepted as the impact was found as significant based on the results. When the human development index is increased, the natural resources required by the humans also increase and thus the ecological footprint per human is also supposed to increase. This result is in line with the results obtained from the past similar studies (Goudie, 2018). Moreover, the impact of the control variable, education is also found as significant but that of the other control variable i.e. gross capital formation is found as insignificant. These results have been found in the similar studies from the past literature (Fu & Liu, 2017).

5.2 Conclusion
As the current study was designed with the motive to find out how the three dimensions of life quality i.e. per capita income, happiness and human development impact the ecological footprint in ASEAN countries, the researcher collected the relevant data from the ASEAN countries for 30 years and analyzed it using unit root test, diagnostic checks, PCSE estimation and GMM estimation and the results were obtained. The results have clearly indicated that the impact of all the independent variables of the study i.e. per capita income, happiness and human
development have significant impact on ecological footprint. It can be concluded on the basis of these results that the countries must improve the quality of life of the people in such a way that the impact on ecological footprint can be minimized to attain environmental sustainability.

5.3 Implications and Limitations

The theoretical benefit of the study is that it contains the literature and knowledge about the relevant aspects as given in the topic and discussed earlier. This is especially beneficial to the other researchers and authors for their studies because they can use it for further research. Moreover, the governments may get guidance from the study to improve the quality of life of the people in such a way that the impact on ecological footprint can be minimized to attain environmental sustainability.

The variables other than the dimensions of life quality may also be considered by the other researchers so that more literature can be obtained. The researchers must consider other regions of the world too to find out what perspective they have about the same topic. By following these recommendations, this study can be further improved, and contribution can be made in the literature.

References


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Testing Environmental Regulations, Green Innovation and Social Distribution as Determinants of Environmental Sustainability: A Case of ASEAN Region

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Abstract. Regulations and policies regarding environment and green and environment friendly innovations play an important role in the reduction in pollution and to make the environment clean to live a better life. In this regard, people play a critical part by following these policies and regulations and by promoting the green innovations. The current study has been designed with the aim to find out and investigate the impact of environmental regulations, green innovation, and social distribution on the environmental sustainability of ASEAN countries. Therefore, the data for the study has been gathered from ASEAN countries covering the period of 29 years. The accuracy of the results obtained by the analysis of data collection has been ensured by the collection of data from World Bank Development Indicators and Global Economy. Various tests and techniques have been applied on the collected data such as panel unit root test, panel cointegration test, FMOLS coefficient estimation and Granger Casualty test. The result obtained by the analysis indicated that all the independent (environmental regulations, green innovation, and social distribution) and control variables (per capita income and human development) have significant impact on environmental sustainability. Moreover, the researcher also found the casual relationships between various variables of the study.

Keywords: Environmental Regulations; Green Innovation; Social Distribution; Environmental Sustainability; ASEAN Countries


Jel Codes: O1, O53

1. Introduction

Environmental sustainability is a concept that means to be more conscious towards the environment (Rosen, 2018; van Huis & Oonincx, 2017). In the current era, the majority of developing and developed nations worked on establishing a sustainable environment within their states so that the climate change and global warming based environmental issues can be resolved (Baland, Bardhan, & Bowles, 2018; Tvaronavičienė, & Ślusarczyk, 2019; Eddelani et al., 2019; Moumen et al., 2019; Prasetyo, & Kistanti, 2020; Hernández de Velazco, Ravina Ripoll, & Chumaceiro Hernandez, 2020; Nuryakin, & Maryati, 2020; Igaliev, Niyazbekova, Serikova, Kenzhegaliyeva, Mussirov, Zueva, Tjurina, & Maisigova 2020; Mikhailov, Moiseev, Aleshin, & Burkhartd, 2020; Khan, Maqbool, Haleem, & Khan Mohd, 2020; Issock Issock Paul, Roberts-Lombard, & Mpinganjira, 2020).

In the ASEAN states, more than 600 million people are living in urban areas and its figure is continuously increasing, so there is a major need to ponder on the environmental issues (Kheng-Lian, Robinson, & Lin-Heng, 2016). According to the report of ASEAN Progress Towards Sustainable Development Goals, the IMF plays a significant role to give support to the ASEAN states in this challenging environmental situation (Suchojroensin, 2018; Yonn, 2017). There are ten major ASEAN countries (Malaysia, Indonesia, Thailand, Singapore, Myanmar, Laos, Cambodia, Burnie, Philippines and Vietnam) who effectively achieving sustainable development within this region. Their strong income and stable consumption growth directly reduced poverty, improve education and
health outcomes, and result in great inclusion within their states. These nations are collectively worked to obtain sustainable environmental growth. Their tax revenue based outcomes in the last three decades are given below (Figure 1)

![Figure 1: Environmental Tax Revenue within most developing ASEAN countries](image)

The above figure depicts that Brunei Darussalam is that advanced developing state whose management faced great fluctuation in its GDP outcomes (X. Liu, Zhang, & Bae, 2017). Well, Thailand, Malaysia, and other related energy states are more capable to develop their environmental strategic approaches. In addition, there are major green investment opportunities for infrastructural development within the ASEAN states (Anbumozhi, 2017). Their statistics are shown in the following table 1.

<table>
<thead>
<tr>
<th>ASEAN states</th>
<th>Percentage of Green Investment Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>12%</td>
</tr>
<tr>
<td>Singapore</td>
<td>2%</td>
</tr>
<tr>
<td>Philippines</td>
<td>15%</td>
</tr>
<tr>
<td>Myanmar</td>
<td>7%</td>
</tr>
<tr>
<td>Malaysia</td>
<td>9%</td>
</tr>
<tr>
<td>Vietnam</td>
<td>16%</td>
</tr>
<tr>
<td>Cambodia</td>
<td>3%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>36%</td>
</tr>
</tbody>
</table>

The problem statement of this paper is to critically evaluate the significance of environmental regulations, green innovation, and social distribution on the development of environmental sustainability within the developing ASEAN states. This aim based strategic approach will help to make a strategic decision regarding which dimension cause a major impact on sustainable environmental development in the global warming situation.

This study is informative and challenging which directly overcome all the deficiencies made by the previous scholars in their related studies. Like according to previous literature, the majority of the researches has been made on the environmental sustainability factor, but neither of them specifically tests the major determinants of
environmental sustainability e.g. environmental regulations, green innovation and social distribution, in the ASEAN region perspective. Majority of the researchers critically evaluate this sustainability concept with globalization, foreign direct investment, green innovation efficiency and other business operation perspective (Feng, Zeng, & Ming, 2018; Piyathanavong, Garza-Reyes, Kumar, Maldonado-Guzmán, & Mangla, 2019; Suki, Sharif, Afshan, & Suki, 2020; Iqbal, et al., 2020), but nobody majorly worked on deriving the major sustainability provoking determinants within the developing Southeast Asian countries. In this paper, the major objective is:

- To investigate the impact of environmental regulations on environmental sustainability within the ASEAN region.
- To investigate the impact of green innovation on environmental sustainability within the ASEAN region.
- To investigate the impact of social distribution on environmental sustainability within the ASEAN region.
- To identify the major determinant to majorly enhance environmental sustainability.

This study is an informative approach in front of the environmentalist, policymakers, state's authority, and the business community to consider the importance of the tested determinants in sustainable environmental development. Like the environmental regulation and social-based strategic variables will help, the related field environmentalist and the nation’s government to develop such decisions and regulations that directly reduced the carbon emission within the state and enhance their sustainable environment by promoting natural resources. In addition, such information will help the local natives within the ASEAN region to consider their social responsibilities towards the healthy environment development that directly affect their socio-economic development. In addition, the green innovation based entrepreneurial approach and its implication on the sustainable environment concept within this research will motivate the business community, analysts and management to develop such operating and marketing activities that fulfill their environmental need and gain their customer satisfaction and positive word of mouth for sustainable growth.

After considering the problem statement, research objectives, research question, its justification and significance within this chapter one, introduction, it's time to work on section 2 named as the literature review. In this portion, all the previous scholars' work will be critically considered and evaluated to propose a relevant hypothesis associated with these research objectives. After this, there will be a third section, research methodology, where the data collection, sampling, and the applied statistical tests clearly discussed. This section is considered as an important research portion in which all the technical information regarding the variables testing and the participants' demographic descriptions are considered (Ghauri, Grønhaug, & Strange, 2020; Kalton, 2020; Kanwal, et al., 2020). In section 4 of analysis interpretation, all the SPSS test based values evaluation will be made to inspect that either the outcome of the results is significant or not in order to justify or nullify the hypothesis. Last, but not the least, discussion and conclusion based major heading cover all the consequences of the hypothesis by considering the related scholars' work to enhance the authenticity of this paper (Valencia et al., 2020). In addition to concluding all the research's outcomes, its future implications and limitations will also be explained that enhanced the upcoming scholar’s opportunity to utilize this paper information.

2. Literature Review

2.1 Environmental Sustainability Theory

The sustainability theory is majorly based on promising and integrating the social response towards the cultural and environmental issues within a state (Font, Garay, & Jones, 2016; Freudenreich, Lüdeke-Freund, & Schaltegger, 2019). It has three major models like the first one is an economic model which directly based on sustaining the natural and financial capital, the second one is an ecological model that looks towards the ecological integrity and biological diversity, and the third one is a political model which based on the social system in order to realize the human dignity concept (Stern, 2018). This theoretical concept is a helpful approach
Environmental Regulations and Environmental Sustainability

In order to explore the relationship between the environmental regulations and its sustainability factor, many researchers have been made by environmentalist and analyzers where they stated that in the current era, the environment-related productive regulation and its innovation cause a significant impact of the efficient sustainable firm’s performance because such strategic approach gives flexibility in their operating activities (Ramanathan, He, Black, Ghabadian, & Gallear, 2017). Also, the trade liberalization based strategic activities within a state play a significant role to develop a sustainable environment (Mahrinasari, Haseeb, & Ammar, 2019). In 2017, Piera, Roberto and Emilio majorly stated that green initiatives and its related regulations within a state caused a significant impact on sustainable development within a state. According to the researchers, the green IT system directly boosts the sustainability concept within a state (Centobelli, Cerchione, & Esposito, 2017; Niesten, Jolink, de Sousa Jabbour, Chappin, & Lozano, 2017). According to these scholars, there is a great influence of governance and institution on the environmental regulations that is why those developing nations who having weak administration and policymaking departments are facing major environmental issues. This shows that environmental regulation regarding technology and other business-oriented activities caused a direct influence on a healthy environment (Abdelzaher & Abdelzaher, 2017; Dalle et al. 2020). Hence, after critically evaluate the previous research, the following hypothesis will be generated.

H1: There is a significant relationship between Environmental Regulations and Environmental Sustainability

Green Innovation and Environmental Sustainability

Like the previous ones, the green innovation within the business activities directly impact on boosting the concept of environmental sustainability within a state. According to the researchers, if the business marketing department becomes successful in developing the green innovation within their consumer market by generating their needs, then more efficient outcomes will be made (Song & Yu, 2018; Tang, Walsh, Lerner, Fitza, & Li, 2018). In most scholars stated that such innovation in the business field caused a direct impact on the efficient sustainability concept within a state and boost the ecological footprints within a state. According to them, the advanced technological development within a state caused an excessive greenhouse gas emission and this global warming issue can be resolved by enhancing this green innovation-based awareness concept (Gliedt, Hoicka, & Jackson, 2018; Li, Huang, Ren, Chen, & Ning, 2018; Luo & Wu, 2020). In 2016, Dayuan Min, Shenggang, Xiaohong and Lutao majorly concluded that there is a major need to reduce the carbon emission based climate change situation by making environmental legitimacy and green innovation based strategic growth (Li et al., 2018; Mei, et al., 2020). According to them, an internal formal mechanism-based green innovator plays a significant role to mitigate the carbon dioxide emission oriented problematic situation within a state. In the current era, majority of the companies utilize both formal and informal mechanism i.e. internal green process innovation and external environmental legitimacy, to ensure sustainability by disclosing the carbon information. Therefore, the following hypothesis will be suggested from the previous literature.
H2: There is a significant relationship between Green Innovation and Environmental Sustainability

2.4 Social Distribution and Environmental Sustainability
Social distribution is such a marketing-based commune practice that cause a major influence on circulating the information regarding environmental sustainability through networking, social media platforms, word of mouth, etc. In 2017, Armin Scheidal with others stated that there is a direct link between a pattern of social metabolism, rise of environmental justice distribution conflict, the emergence of the ecological distribution and the potential contributions for the sustainable transition that caused a direct impact on sustainable environment development (Scheidel, Temper, Demaria, & Martínez-Alier, 2018). Effective communication plays a significant role to boost an environmental concept. The Global Environmental Justice Atlas based ecological distribution conflicts were considered by Leah Temper and others (2018) where they stated that ecological distribution conflict caused a major impact on the sustainability factor and developed such environmental issues that directly hit the healthy climate and many other environmental issues (Temper, Demaria, Scheidel, Del Bene, & Martínez-Alier, 2018). In the sustainability science-based informative journal, the related scholars stated that there are some trends in the social metabolism and the environmental conflict that cause a drastic change in Bolivia, Colombia, Peru and Ecuador countries (Grabara, Hussain & Szajt, 2020). According to them, biomass, fossil fuels, hydropower, and mining are the major conflicting sectors within a state (Pérez-Rincón, Vargas-Morales, & Crespo-Marín, 2018). In the current era, there is a need to develop efficient social distribution concepts towards ecosystems that result in sustainable environmental sustainability factors. In the ecosystem service-based journal, the scholars refocused the ecosystem towards sustainability where their major aim is to make justice within the ecological limits for the long run. In their study, they majorly emphasized inter-generational, interspecies and procedural distribution, and concluded that efficiency, sufficiency and persistence are the major strategies to control the ecological limits (Schröter et al., 2017). The similar statistical research outcomes made by the scholars where they justified that efficient social distribution within a developing state causes an effective development of sustainable environment and secure the state’s future (Clayton, Kals, & Feygina, 2016; Saunila, Ukko, & Rantala, 2018; Temper et al., 2018). So, the following hypothesis will be proposed from previous researches;

H3: There is a significant relationship between Social Distribution and Environmental Sustainability

3. Methodology

3.1 Data
This section contains detailed information about the data collection method adopted by the researcher and the techniques and tools that have been used to analyze the collected data appropriately. First of all, the data collection process will be discussed. It is quite clear that the objective of the study directly impacts the data collection procedure and thus based on the objective of this particular study i.e. to explore the effect of environmental regulations, green innovation and social distribution on the environmental sustainability of ASEAN countries, the data for the study has been gathered from ASEAN countries covering the time period of 29 years. The accuracy of the results obtained by the analysis of data collection has been ensured by the collection of data from World Bank Development Indicators and Global Economy, the most reliable data sources as per the data required for this study.

3.2 Model Specification
In context of model specification, the measurement units of the variables of the study must be made clear before generating the regression equation. In this regard, the dependent variable, environmental sustainability has been measured by using an index named as environmental sustainability index and has been denoted by ENS. The first independent variable of the study, environmental regulations have been measured through an index named
environmental protection index and has been represented by ENR. The next independent variable, green innovation has been measured through the revenues obtained from the sales of green products and has been denoted through GRI. The last independent variable, social distribution has been measured through social capital index and represented by SOD. In addition to these variables, two control variables have also been taken into consideration i.e. per capita income and human development. Per capita income has been measured through US dollars and denoted by PCI while the human development has been measured through the human development index and represented by HUD. In this way, the following regression model can be generated:

$$\text{ENS}_t = \alpha + \beta_1 \text{ENR}_t + \beta_2 \text{GRI}_t + \beta_3 \text{SOD}_t + \beta_4 \text{PCI}_t + \beta_5 \text{HUD}_t + \varepsilon_t$$

Here, ENS represents environmental sustainability, ENR shows environmental regulations, GRI denotes green innovation, SOD represents social distribution, PCI shows per capita income, HUD denotes human development and $\varepsilon_t$ is the error term.

3.3 Estimation Procedure

3.3.1 Panel Unit Root Test

As the first step, the researcher intended to find out the order of integration of the variables of the study and the stationarity of the collected data and for this purpose, the panel unit test was applied by the researcher (Levin, Lin, & Chu, 2002). Although, various tests have been used in this regard but the researcher has preferred LLC test in the current study with null and alternate hypothesis. The null hypothesis involves the non stationary condition of the collected data while alternate hypothesis involves the stationary condition of the collected data. Based on these hypotheses, the results of panel unit root test are interpreted (Levin & Lin, 1993). The following model has been used for panel unit root test;

$$\Delta y_{i,t} = a_i + \rho y_{i,t-1} + \sum_{j=1}^{p_i} a_j \Delta y_{i,t-j} + \varepsilon_{i,t}$$

3.3.2 Panel Cointegration Test

In the next step, the researcher had intended to find out whether there is any cointegrated relationship present between the variables of the study or not and for this purpose, the panel cointegration test has been applied in the study. Two different statistics i.e. homogenous panel or within dimension and heterogeneous group or between dimension have been considered in the test (Pedroni, 1999). Moreover, the results are interpreted on the basis of rejection of null hypothesis which refers to the absence of cointegrated relationships between the variables (Pedroni, 2001). In this regard, the following model has been used in the study,

$$y_{i,t} = \alpha_i + \delta_{i,t} + \beta_1 X_{1,i,t} + \beta_2 X_{2,i,t} + \ldots + \beta_n X_{n,i,t} + \varepsilon_{i,t}$$

3.3.3 Estimating the Coefficient with FMOLS

In the next step of the estimation procedure, the researcher wanted to find out the most important aspect of the study i.e. the impact of independent and control variables on the dependent variable and for this purpose, the FMOLS coefficient estimation test has been applied in the study. It has been derived from ordinary least square OLS to resolve the issues of serial correlation and endogeneity which might possibly have been caused by the cointegration among the variables (Pedroni, 2000). The following model has been considered for this test;

$$\hat{\beta}_{FM} = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - \bar{x}_i)^2\right)^{-1} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} (x_{i,t} - \bar{x}_i) ENS_{i,t} - T \hat{\delta}_{et}\right)$$

In this equation, $\text{ENS}_{i,t}$ is the transformed variable of ENS due to endogeneity while $\hat{\delta}_{et}$ represents the serial correlation correction.
3.3.4 Panel Granger Casualty Test
In the last, the researcher intended to find out if there are any casual relationships between the variables or not and for this purpose, Granger casualty test has been used in the study. The presence of casual relationships has high chances because of the cointegration among variables. So Dumitrescu and Hurlin Granger Casualty test based on null hypothesis of no casualty and alternate hypothesis of casualty has been used in the study (Dumitrescu & Hurlin, 2012).

4. Results and Analysis

4.1. Results of Panel Unit Root Test
The first test applied for the exploration of order of integration of the variables i.e. IPS panel unit test has its results as shown in the table 1. The intercept and intercept plus trend results for both level and first difference series have been reported separately in detailed way. Let us discuss both of them one by one. As far as the level series is concerned, it is clear from the table that three variables in both intercept and intercept plus trend have rejected the null hypothesis and the remaining four have accepted it. The variables that have rejected the null hypothesis include environmental regulations, social distribution and per capita income. Contrary to the level series, in the first difference series, the null hypothesis has been rejected by all the variables of the study both for intercept and intercept plus trend. The end result or nut shell is that the data is non stationary at level series but it has become stationary at first difference series. The detailed results along with the relative values can be viewed in the table 2.

Table 2: Panel Unit Root Test – Im, Pesaran and Shin (IPS)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>1st difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>Intercept + Trend</td>
</tr>
<tr>
<td>ENS</td>
<td>-2.2940</td>
<td>-2.2883</td>
</tr>
<tr>
<td>ENR</td>
<td>-3.1274*</td>
<td>-3.1844*</td>
</tr>
<tr>
<td>GRI</td>
<td>-2.4203</td>
<td>-2.4493</td>
</tr>
<tr>
<td>PCI</td>
<td>-3.2993*</td>
<td>-3.8474*</td>
</tr>
<tr>
<td>HUD</td>
<td>-0.2884</td>
<td>-1.2994</td>
</tr>
</tbody>
</table>

4.2. Results of Panel Cointegration Test
The next test applied with the motive to explore the cointegrated relationships between the variables was panel cointegration test, the results of which have been shown in the table 3. The table contains results about two types of statistics i.e. homogeneous panel and heterogeneous group statistics also called as within dimension and between dimension. As per the table, it is quite clear that three out of four values from within dimension have rejected the null hypothesis of no cointegration and in the same way; all the values from between dimension have rejected the null hypothesis of no cointegration. Overall, it can be stated that six out of the total seven values have rejected the null hypothesis of no cointegration leading towards the conclusion that there are cointegrated relationships between the variables of the study.

Table 3: Cointegration Test - Pedroni Panel

<table>
<thead>
<tr>
<th>Test</th>
<th>Statistics</th>
<th>T-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Within Dimension)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel v-Statistic</td>
<td>-1.3889*</td>
<td>-6.8666*</td>
</tr>
<tr>
<td>Panel ρ-Statistic</td>
<td>-1.2881*</td>
<td>-5.4088*</td>
</tr>
<tr>
<td>Panel t-Statistic: (non-parametric)</td>
<td>-1.4666*</td>
<td>-4.8765*</td>
</tr>
<tr>
<td>Panel t-Statistic (adf): (parametric)</td>
<td>-4.1987</td>
<td>-6.8667</td>
</tr>
</tbody>
</table>
4.3. Results of FMOLS Coefficient Estimation

The next step was to find out what impact is casted by the independent and control variables on the dependent variable of the study and for this purpose, the researcher had used the FMOLS estimation test, the results of which have been given in the table 4. As per the table, it is clear that environmental regulations have significant and positive impact on environmental sustainability as the p-value is less than 0.05. This means that with the increase in one percent of environmental regulations, the environmental sustainability will increase by 21.2%. In the same way, the impact of green innovation has positive and significant impact on environmental sustainability and it suggests that with one percent increase in green innovation, the environmental sustainability will be increased by 30.4%. The last independent variable i.e. social distribution is also found to have a positive and significant impact on environmental sustainability and it indicates that with one percent increase in social distribution, the environmental sustainability will be decreased by 29%. In the last, the control variable, per capita income is having positive and significant impact on environmental sustainability. In other words, when the per capita income is increased by one percent, the environmental sustainability will also be increased by 28.8%. In the same way, the other control variable, human development is also having positive and significant impact on environmental sustainability. In other words, when the human development is increased by one percent, the environmental sustainability will also be increased by 12.1%. The value of R square indicates that 87.1% change in environmental sustainability is caused by all these variables and the remaining change is caused by some other variables.

Table 4: FMOLS Estimation

<table>
<thead>
<tr>
<th>Estimator</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENR</td>
<td>0.212*</td>
<td>0.288</td>
<td>0.000</td>
</tr>
<tr>
<td>GRI</td>
<td>0.304**</td>
<td>0.294</td>
<td>0.023</td>
</tr>
<tr>
<td>SOD</td>
<td>0.290*</td>
<td>0.533</td>
<td>0.003</td>
</tr>
<tr>
<td>PCI</td>
<td>0.288*</td>
<td>0.398</td>
<td>0.028</td>
</tr>
<tr>
<td>HUD</td>
<td>0.121*</td>
<td>0.454</td>
<td>0.000</td>
</tr>
<tr>
<td>Adj. R Square</td>
<td>0.871</td>
<td>0.885</td>
<td>0.000</td>
</tr>
<tr>
<td>F-value</td>
<td>43.894S</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D.W. Stat</td>
<td>2.188</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The results of multicollinearity test applied by the researcher have been presented in table 5. According to these results, it is very clear that the value (1.211) of mean VIF (variance inflation factor) for all the variables is quite close to 1 which shows that there is no issue regarding multicollinearity in these variables.

Table 5: Multicollinearity Test

<table>
<thead>
<tr>
<th></th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENR</td>
<td>1.493</td>
<td>.768</td>
</tr>
<tr>
<td>GRI</td>
<td>2.299</td>
<td>.488</td>
</tr>
<tr>
<td>SOD</td>
<td>1.994</td>
<td>.505</td>
</tr>
<tr>
<td>PCI</td>
<td>1.454</td>
<td>.596</td>
</tr>
<tr>
<td>HUD</td>
<td>0.299</td>
<td>.889</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>1.211</td>
<td>-</td>
</tr>
</tbody>
</table>
4.4. Results of Panel Granger Casualty Test

The results of granger casualty test have been presented in the table 6 in which the variables having unidirectional and bidirectional have been given. It is clear that bidirectional casualty is running between environmental regulations and human development. On the other hand, unidirectional casualty is running from environmental regulations to environmental sustainability, from social distribution to environmental sustainability, from per capita income to green innovation, from environmental regulations to social distribution, from environmental sustainability to per capita income, from environmental sustainability to social distribution and finally from green innovation to human development.

Table 6: Granger Casualty Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>ENS</th>
<th>ENR</th>
<th>GRI</th>
<th>SOD</th>
<th>PCI</th>
<th>HUD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENS</td>
<td>-</td>
<td>.022</td>
<td>.122</td>
<td>.012</td>
<td>.122*</td>
<td>.122</td>
</tr>
<tr>
<td>ENR</td>
<td>.373**</td>
<td>-</td>
<td>.033</td>
<td>.122*</td>
<td>.012</td>
<td>.271*</td>
</tr>
<tr>
<td>GRI</td>
<td>.047</td>
<td>.012</td>
<td>-</td>
<td>.021</td>
<td>.026</td>
<td>.367*</td>
</tr>
<tr>
<td>SOD</td>
<td>.035*</td>
<td>.037</td>
<td>.012</td>
<td>-</td>
<td>.067*</td>
<td>.036</td>
</tr>
<tr>
<td>PCI</td>
<td>.020</td>
<td>.054</td>
<td>.102*</td>
<td>.002</td>
<td>-</td>
<td>0.0177</td>
</tr>
<tr>
<td>HUD</td>
<td>.001</td>
<td>.027*</td>
<td>.010</td>
<td>.012</td>
<td>.016</td>
<td>-</td>
</tr>
</tbody>
</table>

5. Discussion and Conclusion

5.1. Discussion

With the purpose to find out and investigate the impact of environmental regulations, green innovation and social distribution on the environmental sustainability of ASEAN countries, the researcher came up with three hypotheses which were having the foundation from the past literature. These hypotheses were generated so that they can be tested on the basis of the results obtained by application of various techniques and tests over the collected data. The first hypothesis was that the impact of environmental regulations is significant over the environmental sustainability. This hypothesis was accepted on the basis of the results as the impact of environmental regulations was found as significant. When proper regulation regarding environment are made and implemented as well, it enhances the environmental sustainability of the country and this result is in consistency with the past studies (Shen, Wei, & Yang, 2017). The next hypothesis was that green innovation has significant impact on environmental sustainability and this hypothesis was also accepted as per the results of the study. With the increase in the production of environment friendly products through environment friendly techniques, the environmental sustainability is ensured. This result has been confirmed with the results obtained from the similar studies from the past (Li et al., 2018). The last hypothesis was that the social distribution has significant impact on the environmental sustainability and this hypothesis was also confirmed on the basis of the results. If the social capital is distributed effectively, the environmental sustainability is ensured. This result is in accordance with the similar past studies (C.-H. Liu, 2017). In addition, two control variables were also taken into consideration i.e. per capita income and human development. The impact of both these control variables over the environmental sustainability has been found as significant which is totally in concordance with the past literature (Kiseľáková, Šofranková, Gombár, Čabinová, & Onuferová, 2019). Hence it can be stated that all the independent and control variables have significant impact on environmental sustainability.
5.2. Conclusion

In regard of the objective of the current study i.e. to find out and investigate the impact of environmental regulations, green innovation and social distribution on the environmental sustainability of ASEAN countries, the researcher has collected data from ASEAN countries for 29 years and has applied a number of relevant tests and techniques such as panel unit root test, panel cointegration test, FMOLS coefficient estimation and Granger Casualty test. The results have indicated that all the independent (environmental regulations, green innovation and social distribution) and control variables (per capita income and human development) have significant impact on environmental sustainability. This leads towards the conclusion that the countries must devise proper environmental regulations and must invest in the green and environment friendly innovative projects so that the environmental sustainability can be ensured in these countries.

5.3. Implications and Limitations

As far as the practical implications are concerned, the countries can get information and guidance from this study to devise proper environmental regulations and must invest in the green and environment friendly innovative projects so that the environmental sustainability can be ensured in these countries. The policies must be made by the government to enforce these aspects. The theoretical implication is that the researchers will find literature and information about the relevant aspects to be used in their studies for future research.

The sample size of the current study is 29 years, which must be increased, by the other researchers and other new and latest techniques must be used for analysis purpose to get results that are more accurate. In addition, the researchers might also consider various other countries and regions to obtain their perspective as well and to increase the literature on this topic. In this way, the study can be improved academically.

References


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POPULATION DYNAMICS AND ENVIRONMENTAL SUSTAINABILITY: A CASE OF ASEAN COUNTRIES BY USING PANEL DATA ANALYSIS

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Abstract. This informative study is majorly based on examining the nexus between the population dynamics and environmental sustainability for the 13 major Asian states over the time of 1990-2016. In order to fulfill this major objective, population density, population growth, and urbanization are studied as independent variables; environmental sustainability as a dependent variable; while literacy rate acts as a controlling variable within the relationship among major items. Initially, IPS and LLC based panel unit tests are considered to inspect either the variables are stationary or not. Then Pedroni’s panel cointegration method is implemented to evaluate the cointegrating relationship between the tested variables. According to the results, a cointegrating relationship has existed among all the variables; and after this, the FMOLS and DOLS based estimators predict the coefficient of all the variables and concluded that population density and population growth positively enhanced the environmental sustainability due to excess literacy rate, but the urbanization negative impact on the environmental sustainability factor within the Asian nations. This paper is informative for the environmental policymakers and governments to ponder on the importance of literacy rate for the effective utilization of natural resources to develop a favorable environment. In addition, a lack of CO2 based major controlling value may affect this research's validity, which can be overcome by upcoming scholars.

Keywords: Population Dynamics; Population Density; Population Growth; Urbanization; Environmental Sustainability; Literacy Rate; Panel Data Cointegration

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Jel Codes: O1, O53

1. Introduction

The human population has a greater effect on the environment of ASEAN countries that can be determined by the complex interactions between different forces that may include institutional and political contexts (Salman, Long, Dauda, Mensah, & Muhammad, 2019). According to (Petcharamesree, 2016) the relationship between sustainable development and population dynamics has been developed since 1990. The ASEAN countries develop and promote political and economic cooperation among its members, and their total population is about 650 million (Brata & Pemayun, 2018; Meng, 2020). The association of population dynamics and sustainable development addresses the objectives and needs of the population of ASEAN countries without negotiating the well-being of upcoming generations. The unchecked growth of the population will result in un-sustainability in the ASEAN countries as it is considered that the population of a country has the affinity to exceed the capability of the environment to provide sustenance. The below table provides some key environmental sustainability (ES) issues facing by ASEAN countries (see Table 1).
Table 1: Key ES issues

<table>
<thead>
<tr>
<th>Environmental sustainability issues</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergenerational decisions</td>
<td>Make environmental decisions based on long-term results.</td>
</tr>
<tr>
<td>Avoid excess pollution</td>
<td>Pollution and population growth can cause damage to the earth's atmosphere.</td>
</tr>
<tr>
<td>Protect the health of eco-systems</td>
<td>Avoid ecosystems becoming significantly damaged</td>
</tr>
<tr>
<td>Shift renewable assets</td>
<td>Limiting consumption of non-renewable assets</td>
</tr>
</tbody>
</table>

The population of the ASEAN countries is not checked from time to time, which results in unsustainable development, and it becomes difficult for these countries to provide sufficient food to their residents if the ratio of the population growth is increased (Jones, 2004; Pan, 2020). According to (Crist, Mora, & Engelman, 2017) the increase in the human population is inversely proportional to sustainable development because a country needs resources to keep the residents alive, and these resources include home and food. The shelter for the people requires a piece of land; thus, the growth of food also requires a piece of land for cultivation. Therefore, an increase in the dynamic population and less land for cultivation results in a decrease in the number of resources. Figure 1 is shown below also describing the population growth of ASEAN countries.

![ASEAN Market Population](image)

Figure 1: ASEAN Market Population

It is well known that the population has a huge impact on the environment and sustainability performance in terms of environment (Scovronick et al., 2017). From previous results, it can be indicated that significant efforts have been made regarding population dynamics as well as environmental quality (EQ). An effort recently by Yu, Deng, and Chen (2018), has indicated that population types directly influence the sustainable development concerning the environment and other related concepts. Consequently, the research has not been conducted regarding the direct impact of population dynamics (PD) on the sustainability environment (SE) of ASEAN countries. Therefore, the current research is new and remarkable for all ASEAN nations in evaluating the impact of (PDs) on SE. Besides, during the last few years, different researchers such as (Hakimi & Hamdi, 2016) have examined the overall effect of EQ on the economic growth of different ASEAN countries. However, the given effort is justified
because no other study has evaluated the nature of PDs on the environment of ASEAN nations. The specified research has the following objectives,

- The foremost aim of the study is to identify the impact of population density on environmental sustainability in ASEAN countries.
- The second goal of the research is to evaluate the impact of population growth on environmental sustainability in ASEAN nations.
- Moreover, the final objective is to examine the impact of Urbanization on environmental sustainability in ASEAN countries.

The findings of the current study illustrate that the analyst of the study essentially focuses on the overall influence as well effects of population types such as density, growth, and urbanization on the environment of ASEAN nations. Therefore, the results of the given study help environmental experts of ASEAN nations, and this research has a broad scope for the fellow as well as future environmental researchers of any country. Additionally, the following effort has a remarkable opinion in examining the direct effect of population and how the population became a big reason behind the sustainability in the environment (Haseeb et al., 2021).

A thesis generally consists of five chapters and these five chapters are listed as an introduction, literature review, research methods, findings or results, and discussion and conclusion; these chapters explain individually that how all this work has been performed. The introduction elaborates on the need importance and value of the study as it replies to the following questions why, where, and how. The literature review explains very briefly about the previous studies worked on the same field and their results and in the findings, discussion, and conclusion describes the studies or research.

2. Literature review

2.1. Theory of Environmental sustainability (ES)

Herman Daly, one of the initial analysts as well as a pioneer of environmental sustainability. In the early 1990s he proposes a theory of ES and according to Herman sustainability in the environment is the degree of viable resource harvest, pollution created by population, and non-viable resource depletion that can be carried on indefinitely (Sarkis & Zhu, 2018). According to Aberilla, Gallego-Schmid, and Azapagic (2019) if they cannot be carried out indefinitely than they are not said to be sustainable. In his theory, Herman also suggests that for viable resources, the degree of harvest should not exceed the degree of reproduction, and for pollution according to Howes et al. (2017), the volume of waste products from population should not invade the assimilative absorption of the environment, and for non-viable resources, the depletion of the non-viable assets should need a significant generation of renewable replacement for that asset. Furthermore, the theory of ES also states that the population has a major effect on the overall sustainability in terms of ecological concepts and performance. According to the theory of ES populations and different countries of the world should practice some significant processes to minimize the insignificant impact on the sustainability environment (Higón, Gholami, & Shirazi, 2017; Seoane, Bermúdez & Montes, 2020). Some sustainable practices of ES are also suggested by according to Centobelli, Cerchione, and Esposito (2017), such as sustainable constructions, sustainable water as well as waste management.

2.2. The relationship between population density and environmental sustainability

The density of the population has been increasing rapidly across different regions and countries that influence the sustainability of an environment at global, national, and regional levels. According to Lau et al. (2018), different problems such as the depletion of the resources, the increased level of pollution, and the threat of rising sea levels has been increased because of the growth of the population in ASEAN countries. According to Heng, Malone-Lee, and Zhang (2017), the rapid growth of the population results in declining fertility rates in a country and limiting the resources such as potable water, fisheries, forests, and arable land. According to (Saleem, Jianzong,
Zaman, Elashkar, & Shoukry, (2018) the relationship between environmental sustainability and population density is a part of the esteemed tradition that has frequently sought to diminish the environmental change to an ordinary function of growth or population size. According to Nykvist et al. (2017), the increase in population density decreases the number of resources in a country that highly affects the sustainability of the environment of that country. The people of ASEAN countries feel the impact of environmental problems due to the increased population more intensely. According to X. Liu, Zhang, and Bae (2017) environmental sustainability should be applied by ASEAN countries that are opposite to the depletion of resources and describes a prototype of usage of resources in which the present generation consumes only the natural resources to make sure that the future generations receive resources. The air pollution has also been increased due to the human population by the increased emission of carbon dioxide. According to J. Song, Tong, Wang, Zhao, and Prishchevov (2019), the increased density of the population in a country results in increasing the pressure on the atmosphere of its land by challenging environmental sustainability. According to (Pandarinath et al., 2018) the population dynamics can also have a positive impact on the sustainability of an environment if there is a fall in the fertility level, and the growth of the population is slow. It will result in increased environmental sustainability and will provide more opportunities regarding sustainability development. According to Mafarja et al. (2018) different variations regarding land-use have numerous influences on the environment, i.e., transforming the land to agricultural use can lead to soil erosion. Therefore, all the above arguments lead to the construction of the following hypotheses,

H1: There is a significant relationship between population density and ES.

2.3. The association between population growth and environmental sustainability

The interlocking issues in the growth of population, environment, and assets have been the focus of many studies and researches (Kojo & Paschal, 2018). In this perspective and concept, many questionable processes and assertions have been discussed with enhancing volume. And according to Cumming and von Cramon-Taubadel (2018), the most critical of these is the notion that the density, as well as the growing volume of the ASEAN countries, are significant contributors to this region’s adverse effect on local as well as global environment damages. population growth (PG) is one of the big factors for degradation in the environment (Salahodjaev, 2016). In general, PG plays a direct and significant impact on the designing and functioning of a socio-economic type of environment (Alkaher & Carmi, 2019; Ch, et al., 2020). The impacts are experienced in the natural environment also. According to Saint Akadiri, Bekun, and Sarkodie (2019) production of waste by a large volume of the population directly affects the sustainability level in the environment, and this is mainly because by destructive processes individuals dumped more and more waste in the environment which directly affects the sustainability level (Aboagyey, 2017). As the large-population made waste is not transformed, it mainly causes degradation, and the volume of the environment to absorb large waste is minimized, and additionally waste majorly leads to water and air pollution which directly influences the ES (Asongu, Le Roux, & Biekpe, 2018). A study by Batchelor (2019) demonstrates that destructive processes by the huge growth in population removed a significant amount of minerals from the earth and mainly leads to the damage of biodiversity and according to Iwamura, Lambin, Silvius, Luzar, and Fragoso (2016) these have majorly led to ES imbalance and sometimes huge damages. Moreover, Chowdhury et al. (2020) manifest that fast growth of population has majorly ensured urbanization which further has negatively impacted ES because due to PG natural resources in the region are depleted at a significant rate which is not positive signs for ES. Therefore, the above discussion leads to the following hypotheses,

H2: There is a positive relationship between population growth and environmental sustainability.

2.4. The relationship between Urbanization and environmental sustainability

Human beings are the most powerful environmental force round about the last 10,000 years. With the advancement of agriculture, before 8,000 years ago, humans started to change the land, but the advancement in the industrial sector, humans started to affect its atmosphere (Z. Liu, Ding, He, Li, & Wu, 2019). Urbanization is the major issue and a serious matter to solve in the present times. In the modern age, the world population is
increasing twice but urbanization is triple. This population density has affected environmental sustainability as this is a fact that the population of an area affects environmental sustainability (Capps, Bentsen, & Ramírez, 2016). Thus, population growth of the world is also causing the growth of urbanization. It is estimated that almost all the world population would have become urbanization. This continuous growth in the population affects environmental sustainability as more sources, industries, health facilities, education needs to be developed and an increase is required. Consequently, there is an issue regarding urbanization that all these facilities to fulfill the requirement of the urban population affect environmental sustainability. The urban population affects the environment as the urbanization affects environmental sustainability utilizing their consumption of food, water, energy, and land also (Azam & Khan, 2016; Besenyő, & Kármán, 2020). As a result, this affects the quality of their health and life. The urban population also plays a major role in the consumption of energy, electricity, food, water, buildings, health and most important of all use of transport that affects the health and the lifestyle of the urban population as there is no fresh air and water to live affects the health quality of the urban community. Mancabelli et al. (2017) in research determines that environmental sustainability is only possible through the means of implementing a proper system to maintain a balance and system where all health facilities, educational, industrial, and environmental facilities are in bulk so that the population density may also be benefitted from the facilities of a sustainable life. Environmental sustainability is dependent on the balanced distribution of population in the urban areas (Liang, Wang, & Li, 2019; Klimas, 2020; Pavlova, Šenfelde, 2017). The relation between the urbanization and environmental sustainability is very sensitive as sustainability in the environment is possible when there is a proper through channel development of all the facilities required and the population must have been provided the facilities at the place where they are resident so that urbanization may affect positively on environmental sustainability (Adams & Klobodu, 2017). Thus, the above discussion concludes to the following hypotheses,

**H3:** There is a significant relationship between Urbanization and environmental sustainability.

### 3. Methodology

#### 3.1. Framework

Based on the previous research work related to population density, urbanization, population growth and environmental sustainability, we have decided to consider the literacy rate as a controlling variable whose existence directly affects the relationship among tested variables. So, in order to consider the impact of tested population dynamics on environmental sustainability, the following aggregate production function model is developed:

\[
Y = f(L, K, M)………………………………………………… (1)
\]

where \(y\) is an environmental sustainability variable, \(f\) is literacy rate, \(L\) is the population density, \(K\) is population growth and \(M\) is Urbanization. We have converted the above equation 1 into a log-linear form which can be considered as follows.

\[
\ln y = \beta_0 + \beta_1 \ln L + \beta_2 \ln K + \beta_3 \ln M…………………………………….. (2)
\]

where the coefficients \(\beta_i\), \((i = \ldots n)\) is directly related to the population dynamics, urbanization and population growth.

#### 3.2. Data

In order to make a constructive outcome, this study majorly used the population dynamics of 13 Asian countries throughout 1990-2016, where their density, urbanization figures, and the growth rate based statistical outcomes are considered. The major countries selected for this paper are China, India, Sri Lanka, Pakistan, Indonesia, Japan, Philippines, Bhutan, Thailand, Bangladesh, Vietnam, Nepal and Tajikistan. The reason is that all of these selected
countries are developing nations within this region and there is a drastic change occurred within their environmental sustainability approach within these states. This paper is helpful to critically evaluate their population dynamics with their changing environmental sustainability factors. To collect the relevant data to justify the tested hypothesis, majorly annual data regarding their urbanization, population density, and population growth is considered to critically evaluate their stability factor. This majorly considered “GDP growth rate” to inspect their annual population growth factor, and “number of industrial development projects’ to evaluate their urbanization concept. While environmental sustainability is usually considered through their “environment performance” in this paper. All the tested values of the data are selected from "World Development Bank Indicators of World Bank." This paper will be informative to critically evaluate the relationship between the tested variables.

3.3. Unit Root Test
This study employs the “Im-Persaran-Shin (IPS)” and “Levin-Lin-Chu (LLC)” based unit root tests in order to confirm the stochastic properties of the selected variables along with the order of integration (Hussain, Naqvi, Makhdum, & Shah, 2019). These two-panel unit root tests are more effective and productive in this data evaluation as compared to the traditional time series approach because these two easily overcome the size and power-based problems faced by the individual time series techniques. IPS is a helpful one to depict that both variables are stationary that helps to justify that the null hypothesis is not existed (L. Song & Mi, 2016). This is an effective approach to perform the cointegration with the related variable sets. This shows that the IPS test directly permits the heterogeneity autoregressive process across the cross-section. While, in the case of LLC, which was estimated by Levinlin, shows that each unit in the panel explores the same co-efficient, but only considered the time effects, individual effects and time trend based possibility in the evaluation. This test usually performs on the basis of the null hypothesis of variables who are suffering from unit root against the no unit root based alternative in a series. However, it considers the same autoregressive process across any cross-section. According to the Baltagi, statistics of the panel unit root test effectively lead to the standardized normal distribution. The IPS and LLC unit root tests are nothing but a unit root test based extension which is specified for the time series approach in the augmented Dicky-Fuller. The research structure of both panel unit tests can be presented by using the following augmented Dicky-Fuller regression equation, as given below;

\[ y_{i,t} = \alpha_i + \rho y_{i,t-1} + \pi \sum_{j=1}^{\infty} \alpha_j y_{i,t-j} + \epsilon_{i,t} \ldots \ldots (3) \]

3.4. Panel Cointegration Test
Just like the IPS based panel unit root test, the Pedroni cointegration technique allowed the heterogeneity across the individual panel member. By considering the heterogeneity across the panel members, this cointegration type of statistical technique is useful as it’s an unrealistic approach to significantly assuming the common cointegration vectors across the panel members (Nguyen & Kakinaka, 2019; Zoundi, 2017). With the help of the regression specification, the panel cointegration technique of Pedroni can be started and it is shown in the following equation;

\[ y_{i,t} = \alpha_i + \delta_i t + \beta_1 X_{1i,t} + \beta_2 X_{2i,t} + \cdots + \beta_n X_{ni,t} + \epsilon_{i,t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (4) \]

According to the above equation (4), \( \alpha_i \) denoted the country-specific effects, \( \delta_i \) represents the deterministic time trend and \( \epsilon_{i,t} \) is an estimated residual within a specific selected state.

From equation (2), the cointegration test is performed based on the regression of the selected residuals. On this base, the following regression equation is usually performed on the estimated residuals (\( \epsilon_{i,t} \)) in order to inspect the null hypothesis that tested variables are not cointegrated and all the hypotheses are justified.

\[ \epsilon_{i,t} = \rho_i \epsilon_{i,t-1} + \mu_{i,t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (5) \]
Pedroni’s majorly proposed two types of cointegration approaches, the first one is between dimension approach and the second one is within the dimension approach. Well, the first one based on three major statistics like “group PP statistics” (nonparametric), “group rho” and “group ADF statistics (Parametric)”. On the other hand, the second type includes four test statistics, named as “panel (PP) statistics” (nonparametric), “panel v”, “panel ADF statistics (parametric)” and “panel rho”. In “within the dimension approach”, the panel cointegration technique of Pedroni assumed the null hypothesis of Ho:ρi = 1 for all i against the alternative H1: ρi < 1, for all i. While on the other “between the dimension approach”, against the alternative of H1:ρi < 1 for at least one i, the assumption is made where H0:ρi = 1 for all i.

3.5. The FMOLS and DOLS Tests

To critically inspect the full dynamics OLS and modified OLS, the following equation of the regression equation is developed;

\[
GDP_{i,t} = \alpha_i + x_{i,t}\beta + u_{i,t} \hspace{1cm} (6)
\]

Where \( \alpha_i \) is country-specific effects, \( \beta \) is a slope vectors (k, 1) dimension, GDP\(_{i,t} \) is gross domestic product, and \( u_{i,t} \) is a stationary disturbance term. According to above statistics, \( x_{i,t} \) is considered to be (k,1) vector of explanatory variables where the \( x_{i,t} \) (k, 1) vector of independent variables are the integrated process of a specific order for all the cross-sectional items, as shown in the following equation;

\[
x_{i,t} = x_{i,t-1} + \varepsilon_{i,t} \hspace{1cm} (7)
\]

The fully modified OLS estimator is usually obtained by considering the endogeneity correction and serial correlation to the ordinary least square estimator (Khan et al., 2019). The related outcomes of FMOLS estimator is represented in the following equation;

\[
\beta^{FM} = (N \sum_{i=1}^{N} \sum_{t=1}^{T} (X_{i,t} - X_{-i}^{-1} 2)^{-1} N \sum_{i=1}^{N} \sum_{t=1}^{T} (X_{i,t} - X_{-i}^{-1}) \cdot GDP_{i,t} - T \delta^* \varepsilon_{u}) \hspace{1cm} (8)
\]

where \( \delta^* \varepsilon_{u} \) represents serial correlation correction item, GDP\(_{i,t} \) is the transformed variables of GDP\(_{i,t} \) to develop the endogeneity correction. Well, Chiang and Kao majorly extended the DOLS estimator to the panel analysis. Such an estimator is usually obtained through endogeneity correction and serial correction. Smyth and Lean also stated the possibility of controlling the endogeneity problem in the model that based on cointegration regression with lagged and lead difference of the population dynamics based independent variables. Thus, a robust correction of endogeneity in regression offered by DOLS estimator, as shown in the following equation;

\[
GDP_{i,t} = \alpha_i + x_{i,t}\beta + p2 \sum_{k=-p1}^{q2} \lambda_{ik} x_{i,t-k} + u_{i,t} \hspace{1cm} (9)
\]

Where, the coefficient of lag or lead of first differenced explanatory variables shown as \( \lambda_{ik} \), country-specific effects shown as \( \alpha_i \) and error term of following I (0) process represented as \( u_{i,t} \).

4. Empirical Findings

4.1. Results of Unit Root Test

In this paper, IPS and LLC tests are applied to the selected variables, as there results are shown in the following table 2. According to the following statistics, it becomes clear that for all the tested variables, the null of unit root cannot be rejected at any level. Well, these variables are stationary at the initial differences, so it becomes clear that all the tested variables, independent, dependent and controlling ones, are non-stationary at the levels and become stationary at their first difference. Its tests based outcomes are shown in the following table, where the *, **, and *** depicts the rejection of the null hypothesis at one, five, and the ten percent levels.
Table 2: Unit Root Test

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Level</th>
<th>1st Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant</td>
<td>Constant+ Trend</td>
</tr>
<tr>
<td>POD</td>
<td>-2.3023</td>
<td>-2.4885</td>
</tr>
<tr>
<td>POG</td>
<td>-2.3994*</td>
<td>-2.3847*</td>
</tr>
<tr>
<td>URB</td>
<td>-3.3843*</td>
<td>-3.4883*</td>
</tr>
<tr>
<td>LIT</td>
<td>-5.3982*</td>
<td>-5.2990*</td>
</tr>
<tr>
<td>ENS</td>
<td>-4.3843*</td>
<td>-4.2984*</td>
</tr>
</tbody>
</table>

4.2. Results of Pedroni’s Cointegration Technique

This test is informative to effectively test the cointegration among the selected variables, like in "within dimension approach", three of the four statistics reject the null hypothesis of cointegration lackness at 5 and 1% level, as shown in the following table. Similar to this, in "between dimension approach", one of the three statistics rejects the null hypothesis of cointegration lackness at 5 and 1% levels. Overall, four out of seven test statistics as suggested by Pedroni reject the null hypothesis, so all the variables are cointegrated, as discussed below in table 3.

Table 3: Panel Cointegration Test

"Alternative hypothesis: common AR coefs. (within-dimension)"

<table>
<thead>
<tr>
<th></th>
<th>Statistic</th>
<th>Prob.</th>
<th>Weighted Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel v-Statistic</td>
<td>-3.0949*</td>
<td>0.0032</td>
<td>9.3947</td>
<td>0.0044</td>
</tr>
<tr>
<td>Panel rho-Statistic</td>
<td>4.0334*</td>
<td>0.0288</td>
<td>2.6394</td>
<td>0.0361</td>
</tr>
<tr>
<td>Panel PP-Statistic</td>
<td>-3.7024**</td>
<td>0.0391</td>
<td>-4.1076</td>
<td>0.0030</td>
</tr>
<tr>
<td>Panel ADF-Statistic</td>
<td>1.1995</td>
<td>0.0819</td>
<td>-0.4309</td>
<td>0.3283</td>
</tr>
</tbody>
</table>

"Alternative hypothesis: individual AR coefs. (between-dimension)"

<table>
<thead>
<tr>
<th></th>
<th>Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group rho-Statistic</td>
<td>6.0209*</td>
<td>.00001</td>
</tr>
<tr>
<td>Group PP-Statistic</td>
<td>-9.1497</td>
<td>0.0000</td>
</tr>
<tr>
<td>Group ADF-Statistic</td>
<td>-1.13996</td>
<td>0.3498</td>
</tr>
<tr>
<td>Kao test.</td>
<td>Statistic</td>
<td>Prob.</td>
</tr>
<tr>
<td>ADF</td>
<td>-2.3983*</td>
<td>0.0017</td>
</tr>
</tbody>
</table>

According to the above-mentioned statistics, it becomes clear that there is a significant integrating relationship between the population dynamics i.e. density, growth and urbanization, and environmental sustainability.

4.3. Results of FMOLS and DOLS Estimators

After the major hypothesis justification, it is useful to estimate the retention coefficients of the explanatory variables with the help of a panel-integrating estimator. This FMOLS panel estimator is helpful to attain these study objectives, where both pooled and group-based versions of the tested variables are considered. As mentioned below, the coefficient of both pooled and grouped version of FMOLS and DOLS estimators are statistically significant in case of population density (their values is 0.312 and 0.294), population growth (value is 0.104 and 0.103), urbanization (0.183 and 0.189); and also in literacy rate based controlling variable (0.293 and
0.297) and environment sustainability-oriented dependent variable (0.273 and 0.203). Also, there beta and standardize values are significant to justify that population dynamics caused a direct impact on environmental sustainability within the selected Asian states. The following table 4 shows its numerics in a quite authentic way;

Table 4: Coefficient Estimation Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Pooled</th>
<th>Grouped</th>
</tr>
</thead>
<tbody>
<tr>
<td>POD</td>
<td>Beta</td>
<td>0.312**</td>
<td>0.294**</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.674</td>
<td>0.675</td>
</tr>
<tr>
<td>POG</td>
<td>Beta</td>
<td>0.104*</td>
<td>0.103*</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.648</td>
<td>0.398</td>
</tr>
<tr>
<td>URB</td>
<td>Beta</td>
<td>0.183**</td>
<td>0.189**</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>-0.516</td>
<td>-0.371</td>
</tr>
<tr>
<td>LIT</td>
<td>Beta</td>
<td>0.293**</td>
<td>0.297**</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.386</td>
<td>0.567</td>
</tr>
<tr>
<td>ENS</td>
<td>Beta</td>
<td>0.273**</td>
<td>0.203**</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.566</td>
<td>0.734</td>
</tr>
<tr>
<td>Adj. R Square</td>
<td>Beta</td>
<td>0.892***</td>
<td>0.886***</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.966</td>
<td>0.954</td>
</tr>
</tbody>
</table>

4.4. Causality Test Evaluation

The Granger Causality test is such statistical hypothesis testing techniques that help to determine whether the selected time series is helpful to forecast the future. This test helps to predict the future performance of environmental sustainability within the selected developing states due to the influence of continuously changing population dynamics.

Table 5: Causality Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>POD</th>
<th>POG</th>
<th>URB</th>
<th>LIT</th>
<th>ENS</th>
</tr>
</thead>
<tbody>
<tr>
<td>POD</td>
<td>0.735</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POG</td>
<td>0.421*</td>
<td>0.647</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>URB</td>
<td>0.402*</td>
<td>0.383*</td>
<td>0.777</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIT</td>
<td>0.384*</td>
<td>0.309*</td>
<td>0.283</td>
<td>0.710</td>
<td></td>
</tr>
<tr>
<td>ENS</td>
<td>0.388</td>
<td>0.374</td>
<td>0.399**</td>
<td>0.492**</td>
<td>0.271</td>
</tr>
</tbody>
</table>

According to the above-mentioned table 5, it becomes clear that population density is significantly cointegrated with the population growth, urbanization, and literacy rate within an Asian state. In addition, the population growth directly boosts the percentage of urbanization and literacy rate, but the urbanization and literacy rate are such variables that show one, five, and ten percent based direct influence on environmental sustainability. This shows that all the variables are cointegrated and caused major environmental sustainability development within the selected Asian states.

5. Discussion and Conclusion

After critically evaluate the panel data analysis based statistical outcomes, it becomes concluded that there is a significant impact of the selected population dynamics i.e. population density, urbanization and population growth, on the development of advanced environmental sustainability within the China, India, Sri Lanka, Pakistan, Indonesia, Japan, Philippines, Bhutan, Thailand, Bangladesh, Vietnam, Nepal and Tajikistan based Asian states. Also, the literacy rate is a major variable that directly enhanced the people's awareness regarding
environmental safety and its related information in their socio-economic activities. In the journal of renewable and sustainable energy reviews, Mohammad Mafizur Rahman (2017) majorly concluded that mostly carbon dioxide emission-based economic development with less understanding regarding the environmental concerns caused a challenging situation to maintain the earth resources for a long run. It mostly occurs when the state authority is unable to make some environmental oriented development projects within the people (Rahman, 2017). In addition to this, Jie Liu with others in the cleaner production journal justified that there is a direct impact of logistics performance on the environment from an international perspective, where the efficiency of international shipment negatively influences the environmental degradation within Asian states. But if the environment-oriented policies have been implemented in the trade openness and other urbanization concepts, then there will be a significant inference on the environment within Asian states (J. Liu, Yuan, Hafeez, & Yuan, 2018; Zamil, Furqan, & Mahmood, 2019; Chetathamrongchai, Jermsittiparsert & Saengchai, 2020).

This shows that excessive urbanization based developmental projects caused a drastic negative impact on favorable environmental sustainability factors. A similar cross-country based panel data analysis made by other scholars who critically inspect the negative influence of urbanization on the carbon dioxide emission. According to them, there is a U-shaped relationship between urbanization and carbon emission that results in the slowdown of all the sustainable economic activities within a state (Azam, 2016; Zhang, Yu, & Chen, 2017; Moumen, El Idrissi, Tvaronavičienė, & Lahrach, 2019).

When the literacy rate directly boosts the population density and population growth, then there will be more opportunities to enhance environmental sustainability within a developed and developing nation (Kojo & Paschal, 2018).

Thus after critically evaluate the tested variable by using a panel data analysis, it becomes concluded that population density and population growth directly boost the concept of environmental sustainability factor when the literacy rate among the natives becomes high. However, the urbanization always caused a negative impact on the environment because of the emission of CO2 gas that negatively affects the climate. So, after critically evaluate the past years' data of the selected Asian countries by applying Pedroni’s panel cointegration technique and FMOIC estimation, it becomes clear that due to advanced literacy rate among the Asian nations over the period of 1990-2016 enhanced the positive influence of population density and population growth, and negative influence of urbanization on the environmental sustainability factor.

This paper is an informative approach to give a new direction to the policy implication within the Asian countries regarding enhancing the literacy rate among people. In addition, their local governments can develop such environmental awareness campaign among its people. No doubt, it is informative research, but the carbon dioxide based major controlling variable is not considered for data evaluation, which may affect the validity of this paper. This weakness can be overcome by upcoming researchers in their journal articles.

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MACROECONOMIC INDICATORS AND CO\(_2\) EMISSION: ARE ASEAN COUNTRIES DOING A WRONG TRADE-OFF?

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Abstract. The major aim of this study is to explore the impact of macroeconomic indicators on the carbon dioxide emission in the ASEAN stated from 1975 to 2016 by using the World Bank Data. To fulfill this objective, the GDP, FDI, non-renewable energy, and industrialization are considered as independent variables, CO2 emission as a dependent variable, and population growth as a controlling variable used to justify the wrong trade-off. India, Bangladesh, Sri Lanka, Pakistan, and Nepal based ASEAN countries are majorly studied for data analysis. In this research methodology, Panel corrected the standard error for the statics estimation approach, and also one step generalized moment's method for the dynamic estimation approach is specifically used in the data evaluation. Both dynamics and static estimations indicate GDP, FDI, non-renewable energy, and industrialization caused a significant positive impact on the carbon dioxide emission, where the presence of population growth acts as a strong controlling variable that boosts the impact of macroeconomic indicators on the CO2 emission. This current study is an informative approach in front of the ASEAN administration, policymakers, business community and their local natives to consider their socio-environmental responsibilities in the advanced economic development phase. In addition, these research findings are a new contribution to the existing literature. However, there are some deficiencies within its variables selection like lack of green marketing and literacy rate as the controlling variables may affect the authenticity and reliability of the analyzed data, which can be overcome by upcoming researchers.

Keywords: GDP; FDI; Non-Renewable Energy; Industrialization; CO\(_2\) Emission; Population Growth


Jel Codes: O1, O53

1. Introduction

The ASEAN nations have embraced numerous efforts to acquire the targets related to renewable energy that results in environmental, energy-related, and economic challenges faced by the stakeholders and the policymakers (Vo & Le, 2019). In recent years, ASEAN countries have developed to the most dynamic economic area and consist of approximately $2.4 trillion of gross domestic product (Sharvini, Noor, Chong, Stringer, & Yusuf, 2018). Research by Yaqoot, Diwan, and Kandpal (2016) states that misleading conclusion is suggested by conventional tests that are applied to the dataset concerned with EKC and Granger causal association among EC, CO\(_2\), and GDP in the existence of CD (Chang et al., 2017). The emission of CO\(_2\) and macro indicators is considered as a wrong trade-off of ASEAN countries that results in decreasing the productivity and the quality of the environment (Islar, Brogaard, & Lemberg-Pedersen, 2017). The below Table 1 gives some important non-renewable energy usage that derives CO2 emissions in ASEAN countries.
Table 1: Non-renewable energy usage and their impacts

<table>
<thead>
<tr>
<th>Non-renewable energy usage (The problem)</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased consumption of fossil fuels</td>
<td>Increasing global temperatures at a degree above what humans can adapt to live.</td>
</tr>
<tr>
<td>Total depletion of non-renewable energy source due to the finite supply</td>
<td>It generates air pollution through the burning of fossil fuels which damaging the entire planet.</td>
</tr>
<tr>
<td>Carbon imbalance by burning fossil fuels</td>
<td>Environmental disasters such as harmful to humans.</td>
</tr>
</tbody>
</table>

The ASEAN countries are facing the problems of change in the climate as well as an increase in economic growth (Özokcu & Özdemir, 2017; Pang & Jia, 2020). The rates of energy consumption have also been increasing rapidly that is contributing to the emission of greenhouse gas (Aung, Saboori, & Rasoulinezhad, 2017; Qambar & Waheed, 2020). Accurate information regarding the association of energy consumption (EC), carbon dioxide emission, and economic development should be gathered by ASEAN countries to apply applicable policies for controlling them (Ahmad et al., 2017; Mehmood & Farooqi, 2020). Plans and strategies should be made for energy consumption and the emission of CO2 (Liobikienė & Butkus, 2018; Baltgailis, 2019).

The figure 1 below illustrates the quantity of CO2 emissions in different ASEAN countries.

![Figure 1: CO2 Emissions in ASEAN Countries](image)

From a past research perspective, it comes to the knowledge that significant efforts have been completed regarding the impact of economic indicators (EIs) on environmental damage. For example, a study by Liobikienė and Butkus (2019) deeply understands as well as evaluate the impact of EIs such as GDP and industrialization on the degradation in terms of the environment in different MENA countries. Nonetheless, no research has been conducted concerning ASEAN countries and their environmental degradation mainly due to CO2 emissions. For
that reason, the given research is new and helping to acknowledge the importance as well as the role of GDI and industrialization in increasing the emissions of CO2 gasses, which affect the environment of all ASEAN nations.

Moreover, during the last few years, several analysts such as (Kahia, Jebli, & Belloumi, 2019) have exemplified the role of economic growth (EG) in increasing the emissions level of CO2 gas in different perspectives and regions. Still, the current article is significant as well as justified because no other analyst has manifested the impact of foreign direct investment and non-sustainable energy usage on the emission level of CO2 gas in ASEAN regions. Based on the above justification, the following study has below objectives,

- The initial objective is to identify the overall impact of GDP on the level of carbon dioxide emissions in ASEAN states.
- The second intention of the research is to evaluate the direct influence of FDI on CO2 releases in ASEAN kingdoms.
- The third goal of the study is to examine the impact of non-renewable energy usage on CO2 emissions in ASEAN states.
- The final aim is to scrutinize the direct effect of industrialization on CO2 emissions in ASEAN regions.

The significant intention of this research paper is to investigate the impact of macro-economic indicators on the rate of CO2 emissions to determine the level of environmental degradation in ASEAN nations. Therefore, the outcomes of specified study help and significant for many chemical experts that deal with the emissions of CO2. Moreover, due to the limited number of researches considering the association among macro-economic indicators and environmental effects, the significance of this effort is to recognize the clear role of macro-economic indicators on the CO2 releases from the perspective of ASEAN nations.

The study comprises five sections in which the problem statement, background, research objectives and questions, scope, and significance is discussed in the section of the introduction. The detailed literature of different variables is described in the review of the literature section. The information collection techniques and tools are defined in the chapter of the research methodology. The data analysis section discusses the techniques and processed data of interpretation. The last chapter covers implications, conclusion, discussion, and future recommendations concerned with the study.

2. Literature review

2.1. Theory of Greenhouse gas emissions (GHGEs)

According to Gao and You (2017), the weather change is one of the most earth pressing as well as significant issues. Human emissions of greenhouse such as CO2 and methane have enhanced global temperatures by approximately one-degree centigrade and this all happens due to vast industrialization (Draskovic, Popov, & Peleckis, 2017; Pei & Shan, 2020). According to the theory of GHGEs, CO2 traps certain kind of heat and make the planet warmer mainly due to huge economic activities (Depoers, Jeanjean, & Jérôme, 2016). This theory state that, economic as well as spreading industrialization activities are mainly responsible for almost entire of the increase in greenhouse gases like CO2 and nitrogen oxide in the environment over the last few decades (Borghei, Leung, & Guthrie, 2018). Moreover, according to Kellner (2016), the largest source of CO2 gas emissions from industrialization as well as energy usage activities are mainly from burning fossil fuels and other materials for rapid economic growth, electricity, transportation, and heat. In the light of the given theory, Haites (2018) in a research manifest that transportation involves in the rapid growth of FDI, as well as EG, is the first major source of CO2 emissions in all over the globe (Hussain, Anwar & Razimi, 2020). Additionally, the economic sector establishes the massive share of conservatory gas mainly because CO2 outflows from EG initially come from developing new sectors and companies that burn materials like fossil fuels (Berthiaume, Rosen, & Bouchard, 2017).
2.2. The relationship between gross domestic product (GDP) and CO2 emissions
There is a reverse U-shape relationship among GDP and CO2 that helps in reducing the environmental damage to a country. According to a research study by Mendonça et al. (2020), a long-run antecedent exists among CO2 and GDP of ASEAN countries, and an enlarge in the emission of CO2 is directly proportional to the enhancement in GDP. As a result, the increase in GDP increases the EG of the state. GDP is positively related to CO2 emissions at a significant level that results in increasing productivity and producing effective services and products (Nain, Ahmad, & Kamaiah, 2017). It is proved by the theory of greenhouse gas emissions that the emission of CO2 and methane have improved the universal temperatures with the help of massive industrialization. The economy of ASEAN countries can be developed by attaining dramatic drops in the concentration of carbon by substituting to geothermal, solar, wind, and other renewable sources of energy (Ho, 2018). According to Shabani and Shahnazi (19), the emission of CO2 should be alleviated by focusing on the alteration factor that links the energy to productivity to pollution. The connection between carbon dioxide emissions and GDP can be determined with the help of a regression technique that examines the economy of a country. Similarly, another study by Muhammad and Saad (2018) said that cross-sectional dependency also plays a vital role in the relationship between CO2 emissions and GDP that helps in directing the causality among different variables. The environmental quality of a country will increase effectively and efficiently if the emission of CO2 will increase till average income extents to a turning point. The policies that are specifically developed to preserve energy will not influence GDP badly (Marjanović, Milovančević, & Mladenović, 2016; Maziriri, Mapuranga, Maramura, & Nzewi, 2019; El Idrissi, N. E. A., Ilham Zerrouk, Zirari, & Monni, 2020; Chehabeddine, & Tvronavičienė, 2020; Mikhaylov, Moiseev, Aleshin, & Burkhardt, 2020; Nuryakin, & Maryati, 2020).

The ASEAN countries are vulnerable to common tremors such as international financial crises and oil price shocks that are affecting GDP and CO2. Cross-sectional dependence should not be neglected while examining and estimating the interconnection between CO2 and GDP because the problem like size alteration will have to be faced by such countries. Therefore, the current research proposes the following hypotheses,

H1: There is a positive association between GDP growth and CO2 emissions.

2.3. The relationship between foreign direct investment (FDI) and CO2 emissions
A study by Salahuddin, Alam, Ozturk, and Sohag (2018) characterized that FDI is a type of investment in the shape of managing ownership in a particular business in one region or nation by an entity based in another nation. FDI brings a huge amount of investment in the host country which may result in the establishment of new industries and companies that may burn harmful materials which directly leads to greater CO2 emissions. During the last few decades, the emerging businesses as well as markets in ASEAN countries have attained positive financial development and profits and their financial growth depends majorly on investment and some type of foreign capital (Shahbaz, Balsalobre-Lorente, & Sinha, 2019). The countries have enchanted a significant level of FDI, which has a huge impact on the environment of the region. This is mainly because a significant level of FDI also leads to ecological damages mainly due to the emissions of GHGs by sectors and energy projects which are originally initiated by FDI volume. According to Rana and Sharma (2019) host nations examined the trade-off among ecological degradation and development therefore they can get a huge amount of FDI in their regions. Furthermore, any damages happen due to CO2 emissions by sectors as well as businesses that are initiated by FDI (Khan & Ozturk, 2020). Moreover, Xie, Wang, and Cong (2020) investigated the impact of business relationships between different ASEAN nations on the rate of CO2 emissions, indicate that exports under the FDI program are the major cause of GHGEs like CO2 in different countries of the world. The above linkage in the middle of FDI and CO2 emissions also supported by the theory of GHGEs, because theory states that a significant rate of CO2 emissions is majorly caused by vast investment activities. Therefore, the current study suggests the following hypotheses,

H1: There is a positive association between FDI and CO2 emissions.
H2: Increase the volume of FDI increases the level of CO2 emissions.

2.4. The association between non-renewable energy usage and CO2 emissions
A study by Dogan and Seker (2016) characterized that non-renewable energy (NRE) majorly comes from the sources that will run out and will not be refilled for many years, the most general sources of NRE are fossil fuels that are majorly used by different vehicles. Fossil fuels were mainly developed as the remains of marine creatures decayed several years ago, mainly under significant among of heat as well as pressure. Most fossil fuels are majorly burned to generate electricity and energy for vehicles which emit gases like CO2 (Inglesi-Lotz & Dogan, 2018). According to Zhang, Wang, and Wang (2017) coal, above, is a dimension of rock that is also a fossil fuel that emits a significant amount of CO2 gases. Recent statistics regarding GHGEs manifest that the transportation sector which uses a large number of fossil fuels creates a huge share of carbon dioxide emissions. This is mainly because CO2 releases from this sector fundamentally come from using fossil fuel for ships, cars, planes as well as trains. Dogan and Ozturk (2017) Demonstrate that over 80% of the fuel used for this sector is petroleum-based, which mainly involves initially diesel as well as gasoline which are major sources of CO2 emissions. Consequently, the above discussion leads to below hypotheses,

H3: There is a significant relationship between non-renewable energy usage and CO2 emissions.

2.5. The relationship between industrialization and CO2 emissions
From an economic perspective, industrialization is the economic as well as social modification of different countries from agrarian to industrial growth. From about 1840 to 1940, the ASEAN countries converted from an agrarian society to an industrialized society, and this period is significantly known as the industrial revolution for different ASEAN nations. By far, the major insignificant effect of this industrialization is on the environment majorly by emissions of GHGs (Liu & Bae, 2018). According to Zhu, Liu, Tian, Wang, and Zhang (2017), pollution is the most relevant by-service of industrialization. Though the degradation of environmental mechanisms, and CO2 emissions, and the unfavorable impact on an individual’s health have accumulated extensive discuss (Raheem & Ogebe, 2017). This is mainly because many industrialized firms are generally not forced to pay damages for ecological harm they cause due to CO2 emissions. This inter-connection between industrialization and CO2 emissions is also supported by the above theory because the theory state that GHGEs from industry initially come from burning fossil fuel for electricity which causes CO2 emissions. Hence, based on the above arguments the study proposes the given hypotheses,

H4: There is a direct relationship between industrialization and CO2 emissions.

3. Methodology
This paper majorly used the heterogeneous panel data approach to make an empirical estimation of the regression model and majorly five ASEAN countries are selected, named as India, Bangladesh, Sri Lanka, Pakistan, and Nepal where their annual data has been collected from the World Bank website from 1975 to 2016. In this study, the Gross Domestic Product (GDP), Foreign Direct Investment (FDI), Nonrenewable Energy Usage, and Industrialization are considered as independent variables and Carbon dioxide (CO2) is studied as a dependent variable, while population growth act as a controlling variable between both their relationship. All the variables are selected based on the previous literature regarding the most affected macroeconomic indicators that directly impact on the environmental sustainability factors. After this, the estimation analysis is also considered for the tested variables in the tested model, which can easily capture the poor environmental sustainability indicator (carbon dioxide) which is continuously increases since last many decades.
Based on the empirical and theoretical selected variables and their literature review, the following equation for estimation will be designed:

\[ CO2gri = \alpha + 6 \sum_{j=1}^{J} \beta_{j} X_{it} + 4 \sum_{j=1}^{J} \delta_{j} \text{CFE} \, dum_{j} + 2015 \sum_{j=1}^{J} \Theta_{j} Y + E_{it} \]  

(1)

Where \( t \) is the year, \( \alpha \) is a constant, \( i \) is the country, \( X_{it} \) is the explanatory variables, \( \text{CFE} \, dum_{j} \) is the country fixed-effect dummy, \( \beta_{j} \) is the coefficient of individual independent variables, \( \delta_{j} \) is the coefficient of country fixed-effect dummy, \( \Theta_{j} \) is the coefficient of time fixed-effect dummy and \( Y \) is the time fixed-effect by the year dummy. After this, the following explanatory variables will occur:

\[ CO2gri = \alpha + \beta_{1} \text{GDP} + \beta_{2} \text{FDI} + \beta_{3} \text{NRE} + \beta_{4} \text{IND} + \beta_{5} \text{POP} + \beta_{6} \ln\text{ENGCON} \, it + 4 \sum_{i=1}^{I} \text{CFE} \, dum_{j} + 2015 \sum_{j=1975}^{2015} \Theta_{j} Y + E_{it} \]  

(2)

Thus in time, fixed-effect dummy the proper model accounts estimation for time series based aggregate that reduces the cross-country regression influence. This approach effectively controls the panel data model based common trend that may develop a significant relationship between variables and with R2square. This selected Panel data regression model is effective for cross-section, heteroscedasticity, and autocorrelation based dependence problems along with possible multicollinearity bias. All issues in equation's data are easily tested for Wald and Breusch-Pegan/Cook-Weisberg heteroscedasticity test. VIF test for multicollinearity, Wooldridge test for autocorrelation, and the cross-section dependence test developed by Pasaran (2004). One-step system GMM estimation is used in this data evaluation where the Prais-Winsten regression correlated with dynamic and PCSE estimation (Nuță & Nuță, 2020). We considered time-fixed and country-fixed based efforts to evaluate the unobserved heterogeneity. More efficient PCSE is used to assume that disturbance, contemporaneously and heteroskedastic is correlated across panels and can easily handle the unbalanced panel.

In the selected GMM approach, the lagged values of the dependent variable are effectively used as an instrument in order to consider the endogeneity problem. In the past empirical outcomes, both system GMM and first-differenced GMM collected major attention (Maurya, Kumar, & Agarwal, 2018). Overall, the system GMM is much better when a time series is a random walk process where the level estimation based instruments are efficient predictors for the endogenous variables. So, this paper used the following system GMM model:

\[ \phi_{it} = \alpha_{i} + \gamma \, \phi_{i,t-1} + p \sum_{p=1}^{P} \beta_{p} Z_{p} \, it + q \sum_{q=1}^{Q} \beta_{q} Z_{q} \, it + \tau \sum_{r=1}^{R} \beta_{r} Z_{r} \, it + \varepsilon_{it} \]  

\[ \varepsilon_{it} = v \, it + e \, it \]  

(3)

In this model, the \( \phi_{it} \) depicts the number of macroeconomic indicators of the five ASEAN states at time \( t \), where \( \alpha_{i} \) is the constant term and \( \gamma \) \( \phi_{i,t-1} \) explore the lag value of the macroeconomic indicators. Well, \( Z_{r} \, it \) is the predictor variables and \( \varepsilon_{it} \) is an error term. Besides this, the unobserved growth of specific factors and the idiosyncratic errors are \( v \, it + e \, it \) respectively. This model also considers the following assumptions where \( E (v \, it, v \, is) = 0 \) for \( i = 1, ..., n \) and \( t \neq s \) and \( E (\phi_{it}, \phi_{i,t}) = 0 \) for \( i = 1, ..., n \) and \( t = 2, ..., T \). Lastly, the system GMM estimations are used in order to improve the model precisions along with reducing the small sample bias.

### 3.1 Analysis Interpretation

In this study, the LLC test is applied to the selected variables, as results are discussed in the following table. These outcomes depict that for all the tested variables, the null of unit root can never be rejected at any level. Therefore, these variables are stationary at the initial difference, so it becomes concluded that all the tested variables; GDP, FDI, nonrenewable energy, industrialization, population growth and the CO2 emission, are non-stationary at the levels and then become stationary at their first difference. Its * and ** based statistical description depicts the rejection of the null hypothesis at one, five and ten percent levels. Its statistics are discussed below in table 2.
Table 2: LLC unit root

<table>
<thead>
<tr>
<th>Constructs</th>
<th>GDP</th>
<th>FDI</th>
<th>NRE</th>
<th>IND</th>
<th>POP</th>
<th>CO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Level</td>
<td>-2.388**</td>
<td>-0.387</td>
<td>-3.283</td>
<td>-2.372*</td>
<td>-0.632</td>
<td>-3.873*</td>
</tr>
</tbody>
</table>

After critically utilize the LLC unit root test, it is time to make a diagnostic check of the studied variables. Diagnostic checks are efficient to critically inspect either the parameters of the model are efficiently estimated by using a maximum likelihood approach at the estimation stage or not. According to the following Diagnostic checks table, it becomes concluded that the selected data has a significant level of cross-section and heteroscedasticity dependence which combined with no multicollinearity and autocorrelation. This study data show a strong form of heteroscedasticity and cross-section dependence where two well-established empirical techniques are used to robust the standard errors and overcome the issues. All the related information regarding the F-statistics, Test statistics and mean VIF with the significant χ²-values are shown in the following Table 3.

Table 3: Diagnostic checks

<table>
<thead>
<tr>
<th>Heteroskedasticity</th>
<th>Autocorrelation</th>
<th>Cross-section dependence</th>
<th>Multicollinearity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified wald</td>
<td>Wooldridge</td>
<td>Pesaran</td>
<td>VIF</td>
</tr>
<tr>
<td>Breusch-Pagan/Cook-Weisberg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>χ²-value: 12.23**</td>
<td>F-statistic: 2.33</td>
<td>Test statistic: 4.28**</td>
<td>Mean VIF: 2.09</td>
</tr>
<tr>
<td>χ²-value: 5.00**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After considering the following correlation matrix based descriptive evaluation, it becomes clear that the correlation matrix easily rules out the possibility of any appropriate multicollinearity and depicts that there is a general level of the relationship among the tested variables. Like the GDP of the ASEAN countries is highly correlated with industrialization, population growth and then the foreign direct investment, while this variable is equally correlated with non-renewable energy and carbon dioxide emission because of their diverse outcomes. After this, foreign direct investment highly correlates with non-renewable energy and population growth within these developing ASEAN states, as compared to industrialization and CO2 emission. After this, non-renewable energy is highly correlated with CO2 emission, population growth and then the industrialization item. Similar industrialization is effectively correlated with population growth and CO2 emission, while the population growth only causes a major correlation with the CO2 emission because due to increase in population, more carbon dioxide gas-based pollution will be increased. Its numerical description are mentioned below in table 4.

Table 4: Correlation Matrix

<table>
<thead>
<tr>
<th>Variables</th>
<th>GDP</th>
<th>FDI</th>
<th>NRE</th>
<th>IND</th>
<th>POP</th>
<th>CO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDI</td>
<td>.588</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRE</td>
<td>.492</td>
<td>.583</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IND</td>
<td>.601</td>
<td>.384</td>
<td>.384</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POP</td>
<td>.592</td>
<td>.487</td>
<td>.483</td>
<td>.674</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CO2</td>
<td>.492</td>
<td>.387</td>
<td>.501</td>
<td>.523</td>
<td>.492</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 5: Results from PCSE estimation

<table>
<thead>
<tr>
<th>Dependent Variable = ENS</th>
<th>PCSE estimation</th>
<th>Sys-GMM estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>0.204** (0.377)</td>
<td>0.288** (0.384)</td>
</tr>
<tr>
<td>FDI</td>
<td>0.239* (0.648)</td>
<td>0.384** (0.387)</td>
</tr>
<tr>
<td>NRE</td>
<td>0.183* (0.577)</td>
<td>0.431** (0.482)</td>
</tr>
<tr>
<td>IND</td>
<td>0.301** (0.673)</td>
<td>0.384** (0.484)</td>
</tr>
<tr>
<td>POP</td>
<td>0.046** (0.266)</td>
<td>0.365** (0.483)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.832** (0.388)</td>
<td>0.398** (0.384)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.632*** (0.483)</td>
<td>-</td>
</tr>
<tr>
<td>Arellano-Bond test for AR (1) (Pr W z)</td>
<td>-</td>
<td>0.053</td>
</tr>
<tr>
<td>Arellano-Bond test for AR (2) (Pr W z)</td>
<td>-</td>
<td>0.399</td>
</tr>
<tr>
<td>Hansen test of overid restrictions</td>
<td>-</td>
<td>2.394</td>
</tr>
</tbody>
</table>

Well, the outcomes of both the static and dynamic estimations are discussed in the above-mentioned PCSE estimation table 5. According to the PCSE and Sys-GMM based estimations, all the outcomes of gross domestic product (GDP), foreign direct investment (FDI), non-renewable energy (NRE), industrialization (IND) and population growth (POP) are quite significant that justify the hypothesis of this paper. Majorly, industrialization (IND) and population growth (POP) based items more significantly impact on the dependent variables as compared to the remaining ones, according to the PCSE estimation. While, the Sys-GMM estimation effectively concluded that there is a significant impact of all the tested independent items on the excessive carbon dioxide emission within these developing ASEAN states, while the population growth directly boosts their influence on this negative environmental factor. Also, the above mentioned Arellano-Bond test and Hansen test based statistics show the appropriate outcomes to justify this hypothesis testing based panel data analysis.

4. Discussion and Conclusion

4.1. Discussion

According to the above mentioned PCSE estimation based statistical outcomes, it becomes concluded that there is a significant positive impact of all the tested independent variables on the excessive carbon dioxide emission. Firstly, in the case of gross domestic product (GDP), excess amount of economic growth rate within India, Bangladesh, Sri Lanka, Pakistan, and Nepal based ASEAN countries caused a negative impact on the external environment due to excessive energy consumption and utilizing all the natural resources. The current war of GDP growth within the ASEAN and other European countries creates a major threatening situation in front of the business community to maintain a healthy environmental factor with sustainable growth. According to Boqiang Lin and Zhijie Jia (2019), the output of the energy industries is more sensitive towards emission trading scheme prices as compared to other countries. This energy industries boost the country's GDP but also reduce environmental efficiency (Lin & Jia, 2019). In addition to this, many researchers critically consider the GDP growth as the basis of the carbon dioxide gas emission within an industrial state because such development approach may sometimes misuse the natural resources for business purpose and higher growth e.g. petrol, gas,
deisereal and other electronic companies are the best examples of this strategic approach (Dong et al., 2018; Shuai et al., 2018).

In addition, excessive FDI within a developing nation causes excessive emission of greenhouse gases that result in a negative impact on the environmental sustainability factor. According to Samuel and Vladimir in the science journal of total environment, the FDI directly increased the level of CO2 emission, and more clean and modern energy technologies are required to enhance the pollution levels of industrial (Sarkodie & Strezov, 2019). Pasquale Pazienza also justified this point in their research that FDI based economies in the manufacturing sector grow the excessive CO2 from fuel combustion (Pazienza, 2019). Well, non-renewable energy is such variable that causes a major drastic change in the clean and sustainable environmental factor because coal, natural gas, and nuclear power, etc. are such resources that can never be recovered and their excessive usage harmed the environmental efficiency factor (Tuna & Tuna, 2019).

In the current era, the concept of urbanization and industrialization are excessively utilized within the developing ASEAN states where a large number of environmental affected companies are operating by ignoring sustainable environmental importance. According to Feng Dong with others (2018), industrialization and the income level cause a double-threshold impact on carbon emission (Dong, Wang, Su, Hua, & Zhang, 2019). According to the above-mentioned statistics, the population growth directly enhanced the negative influence of environmental affected variables on CO2 gas emission. In the dynamic panel threshold model based descriptive research, population and energy consumption caused a significant positive impact on the carbon emission in the presence of financial development indicators (Aye & Edoja, 2017).

5. Conclusion

Thus, after critically studied the outcomes of the one-step system generalized method of moments and the Panel corrected standard error approach of the studied variables, it becomes concluded that there is a significant positive impact of GDP, FDI, non-renewable energy and industrialization on the carbon dioxide (CO2). In this situation, the excessive population growth directly boosts the influence of all the environment affected variables to consume excessive energy and other non-renewable natural resources that emit more carbon in the environment and result in environmental pollution. This paper is informative which based on exploring the concept that how advanced industrialization and FDI strategic conversion in the business operating activities of ASEAN developing nations make people's lives in danger. This 1975 to 2016 years based panel data of India, Bangladesh, Sri Lanka, Pakistan, and Nepal shows that if its management does not make any active action towards their FDI, industrialization and other major environment affected factors then it becomes quite difficult in front of its state to maintain their sustainable environment in upcoming years.

5.1. Future Implications

This paper is informative in front of these ASEAN state's governments and policymakers to consider the negative influence of unequal FDI, industrialization, non-renewable energy and GDP on the environmental sustainability factor with excessive CO2 emission, and also help them to make an efficient decision in the climate change perspective. Also, this paper helps the selected ASEAN natives and its business community to consider their social and environmental responsibility. The related field scholars can also utilize this valid data in the discussion portion.

5.2. Limitations and Future Researches

No doubt, it’s an innovative and challenging research but there are some limitations regarding its variable selection mechanism like lack of literacy rate and green marketing factors as the controlling variables, can impact the authenticity and reliability of the analyzed data. This weakness can overcome by upcoming scholars.
References


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OVERALL BUSINESS CLIMATE AND ITS IMPACT ON ENVIRONMENTAL SUSTAINABILITY:
ANALYZING EVIDENCE FROM ASEAN COUNTRIES

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Abstract. This study examines the impact of overall business climate on the environmental sustainability factor by specifically considering the ASEAN countries named as Philippines, Malaysia, Vietnam and Singapore. This paper fills the gap of the previous researches by majorly considering the trade openness, competitiveness and ease of doing business as independent variables, environmental sustainability as a dependent variable, while GDP and inflation are studied as controlling variables. All the variables data are collected from the country's official sites over the period of 2000-2015. The long-run equilibrium relationship between the tested variables is confirmed by Kao and Pedroni based panel cointegration tests. According to the fully modified ordinary least square (FMOLS) results, the trade openness, ease of doing business, and GDP cause a significant negative influence on the environmental sustainability within the selected states as compared to competitiveness based independent variables. This paper is an informative approach in front of their state's business community, government, policymakers, natives, and other related ones to consider the negative influence of overall business climate on the environment. In addition, there are some limitations like if industrialization and population growth are considered as controlling variables then more significant and authentic outcomes will be generated.

Keyword: Trade Openness; Competitiveness; Ease of Doing Business; GDP; Inflation; Environmental Sustainability


Jel Codes: O1, O53

1. Introduction

The climate of a business plays a vital role in developing and maintaining sustainability in the environment as it has become an essential part of political life (Amran, Ooi, Wong, & Hashim, 2016; Ohotina, Lavrinenko, Gladevich, & Lazdans, 2018; Bernardi, 2019; Pogodina, Aleksakhina, Burenin, Polianova, & Yunusov, 2019; Al Mazrouei, Khalid, & Davidson, 2020; Mazzoni, 2020).

The ASEAN countries can develop and find numerous opportunities to develop and according to Rasiah, Ahmed, Al-Amin, and Chenayah (2017) enhance their competitive positioning by innovating products and services in the method of addressing climate change that exploits the demands of climate induce (see Figure 1).
The climate of business and environmental sustainability (ES) helps in reducing the adverse effect on the business environment (Rasiah, Al-Amin, Chowdhurry, Ahmed, & Zhang, 2018). ES enables a business to endure prosperity. The ASEAN states are responsible for looking inside out of business to determine and understand the influence of the activities of an organization on its climate. The given enlists some important factors that affect the ES of ASEAN nations (Table 1).

Table 1: Key factors affecting environmental sustainability

<table>
<thead>
<tr>
<th>Factors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic conditions</td>
<td>External factors that concerned with a business condition such as trends and competitiveness between ASEAN nations.</td>
</tr>
<tr>
<td>Industrial input</td>
<td>Factors that consider as an input for business growth and these factors directly affect ES.</td>
</tr>
<tr>
<td>Supply chain</td>
<td>The association between suppliers between the supply chain is reflecting the ES performance.</td>
</tr>
</tbody>
</table>

There is a lack of enough resources to maintain environmental sustainability in an organization, and strategic planning is not done in the organizations of ASEAN countries that result in sustainability issues. The opportunities regarding the climate of the business are not being offered in ASEAN countries that result in unsustainability in the business environment (Menon & Melendez, 2017; Sun & Meng, 2020). Moreover, it also results in decreasing the economic value and productivity of such organizations and can increase their failure rate. There is a lack of CSR activities in the businesses of ASEAN countries as the implementation of CSR activities helps in developing environmental sustainability.

The major purpose of this research is to examine the overall impact of business climate and conditions on the environmental sustainability of ASEAN countries. Although financial development and business activities Vithessonthi and Tongurai (2016) have been examined and evaluated in past efforts and studies, there is a lack of information as well as hypotheses regarding the behavior of different businesses and companies towards environmental sustainability (ES) and other ecological concerns. Therefore, the following paper is remarkable as well as justified largely because no other study in the past has evaluated the overall impact of business dimensions.
and climates such as trade openness and competitiveness. Also, in the past, several scholars such as Osabuohien, Odebiyi, Efobi, and Fayomi (2017) have instantiated the impact as well as the role of business models in affecting the overall environment of the region from different perspectives. Nevertheless, the given project is proving to be very supportive and justified largely because no other past effort has evaluated the impact of business climate such as ease of doing business on the ES of ASEAN countries. The specified study has the following objectives which are,

- The premier objective of the study is to identify the impact of trade openness on environmental sustainability in ASEAN countries.
- The secondary purpose of the research is to examine the impact of competitiveness on environmental sustainability in ASEAN countries.
- And the endmost objective is to evaluate the direct impact of ease of doing business on the environmental sustainability in ASEAN countries.

Businesses that damage the environment generally hide what they are doing to avoid getting caught and also facing social, economic as well as legal results (Dumrul, 2018; Flores & Rojas, 2020; Tao, 2020). The major aim of the given project is to reveal the insignificant impacts of different businesses on environmental sustainability (ES) level of different ASEAN nations. Therefore, the findings of this paper help business managers to evaluate their business climate to save the environment and ensure ES. Moreover, this research can be executed in almost every type of sector as well as a business operating in ASEAN nations.

The study entails five divisions in which the introduction section describes the scope, significance, problem statement, and the background of the study. The information regarding different types of variables is discussed in the chapter of the literature review. The evidence related to the sample and population size of the research study is defined in the section of the research methodology. The tools and techniques related to the analysis of data are described in the data analysis chapter. The last chapter comprises of conclusion, limitations, implications, and future recommendations.

2. Literature review

2.1. Theory of environmental quality (EQ)
Quality of environment is one of the world’s huge environmental problems Carter, Resh, and Hannaford (2017) and the business climate impact due to contamination and some pollution stretches all around, and according to Nasreen, Anwar, and Ozturk (2017) with certain example pointing to how businesses affect the quality level of the environment which then affects the heath level of individuals. According to this theory heavily polluted regions, majorly have an insignificant time hiring and also retaining employees. According to Charfeddine and Khediri (2016) waste disposal and raw materials is another problem by a different business which affects overall quality of the environment, because according to Le, Chang, and Park (2016) with improper raw materials and disposal mainly resulting in damageable smells which directly affect the air quality of the region. Besides, this theory also states that quality includes the built as well as the natural environment such as water purity, noise, air, pollution, and some other potential impacts which all are directly affected by improper business activities and climates. Furthermore, according to Shahbaz, Shahzad, Ahmad, and Alam (2016) business practices have an insignificant impact on the natural resources which further influence the quality of environments such as oil and timber are utilized to produce goods.

2.2. The relationship between trade openness and environmental sustainability (ES)
According to Bernard and Mandal (2016) trade openness (TO) is an indicator of the relative significance of international business in the overall economy of the region. In addition, it is mainly computed by diving aggregate value of the exports as well as imports over a certain period by the GDP at the same time. According to Liu,
Yuan, Hafeez, and Li (2019) TO majorly be used as a measure of the openness of a region or nation to international business, and therefore may also be referred to as a trade openness ratio. During the past few decades, it comes to the knowledge that openness in business or trade can affect the sustainability of the environment either directly or indirectly to a very significant ratio Shahbaz, Nasreen, Ahmed, and Hammoudeh (2017). How environment-friendly a trade is when it comes to incorporating energy resources and cools the vehicles like ships and trains, to bring goods and products into it, and to eliminate the extra material from it has a direct impact on the level of ES. According to (Mahrinasari, Haseeb, & Ammar, 2019; Zeb, et al., 2020) vast or open trades between two regions and countries directly affect the quality level of environment, this is mainly because according to Sun, Attuquaye Clottey, Geng, Fang, and Clifford Kofi Ammissah (2019) resources that are used during open trade process emit dangerous greenhouse gases which insignificantly affects the ES level of the region. Open trades consume a vast amount of energy resources like diesel, and petrol, even with openness trading recycling waste, according to (Omri, Euchi, Hasaballah, & Al-Tit, 2019; Iqbal, Adeel & Khan, 2020) a huge amount of waste and different kinds of disposal still goes to incinerators as well as landfill sites which further affects the ES in an insignificant way. In addition to emissions, openness trade generates a lot of other ecological issues, including types of equipment like modern technologies; this is mainly because according to (Yu, Golpîra, & Khan, 2018) trading companies regularly modify their trading processes to stay competitive in the market. Additionally, technologies like computers and other devices can majorly end up in landfills where they do not collapse and, according to (Liu, Yuan, Hafeez, & Yuan, 2018) even damageable, can drain harmful chemicals and materials into the water which finally leads to the direct impact on the level of ES. Hence, the above all discussion leads to the generation of following hypotheses, 

H1: There is a positive relationship between trade openness and environmental sustainability.

2.3. The relationship between competitiveness and environmental sustainability

Environmental sustainability is considered an essential part of the success of marketplace and corporate strategy as well as the competitiveness strategy of ASEAN countries. According to (DeBoer & Panwar, 2018) the decisions of a country related to the modalities of environmental conventions or the severity of environmental standards can highly affect the profits of an organization and can make it less competitive in the world vocation. Doyle and Alaniz (2020) describe that when the environmental conventions correlated to sustainability are wisely designed to resolve genuine ecological complications using proficient policy tools, it will not significantly diminish national competitiveness (Hussain et al., 2020). The execution of research related to Chuang and Huang (2018) has revealed that the economy of a country is highly affected by the positive association of environmental sustainability and competitiveness in multiple ways. This relationship can also result in a better and effective outcome if it is related to informal or formal societies that describe property rights and result in the implementation of sustainable processes. Dias (2017) has determined that competitiveness plays an essential role in the contention for the customer base and bigger market share, and it is concerned with the success of an organization. According to Luis, Giulio, and Gabriel (2020), the relationship of competitiveness and environmental sustainability provides a company distinctive external and internal features that assist as strength to preserve its position in this impulsive economy. The researcher Camisón (2020) explains that environmental sustainability in an organization can be enhanced with the help of competitiveness, and the greater value can be provided to the customers along with the greater benefits to the organization. The investigation conducted by Susanto (2019) has articulated that a company needs to maintain its competitiveness along with its environmental sustainability to be successful in this modern economy. The positive relation among sustainable environment and competitive advantage is supported by the theory of environmental quality that the raw materials and water disposal are the problems being faced by a company that affects the quality of its environment badly.

H2: There is a significant association between competitiveness and ES.
2.4. The relationship between the ease of doing business and environmental sustainability
Ease of doing business (EDB) is a relative concept that has understanding only when the comparison between two regions or states is made Asongu and Odhiambo (2019). A study by (Hassan & Basit, 2018) manifests that EDB means how easier and effective conditions a country offer to start a business or an enterprise with significant taxation facilities. According to Muli and Aduda (2017), EDB is a concept which means that how easier and supportive facilities a government of a country offer to get an electricity connection for industrial purpose and also access to credit for large business objective (Kamarudin et al., 2020). Besides EDB are supportive conditions that a country offers to foreign investors with extra facilities like relaxation in taxation norms and values, relaxation in GST as well as the property registration laws so that the foreign investors get effective facilities (Jovanovic & Jovanovic, 2018). According to Vogiatzoglou (2016), ease or facilities in business activities and conditions enlarge the volume as well as the number of enterprises and industries which directly affect the environment and sustainability of environmental efforts. According to ASEAN Environmental Protection Agency, industrial energy use (derive by high facilities in terms of EDB) accounts for about 35% of total ASEAN greenhouse gas releases. The EDB activities that are major affecting the environment and will continue to affect sustainability and quality in terms of environment and according to Gaur and Jasmin (2017) such challenges as huge emissions, improper waste management, and other business-related issues that affect the environment are generating critical determents. According to (Canton & Petrucci, 2017) higher demands for energy by industries and business that operate under EDB facilities also translates into more use of natural resources like fossil fuels and water, which then turn into serious environmental issues and affect the sustainability level of the environment. Hence, based on above all discussion this research proposes the below hypotheses,

H3: There is a positive interconnection between the ease of doing business and ES.

3. Methodology
In order to explore the influence of overall business climate on the environmental sustainability within the ASEAN states, Indonesia, Thailand, Philippines, Malaysia, Vietnam and Singapore are selected for data evaluation. For data collection, their fifteen years data from 2000 to 2015 are selected from their official sites regarding the major tested variables of this paper. For the above-mentioned proposed hypothesis testing, trade openness, competitiveness and ease of doing business are studied as independent variables, environmental sustainability studied as a dependent variable, while the gross domestic product (GDP) and inflation based variables act as controlling ones between the relationships of two major variables. The relevant data of these tested variables is collected from the previous literature. The following econometric model is specified in order to check the proposed hypothesis, as mentioned in the literature review;

\[
ENS = \beta_0 + \beta_1 LTRO_{it} + \beta_2 LCPI_{it} + \beta_3 LEOD_{it} + \beta_3 LGDP_{it} + \beta_4 LINF_{it} + \epsilon_{it} \] ................. (1)

Where \(LTRO_{it}, LCPI_{it}, LEOD_{it}, LGDP_{it}, \) and \(LINF_{it}\) are the logarithm forms of trade openness, competitiveness, ease of doing business, environmental sustainability, GDP and inflation.

3.1. Panel Unit Root Test
Levin-Lin-Chu (LLU), ADF-Fisher chi-square (ADF-Fisher) and Im, Pesaran and Shin (IPS) based panel unit root tests are implemented to testify the presence of panel stationarity (Cai & Menegaki, 2019). All these tests have a null hypothesis that there is a unit root in front of any alternative where all variables are stationary. These are represented in the following equation form;

\[
y_{it} = \alpha_i + \beta_i y_{i,t-1} + p\sum_{j=1}^{n} \alpha_j y_{i,t-j} + \epsilon_{it} \] ....................... (2)

where, \(\Delta y_{it}\) is the difference of y for the ith country in the time span t =1, ….., T. This type of statistical test is majorly based on homogeneity assumptions, like Ho: \(\beta_1 = \beta_2 = 0\). The heterogeneity is also discussed in equation 2, by allowing the \(\beta_i\) to differ across cross-sections like under the alternative hypothesis. Well, some of its tested
variables may be non-stationary in the test outcomes. The heterogeneous, nonparametric Maddala, Fisher and Wu test based $p$ values in the final panel unit root test is shown in the following equation:

$$p = -2 N \sum_{i=1}^{N} \ln \beta_i$$………………… (3)

### 3.2. Panel Integration Test

Cointegration test of Pedroni and Kao are majorly considered to test the occurrence of any long term relationship among the variables. The Kao test is a residual and parametric based test to justify no cointegration for the null hypothesis (Sehrawat & Giri, 2016). It is shown in LSDV regression as shown in the following equation;

$$y_{it} = \alpha_i + \beta X_{it} + \epsilon_{it}$$………………………. (4)

Well, the Dickey-Fuller and its augmented tests are implemented to detect the residuals from the regression equation based estimation. There is a cross-sectional invariant among all the five variations of the Kao test based slope coefficient ($\beta$) values (Ramenah, Casin, Ba, Benne, & Tanougast, 2018). In addition, Pendroni based cointegration test for no integration of the null hypothesis is implemented for the homogeneity assumption of Kao. Its Pendroni regression equation is discussed below;

$$y_{it} = \alpha_i + \delta_i t + \beta_i X_{it} + \epsilon_{it}$$……………………….. (5)

where $\beta_i$, $\delta_i$ and $\alpha_i$ are free to change across any cross-sections. In the equation 5, two types of statistics based pooling residuals are discussed where the first type pools the obtained residuals on homogeneous panel cointegration statistics based on "within dimension", and the second type pools the obtained residuals along with heterogeneous group mean statistics based on "between dimension".

### 3.3. Estimating the Cointegration Relationship with Weighted FMOLS

Fully Modified Ordinary Least Square (FMOLS) based panel estimation technique is used to estimate the cointegrated panel regression (Pradhan, 2016). It is a nonparametric approach that is helpful to generate an optimal cointegrating regression outcome and designed adjustments for the endogeneity and serial correlation due to the existence of cointegrating relationships. In this paper, Kao and Chiang, and Pedroni specifically pooled the FMOLS estimators for the heterogeneous panels (weighted FMOLS based cointegrated). The relevant asymptotic covariance and estimators are given below;

$$\beta_{f w} = (N\sum_{i=1}^{N} T_{i}^{T} X_i \# X_i \#) - 1 \sum_{i=1}^{N} T_{i}^{T} \# X_i \# \# - \lambda_{12}$$……………. (6)

$$V_{fw} = (1/N \sum_{i=1}^{N} (1/T_{i}^{2} T_{i} T_{i} X_i \# X_i \#)) - 1$$…………………… (7)

### 3.4. Cross-Sectional Dependence Test

Finite and asymptotic sample properties of the panel unit root and the related cointegration tests are implemented in this paper to make an assumption that there is no cross-correlation among the error terms (Dogan, Seker, & Bulbul, 2017). Also, the relaxation of the cross-sectional dependences based assumptions depicts that the variance-covariance matrix is significantly increased with cross-section number and result in the invalidity of the test distributions. In this paper, the Pesaran CD test is effectively implemented to resolve the size distortion related problems within the test. The pairwise correlation coefficient averages based Pesaran test is implemented to test the null of no cross-sectional dependence and is shown as;

$$CD_p = (\sqrt{2}/N(N-1)) \sum_{i=1}^{N-1} \sum_{j=i+1}^{T} \sum_{t=1}^{T} \epsilon_i \epsilon_j \to N(0, 1)$$………………… (8)
4. Analysis Interpretation

Firstly, the Pesaran cross-sectional dependence (CD) test with the appropriate significance value is implemented. This shows that the tested data do not suffer any cross-correlated error terms, which justified the first-generation models. After this, the unit root test is used to explore the integration order of the tested variables for the precondition panel cointegration tests. According to the following Panel Unit Root test statistics, all the variables are tested in with and without trend, and both in first difference and level. A test results show that the unit root is present at the level and absence of unit roots at the first difference, as shown in the following table 2.

Table 2: Panel Unit Root Test – Im, Pesaran and Shin (IPS)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>1st difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>Intercept + Trend</td>
</tr>
<tr>
<td>TRO</td>
<td>-2.1493</td>
<td>-2.2933</td>
</tr>
<tr>
<td>CPN</td>
<td>-3.2933*</td>
<td>-3.3994*</td>
</tr>
<tr>
<td>EOD</td>
<td>-0.4093</td>
<td>-1.2094</td>
</tr>
<tr>
<td>GDP</td>
<td>-3.4933*</td>
<td>-4.4492**</td>
</tr>
<tr>
<td>INF</td>
<td>-3.3944*</td>
<td>-3.389**</td>
</tr>
<tr>
<td>ENS</td>
<td>-2.3984</td>
<td>-3.2984*</td>
</tr>
</tbody>
</table>

It became confirmed that all the variables are integrated with order one, I(1) where the cointegration test usually proceeds in order to determine the occurrence of a long-run relationship among the independent, dependent and controlling variable. According to the following homogeneous panel cointegration test based Kao and Pedroni cointegration test outcomes, two out of four Pedroni tests are within the dimension-based outcomes (panel ADF-statistics and panel PP-statistic). After this, Kao test depicts that all there is a long-run relationship among the variables. In addition, the heterogeneous cointegration tests are more authentic where two out of three variables are cointegrated. Based on their significant outcome, it becomes concluded that all variables are cointegrated based on the group PP-statistics for both nonparametric and heterogeneous. Specifically, nonparametric tests are more suitable for data which is normally distributed and having more power in Kao and Pedroni tests. Its values are discussed in the following table 3.

Table 3: Cointegration Test - Pedroni Panel

<table>
<thead>
<tr>
<th>Test</th>
<th>Statistics</th>
<th>T values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel v-Statistic</td>
<td>-0.573</td>
<td>-3.2933**</td>
</tr>
<tr>
<td>Panel ρ-Statistic</td>
<td>-0.291</td>
<td>-4.298**</td>
</tr>
<tr>
<td>Panel t-Statistic: (non-parametric)</td>
<td>-2.293**</td>
<td>-5.2874*</td>
</tr>
<tr>
<td>Panel t-Statistic (adf): (parametric)</td>
<td>-2.2944**</td>
<td>-5.9844*</td>
</tr>
<tr>
<td>Group ρ-Statistic</td>
<td>-2.9421**</td>
<td>-9.93496**</td>
</tr>
<tr>
<td>Group t-Statistic: (non-parametric)</td>
<td>-0.0372</td>
<td>-3.4044*</td>
</tr>
<tr>
<td>Group t-Statistic (adf): (parametric)</td>
<td>-2.6498*</td>
<td>-3.2944*</td>
</tr>
</tbody>
</table>

After this, the co-efficient of long-run relationship with the FMOLS estimator and its related outcome is shown in the following table. There is a nonparametric estimation technique and is authentic even in the absence of normality assumptions. According to the coefficient outcomes of the tested variables, it becomes clear that trade openness, GDP and ease of doing business are those variables that cause a significant impact on the environmental sustainability factor. Their probability-based significance values also show the same outcomes as their values are lower than the 0.05 standard value. But in case of competitiveness variable, its probability value is appropriate, but its overall outcomes reduce its significant impact on the environmental sustainability factor. In
addition, the probability of adjusted r square shows that the significant statistical outcome. Well, inflation is that particular factor whose outcome does not majorly perform in environmental development. The FMOLS estimations are discussed in the following table 4.

**Table 4: FMOLS Estimation**

<table>
<thead>
<tr>
<th>Estimator</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRO</td>
<td>0.274**</td>
<td>0.568</td>
<td>0.000</td>
</tr>
<tr>
<td>CPN</td>
<td>0.034</td>
<td>0.856</td>
<td>0.007</td>
</tr>
<tr>
<td>EOD</td>
<td>0.201*</td>
<td>0.644</td>
<td>0.038</td>
</tr>
<tr>
<td>GDP</td>
<td>0.291**</td>
<td>0.364</td>
<td>0.066</td>
</tr>
<tr>
<td>INF</td>
<td>0.045</td>
<td>0.746</td>
<td>0.384</td>
</tr>
<tr>
<td>Adj. R Square</td>
<td>0.890</td>
<td>0.847</td>
<td>0.000</td>
</tr>
<tr>
<td>F-Value</td>
<td>66.48</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D.W. Stat</td>
<td>2.21</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Last, but not the least, the multicollinearity test-based statistical outcomes depict that all the tested values are appropriate. The Variance Inflation Factor (VIF) measures the effect of collinearity among the tested variables in a regression model. Its value is considered as 1/Tolerance where VIF based statistics are greater than 1 which means there is no multicollinearity issue within variables. Its statistical outcomes are given below in table 5.

**Table 5: Multicollinearity Test**

<table>
<thead>
<tr>
<th></th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRO</td>
<td>2.768</td>
<td>.785</td>
</tr>
<tr>
<td>CPL</td>
<td>1.498</td>
<td>.788</td>
</tr>
<tr>
<td>EOD</td>
<td>3.479</td>
<td>.583</td>
</tr>
<tr>
<td>GDP</td>
<td>2.287</td>
<td>.788</td>
</tr>
<tr>
<td>INF</td>
<td>2.487</td>
<td>.987</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>1.864</td>
<td>-</td>
</tr>
</tbody>
</table>

5. **Discussion and Conclusion**

5.1. **Discussion**

After critically evaluating the above statistical outcomes, it becomes clear that trade openness and ease of doing business cause a significant negative impact on the environmental sustainability factor due to the excessive existence of GDP based development approach within the selected states. According to Yongmoon, Park with others (2018), trade openness, economic growth, internet use, and financial development cause a direct impact on the carbon dioxide emission in the selected states. According to them, when the FDI and trade activities increased within the states then there will be more chances to boost the negative impact of such development projects on the environmental sustainability factor. Because both economic development and environmental sustainability are inversely proportional to one another (Park, Meng, & Baloch, 2018). In the energy policy journal, Robi and Shunsuke stated that urbanization and trade openness directly increased the coal consumption that causes a negative impact on the environmental growth. In this case, energy conservation in the residential sector is important to reduce coal consumption (Kurniawan & Managi, 2018). In this situation, the competition among the companies to earn more profit reduce their motivation to consider the environmental factor in the decision making process that results in the excessive pollution within a developing state and caused an environmental change.

This shows that competition among the companies negatively affects the favorable sustainable environment. In this case, there is a need of an equilibrium solution to maintain the economic competition along with
environmental sustainability (Chen, Wang, & Chan, 2017). The competition of earning more profit and market share within the developing states also boost the concept of ease of doing business by utilizing all the natural resources. In the computers, environment and urban system based journal, Yannis, Vassilis and Catalina critically explored the negative influence of urbanization based ease of doing business concept on the environment sustainability factor that now air, water and land-based natural resources are high jacked by industrialization concept where a large number of companies are struggling to retain their market position. The excessive amount of new businesses increased the greenhouse gas emission and result in global warming issues within the manufacturing industries based developing nations. In a large number of new companies’ entry, the inflation rate becomes high and it becomes quite difficult in front of the business community to sustain the healthy environment within their pollution-causing plants (Oláh et al., 2019; Phillis, Kouikoglou, & Verdugo, 2017).

6. Conclusion

Thus, it becomes concluded that there is a significant negative influence of trade openness and ease of doing business on the environmental sustainability factor within Indonesia, Thailand, Philippines, Malaysia, Vietnam and Singapore over the period of 2000-2015. In this case, the GDP based economic indicators played as a major contributor to the emission of carbon dioxide. Well, the competition factor caused a diverse outcome on the environmental sustainability factor because of its indirect effect on the state ecosystem. In order to justify these hypotheses, the unit root test is adopted to testify either variables are integrated into one order or not. In addition, Kao & Pedroni cointegration tests to check the longterm relationship among variables. After this, the major and important FMOLS test depicted that there is a strong relationship between trade openness, ease of doing business, and GDP on reducing the environmental sustainability factor.

6.1. Future Implications

This paper is an informative approach in front of these ASEAN state's administration, the business community, and environmentalists to inspect the overall business climate and its negative influence on their environmental sustainability factor. Its country-wise valid information will also add value in the longterm sustainable environment-oriented business approach and decision-making process by providing proper direction to the policymakers to inspect and evaluate the current situation of this region. In addition, their natives and government can consider their social responsibilities towards the environment after considering this authentic paper. Upcoming scholars in their research studies’ discussion can utilize its information.

6.2. Limitation and Future Researches

No doubt, it is informative and challenging research but still, there are some deficiencies within its variable selection like if industrialization and population growth based controlling variables are considered for analysis then more authentic and significant outcomes will be generated in its result outcomes. There is an opportunity in front of business researchers to utilize this weakness in their authentic research outcomes. Empirically, other Asian economies, specifically G20 members like Saudi Arabia and Indonesia can be examined within the context of the current research by fellow researchers.

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FINANCIAL SECTOR DEVELOPMENT OF ASEAN COUNTRIES AND ITS IMPACT ON CO2 EMISSION: A PANEL DATA ANALYSIS OF VARIOUS BANKING ASPECTS

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Abstract. This paper is an informative approach to critically inspect the influence of financial sector development’s dimensions on the CO2 emission within the developing ASEAN states i.e. Cambodia, Indonesia, Malaysia, Myanmar, Singapore, Philippines and Thailand over the period of 1990-2016. The major tested variables of this paper are the number of bank deposits, number of bank branches and ATMs who act as independent variables; CO2 emission act as a dependent variable, while population and gross capital formation act as controlling variables within this research. To justify the hypothesis, the Panel Unit Root Test, Pedroni’s Cointegration Test, FMOLS Estimation, and Multicollinearity Test based statistical evaluation performed within this paper. According to the outcomes, it becomes concluded that there is no existence of any null hypothesis and cointegration among the tested variables. In addition, the significant coefficient values of the number of bank branches, number of bank deposits, population, and gross capital formation depicts that these factors directly enhanced the CO2 gas emission based situation within the selected states within the 1990-2016 era. This paper is an informative approach in front of the state’s government, policymakers, business community and other related financial institutions to overcome their negative environmental influence by enhancing their work on the green marketing approach. In addition, there is a need to implement the coordination among stakeholders; capacity building and market share based effective controlling variables to enhance its authenticity.

Keywords: Number of Bank Deposits; Number of Bank Branches; ATMs; CO2 Emission; Population; Gross Capital formation


Jel Codes: O1, O53

1. Introduction

The boost in the development of the financial sector of ASEAN countries results in growing economic growth and the growth of energy (Pradhan, Arvin, Nair, Bennett, & Hall, 2018; Siddique, Masood, Javaria, & Huy, 2020).

There is a U-shaped relationship between environmental degradation and economic growth in the early development stages of financial sectors as the ASEAN countries tend to neglect ecological pollution in a bid to develop economic growth (Nosheen, Iqbal, & Hassan, 2019). The trend of CO2 emissions in different countries years has been given below in the shape of the figure 1.
Furthermore, the growth of the financial sector is directly related to the emissions of CO$_2$ and this link has been increased significantly from the beginning of the 21st century (Nasir, Huynh, & Tram, 2019). If the degree of development of the financial sector and liberalization will increase in the ASEAN countries, it will allow the financial variables to diminish the emissions of CO$_2$ (Shaheen, Sheng, Arshad, Salam, & Hafeez, 2020). The below table 1 enlists some key green finance activities that are adopted by many financial sectors of ASEAN states.

Table 1: Important green finance activities

<table>
<thead>
<tr>
<th>Green finance activities</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green investments</td>
<td>Financing public as well as green investments in environmental services and prevention of damage.</td>
</tr>
<tr>
<td>Public policies</td>
<td>Financing of public procedures that encourage the execution of environmental and environmental damage mitigation.</td>
</tr>
<tr>
<td>Financial systems</td>
<td>Elements of the financial sector that deal with green investments to improve sustainability.</td>
</tr>
</tbody>
</table>

According to Shahbaz, Nasir, and Roubaud (2018), the ASEAN countries consider short term economic plans for the expansion of the financial sector that results in increasing environmental degradation. So, long-term economic plans should be made so that economic growth can be increased and environmental pollution can be decreased (Saidi & Mbarek, 2017). The equipment and the production quality is updated by ASEAN countries that are useful in enhancing the market competitiveness of the products and reduces the emissions of CO$_2$ emissions.

Based on the findings of previous studies, it comes to the knowledge that significant research has been completed in the previous year’s concerning financial growth (FG) as well as economic growth. Research recently by Amri (2018) has evaluated the impact of FG on the carbon dioxide releases and its impact on the overall environment of the region. Nonetheless, the research has not been conducted concerning all ASEAN nations and their financial development. None of the past researches has explained as well as evaluated the impact of FG on the level of CO2 releases in terms of the banking sector of ASEAN states. So, this paper is new and positive to acknowledge the impact of FG on carbon dioxide emissions. Also, in the previous years, many analysts such as (Haseeb, Wattanapongphasuk, & Jermsittiparsert, 2019) have examined the direct impact of FG on the sustainability level of the environment in different perspectives and techniques. However, the following article is new as well as justified mainly because no other effort has been made to identify the association between FG and emissions.
through panel data analysis of different banking perspectives and dimensions. Based upon the above justification, the study has the following objectives,

- The key objective of the paper is to identify the impact of the number of bank branches on CO2 emissions in the financial sector of ASEAN nations.
- The second purpose of the study is to explore the association between the number of ATMs and the carbon dioxide emissions in the banking sector of ASEAN states.
- And finally, the last aim is to evaluate the impact of the number of bank deposits on the emissions of CO2 in the financial industry of ASEAN countries.

During the past few years, carbon dioxide releases are on the peak, constituting a critical global challenge (Muthuraj & Mekonnen, 2018). Hence, it is most significant that policymakers as well as experts understand the exact influences and causes of these releases. The current study evaluates the effect of financial development (FD) and energy usage by different banks in the ASEAN region. The outcome of this study create a significant platform for banking experts as well as environmental experts in understanding the impact of the number of branches, ATMs, and deposits on the level of carbon dioxide released by the banking sector. Therefore, the findings of this research proves to be very positive and scope in the financial sector of different ASEAN states.

The research study is composed of five modules in which the problem statement, significance, scope, and background of the study is discussed in the introduction module. The section of the literature view comprises information related to dependent and independent variables. The research methodology chapter entails the information regarding sample and population size of the study. Data analysis techniques and tools are described in the section of data analysis. Implications, conclusion, future recommendations, and limitations are reported in the last chapter.

2. Literature review

2.1 Theory of Energy Consumption (EC)
EC has been a broadly debated concept by both environmentalists and financial experts, who evaluated the association between FD and growth, on one aspect, and carbon dioxide releases, on the other aspect (Bento & Moutinho, 2016). According to Isik, Dogrui, and Turk (2018), EC mainly refers to all the energy used to perform financial activities or other business practices that may have a certain impact on environmental sustainability (ES). The theory of EC states that trying to attain significant development rates majorly through business advancement, the developing nations of the world have enhanced their level of utilization of fossil fuels as well as oil and petrol, which, in turn, have directly elevated CO2 releases and affect the overall environment of the region (Galvin & Sunikka-Blank, 2016). Moreover, this theory states that non-renewable energy utilization has a significant correlation to carbon dioxide emissions, which means that an enhancement in the consumption of non-renewable energy by different sectors will enhance the releases of CO2 (Mainzer, 2017). According to Gordon, Waitt, Cooper, and Butler (2018), the largest effect of using too much energy or too much energy consumption by the banking sector is an increase in the carbon footprint which mainly refers to the amount of CO2 and all its other elements into the environment.

2.2 The relationship between the number of bank branches and CO2 emissions
The association between financial development and environmental degradation has been broadly evaluated in past researches, with significant of them manifesting that there is a transpose connection between the two above variables (Wong, Krüger, Loper, & Mori, 2019). According to Wang, Zhang, and Wang (2018), the task of the financial sector is very critical in affecting the ES goals and manifest that a significant banking system majority promotes consumers to buy more services and products, leading to significant EC which releases a huge amount of carbon dioxide gases. This exhibits that banking development positively promotes EC mainly through an
increase in the number of branches and points which directly affect the level of CO2 emissions (Ye et al., 2018). At the same time, a well-established bank branch can give essential assistance to its customers to enlarge their operations and services (Koengkan, Fuinhas, & Santiago, 2019). Consequently, this increases the number of branches and service offices which mainly lead to an enhancement in EC and release a huge amount of CO2 gases (Shakouri, Khoshohevis Yazdi, & Ghorchebigi, 2017). Briefly, by increasing banks' offices and branches and expanding financial services to other regions and cities, banking sector growth can derive a rise in EC which positively affects the level of CO2 emissions (Pulido-Arcas, Pérez-Fargallo, & Rubio-Bellido, 2016). Moreover, higher EC by a large number of financial points is the main issue behind the rising scale of carbon emissions that affect the quality of the environment on a large scale. The ultimate environmental impact of EC by a huge number of branches is a modification in carbon footprint (CF), but there are certain changes an employee can make at the bank office to avoid this process. Such as according to (Bento & Moutinho, 2016) if an increased number of branches use devices and also running when they are not in use, the result is enhanced in electrical use and, as a result, an increase in the amount of CO2 gases that enter the environment. Therefore, the above argument leads to the development of below hypotheses,

H1: There is a significant nexus between the number of branches and CO2 gases.

2.3 The relationship between the number of ATMs and CO2 emissions

An automated teller machine or ATM is a modern electronic telecommunication device that helps financial customers of banks to perform financial transactions mainly such as deposits, account information inquires, and cash withdrawals at any time (Y. Zhao, Liu, Wang, Zhang, & Li, 2016). According to a study by Guelpa, Mutani, Todeschi, and Verda (2018), using the ATM, financial customers can assess their bank credit accounts as well as bank deposits to make a category of financial transactions which is an effective facility for customers. Therefore, in the past few years, many banks and financial points in different ASEAN nations increased their number of ATMs for 24 hours effective financial services for their customers. As described by (Camarda et al., 2019), ATM uses a complex type of software and hardware elements that consume a lot of energy this is mainly because ATM requires heavier computing demands which result in large EC. Moreover, a normal or small bank ATM requires a lot of power and energy to dispense cash, which generally causes higher CO2 excretion (W. Wang et al., 2018). The system of ATM also majorly requires air conditioning, because it consists of an operating system and a processor that consumes a huge amount of energy. Generally, according to (Sterman, Siegel, & Rooney-Varga, 2018) a simple ATM requires around 2500 watt of energy that is, approximately 700 watts for the machine and another watt for the air conditioners facility. Therefore, an increasing number of ATMs of large numbers of banks and their branches consume a significant amount of energy which mainly causes a huge amount of CO2 radiations. This relationship between ATM and emissions of carbon dioxide is also supported by the theory of EC because this theory indicates that high energy consumption leads to a high amount of CO2 radiation. Hence, the entire above discussion leads to the design of the following hypotheses,

H2: The number of ATMs positively affects the volume of CO2 emissions.

2.4 The association between the number of bank deposits and CO2 emissions

The number of bank deposits highly affects the economy of a country as well as the emissions of carbon dioxide. Bekhet and Othman (2017) Conclude that the CO2 emissions and number of bank deposits are directly linked with each other as a boost in the number of bank deposits boosts the emissions of CO2 and the decrease in the number of bank deposits in the financial sector decreases the CO2 emissions. Hector (2017) describes that the financial sector of a country is developed with an increased number of bank deposits plus industrial production is also increased. As a result, there is an raise in CO2 emissions as the increased industrial production is responsible for it. The execution of research related to B. Zhao and Yang (2020) has revealed that the financial developments of a country lead to an increase in the emission of carbon dioxide. The economic growth of a country depends on the financial sector and industrial production that is directly proportional to the release of CO2. It has been determined by the (Gokmenoglu & Sadeghieh, 2019) that the direction and the magnitude of the financial sector can be
changed due to the effect of financial development on carbon dioxide emissions. The relationship of these variables has been explained by (Bekhet, Matar, & Yasmin, 2017), that it can help a country to determine its economic growth and the development of its financial sector. The researchers such as Saka (2017) has discussed that the financial sector is focusing on its development and the economic growth instead of keeping in view the disadvantages of the energy consumption and the emission of CO₂ that is destructive to the environment. The pollution in ASEAN countries is increasing with the increase in its development. The investigation conducted by Charfeddine (2017) has articulated that mechanisms such as environmental degradation and industrial composition are analyzed and measured with the help of the emission of carbon dioxide. CO₂ emission is related to the rise of GDP but merely alleviates when economies extent to a certain income level.

H3: The number of deposits positively affects CO₂ emissions.

3. Material and Method

Framework
After critically consider the previous researchers' point of view regarding the dimensions of financial sector development on the CO₂ emission, the following equation will be proposed based on the literature data;

\[ y = f(L, K, M) \] ................................. (1)

Where \( y \) is the CO₂ emission, \( L \) is the number of bank branches, \( K \) is the ATMs and \( M \) is the number of bank deposits. This equation 1 is converted into a log-linear form as shown in the following equation;

\[ \ln y = \beta_0 + \beta_1 \ln L + \beta_2 \ln K + \beta_3 \ln M \] ................................. (2)

where the coefficient \( \beta_i \), \( (I = 1, \ldots n) \) related to CO₂ emission, number of bank branches, ATMs and number of bank deposits.

3.1 Data
This study is majorly based on macroeconomic data of the selected ASEAN countries over the period of 1990-2016. The seven selected ASEAN countries are Cambodia, Indonesia, Malaysia, Myanmar, Singapore, Philippines and Thailand, and their annual data regarding the bank deposits, ATMs, number of bank branches, gross capital formation and the population is selected from their official sites and also from World Bank sites.

3.2 Unit Root Test
In order to justify the stationary properties of the selected variables with the related order of integration, this paper majorly adopts Im Pesaran Shin (IPS) and “Levin Lin Chu (LLC) based unit root tests. These selected panel unit root tests are further efficient as contrast to the traditional ones that are helpful to overcome the issues regarding the power and size of the separate time series procedure. According to the Baltagi, the panel unit test based statistics suitably lead towards standard normal distribution. These IPS and LLC based unit root tests are not more than a derivation of the unit root test for the specific time series approach. The IPS test promotes the heterogeneity autoregressive procedure in the cross-section, while the LLC test performs effectively based on the null hypothesis of the items that are suffered from the unit root against the absence of unit root. Therefore, it assured the same auto-regression process across the cross-sections. Well, the panel unit root test based structure is shown by using the following augmented Dickey-Fuller regression equation;

\[
\Delta y_{i,t} = a_i + \rho y_{i,t} - 1 + \sum_{j=1}^{p_i} a_j \Delta y_{i,t-j} + \varepsilon_{i,t}  \\
\] ................................. (3)
3.3 Panel Cointegration Test

Just like the researcher used the IPS panel unit root check, a Pedroni cointegration method specifically motivates the heterogeneity across the individual panel. By considering such heterogeneity across the panel member, a great advantage of the cointegration technique shows that its unreal to assume the common cointegration of vectors across the panel members (Zoundi, 2017). The following regression specification based Pedroni’s panel cointegration technique shows the real image of this test;

\[ y_{i,t} = \alpha_i + \delta_{i,t} + \beta_1 X_{1,i,t} + \beta_2 X_{2,i,t} + \cdots + \beta_n X_{n,i,t} + \varepsilon_{i,t} \]  

(4)

According to the above equation, \( \varepsilon_{i,t} \) is estimated residuals, \( \delta i \) is a deterministic time trend and \( \alpha i \) is a country-specific effect. The cointegration test based residual's regression is derived from equation 2. The regression model is based on estimated residuals performance in order to justify the null hypothesis that no variable is cointegrated.

\[ \varepsilon_{i,t} = p_i \varepsilon_{i,t} + \mu_{i,t} \]  

(5)

There are two cointegration approaches named as “between dimension approach” and “within dimension approach”. There are four test statistics in “within dimension approach”, named as panel rho, panel v, panel ADF statistics (parametric) and panel (PP) statistics. While, in “between dimension approach”, there are three major statistics; group ADF statistics (parametric), group rho and group PP statistics (nonparametric). Well, the first Pedroni's panel-based cointegration test predicted a null hypothesis of \( H_0: p_i = 1 \) for all \( i \) against the alternative \( H_1: p_i < 1 \) for all \( i \). On the other "between dimension approach", it is predicted that \( H_0: p_i = 1 \) for all \( i \) against the opposite \( H_1: p_i < 1 \) for all \( i \).

3.4 The FMOLS Test

The following regression equation has been estimated the dynamics OLS and fully modified OLS:

\[ CO_{2i,t} = a_i + x_{i,t} \beta + u_{i,t} \]  

(6)

Where \( CO_{2i,t} \) is the carbon dioxide emission, \( \beta \) is the slope (k,1) estimation’s vector, \( a_i \) is a country-specific effect, and \( u_{i,t} \) are the stationary disturbance terms. \( x_{i,t} \) is considered to be (k,1) based explanatory variables’ vector. According to the equation, \( x_{i,t} \) (k, 1) is an independent variables' vector that is an integrated process of order one for the cross-sectional items (Khan et al., 2019);

\[ x_{i,t} = x_{i,t-1} + \varepsilon_{i,t} \]  

(7)

A FMOLS estimator is considered by correcting endogeneity and serial correlation to the OLS estimator. The FMOLS estimator is justified as follows:

\[ \beta'w = (N \sum i=1 T \sum t=1 (X_{it} - \bar{X}_t)2) \sum i=1 (T \sum t=1 (X_{i,t} - \bar{X}_i) CO2*it - T \delta^\varepsilon u) \]  

(8)

where, \( \delta^\varepsilon u \) represents the serial correlation correction terms and \( CO2*it \) is a transformed variable of \( CO2_{it} \) for developing an endogeneity correction.

4. Analysis Interpretation

4.1 Results of Unit Root Test

In order to justify a relationship between the tested variables; the number of bank deposits, ATMs, number of bank branches, gross capital formation, population and CO2 emission, the IPS and LLC tests based outcomes are discussed in the following table. According to the outcomes, it becomes clear that the null hypothesis is rejected in this paper because the outcomes are stationary at the first difference. All the variables are found to be non-
stationary at the levels and stationary at the first difference. Its outcomes are shown in the following table 2 where the * and ** show the rejection of the null hypothesis at ten, five and one percent levels.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>1* difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>Intercept + Trend</td>
</tr>
<tr>
<td>CO2</td>
<td>-2.1294</td>
<td>-2.2944</td>
</tr>
<tr>
<td>NOB</td>
<td>-2.2903</td>
<td>-3.8474</td>
</tr>
<tr>
<td>ATM</td>
<td>-0.4222</td>
<td>-1.4488</td>
</tr>
<tr>
<td>GCF</td>
<td>-3.3883*</td>
<td>-3.4984*</td>
</tr>
<tr>
<td>POP</td>
<td>-2.2833</td>
<td>-2.3495</td>
</tr>
</tbody>
</table>

### 4.2 Results of Pedroni’s Cointegration Technique

The following Pedroni’s cointegration technique based outcomes depict that in “within dimension approach”, two of four statistics significantly reject the occurrence of null hypothesis of no cointegration at 1 and 5% levels. Also, "between dimension approach" case depicts that two out of three statistics reject the existence of null hypothesis with no cointegration of 1 and 5% levels. In the following table statistics, it becomes clear that there is a significant cointegration relationship between the financial sector development’s dimensions and the CO2 emission, as given below in table 3.

<table>
<thead>
<tr>
<th>Test</th>
<th>Statistics</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Within Dimension)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel ρ-Statistic</td>
<td>-0.6384</td>
<td>-1.8844</td>
</tr>
<tr>
<td>Panel ρ-Statistic</td>
<td>-0.2993</td>
<td>-1.7848</td>
</tr>
<tr>
<td>Panel t-Statistic: (non-parametric)</td>
<td>-3.2433**</td>
<td>-9.884*</td>
</tr>
<tr>
<td>Panel t-Statistic: (parametric) (Between Dimension)</td>
<td>-4.2112**</td>
<td>-7.4984**</td>
</tr>
<tr>
<td>Group ρ–Statistic</td>
<td>-3.2993**</td>
<td>-9.4099**</td>
</tr>
<tr>
<td>Group t-Statistic: (non-parametric)</td>
<td>-0.0372</td>
<td>-5.4455*</td>
</tr>
<tr>
<td>Group t-Statistic: (parametric)</td>
<td>-2.2944*</td>
<td>-6.2046*</td>
</tr>
</tbody>
</table>

### 4.3 Results of FMOLS Estimation

After considering the cointegration between the selected variables, it becomes quite easy to evaluate the retention coefficient of explanatory variables by using a panel cointegrating estimator. In this case, the FMOLS test based statistics show that coefficient of the number of bank branches and the number of bank deposits based independent variables cause a major impact on the carbon dioxide emission. Also, the existence of population and gross capital formation act as a significant controlling variable that boosts the negative influence of such financial sector’s development on environmental sustainability. All these outcomes are also justified by their probability values that are lower than 0.05 with the proper R square value. But, the outcomes of ATM existence in the developing nations do not impact on their CO2 emission because of 0.489 based insignificant values in the FMOLS estimation. All its related outcomes are shown in the following table 4.
Table 4: FMOLS Estimation

<table>
<thead>
<tr>
<th>Estimator</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOB</td>
<td>0.288**</td>
<td>0.765</td>
<td>0.000</td>
</tr>
<tr>
<td>ATM</td>
<td>0.003</td>
<td>0.466</td>
<td>0.489</td>
</tr>
<tr>
<td>NBD</td>
<td>0.112*</td>
<td>0.388</td>
<td>0.003</td>
</tr>
<tr>
<td>GCF</td>
<td>0.283**</td>
<td>0.783</td>
<td>0.000</td>
</tr>
<tr>
<td>POP</td>
<td>0.203**</td>
<td>0.394</td>
<td>0.000</td>
</tr>
<tr>
<td>Adj. R Square</td>
<td>0.746</td>
<td>0.833</td>
<td>0.000</td>
</tr>
<tr>
<td>F-Value</td>
<td>44.14</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D.W. Stat</td>
<td>2.19</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

4.4 Results of Multicollinearity Test

Multicollinearity is a statistical phenomenon where the multiple independent variables show a high correlation with one another or make a prediction that either the independent variables are too interrelated or not (Kalnins, 2018; Thompson, Kim, Aloe, & Becker, 2017). In this case, the variance inflation factor (VIF) is the variance’s quotient in a model with multiple terms by the deviation of model with one term alone. Its values are helpful to quantify the severity of multicollinearity in an ordinary square regression analysis, and its appropriate value is within the 1-10 range which depicts that there is no multicollinearity issue within this test (Salmerón Gómez, García Pérez, Lópe Martín, & García, 2016). According to the following statistics, all the VIF values are greater than 1 and smaller than 10. Also, its mean value is 2.477 which shows that there is no multicollinearity issue within this testing model. Well, its statistics are discussed in the following table 5.

Table 5: Multicollinearity Test

<table>
<thead>
<tr>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOB</td>
<td>2.037</td>
</tr>
<tr>
<td>ATM</td>
<td>1.371</td>
</tr>
<tr>
<td>NBD</td>
<td>1.696</td>
</tr>
<tr>
<td>GCF</td>
<td>1.498</td>
</tr>
<tr>
<td>POP</td>
<td>1.477</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>2.477</td>
</tr>
</tbody>
</table>

5. Discussion and Conclusion

5.1 Discussion
After critically evaluate the Pedroni’s Cointegration and FMOLS estimation based tests, it becomes confirm that there is a significant impact of the number of bank branches and the number of bank deposits on the excessive emission of carbon dioxide gas within ASEAN states, where their increasing population and gross capital formation act as major controlling variables that boost the negative impact of such financial sector development dimensions on the environmental sustainability factor. In the previous researches, many scholars justified this statement through their theoretical arguments like Carl-Jahan, Richard and Edgar (2018) majorly studied capital formation and its relationship with the environment. According to them, capital goods based investment is a well-known driver of associated resource use, economic activity and environmental influence. Also, the gross fixed capital formation having a major market share in terms of embodied resources and monetary turnover (Södersten, Wood, & Hertwich, 2018). After performing a structural decomposition analysis, these researchers assess the relative significance of input-output multipliers and investment structure for the deviation in capital assets based carbon intensity. In the Journal of Environmental Management, the scholars stated that economic and financial development and the foreign direct investment result in a significant long-run relationship with the environmental degradation in feeble proof of Environmental Kuznets Curve (EKC). They discussed different financial
development aspects named as financial development, economic growth, and the FDI that boost their influence on the environmental degradation within ASEAN countries (Nasir et al., 2019).

A similar point of view was explained by related scholars in their research journal by exploring the nexus among the market freedom, economic growth, financial development, political stability and CO2 emission in the ASEAN states. According to them, there is a direct influence of the financial institutions and their related existence on the emission of the greenhouse gases within an organization (Haseeb et al., 2019). According to the other related business scholars, the financial inclusions caused a major negative impact on the environment because their profit gaining activities result in the emission of carbon dioxide, and till now there are no policies existed between financial inclusion and the related mitigation of CO2 emission. They concluded it by specifically considering the Asian countries' data from 2004 to 2014 (Le, Le, & Taghizadeh-Hesary, 2020). In their research, they considered income, energy consumption, urbanization, financial inclusion, industrialization and financial inclusion as the major factors that cause the higher emission of CO2, and also stated that enhanced the trade openness can reduce the CO2 emission. Well, an innovative concept based theoretical research is conducted by Gayathri and Sankar in the current year, where they majorly explored the importance of advanced green banking in the Indian Banking system. In their research, they concluded that in the current digital era, many environmental issues faced by financial institutions which can be overcome by enhancing this green banking concept within their operating activities (GAYATHRI & SANKAR, 2020).

5.2 Conclusion and Future Implications
Thus, it becomes concluded that within the ASEAN states, the excessive number of banks and the bank deposits plays a noteworthy positive role to enhance the emission of greenhouse gas e.g. CO2, while the ATM existence does not majorly enhance this gas emission within these developing states because of its weak correlation with the population and gross capital formation. According to the Panel Unit Root and Pedroni’s Cointegration based tests, there is no existence of null hypothesis cointegration among the tested variables. Well, the outcomes of informative FMOLS estimation depict that the coefficient of the number of bank branches, the number of bank deposits, population, and gross capital formation is significant as compared to the ATM variable. This is informative research because there is no multicollinearity issue existed within the tested variables and related outcomes. It means there is a need in front of Cambodia, Indonesia, Malaysia, Myanmar, Singapore, Philippines, and Thailand’s governments to work on the green banking based strategic approach in their operating, investing and financing activities within this industry. This paper is an informative approach in front of the related state’s policymakers, social activists, authorities, financial institutions and related environmental bodies to make an efficient decision to resolve this issue.

5.3 Limitations and Future Researches
Last, but not the least, deficiency of coordination among stakeholders, capacity building, and market share based effective controlling variables may impact the authenticity of this paper, which can be overcome by upcoming scholars.

References


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Abstract. Ecological footprint (EF) measures the demand generated by people or the group of people towards the global natural resources. This paper is majorly based on exploring the number of major factors that enhanced sustainable ecological footprints, and these are climate fund, green technology investment and research & development expenditure, while population and education are act as controlling variables. In this paper, eight major ASEAN states i.e. Singapore, Cambodia, Philippines, Vietnam, Indonesia, Thailand, Malaysia, and Myanmar based information is considered for hypothesis testing. A panel data analysis based statistical outcomes are generated to conclude that there is a strong relationship among the tested variables. The unit root test-based outcomes show that there is no existence of the null hypothesis, and the panel cointegration test depicts that there is no cointegration (in both within-dimension and between-dimension) among the tested hypothesis. All the probability values are lower than 0.05, while the coefficient estimation test shows that all the tested variables having significant coefficient values. Last, but not the least, the Granger Casualty Test based statistics show that there is a strong correlation among the tested variables, so it becomes clear that if the government made an efficient green technology investment, climate funds and research & development & expenditure oriented strategies, then a sustainable ecological footprints will be developed. This paper will add value in efficient environment-oriented decision making for government, policymakers and environmentalists. However, the lack of renewable energy consumption and fertility rate affect the authenticity of this paper, which can be overcome by upcoming scholars.

Keyword: Ecological Footprints; Climate Funds; Green Technology Investments; Research and Development Expenditure; Population; Education


Jel Codes: O1, O53

1 Introduction

The sustainable ecological footprints of ASEAN countries from the period of 1971 to 2017 were impacted with the help of financial development such as green practices, climate funds, and research expenditures (Kongbuamai, Bui, Yousaf, & Liu, 2020; Farooqi, 2020; Siddique, Masood, Javaria, Huy, 2020).

The environmental quality of a country can be improved by the reduction of an ecological footprint because according to Yilanci and Pata (2020) as environmental quality and ecological footprint are inversely proportional to each other. Environmental degradation has been increasing with the increase in the economic growth that result in releases of greenhouse gases. Deforestation also increases the level of environmental degradation by releasing carbon dioxide. The financial sector of a country plays a vital role in achieving and enhancing sustainable development. The table 1 below describe important goals in investing green technology.
Table 1: type of Goals

<table>
<thead>
<tr>
<th>Short-term goals</th>
<th>Medium-term goals</th>
<th>Long-term goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhanced foreign as well as domestic investment in green technology</td>
<td>Enhanced production of green technology services and products.</td>
<td>ASEAN states become major producers of green technology in the global market.</td>
</tr>
<tr>
<td>Enhanced public awareness and commitment to the adoption of green technology</td>
<td>Expansion of green technology application to many sectors.</td>
<td>Induction of green technology in ASEAN nations.</td>
</tr>
<tr>
<td>Expansion of local research centers and institutes</td>
<td>Enhanced research development and innovation of green technology.</td>
<td>Significant minimization in energy consumption.</td>
</tr>
</tbody>
</table>

Environmental pollution has been increasing day by day because of the release of CO₂ and greenhouse gases and makes it difficult to achieve ecological sustainability (Bilgili, Koçak, & Bulut, 2016; BeltránPascual & Virseda, 2020). Urbanization is also a problem of ASEAN countries that results in a greater number of emission of harmful gases in the atmosphere (Wang, Chen, & Kubota, 2016; Farooq & ullah yousafzai, 2020). These countries are facing the issue of environmental degradation because of the rapid growth of industrialization. The green financing should concentrate on an innovative financial blueprint that helps in increasing sustainable ecological development. However, the investments in renewable energy remains up and down in different years. It has been given below in figure 1.

![ASEAN Countries Investment in Renewable Energy](image_url)

**Figure 1:** Investment in Renewable Energy

By exploring some previous researches, it comes to the knowledge that significant researches have been conducted in the previous year’s concerning ecological footprints (EFs). For example, research recently by Majeeed and Mazhar (2019) has evaluated the overall impact of financial development on the ecological footprint through a panel data analysis method. However, the research has not been conducted regarding ASEAN states and its climate funds to enhance the sustainability level of EFs (Hussain et al., 2020). Hence, the current research paper is new and supportive to understand the role of climate funds in improving sustainable EFs. Moreover, in previous decades, several scholars such as Baloch, Zhang, Iqbal, and Iqbal (2019) have demonstrated the impact as well role of research development on the overall performance of EFs in different perspectives and regions. Nonetheless, the given paper is remarkable and justified mainly because no other scholar has explained the nexus
between green technology investments (GTI) and EFs from the perspective of all ASEAN countries. The current effort is new because no other study in the past has evaluated the direct impact of research and development expenditure (R&DE) on the sustainability of EFs concerning ASEAN regions. Based on the above justification, the study has the following objectives,

- The premier aim of the research is to evaluate the relationship between climate funds and sustainable ecological footprints (SEFs) in ASEAN states.
- The second objective of the paper is to analyze the impact of green technology investments on sustainable ecological footprints in ASEAN regions.
- The third and final objective of the study is to evaluate the overall impact of research and development expenditure on sustainable ecological footprints in ASEAN countries.

Several other types of research evaluate the nexus between economic development and ecological issues to give effective policy solutions to control economic growth and ecological challenges together (Charfeddine, 2017). The huge weakness of this researches is that they mainly rely on only CO2 releases as a major indicator of ecological problems. The results of this paper are significant because this study takes other variables to understand the overall sustainability in EFs, hence the study has a significant scope in the ecological sector of ASEAN kingdoms to understand the role of GTI and climate funds.

The study consists of five chapters and background of the study, scope, significance, and problem statement has been discussed in the introduction chapter. The evidence related to different types of variables has been described in the literature review chapter. The information regarding population and sample size of research size has been described in the chapter of research methodology. The chapter of data analysis entails the data analysis tools and techniques. The last chapter of the study defines the conclusion, future recommendations, implications, and limitations.

2 Literature review

2.1 Theory of ecological footprint (EF)
A Canadian ecologist William Rees presented the theory of EF in 1996, and according to Liu, Zhang, Ren, Gu, and Yuan (2018) he demonstrates in his theory that EF is the estimation of the available biologically productive land as well as the water are required to provide the renewable assets that a country consumes and to absorb the wastes it produces (Zhang et al., 2020). According to LIANG et al. (2017) William Rees state that EF calculates the needs for productive areas mainly such as croplands, marine areas, forested land, and built uplands. William Rees also gave the concept of bio-capacity and according to him, footprint and bio-capacity can be compared mainly at the individual, regional, country, and world level. According to Steiner, Peschel, and Grebitus (2017) both bio-capacity, as well as footprint, modifies every year with the number of individuals, per individual consumption and the productivity of ecosystems. According to this theory, climate funds and eco-friendly investments are the one solution to deal with the challenge of modification in the footprint every year (Jorgenson, 2016). According to Naderi Mahdei, Bahrami, Aazami, and Sheklabadi (2018) during the past few years, the concept of EF analysis has been broadly used around the globe in support of sustainability through research and development. This is mainly because according to Yin, Han, and Wu (2017) research and development in the field of ecology enable individuals to analyze as well as manage the use of resources mainly throughout the economy and finds the sustainability of people's lifestyles and goods (Rudolph & Figge, 2017).

2.2 The relationship between Climate funds and sustainable ecological footprints
Climate funds play a dynamic role in achieving a sustainable ecological footprint by reducing the emission of harmful gases in the atmosphere, such as greenhouse gases and carbon dioxide. The execution of the study concerned with Luke (2019) has revealed that climate funds increase the resilience of and reduces the vulnerability of ecological systems and enhances the sinks of harmful gases. A financial blueprint known as green
credit helps in controlling the environmental pressure by climate funds. Boermans and Galema (2019) describes that environmental pollution can be controlled by providing loans to the industries implementing clean technology at a low-interest rate to enhance the sustainability of ecological footprints. It has been explained in the study by Ciplet and Roberts (2019) that to emphasize the production of ecological agriculture, the financial sectors of ASEAN countries have promoted research and development in the new energy source. Climate funds attract more environmental-friendly projects with the help of R&D to improve the sustainability of ecological footprints. It has been concluded by Wirth (2018) that R&D helps in managing the use of the resources during the economy and to find the sustainability of goods and lifestyles of the people of a country. According to J. W. Lee (2019), the world’s largest dedicated fund that helps the ASEAN countries in reducing the emission of carbon dioxide and greenhouse gas is known as the green climate fund. The researcher Scheffers et al. (2016) has elaborated the purpose of climate funds is to enrich the sustainability of ecological footprints and to help different countries to develop green growth. The investigation conducted by the Chu, Deng, Jin, Wang, and Li (2017) states that climate funds play an essential role in providing significant financial resources and allowing the economies and societies to condense the impact of climate change. The theory of ecological footprints supports the association among sustainable ecological footprints and the climate funds by explaining that the challenge of modification in the ecological footprint can only be solved with the help of eco-friendly investments and the climate funds. So, based on above arguments the study propose the following hypotheses, 

H2: There is a favorable connection between climate funds and sustainable ecological footprints.

2.3 The association between Green technology investments and sustainable ecological footprints

The world of green technology (GT) solutions with every sector are fast-moving, and countless concepts exist concerning what GT is for ecological concepts as well as its related advantages for ecological footprints (Saberi, Cruz, Sarkis, & Nagurney, 2018). According to Cohen, Lobel, and Perakis (2016) GT in almost every sector involves producing things and products that incorporate one or more significant aspects of ecologically friendly solutions. Producing and using green technological processes and products has raised the importance of green for ecological issues and also for livability and sustainability (Song & Wang, 2018). According to Neoh, Noor, Mutamim, and Lim (2016) what is more, significant is that sectors with green investments have also enhanced financial as well as ecological efficiency, as when compared to traditional sectors that do not invest in green technologies (Sun, Miao, & Yang, 2017; Wang & Zhou, 2020). Ecological survival in the existing harsh environmental times calls for innovations and green investments. As a consequence, green investments, as well as green remodeling, are significantly becoming hallmarks of contemporary ecological efficiency (Baležentis, Štreimikienė, Melnikienė, & Zeng, 2019; Song & Zheng, 2020). Green technology investments (GTI) generate a lot of benefits for sustainable ecological footprints this is mainly because according to Song, Zheng, and Wang (2017) green technologies directly influence the overall environmental process. Perhaps the single most positive advantage of GTI is the EF’s impact. Traditional technologies like petroleum generators, cause critical and huge damage to the environment, hence making it necessary that businesses as well as all other sectors opt for green technologies. In general, according to Luke (2019) green technology helps business carbon footprint (CF), minimizes waste, minimized energy consumption, minimizes water, and conserve water which significantly affects the sustainability level of EFs. Moreover, investing in GT enables many industries and sectors to use renewable energy resources that never evacuated in nature which affects the sustainability level of ecological footprints significantly(Nguyen & Kostarakis, 2018). Furthermore, investment in GT also enables sectors to use technology that incorporates green chemistry as well as green engineering which significantly affects EFs and its sustainability. Hence, the given study suggests the following hypotheses;

H2: There is a significant relationship between green technology investments and SEFs.

2.4 The relationship between Research and development expenditure and sustainable ecological footprints

In terms of ecological concepts, research and development (R&D) include processes and practices that environmental centers and authorities undertake to enhance the sustainability level of the environment Hassan, Xia, Khan, and Shah (2019) and according to Sayegh et al. (2017), it is often the initial step in the development of
ecological strategy and development process. The objective is generally to take innovative steps and processes to make the environment friendly for humans. R&D expenditure is another related concept which refers to the amount of money spent on creative as well as innovative ecological ideas that generate huge benefits in terms of EFs. According to Yasin, Ahmad, and Chaudhary (2020), R&D expenditure is the money spent on creative efforts majorly undertaken on systematic concepts to enhance the stack of data and knowledge and the use of this data to devise new ecological-friendly applications. In particular, it has come to the knowledge that there is a direct nexus between the R&D expenditure and ecological sustainability across the globe, but this direct correlation is much significant in high-tech nations than in low-tech states and regions. In research done by Musikavong and Gheewala (2017) manifest that countries with high R&D expenditure were found to have a strong relationship between R&D and ecological benefits, while states with low R&D expenditure have experienced bad results in terms of ecological benefits. According to Khan et al. (2020), high R&D expenditure plays a very remarkable role in the success of EFs efforts this is because R&D contributes to the sustainability of ecological footprints. It is the high expenditure function that gives a platform for innovation as well as for creativity to flourish in an ecological concept. According to Zhang et al. (2020), innovative breakthroughs in the ecological field have occurred only because of high expenditure and significant efforts of the R&D function. Therefore, the above arguments lead to the establishment of the following hypotheses,

H3: There is a significant relationship between R&D expenditure and sustainable ecological footprints.

3 Methodology
Eight major ASEAN states are considered for the proposed hypothesis testing and data evaluation named as Singapore, Cambodia, Philippines, Vietnam, Indonesia, Thailand, Malaysia and Myanmar. In this study, Ecological footprints based statistics are considered as dependent variables, while climate fund, green technology, and research & development expenditure are studied as major independent variables. To critically inspect their interdependence, a population and education act as controlling variables within this panel data analysis, where all of these statistics are collected from their official state’s websites. This paper is a productive approach to overcome all the EKC literature gaps regarding the tested variables. The EKS literature is established that sustainable ecological footprints and the other industrial development factors directly enhanced the state’s environment. The following econometric model is considered to test the augmented EKC hypothesis;

\[ LEFP_{2it} = \beta_0 + \beta_1 LCLF_{it} + \beta_2 LGTI_{2it} + \beta_3 LRAD_{it} + \beta_4 LPOP_{it} + \beta_5 LEDU_{it} + \epsilon_{it} \] ………… (1)

Where \( LEFP_{2it} \), \( LCLF_{it} \), \( LGTI_{2it} \), \( LRAD_{it} \), \( LPOP_{it} \), and \( LEDU_{it} \), are the logarithm forms of ecological footprints, climate funds, green technology, investment, research & development expenditure, population and education, respectively.

3.1 Panel Unit Root Tests
Im, Persaran and Shin, Levin-Lin-Chu and ADF-chi-square test based authentic tested are implemented to inspect the existence of panel stationary. All such tests have null hypothesis based justification that there is a unit root against any alternative and a stationary variable (Khraief, Shahbaz, Heshmati, & Azam, 2020; J. Lee & Tieslau, 2019). Levin with other research-based test equation is given below;

\[ y_{it} = \alpha_i + \beta_i y_{it-1} + p\sum_{j=1}^{p} \alpha_j y_{it-j} + \epsilon_{it} \] ………………… (2)

According to the above equation, \( y_{it} \) is considered as a difference of \( y_{it} \) for the \( ith \) state in the period \( t = 1 ,..., T \). This statistical outcome is the best homogeneity assumption so that \( H_0: \beta = \beta_i = 0 \). Equation 2 depicts the heterogeneity by allowing the \( \beta_i \) to change across any cross-section, under the influence of an alternative hypothesis where the majority of individual services may show non-stationary outcomes. The heterogeneous and nonparametric Wu and Maddala test based p values show a final panel unit root test. Its statistical equation is mentioned below;

\[ p = -2N \sum i=1 \ln \beta_i \] …………………………….. (3)
3.2 Panel Cointegration Test

In this paper, the cointegration test of Pedroni and Kao are conducted in order to evaluate the existence of long-run relationship among variables, where the Kao test is a residual and parametric based test for the null hypothesis of no configuration. Its LSDV regression equation is given below;

\[ y_{it} = \alpha_i + \beta X_{it} + e_{it} \]  

(4)

Well, the Dickey-Fuller test is majorly applied for the residuals that are estimated from the regression equation estimation (Zoundi, 2017). There is a cross-sectional invariant among the five variations of the Kao test slope efficient (\( \beta \)). In addition, the Pedroni is also a residual-based cointegration test for no cointegration based null hypothesis. The Pedroni regression equation is shown below;

\[ y_{it} = \alpha_i + \delta_i t + \beta_i X_{it} + e_{it} \]  

(5)

where \( \beta_i, \delta_i \) and \( \alpha_i \) are away from any cross-sections. After this, Pedroni test based pooling residuals tests are derived from equation 5, where the first one is obtained through residuals on “within dimension” which is based on homogeneous panel cointegration statistics. While the second one is based on obtained residuals along "between dimensions" which is based on heterogeneous group means statistics.

3.3 Estimating the Cointegration Relationship with Weighted FMOLS

This fully modified ordinary least square (FMOLS) is used to evaluate the cointegrated panel regression and considered as the best panel estimation technique. It is such a parametric approach which is helpful to generate optimal cointegrating regression outcomes and develop an endogeneity and serial correlation because of their cointegrating relationship (Abdullah, Siddiqua, & Huque, 2017). In this research, Chiang & Kao and Pedroni pooled FMOLS estimators are used for the cointegrated heterogeneous panels. This statistical approach allows deviation in the cross-section based long-run variance. The corresponding asymptotic covariance and estimator of the tested variables are given below;

\[ \hat{\beta}_{fw} = \left( \frac{1}{N} \sum_{i=1}^{N} \sum_{t=1}^{T} X_{it}^* X_{it}^* \right)^{-1} \left( \frac{1}{N} \sum_{i=1}^{N} \sum_{t=1}^{T} (X_{it}^* y_{it}^* - \lambda_{12}) \right) \]  

(6)

\[ V_{fw} = \left( \frac{1}{N} \sum_{i=1}^{N} \left( \frac{1}{T^2} \sum_{t=1}^{T} X_{it}^* X_{it}^* \right) \right)^{-1} \]  

(7)

3.4 Panel Granger Causality Tests

The cointegration existence is such a sign that a causal relationship exists among the variables. In this paper, Hurlin and Dumitrescu based Granger causality test is adopted to inspect the direction and existence of casual relationships (Saidi & Mbarek, 2016). In this panel Granger causality testing of the multivariate regression-based general form is given below;

\[ y_{it} = \alpha_0i + \alpha_1i y_{it-1} + \cdots + \alpha_li y_{it-1} + \beta_1i X_{it-1} + \cdots \]  

+ \beta_1i X_{it-1} + \cdots + \beta_2i Z_{it-1} + \cdots \]  

+ \beta_1i X_{it-1} + \cdots + \beta_2i Z_{it-1} + \epsilon_{it} \]  

(8)

\[ X_{it} = \alpha_0i + \alpha_1i X_{it-1} + \cdots + \alpha_li X_{it-1} + \beta_1i y_{it-1} + \cdots \]  

+ \beta_1i y_{it-1} + \cdots + \beta_2i Z_{it-1} + \cdots + \beta_2i y_{it-1} + \epsilon_{it} \]  

(9)

\[ Z_{it} = \alpha_0i + \alpha_1i Z_{it-1} + \cdots + \alpha_i Z_{it-1} + \beta_1i X_{it-1} + \cdots \]  

+ \beta_1i X_{it-1} + \cdots + \beta_2i y_{it-1} + \cdots + \beta_2i y_{it-1} + \epsilon_{it} \]  

(10)

Under the Hurlin and Dumitrescu panel causality test, the test statistics averages are developed where the Granger causality regressions are acted for each cross section (Younsi & Bechtini, 2018).

4 Analysis Interpretation

In order to justify the hypothesis testing, the Pesaran cross-sectional dependence (CD) test with the p-value is considered to inspect that either the data is suffered from cross-correlated root terms or not. This test is helpful to justify that the first generation model-based application is implemented in this analysis portion. After this, several unit root test-oriented productive outcomes generated to evaluate the order of integration variables which is a precondition for the panel cointegration outcome. All the tested variables are considered in with and without trend at both first difference and level. The following unit root test based statistical outcomes depict that unit root exists at the level and the absence of unit root occurs at the first difference (see table 2).
After the unit root test, all the variables are integrated with order one, I(1) where the cointegration test is processed to evaluate the existence of a long-run relationship among the variables. According to the following Panel Cointegration test, four out of four Pedroni tests are within the dimension based tests means at their homogeneous panel cointegration form between panel ADF-statistic and panel PP-statistic. While, the Kao test shows that there is a long-run interdependence among the variables, where all three out of three variables are between the dimensions means at the realistic heterogeneous cointegrated form. After these statistical outcomes, it becomes concluded that on the group pp-statistics, all the variables are cointegrated in both nonparametric and heterogeneous forms. The table 3 depicts that there is no occurrence of any cointegration among the tested variables.

Table 3: Panel Cointegration Test

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Weighted Statist</th>
<th>Prob.</th>
<th>Weighted Statist</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel v-Statistic</td>
<td>-2.3884*</td>
<td>.0103</td>
<td>12.0387</td>
<td>.0003</td>
</tr>
<tr>
<td>Panel rho-Statistic</td>
<td>2.7334**</td>
<td>.0003</td>
<td>3.63982</td>
<td>.0298</td>
</tr>
<tr>
<td>Panel PP-Statistic</td>
<td>-3.3924**</td>
<td>.0230</td>
<td>-4.13988</td>
<td>.0000</td>
</tr>
<tr>
<td>Panel ADF-Statistic</td>
<td>2.2033**</td>
<td>.0376</td>
<td>-2.42093</td>
<td>.0004</td>
</tr>
</tbody>
</table>

Alternative hypothesis: individual AR coeffs. (between-dimension)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group rho-Statistic</td>
<td>4.3094**</td>
</tr>
<tr>
<td>Group PP-Statistic</td>
<td>-7.1317**</td>
</tr>
<tr>
<td>Group ADF-Statistic</td>
<td>-2.1426**</td>
</tr>
</tbody>
</table>

Kao test. Statistic Prob.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADF</td>
<td>-4.6394*</td>
</tr>
</tbody>
</table>

In order to evaluate the coefficient of a long-run relationship among the FMOLS estimator, the following outcome is generated. This is a nonparametric estimation process and is quite valid that the normality assumption does not exist. In the following table, the *, ** and *** shows that there is a statistics relationship at the 5 and 10% and there is a significant impact of all the tested variables on the ecological footprints, as shown in the following table 4.
The above table depicts the grouped and pooled form of coefficient estimation of all the tested influencing variables and their efficiency is shown in their significant outcomes. According to the above-mentioned test, the coefficient values of climate funds, green technology investments, research and development expenditure, population, and education are significant that means all the variables directly affect the ecological footprints within a developing state. In addition, its adjusted R square shows appropriate outcomes in this analysis. After this, the Granger Causality test based statistics are given below in table 5.

The above table shows that the ecological footprints based dependent variable has a strong relationship with climate funds, green technology investments, population and education. While, climate fund is highly correlated with green technology investments, research and development expenditure and education, and the green technology investment is directly dependent on the population level within the state. Well, the population is highly dependent on the advanced education level in the development of ecological footprints.

5 Discussion and Conclusion
Thus after critically interpreted the panel data analysis based statistics, it becomes clear that there is a significant impact of climate funds, green technology investments, and research and development expenditure on the favorable ecological footprints within the ASEAN states. In the Journal of Cleaner Production, Abdullah Mohammad Aldakhil with others stated that if advanced educational development occurred within a developing state which has an excessive number of inhabitants, then more productive outcomes will be generated to improve the ecological footprints within a state. They majorly explored the influence of green research and development to utilize and enhance the natural resources within the state (Aldakhil et al., 2019). According to them, high
technology export enhanced the emission of fossils, and the agricultural machinery substantially enhanced the emission of carbon-fossil, which should be minimized by making some effective steps. According to Lanouar Charfeddine and Zouhair Mrabet in their renewable and sustainable energy review, socio-demographics items like life expectancy at birth, urbanization, and the fertility rate enhanced the environment efficiency for the long run. This only occurs when the political institution’s improvement of the state has never be accomplished by overcoming the external environment stress (Charfeddine & Mrabet, 2017).

In order to explore a similar concept in the Malaysian market perspective, Zahoor, Zhaohua and others conducted a research in their environmental science and pollution research-based journals. In their research, they concluded that globalization has a direct impact on the ecological carbon footprint in the existence of population density, energy consumption, financial development, and economic growth for the short and long run (Ahmed, Wang, Mahmood, Hafeez, & Ali, 2019). The similar research was conducted by Andrew, Festus and Samuel (2019) where they majorly worked on exploring the number of factors that caused a significant direct impact on the ecological footprints within a state like they majorly considered the country’s trade policy, renewable and renewable energy consumption and the fertility rate that cause a major influence on the sustainable environment. According to these scholars, a 1% increase in the real GDP causes boosting environmental quality by 0.81% in a long run (Alola, Bekun, & Sarkodie, 2019). They considered renewable energy consumption as a major factor to improve the environmental sustainability and energy mix base diversification necessary for reducing pollution. This shows if the authority made efficient policies towards reducing their environmental pollution then sustainable ecological footprints will be developed.

Thus, it becomes concluded that the climate fund, green technology investments, research and development expenditure cause a significant positive impact on enhancing the sustainable ecological footprints within Singapore, Cambodia, Philippines, Vietnam, Indonesia, Thailand, Malaysia and Myanmar. Well, the above unit root test and panel cointegration test based statistics show that there is no existence of null hypothesis and no cointegration has existed among the tested variables. In addition, all the coefficient values of the tested variables depict that there is a direct influence of independent variables on the dependent ones because they all act as a game-changer in the current technological era.

5.1 Future Implications
This paper is an informative approach in front of their state's authorities and policymakers to make some efficient decisions regarding these ecological footprints provoking variables. In addition, the upcoming researchers can utilize this valid databased research in their discussion portion.

5.2 Limitations and Future Researches
In addition, there are some limitations of this challenging research that renewable energy consumption and fertility rate based major variables are ignored in the hypothesis testing, which can be overcome by upcoming researchers.

References


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LOOKING TOWARDS THE BIGGER PICTURE FOR ECONOMIC SUSTAINABILITY OF ASEAN COUNTRIES: ROLE OF CONSUMPTION, INVESTMENT AND DEBT GROWTH

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Abstract. The present study was performed in order to account for the changes in the economic sustainability in relation with the investment, growth of debt and consumption of resources. The study used panel data from six countries from the ASEAN region from the period between 1995-2018. The estimation of the regressors was performed on the basis of the AMG long run estimation. However, the tests of cross-sectional dependence, cointegration, unit roots were also performed on the tests. The AMG estimation reveals that for almost all countries the variables have significant and positive effects on economic sustainability. The results thus show that increases in investment, growth of debt and consumption have an increasing trend with the progress of economic sustainability. The Konya causal test was also performed on the data. Causal analysis shows that bidirectional associations exist between debt growth and economic sustainability and investment and economic sustainability. Whereas, unidirectional relationship from economic sustainability and consumption is observed to be present in the data. The current study is original as it uses the data from a different time period. These studies are important for the development of the ASEAN region. The study also provides some theoretical and policy-making implications.

Keywords: ASEAN; AMG; Konya causality; consumption; investment


Jel Codes: O1, O53

1 Introduction

Economic stability is a term that can be used to describe the overall financial stability of any nation. The output of this financial system can be expressed in terms growth and low inflation rate. It is directly linked with the development across the nation and is affected by the actions and policies of the central bank. This paper focuses on how consumption, investment and debt growth affect the economic stability of the ASEAN countries. ASEAN stands for Association of South Asian Nations. The association has made prominent progress towards the free trade and economic integration in the region. The intra-ASEAN investments and trade were increased after the creation of ASEAN free trade area. This single market attracted an increasing number of foreign investments in 1992. In this group about more than 90% of the trade goods are traded without tariffs. The market sectors that were integrated included tourism, agro based products, apparels and textiles, rubber based products, automotive and electronics (McClanahan, Chandra, Hattari, & Vis-Dunbar, 2014; N. N. H. L. T. Thao, 2014). Due to the differences in income of members of various industries many challenges arose during the economic integration. The import duties have also been reduced to zero in 2016 in order to promote the economic integration (Nafidah,
2015; Naqiyah, Pengestuti, & Mahfudz, 2017). The human development index of the ASEAN countries can be seen in the following table 1.

<table>
<thead>
<tr>
<th>Country</th>
<th>Human Development Index (2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>0.935 (highest)</td>
</tr>
<tr>
<td>Brunei</td>
<td>0.845</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0.804</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.765</td>
</tr>
<tr>
<td>ASEAN</td>
<td>0.723</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.712</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.707</td>
</tr>
<tr>
<td>Vietnam</td>
<td>0.694</td>
</tr>
<tr>
<td>Laos</td>
<td>0.604</td>
</tr>
<tr>
<td>Myanmar</td>
<td>0.584</td>
</tr>
<tr>
<td>Cambodia</td>
<td>0.581 (Lowest)</td>
</tr>
</tbody>
</table>

The Asian Development Bank was given the responsibility for calculating the feasibility of the basket and for the construction of the basket. The overall goal was to increase the financial stability of the regional economy and the price stability as well. The cost of cross border business was lowered due to the reduction in the currency risk. As a result of this the goods and services became cheaper due to the increased trade. This lead to the improvement in the economic stability for the countries since (Yoo, 2006; Yunling, 2008). The GDP growth of ASEAN countries with respect to the other countries can be seen in the following figure 1. The time period for the calculation of GDP growth is from 2008 to 2017.

![GDP Growth of Countries from 2008 to 2017](image_url)

**Figure 1: GDP Growth**

It can be seen that the ASEAN countries have seen a significant increase in their GDP. They have shown a 50% growth rate. The main reasons behind it is the increased trade and currency stability. The individuals were able to
purchase the goods and services at moderate rates. The stability attracted more and more foreign investors which led to further economic development (Ahmad & Harnhirun, 1996; Heidari, Katircioğlu, & Saeidpour, 2015). The consumption of the goods and services was increased due to the reduced rates which were resulted from the currency stability and cross country trade. The association has been working for the development of the political and economic stability of the countries and has shown prominent results. The association has a network of foreign alliances that has helped tremendously in increasing the foreign direct investment. It is involved in many international affairs, diplomatic issues and dialogues. Along with all this the association has been working on decreasing the debt of all its members through numerous ways. Each country supports the other in times of need and economic instability. This is one of the main reasons behind the creation of this association (Anorou & Ahmad, 2000; Rudra P Pradhan, Arvin, Hall, & Bahmani, 2014).

2 Literature Review

The paper focuses on analysing the impact of consumption, investment and debt growth on economic stability of ASEAN countries. Each of these impacts is discussed ahead.

2.1 Relation between Resource Consumption and Economic Stability of ASEAN countries

Resource consumption can be defined in terms of consumption of renewable resources and non-renewable resources. It may refer to the water consumption, environmental degradation and exploitation, resource depletion, fishing, deforestation, oil consumption and oil depletion, natural gas consumption and depletion and energy consumption. It can be defined in terms of natural resources as well as economic resources. In most cases the measures used for this calculation include resource efficiency and resource intensity (Azam, Khan, Bakhtyar, & Emirullah, 2015; C.-C. Lee & Chang, 2008; Monni, Palumbo, & Tvaronavičienė, 2017; Yeganeh Kia, 2020; El Idrissi, Ilham Zerrouk, Zirari, & Monni, 2020; Tvaronavičienė, & Ślusarczyk, 2019). Globalized markets and industrialization have increased the overall consumption of resources. The overconsumption of resources has a negative impact on the economic stability it results in resource depletion. The economic resources of a country include the services and goods that the country is able to provide to its population (Yildirim, Aslan, & Ozturk, 2014; Yoo, 2006). One of the main reasons for the formation of Association of South Asian Nations was to help and increase the economic stability of all its members’ nations (Hussain et al., 2019). The two main objectives of the associations that led to increased consumption of economic resources and economic stability were monetary union and the free trade. Both of these increased the trade between the countries that were members of the association. The increased trade and decreased financial pressure led to the availability of the goods and services at cheaper rates. Due to a significant decrease in the charges of goods and services, their consumption increased (Granada & Mejia, 2020; Lean & Smyth, 2010; Yildirim et al., 2014). The individuals in the population started spending more amount on the services and goods as a result of which the industries started to flourish. The trade was made tariffs free so that the industries and companies would not have to worry about the additional taxes and bear the burden to extra expense. The industrial development increased in the ASEAN countries along with the increased trade. The monetary union eliminated the risk of currency rate fluctuation. There were many obstacles in the way but the association managed to bring all the members into a single currency basket. The elimination of this risk was very beneficial for the increased trade and helped in bringing the inflation down. With the increase in the consumption of economic resources the industries flourished. The industrial development is one of the fundamental elements of economic stability. The revenues generated through the industrial development contribute to the national GDP. Over the years the GDP of the ASEAN countries have increased 50% from 2008 to 2017. There is however another factor that needs to be considered here. The goods and services that are being imported by the country from other countries outside of the association (Dixon, 1990; Tuna & Tuna, 2019). If the consumption of such resources increases then the pressure on the imports also increase. In this case the economic stability decreases. The main aim of the association was to decrease this pressure. Hypothesis one (H1) is that the resource consumption has a significant impact on the economic stability of the ASEAN countries.
2.2 Relation between Investment growth and Economic Stability of ASEAN countries

Investment includes all the economic assets that any country has that can be used for generation of wealth in the future. The economic investments of any country include all the investments in the country and in the other countries as well. The foreign investments are one of the major assets of any country. The sound investments at business level are directly linked with the economic growth. The total outputs of the businesses increase on mass level (Rudra P Pradhan et al., 2014; Yoo, 2006). As a result of this the GDP of the country increases. The increase in the GDP promotes economic growth and support the economic stability. As mentioned before the ASEAN countries promoted the free trade and monetary union. The overall goal was to increase the financial stability of the regional economy and the price stability as well. The cost of cross border business was lowered due to the reduction in the currency risk. As a result of this the goods and services became cheaper due to the increased trade. The increased trade lead to the improvement in the economic stability for the countries since. It can be seen that the ASEAN countries have seen a significant increase in their GDP (H. H. Lee & Tan, 2006; Srinivasan, Kalaivani, & Ibrahim, 2010). They have shown a 50% growth rate. The main reasons behind it are the increased trade and currency stability. The individuals were able to purchase the goods and services at moderate rates. The stability attracted more and more foreign investors which led to further economic development. The consumption of the goods and services was increased due to the reduced rates which were resulted from the currency stability and cross country trade (Abidin, Haseeb, Azam, & Islam, 2015; Rudra Prakash Pradhan, 2009). The association has been working for the development of the political and economic stability of the countries and has shown prominent results. The association has a network of foreign alliances that has helped tremendously in increasing the foreign direct investment. It is involved in many international affairs, diplomatic issues and dialogues. This increased the inward and outward foreign direct investments. The inward foreign investments brought the latest technology and foreign currency to the ASEAN countries. The inflow of foreign currency became another one of the factors contributing to the support of the national GDP (C. G. Lee, 2009; Zhu, Duan, Guo, & Yu, 2016). The outward foreign investment helped in increasing the national revenue as well. The local investments resulted in improvement of the local economy. The revenue generated through the local businesses also contributed to improvement of the financial stability of the country (Kuppusamy, Pahlavani, & Saleh, 2008). Thus it can be derived that the investments have had a positive impact on the economic stability of the ASEAN countries. Hypothesis two (H2) is that the investment growth has a significant impact on the economic stability of the ASEAN countries.

2.3 Relation between Debt growth and Economic Stability of ASEAN countries

The global industrialization has encouraged the countries to invest in human capital, technological development, machine learning and artificial intelligence. The huge investments at international level are being done in order to keep up with the increasing competition world-wide. Investing in such major areas require huge amount of funds (Makin, 2005; Simarmata, 2013). The countries that have fewer trades and less international investment require external support for financing their economic development. The countries like Indonesia have to face natural disasters very often. Thus they require additional funds for such natural disasters. The funds can be collected from foreign and domestic sources. The increasing debt may solve the problem at hand but are linked with the increase in national liability. Now if the debt is collected from domestic or foreign sources than the government of the country is forced to increase the taxes on the population in order to cover the amount of the debt. This results in increasing inflation and unrest among the business circles. The increased taxes decrease the purchasing of goods and services that are essential components in driving the economy of the countries (Rahim & Saad, 2014; P. Thao, 2018). The domestic investments are reduced due to the inflation. The overall balance between the expenditure and revenue is upset. The cost of living in the country increases and the financial pressure on the population increases as well. The economy of the country is able to grow optimally of the percentage of national debt is less
than 90%. Most of the ASEAN countries are developing countries and at some time have relied on external financial aid. This led to the increased liability at national level. When this debt increased the financial pressure on the population increased as well (James, Naya, & Meier, 1989). As a result of all this a major portion of the national revenue generated is used in paying off a debt and is not used on economic development. The investments and trade decreased due to increased taxed so the revenue decreased as well. This way the increasing debt is linked with economic instability in the ASEAN countries.

Hypothesis three (H3) is that the debt growth has a significant impact on the economic stability of the ASEAN countries.

3 Methodology

3.1 Data

In this study the data for consumption, investment, debt growth and economic sustainability has been collected from the ASEAN countries for the period of 1995-2018. Two control variables i.e. per capita income and exports have also been used in the study. The variables have been defined as follows; the economic sustainability is measured in terms of GDP divided by the Co2 emissions per capita and it has been measured in constant 2010 US dollars. Investment is measured through the gross capital formation which is the account of the total additions in the fixed capital accounts of the country and also accounts for the changes in inventories. Investment is also measured in terms of US dollars. Debt-growth is defined as the total increase in the level of debt internal and external owed by the country, it is measured in constant US dollars. Consumption is defined as the use of goods and services by the households or residents of an economy. For measuring consumption level, the study has used the metric of GNI, which is the gross national income and it is measured in terms of constant US dollars. The data has been collected from the World bank from its database. The data regarding six ASEAN countries has been collected i.e. Thailand, Cambodia, Indonesia, Laos, Brunei and the Philippines.

In this study the relationship between economic sustainability, investments, debt growth and consumption were estimated through the following regression equation;

\[ ECS_{i,t} = \beta_0 + \beta_1 CON_{i,t} + \beta_2 INV_{i,t} + \beta_3 DEG_{i,t} + \beta_4 PCI_{i,t} + \beta_5 EXP_{i,t} + \epsilon_{i,t} \] (1)

Where \( \beta_0 \) is the intercept that measures the effect of the dependent variable ECS, \( \beta_1, \beta_2, \beta_3 \) are the coefficients of the independent variables; consumption, investment and debt growth where \( \beta_4 \) and \( \beta_5 \) are the coefficients of the control factors PCI and exports. In equation 1 the subscript ‘i’ denotes the countries and the subscript ‘t’ is used for the specific period under consideration.

3.2 Cross-sectional dependence test

As a consequence of the globalization of the nations of the world and the increasing economic integration, the dependence and association uniting the cross-sections in panel facts is expected. If the associations among the transverse data isn’t considered, then misleading results are produced which eradicate the authenticity and credibility of the study. The study followed the method used by Breusch and Pagan (1980) for testing the cross-sectional vulnerability.

\[ CD_{BP} = \sum_{t=0}^{n-1} \sum_{j=t+1}^{n} \rho_{i,j}^2 \] (2)

However, this test statistic presents a disadvantage in cases where N i.e. the number of cross-sections is large and therefore it cannot relate in such scenarios (N is large and N leads towards \( \infty \)). In order to overcome this issue Pesaran (2004) introduced the LM statistic

\[ CD_{LM} = \sqrt{\frac{1}{N(N-1)} \sum_{t=0}^{n-1} \sum_{j=t+1}^{n} (T \rho_{i,j}^2) (1)} \] (3)

According to Pesaran the above-mentioned statistic is to be used when the cross-sectional size is greater than the time dimension T

\[ CD = \sqrt{2T/N(N-1)} [ \sum_{t=0}^{n-1} \sum_{j=t+1}^{n} T \rho_{i,j}^2 ] \] (4)

Where the term \( \rho_{i,j} \) is used to indicate the correlation among the errors.

The study also analyzes the slope homogeneity by using the test designed by Pesaran and Yamagata (2008).
\[ \Delta = \sqrt{N} \left[ \frac{N^{-1}S - k}{\sqrt{k}} \right] \]  

(5)

### 3.3 Panel Unit root test

The next test applied on the data is the panel unit root test which is applied to test the stationary levels of the variables by using the CIPS panel unit root test, this test accounts for the cross-sectional dependence among variables. The following regression was used for the cross-sectional augmented DF,

\[ \Delta Y_{i,t} = \alpha_i + b_i Y_{i,t-1} + c_i Y_{t-1} + d_i \Delta Y_{t} + \varepsilon_{i,t} \]  

(6)

CIPS = \[ \sum_{i=1}^{N} CADF \]  

(7)

### 3.4 Panel Co-integration Test

The cointegration i.e. the correlations between the time series data is analyzed on the basis of the Westerlund and Edgerton (2007). The following test statistics have been used;

\[ LM_N = \frac{1}{N}\sum_{i=1}^{N}\sum_{t=1}^{T} \hat{\omega}_t^{-2} S_{it}^{-2} \]  

(8)

Where the term \( S_{it}^{-2} \) used to demonstrate the partial sum of the error terms, \( \hat{\omega}_t^{-2} \) is used to show the long-run variance of the error terms. The long run estimates of the model have been computed by using the AMG compositators that take the heterogeneity of the cross sectional units and the vulnerability into consideration (Eberhardt & Bond, 2009).

### 3.5 Panel Causality Test

The causality analysis was performed in order to study the causality among the economic sustainability, consumption, debt growth and investment. The test developed by Kónya (2006) has been considered. The observation of the cross-sectional dependence doesn’t appear, and it can be executed on non-stationery and series that do not co-integrate as well.

### 4 Results

Table 2 indicates the outcomes of the cross-sectional dependence (CSD) and the slope homogeneity results. The zero hypothesis for the CSD test is that if the probability evaluate are weaker than the significant statistics then the null hypothesis is deserted. The null hypothesis contends for no cross-sectional dependence, whereas the alternate hypothesis states a presence of CSD among the study variables. According to the results of the CD_{BP}, CD_{LM} and CD the zero hypothesis of the cross-sectional dependence test is rejected. The * demonstrates significance at the 1% level of positive and the ** is used to depict the importance at the 5 percent level. The results intimate that there is presence of CDS among the variables included in the study. The slope test is conducted to evaluate the homogeneity properties of the dataset. The null hypothesis for this test expresses the presence of homogeneity whereas the alternate hypothesis expresses the presence of heterogeneity. According to the outcomes of the delta computations, the assumption of homogeneity has been denied and the coefficients are found to be heterogeneous.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CD_{BP}</th>
<th>CD_{LM}</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON</td>
<td>180.884*</td>
<td>78.384*</td>
<td>48.493*</td>
</tr>
<tr>
<td>INV</td>
<td>184.378**</td>
<td>94.498**</td>
<td>41.884**</td>
</tr>
<tr>
<td>DEG</td>
<td>167.188*</td>
<td>78.498*</td>
<td>39.998*</td>
</tr>
<tr>
<td>EXP</td>
<td>189.688*</td>
<td>68.498*</td>
<td>35.498*</td>
</tr>
<tr>
<td>PCI</td>
<td>156.983*</td>
<td>97.976*</td>
<td>53.499*</td>
</tr>
<tr>
<td>ECS</td>
<td>187.287**</td>
<td>69.578**</td>
<td>63.298*</td>
</tr>
</tbody>
</table>

**Slope Homogeneity Tests Results**

<table>
<thead>
<tr>
<th>Tests</th>
<th>LM Statistics</th>
<th>t-value</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta</td>
<td>63.89</td>
<td>5.302</td>
<td>.009</td>
</tr>
<tr>
<td>Adj Delta</td>
<td>29.09</td>
<td>3.283</td>
<td>.042</td>
</tr>
</tbody>
</table>
Table 3 presents the results of the CIPS panel unit root test. The null hypothesis for the unit root (UR) test is that there is presence of UR issues in the variables whereas the alternate hypothesis contends for the absence of unit root and presence of stationarity of the data. The panel unit root test is performed in order to evaluate the stationary properties of the variables and also to find its order of integration. Table presents the results of the CIPS panel UR test. The results show that the investment, debt growth, exports and economic sustainability are stationary at level, with 1 percent level of significance. Whereas at the premier difference all variables are stationary and do not present UR issues, thus the null hypothesis is rejected. The series are unified at the first order I(1).

<table>
<thead>
<tr>
<th>Variable</th>
<th>At Level</th>
<th>First Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON</td>
<td>-4.134</td>
<td>-8.113**</td>
</tr>
<tr>
<td>INV</td>
<td>-2.338*</td>
<td>-7.312**</td>
</tr>
<tr>
<td>DEG</td>
<td>-0.3944*</td>
<td>-5.284*</td>
</tr>
<tr>
<td>EXP</td>
<td>-3.394*</td>
<td>-7.392**</td>
</tr>
<tr>
<td>PCI</td>
<td>-2.394</td>
<td>-6.940**</td>
</tr>
<tr>
<td>ECS</td>
<td>-3.2384*</td>
<td>-9.394**</td>
</tr>
</tbody>
</table>

The LM Bootstrap test has been performed next in order to verify the presence of cointegration or long run associations. Table 4 presents the results of this analysis. If the Bootstrap p-value is less than the LM statistic value, then the null hypothesis i.e. absence of co-integration is rejected. As the table demonstrates the values of the bootstrap probability are less than the LM statistics therefore the null hypothesis is rejected and the alternate hypothesis that verifies the presence of long run relationship between the variables is accepted. The table values show that ECS, PCI, EXP, CON, INV and DEG are associated with each other in the long run.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>LM-statistics</th>
<th>Bootstrap p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.499</td>
<td>0.674</td>
</tr>
<tr>
<td>Constant + Trend</td>
<td>11.393</td>
<td>0.109</td>
</tr>
</tbody>
</table>

The AMG estimators have been used for measuring the strong relationships among the variables. The results have been listed in table 5. The results for consumption indicate that it has a favorable impact on the economic sustainability for five ASAEN countries; the results are significant for all but Brunei. The impact for Cambodia is at 5% level of positiveness and for Indonesia, Laos, Thailand and Philippines the results show 1 percent level of significance. The results manifest that increase in the consumption patterns in these countries lead towards economic sustainability. Investment is favorable at the 1% level of favorable in Brunei, Cambodia, Indonesia and Philippines. Increases in investment in these countries have significant effects on their economic sustainability. Debt growth is significant for all six countries and shows that the increase in debt will be beneficial for the economic sustainability. Exports and per capita income are also significant mostly and show positive effects on the economic sustainability of the countries.

<table>
<thead>
<tr>
<th>Countries</th>
<th>CON</th>
<th>INV</th>
<th>DEG</th>
<th>EXP</th>
<th>PCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>0.038</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>0.234**</td>
<td>0.129*</td>
<td>0.204*</td>
<td>0.288**</td>
<td>0.183***</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.294*</td>
<td>0.284*</td>
<td>0.294**</td>
<td>0.046</td>
<td>0.283**</td>
</tr>
<tr>
<td>Laos</td>
<td>0.387*</td>
<td>0.023</td>
<td>0.283*</td>
<td>0.052</td>
<td>0.386**</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.210*</td>
<td>0.043</td>
<td>0.394**</td>
<td>0.399**</td>
<td>0.289*</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.309*</td>
<td>0.384*</td>
<td>0.193***</td>
<td>0.293**</td>
<td>0.399**</td>
</tr>
<tr>
<td>Penal</td>
<td>0.583***</td>
<td>0.405*</td>
<td>0.422***</td>
<td>0.424***</td>
<td>0.382**</td>
</tr>
</tbody>
</table>
Table 6 reveals the findings of the panel causality tests. The decision rule is simple, the relationships with probability values less than 0.05 show causality. From the results depicted in table 5 it can be seen that economic sustainability causes consumption i.e. there is presence of a uni-directional relationship between ECS and CON. There is existence of bi-directional causality among ECS and INV and ECS and DEG. The causal associations among the independent variables have also been explored. Bidirectional causality exists between INV and DEG and INV and CON whereas there is existence of unidirectional causality between DEG and CON i.e. DEG causes Con but CON does not cause DEG.

<table>
<thead>
<tr>
<th>Null Hypothesis:</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS does not Granger Cause CON</td>
<td>2.336</td>
<td>0.0533</td>
</tr>
<tr>
<td>CON does not Granger Cause ECS</td>
<td>3.320</td>
<td>0.5332</td>
</tr>
<tr>
<td>ECS does not Granger Cause INV</td>
<td>3.723</td>
<td>0.0512</td>
</tr>
<tr>
<td>INV does not Granger Cause ECS</td>
<td>5.736</td>
<td>0.0044</td>
</tr>
<tr>
<td>ECS does not Granger Cause DEG</td>
<td>3.201</td>
<td>0.0643</td>
</tr>
<tr>
<td>DEG does not Granger Cause ECS</td>
<td>4.138</td>
<td>0.0473</td>
</tr>
<tr>
<td>CON does not Granger Cause INV</td>
<td>5.310</td>
<td>0.0043</td>
</tr>
<tr>
<td>INV does not Granger Cause CON</td>
<td>4.730</td>
<td>0.0004</td>
</tr>
<tr>
<td>CON does not Granger Cause DEG</td>
<td>6.628</td>
<td>0.5382</td>
</tr>
<tr>
<td>DEG does not Granger Cause CON</td>
<td>4.738</td>
<td>0.0304</td>
</tr>
<tr>
<td>INV does not Granger Cause DEG</td>
<td>2.298</td>
<td>0.0323</td>
</tr>
<tr>
<td>DEG does not Granger Cause INV</td>
<td>6.283</td>
<td>0.0054</td>
</tr>
</tbody>
</table>

5 Discussion
This research has concentrated on studying the nexus between the economic sustainability, consumption, investment and debt extension of the six ASEAN economies under consideration. For this purpose, the researcher employed the use of AMG estimators and Konya causality as well. Similar studies targeting the relationship between the economic sustainability and its indicators have been carried out by researchers (Dinçer, Yüksel, Adalı, & Aydın, 2019; Mahalik, Babu, Loganathan, & Shahbaz, 2017). A study by Nasir, Huynh, and Tram (2019) focused on the economic growth, financial development and the ecological developmental consequences i.e increasing Co2 emissions in the developing ASEAN states. The study employed the use of FMOLS and DOLS method to evaluate the associations among the variables. The study found that long run development and investment is positive for economic growth but poses serious degrading effects on the environment (Ślusarczyk, Haseeb & Hussain, 2019). The results of this study also show that the increase in consumption and investment relates positively with the economic sustainability. Another study by Kim, Ha, and Kim (2017) focuses on the dimensions of public debt and EG. The findings intimate that the increase in public debt relates with the economic sustainability of the country. The causal relationship as assessed by the causality test also verifies that there is a causal connection among debt growth and economic sustainability. The study by Ouyang and Li (2018) studies the association among the energy consumption, financial growth and economic sustainability in china. The study applies the GMM and VAR model on a panel of 30 Chinese provinces in order to study the country wide effects among these variables.

5. Conclusion
The major purpose of this paper was to evaluate the relationships between the economic sustainability, investments, consumption patterns and debt growth effects on the ASEAN countries for the selected time period. The relationships among the explanatory and the outcome variables was assessed as they are associated with each
other and converge together to produce a sustainable economy. Several econometric tools for the purpose of analysis of different dimensions of the data, the Pesaran CSD test, the CIPS panel unit root test, slope homogeneity test, cointegration analysis, AMG long run estimation and the Konya causality were used to verify different dimensions of the data. The analysis shows that the relations between the consumption, debt growth, investment and economic sustainability are significant. The causal analysis shows that bidirectional associations exist between debt growth and economic sustainability and investment and economic sustainability. Whereas, unidirectional relationship from economic sustainability and consumption is observed to be present in the data.

5.1 Limitations
The study has some limitations; the study only uses the data from 1995-2018, it is advised to use a bigger dataset in the future so that the effects and relations can be analyzed. This study employs the use of time series and panel data which is subject to issues like cross-sectional dependence and heterogeneity. The study only focuses 3 explanatory variables, the effects of other variables should also be included in the study. The present research is only limited to six of the ASEAN countries, these relations need to be analyzed for the other four ASEAN countries as well.

5.2 Implications
This study also poses some theoretical and policy making implications. The study focuses on six ASEAN countries and provides details regarding their relationship with economic sustainability and important indicators like investment and consumption. The studies focusing on the ASEAN countries are limited thus this study has important academic and theoretical implications. Moreover, the policy makers can use this study to formulate important policies regarding debt, consumption and investment strategies by integrating them with the economic growth and sustainability.

References


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ROLE OF E-GOVERNMENT AND OPEN DATA TO ENHANCE TRANSPARENCY IN ASEAN REGION: A PANEL DATA ANALYSIS

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Abstract. E-government involves the use of latest skills by the government while providing the services and other information management systems to its citizens. Open data refers to the openness of all the data related to government to its citizens so that the government becomes more and more transparent and to decrease negative activities. Transparency refers to the clear and clean image of a government towards its people, which increases the trust of people on their government. The motive of this study is to analyze the impact of e-government adoption and open government data on transparency in ASEAN countries. Two control variables i.e. literacy rate and corruption have also been used in the study. The past literature has also been discussed in literature review section of this study. In order to conduct research, data about the concerned variables of the study has been collected from ASEAN countries consisting of 29 years. After applying several tests and approaches for research purpose, the two major hypotheses of this study are accepted along with the impact of a control variable, corruption. However, the impact of other control variable i.e. literacy rate has been rejected. There are various theoretical, practical and policy making benefits that will increase the transparency.

Keywords: E-Government; Open Data; Transparency; ASEAN


Jel Codes: O1, O53

1 Introduction

Transparency can be defined as the openness, honesty and clarity of any government or business, which is very much important concept now-a-days (Alt, Lassen, & Rose, 2006; Yang, 2020; Bulyga, Sitnov, Kashirskaya, Safonova, 2020; Besenyő, Kármán, 2020). This concept involves the fact that all the operations and activities going on in government or in businesses must be disclosed to the public so that everyone is aware of these activities. The increased used of social media has made it possible to leak out even the most hidden activities of businesses or governments. In other words, transparency is the quality of something in which a person can see through that particular thing very clearly and know each aspect related to it. According to Alzetta (1997) and Attard, Orlandi, Scerri, & Auer (2015), open data refers to the concept that a certain amount of data must be open to everyone to be used in any context either for business purposes or any other research purpose. The open data must not be having any copyright protection issue and can be freely used by anyone. One of the very crucial types of open data is open government data, which is actually owned by government but is open to everyone to be seen and used (Buchanan & Pilgrim, 2004; Crausaz & Metcalfe, 2005). This data can be found on some websites that are run by the government officials. Many businesses may use this data for research and development purposes and activities.
Figure 1 shows the open government data as a component of open government movement. E-government is a concept with growing importance now a days with the increased use of innovative aspects and technologies (Venkatesh, Thong, Chan, & Hu, 2016). E-government actually involves the application of latest technologies such as information and communication technologies and innovations in various services, it provides to the public. This may be in the form of some mobile application or some online website system. E-government assists the government to improve the competence of its services and to gain the trust of its citizens. Schnoll (2015) in his study supports the idea that this trust becomes the base of strong relationship between government and public of a country. Transparency and accountability are some other benefits of e-government (Davies & Bawa, 2012; Preixens, Rodriguez & Batllé, 2020).

E-government usage and open government data can be very helpful to increase transparency of a government but sadly in ASEAN countries, last of e-government awareness and lack of open government data has resulted in decreased transparency and trust of people on government. Sá, Rocha, and Cota (2016) supports the fact that other than ASEAN countries, other developing and underdeveloped countries are also facing the same issue of decreased transparency. If this problem prevails for a longer period, it will have serious outcomes in the form of lack of trust on government in those countries. Therefore, it is crucial to solve this issue by giving attention to the concept of e-government and providing open government data to public (Ding et al., 2011; Drew & Karagedikli, 2008; Ye & Cao, 2020; Korauš, Dobrovič, Polák, & Backa, 2019; Korauš, Gombár, Kelemen, & Backa, 2019; Lincényi, Čársky, 2020; Korauš, Dobrovič, Polák, & Kelemen, 2019; Remeikiene, Gaspareniene, Chadyšas, & Raistenskis, 2020).

Several researches have been conducted to study the concepts and implications of e-government and open government data but their impact on transparency has not been yet studied (Kurfalı, Arifoğlu, Tokdemir, & Paçin, 2017). Therefore, a research paper by Park and Kim (2019) has recommended studying the impacts of these two important concepts on transparency. The main goals of this study are as follows:

- To analyze the significant impact of e-government on transparency in ASEAN countries
- To identify the significant impact of open data on transparency in ASEAN countries

As ASEAN countries are growing day by day economically and their governments have strong hold on economic activities in these countries, concepts such as e-government and open government data may be useful to increase transparency in these countries (Hussain et al., 2019). Therefore, this study covers the information about impacts of e-government and open government data on transparency (Güler, Mukul, & Büyüközkan, 2019; Ahmed, Iqbal & Farooqi, 2020). The significance of this study is that it provides enough information and literature about e-
government and open data and their impacts on transparency. It will also assist the governments of ASEAN countries to improve the conditions of e-government and provide open government data to public to improve their transparency (Gelos & Wei, 2005; Ch, Batool & Bashir, 2020). Other than that, it will also assist their governments to formulate policies that are favorable for e-government adoption and open data availability in order to increase transparency.

2 Literature Review

2.1. Rational Choice Theory

According to rational choice theory, before doing any act, people measure its consequences in context of costs and benefits (Ostrom, 1998). In other words, in order to make a rational choice, people will prefer that choice that will be easy to perform or act and at the same time giving the high reward. These two conditions make the choice of a person rational. This can be understood in the context of crimes, where the offender commits crime when it is easy to do and has higher outcome or reward. A criminal activity consists of three factors. The first factor in this regard is the presence of an apt target that is available to the offender for committing crime. The next factor is the presence of a provoked offender who is to commit crime. And the last factor in this regard is the absence of any person or authority to prevent the happening of that crime. As our study is about transparency enhancement due to e-government and open data, “transparency” can be considered as an important factor to prevent crime such as corruption, bribery, kickbacks etc. If a government is transparent and all of its data and information is open to general public, it will cause valuable decrease in the various crimes such as corruption (Coleman & Fararo, 1992). Therefore, this theory can be effectively applied in our study.

2.2. Impact of E-Government on Transparency

Transparency refers to the clarity of a government system which includes all the functions of the government, all the rules and regulations related to it and the employees working under the government. E-government has crucial role in this aspect. Many countries have started using information and communication technologies in the form of e-government in order to increase transparency of their governments. Buffat (2015) discussed that e-government can be used to increase transparency in variety of ways; it may reduce the levels of corruption in the country, it may enables its activities being tracked down by the people, its employees being controlled and monitored by citizens and building of strong and healthy relationships between government and public (K. Janssen, 2011). It is not necessary that the application and adoption of e-government can increase transparency in long term situations because researches have shown that sometimes use of e-government in a few cases may also result in decrease in transparency. Filtering of data or information in some countries can be considered as an example of this situation. Anthopoulos, Reddick, Giannakidou, and Mavridis (2016) elaborated that these countries put filters or security on some websites or kinds of information which makes them impossible to be accessed by the general public. This sometimes creates an ambiguous image of government in citizens resulting in decrease of transparency. Nevertheless, clearly this is a rare case. E-government in general is used to increase the transparency of government activities and information. K. Janssen (2012) and M. Janssen, Charalabidis, and Zuiderwijk (2012) explain that under the umbrella of e-government there are several websites and applications that provide government services to the people. Terms and conditions of services available on these forums are same for everyone and thus everyone enjoys same kind of service that is another aspect in the increase of transparency of government. Other than that all the laws and regulations of a state made by government are clear and readily available to every citizen also increases the transparency rate and decreases crime rate and corruption rate in the country (Al-Hujran, Al-Debei, Chatfield, & Migdadi, 2015). In short, we can say that the adoption of e-government can increase the transparency levels of government in a country. The following hypothesis can be generated:

H 1: E-Government has significant impact on Transparency in ASEAN Countries

2.3. Impact of Open Data on Transparency

Government transparency is a much broader concept which involves usually access to government information as well as openness of data to the citizens (Nair et al., 2008). In the past, open data benefits are mostly observed in
political and social context but now transparency of government has also become important aspect in this regard. Increase in transparency not only increases the performance and efficiency of the government but also has a crucial impact on contribution of citizens in the affairs of decision making of government. Alam (2017) in his studies has shown that increase in transparency also results in controlled corruption as well as enhanced trust of people in their government. Open government data shows a very important role in this regard. People can use open government data to provide economic benefits to the country as well as to the citizens of that country. Economies of countries have been observed to be boosted where people have open access to government data. As transparency involves the availability of required data and information about a specific company or government, that can be used to monitor various activities taking place internally in those businesses or government. Shadbolt et al. (2012) emphasize that this information also includes data that must be disclosed to the public. When data related to various aspects and spread on a huge span of time is available to the citizens, they can compare that data in several ways in order to estimate the act of the government and can evaluate it on the basis of that particular data. This performance of government is directly linked to the level of transparency of that particular government depicting the fact that more transparent government will perform better and add towards the growth of the country. A transparent government is also readily available for accountability by its citizens. Abu-Shanab (2017) supports the idea that the open government data can also be used by public in their various activities such as private sectors may use that data in their research and development activities to introduce an innovative product or to entirely start a new business (Becerra & Martinez, 2020; Stasavage, 2003; Ubaldi, 2013). Overall, open government data is supposed to increase the transparency as well as accountability of government services and various other activities leading towards enhanced trust and strong relationships between the government and its citizens. The following hypothesis can be generated in this regard:

**H 2:** Open Data has significant impact on Transparency in ASEAN Countries

### 3 Methodology

#### 3.1 Data

In order to test the hypothesis that have been made earlier in the literature review section of this study, data was collected for 29 years for various countries of ASEAN region. The data was collected for various independent, dependent and control variables. The independent variables of this study are e-government adoption and open data. The dependent variable of this study is transparency and finally the control variables of this study include literacy rate and corruption. All the data about these variables was carefully collected from different reliable sources such as E-government Development Index and World Bank. The reliability of these sources shows that the data will be completely accurate.

#### 3.2 Model Specification

In order to study various relationships between several variables included in this study, author has prepared a model. The impact of independent variables i.e. e-government and open data on the dependent variable transparency will be studied. In addition, the impact of control variables of this study i.e. literacy rate and corruption on transparency will also be studies effectively. All these variables can be defined by their own measurement’s unit each. The first and important variable of this study is e-government adoption (EGOV) that is an independent variable and can be measured in the form of percentage of people adopting e-government. The next variable of out study is open data (OPN) which is also an independent variable and, in this study,, it is measured in the units of percentage of people using open data. The only dependant variable of thus study is transparency (TRN) that can be measured by counting the number of policies, decisions, or the management of the budget submitted to the organization's members. The first control variable of this study is literacy rate (LIT) which can be measured by the percentage of literate people of a country. The other control variable is corruption (COR) and it can be measured by the corruption perception index. For research purpose, by using all the variables included in this study, we can make the following regression equation.
Where, TRN indicates transparency, EGOV is e-government adoption, OPN is open government data, LIT is literacy rate, COR denotes corruption, $\alpha$ represents a constant, $i$ represents the cross sectional data, $t$ shows the time series data and $\varepsilon_{it}$ is used to represent the error.

### 3.2. Estimation Procedure

After collection of complete required data, now it is time to test that data so that the purpose of this research can be effectively fulfilled. Another important aim of the analysis of the collected data is to confirm the acceptance or rejection status of the hypothesis made earlier in the literature review section. Several tests and approaches have been used in this scenario. These tests include panel unit root test, panel cointegration test, estimation of coefficient test etc.

#### 3.3. Panel Unit Root Test

In order to proceed in the study, it is important to check the integration status of the variables for zero or one. For this purpose, various tests can be use; the most important of them are panel unit root tests. These tests can be broadly graded into two categories i.e. Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS). These approaches are significant because they solve the issue of power and size in time series data more effectively as compared to the other tests. The reason behind this is the difference between different types of data. To explain this concept, it can be said that the data having more variations is more suitable to the panel unit root tests as compared to the data having lesser variations in it. However, as in our study the data has been collected in a varied way involving many countries of ASEAN region, therefore it provides the surety of presence of variations in the collected concerned data. Another important advantage of these tests is that they usually produce a normal distribution of the collected data. Contrarily, the conventional tests associated with unit root do not provide a proper standard normal distribution of collected data, which is a major disadvantage. Both the tests IPS and LLC are more competent and reliable as compared to the old and traditional ones for the basic two reasons mentioned above. These tests are actually performed in order to check the stationary status of the variables i.e. whether they are stationary or nonstationary. Pedroni (1999) suggested that for this purpose, null and alternative hypothesis are made. In null hypothesis, it is assumed that the variables are nonstationary while in another hypothesis, it is assumed that the variables are stationary and in integration with each other. A major difference of IPS and LLC unit root test is that LLC gives a same or homogeneous autoregressive process while studying the cross-sectional data. Alternatively, IPS gives a different or heterogeneous autoregressive process during the study of variables included in the study. In this study, however, we will be using IPS technique of unit root test. The general equation of this particular approach is given below:

$$\Delta y_{i,t} = a_t + \rho y_{i,t-1} + \sum_{j=1}^{p_i} a_j \Delta y_{i,t-j} + \varepsilon_{i,t} \quad (2)$$

### 3.4. Panel Cointegration Test

Panel cointegration test is the next step in the research method used in this study. This test is used to identify any cointegration existing between the variables used in our study. After checking the integration of variables, it is very important to check the cointegration of these variables too. A common thing between IPS and cointegration tests is that they both provide the heterogeneous autoregressive results in the study of cross-sectional data. There are two types of cointegration tests that are widely used in the research process used in this study too. These types include Kao and Pedroni, both of which are actually based upon Engle-Granger tests. According to Pedroni, two different approaches are used in order to check cointegration between different variables. These include “within dimension” and “between dimension” approaches explained by Pedroni (1996). Different statistics are distributed among these two approaches in such a way that within dimension includes four statistics namely panel v statistic,
panel rho statistic, panel PP statistic (nonparametric) and panel ADF statistic (parametric). On the other hand, between dimension contains only three statistics namely group rho statistic, group PP statistic (nonparametric) and group ADF statistic (parametric). In this study, however, author will use Pedroni cointegration test, the general equation of which is as follows:

$$y_{i,t} = \alpha_i + \delta_{i,t} + \beta_1 X_{1.i,t} + \beta_2 X_{2.i,t} + \ldots + \beta_n X_{n.i,t} + \epsilon_{i,t}$$ (3)

Where $\alpha_i$ is country-specific affect, $\delta_{i,t}$ is deterministic time trend, and $\epsilon_{i,t}$ denotes estimated residuals.

3.5. Coefficient Estimation Test

Coefficient estimation tests are used to check the relationship between different variables involved in this study. This also gives the exact value, for which the dependent variable changes with one-unit change in independent variable. In this regard, two tests are generally used i.e. FMOLS and DOLS. Pedroni (2004) explained the relationship between different variables could also be confirmed by using this coefficient tests. FMOLS and DOLS can be differentiated from each other on the basis of the fact that FMOLS is a non-parametric method while DOLS is a parametric technique, both used for serial correlation. FMOLS and DOLS are the modified forms of the original OLS, but OLS is not as much effective as the modified forms. The approaches and techniques used in these tests involves both within and between dimension approaches. The general equation of FMOLS used in this study is as follows:

$$\hat{\beta}_{FMLOS} = \left( \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - \bar{x}_i)^2 \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - \bar{x}_i) TRN_{i,t} - T \delta_{zu}$$ (4)

Here $TRN_{i,t}$ is the transformed variable of transparency.

4. Empirical Analysis

4.1 Results of Unit Root Test

Panel root tests are conducted in order to check the integration between different variables that are included in our study. The stationary and nonstationary status of data related to these variables can also be studies and identified with this test. In this study, the author used IPS test for unit root and found the results that are represented in the table 1. According to this table, we can see that in the level section of the table, the data cannot be rejected because of the fact that there is no rejection sign present there. This shows that the data in the level portion of the table is stationary. In addition, the null hypothesis of zero order will not be denied. On the other hand, the data at the first difference section of the table, it can be seen that the null hypothesis of zero order can be rejected at both one and five percent significance levels and the data is considered to be non stationary. In addition to that, as the data on the first difference series has been rejected with one and five percent significance levels, therefore because of null hypothesis rejection, it can be said that the first difference side of data is integrated with order of one. This result can be concluded in such a way that the level section of data is stationary while the first difference portion data is nonstationary. For the detailed results, the following table 1 can be considered:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>First Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRN</td>
<td>-2.26484 (0.4633)</td>
<td>-2.27633** (0.0075)</td>
</tr>
<tr>
<td>EGOV</td>
<td>-1.28746 (0.9273)</td>
<td>-3.47282* (0.0001)</td>
</tr>
<tr>
<td>OPN</td>
<td>-0.82653(0.8263)</td>
<td>-3.39476*(0.0045)</td>
</tr>
<tr>
<td>LIT</td>
<td>-1.28374 (0.2373)</td>
<td>-1.29474** (0.0011)</td>
</tr>
</tbody>
</table>
4.2. Results of Panel Cointegration Test

After the integration has been tested among various variables of our study by the use of panel unit root test, the next thing in this research is to check the cointegration and steady and non steady state of the variables of the study. In order to serve this purpose, the author has used panel cointegration test, as it is more accurate and provide better results as compared to the conventional cointegration tests. After the application of this test on all the variables included in our study, the results of this test have been presented in an effective way in the table 2. In this table, the statistics and probability values of both the approaches within dimension and between dimensions are given. In this table it is clear that in “within dimension” approach; “panel rho statistic” has rejected the null hypothesis with the significance level of five percent, “panel PP statistic” has rejected the null hypothesis with the significance level of one percent and the “panel ADF statistic” has rejected the null hypothesis with the significance level of one percent. On the other hand, in “between dimension” approach, “group rho statistic” has rejected the null hypothesis with five percent and “group ADF statistic” has rejected the hypothesis by one percent. So overall, five out of seven statistics have shown the rejection of null hypothesis by one and five percent significance levels. These rejections clearly show that all our variables e-government adoption, open govt. data, transparency, literacy rate and corruption are cointegrated with each other.

Table 2: Panel Cointegration Test

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Tests</th>
<th>Statistics</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Dimension</td>
<td>Panel v statistic</td>
<td>-0.92773</td>
<td>-1.46827</td>
</tr>
<tr>
<td></td>
<td>Panel rho statistic</td>
<td>-1.62537**</td>
<td>-2.67273</td>
</tr>
<tr>
<td></td>
<td>Panel PP statistic</td>
<td>-3.27358*</td>
<td>-2.48623</td>
</tr>
<tr>
<td></td>
<td>Panel ADF statistic</td>
<td>-2.73681*</td>
<td>-3.82461</td>
</tr>
<tr>
<td>Between Dimension</td>
<td>Group rho statistic</td>
<td>-3.47826**</td>
<td>-2.48971</td>
</tr>
<tr>
<td></td>
<td>Group PP statistic</td>
<td>-2.74821*</td>
<td>-3.64822</td>
</tr>
<tr>
<td></td>
<td>Group ADF statistic</td>
<td>-1.46821*</td>
<td>-2.28371</td>
</tr>
</tbody>
</table>

Note *, ** and *** show rejection of hypothesis

4.3. Coefficient Estimation Test

After the cointegration of all the variables included in our study has been confirmed, the next step in this research process is to estimate the coefficients of these variables. Between the two estimation techniques FMOLS and DOLS, the author has chosen the technique FMOLS technique for this purpose. All the results of this test are shown in the table 3 along with the values of coefficients of variables for both pooled and grouped versions. The results in the table show that the coefficients of e-government adoption are 0.824 and 1.736 respectively. These coefficients show that one and five percent significance levels, which clears that this result is significant. We can say that e-government has important impact on transparency. Similarly, the coefficients of open data are 1.234 and 1.284 for both pooled and grouped versions along with the significance levels of five and one percent respectively, which clearly shows that this result is also significant. In this scenario, we can say that open data has significant impact on transparency. Other than these independent variables, literacy rate being a control variable, is not significant according to the results. While the other control variable, corruption has significant impact on transparency. Overall results show that the two major hypotheses along with a control variable corruption have been accepted.
Table 3: Coefficient Estimation Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pooled</th>
<th>Grouped</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGOV</td>
<td>0.824*(2.634)</td>
<td>1.736**(2.527)</td>
</tr>
<tr>
<td>OPN</td>
<td>1.234**(2.276)</td>
<td>1.284*(2.864)</td>
</tr>
<tr>
<td>LIT</td>
<td>0.324(0.032)</td>
<td>-0.836(-2.032)</td>
</tr>
<tr>
<td>COR</td>
<td>-1.632**(-2.163)</td>
<td>1.284*(-2.165)</td>
</tr>
<tr>
<td>R-Squared Adj.</td>
<td>0.825</td>
<td>0.791</td>
</tr>
</tbody>
</table>

*Note*: *, ** and *** show the significance level of the variables at one, five and ten per cent, respectively.

5. Discussion and Conclusion

5.1. Discussion

The basic purpose to conduct this study was to identify the impact of e-government adoption and open data of government on transparency of the government. For this purpose, various hypotheses were designed and tested through various techniques. The results of these tests are discussed here. The first hypothesis that e-government adoption has significant impact on transparency has been accepted as a result of the tests conducted by the author. This is due to the reason that e-government improves the conditions of services provided by government and as a result transparency increases. Another study of Banerjee and Chau (2004) has accepted this hypothesis. The next hypothesis of our study was that open data has significant impact on transparency. After applying various tests by the researcher, the hypothesis was declared accepted due to the reason that open data opens up all the data of government to the public, which increases the transparency of government (Hood & Heald, 2006). Other than these hypotheses, two control variables were also used in our study. The impact of first control variable i.e. literacy rate has been rejected by the researcher just as it was rejected by another researcher Wallendorf (2001). In the last, there is another control variable, corruption. The impact of corruption on transparency however has been accepted in this study. Corruption involves the negative practices resulting in decrease in transparency. Another researcher, Kitchin (2014) in his study, has also discussed the same status of corruption. In this way, all the impacts of several variables involved in this study are concluded.

5.2. Conclusion

E-government includes use of various new and latest techniques and practices in e-government services provision and information management system, increasing transparency and competence of government services. Open data is very important concept used by the governments of various countries in which they public their data for all the people of the country or those who can use it effectively. Transparency refers to the concept that all the activities and services provided by government must be clear and free of all negative aspects. The purpose of conducting this study is to know the impact of e-government adoption and open data on transparency of that government. For this purpose, data was collected from the ASEAN countries for consecutive 29 years from the most reliable sources of data. Several tests and approaches such as panel unit root test, cointegration test, estimation of coefficient test was applied on the collected data in order to conduct an effective research. Because of application of these tests, it was found that the two major hypotheses of the study regarding impact of e-government and open data on transparency were accepted. The impact of literacy rate, a control variable was rejected while the other control variable, corruption’s impact on transparency was accepted. In short, we can say that e-government adoption and open data have significant impacts on transparency.

5.3. Implications

There are many theoretical, practical and policymaking benefits of this particular study. Theoretically, this study provides enough literature and information about the concepts of e-government adoption, open government data and transparency. In addition, this study will also help the government of a particular country to adopt e-
government as well as to open its data for the public. This will increase the transparency of the government. Moreover, this study will also provide enough assistance to the government in making policies and regulations that are important and in favor of e-government adoption and open government data for making the government transparent and increase the performance of the government.

5.4. Limitations and Future Indications
It is a fact that no research can be perfect and complete in all aspects. There are always some limitations and loopholes in all researches. This research has no exception in this regard. The most highlighted limitations of this study include smaller size of sample, focus only on ASEAN countries, using only few selected tests and techniques for research purpose, focus only on few variables etc. These loopholes must be fulfilled by the future researchers in their studies. They must increase the sample size while collecting data from various sources. In addition, they can also increase the scope of this research to other countries as well. Future researches must use other tests as well other than the tests applied in this study. They may also use the variables other than the variables currently used in this study.

References


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BRINGING VARIOUS DIMENSIONS OF CREDIT OF ASEAN COUNTRIES FOR SCRUTINY: IMPLICATIONS ON SUSTAINABLE ECONOMIC GROWTH

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Abstract. This study has used data from the ASEAN region in order to study the relationship among the various dimensions of credit and sustainable economic growth. The objective of this study was to analyze the effects of the credit dimensions on the economic growth for the period 1995-2018. The estimation of regressors was performed on the basis of the one step system of generalized method of moments and the panel corrected standard approach methods. The dynamic and static estimations reveal that the effect of household credit on the economic growth is insignificant whereas business credit, mortgage credit, consumer credit and private sector credit were found to be positive and significant. The current study is original in the sense that the study has been performed with a new dataset and the focus variables are also different. Such studies are important for the ASEAN region as the region is developing as the region is under development, and the level of credit available is one of the primary indicators of the economic performance or ability of a country. Also, this study has used an estimation method that account for the problems of panel data, specifically the issues created by the cross-sections and heterogeneity. The study also has important theoretical and policy-making implications.

Keywords: ASEAN; LLC; Mortgage credit; business credit; sustainable economic growth


Jel Codes: E00

1 Introduction

Economic growth happens when the real output is increased over time. In order to measure the real output the Gross Domestic Product (GDP) of the nation is monitored at constant prices. By making the prices constant the impact of the increase in prices on the value of the country’s national output is eliminated. A sustainable economic growth can be described as steady growth rate that can be maintained over time without leading to other major economic problems. The problems to be considered here are present ones as well as the problems and issues that the future generations might have to face. In many cases that rapid economic growth requires a lot of resources (W. E. James, Naya, & Meier, 1989; Kheng-Lian & Robinson, 2002; Baltgailis, 2019; Prasetyo, & Kistanti, 2020; Humbatova, Tanriverdiev, Mammadov, & Hajiyev, 2020, Khalatur, Khaminich, Budko, Dubovych, & Karamushka, 2020).
If the resources are consumed at a rapid pace than they are may be depleted for the future generations causing many new environmental problems for them. This may include global warming and the depletion of resources such as fish stocks and oil. The growth periods are affected by the increase in the aggregate demand. This includes the increase in the consumer spending. If the output is not increased along with the increasing demand than the price level will be forced to increase due to the extra demand. The ASEAN countries are working together on achieving a strong growth overall (Huber, Roger, & Hamacher, 2015; Roh, Thai, & Wong, 2016). The average growth rate per year to up till 2018 has been 5.2 %. The association has been working on improving the economic welfare by lowering poverty and boosting incomes. The GDP growth of Indonesia can be seen in the following table 1. These values have been taken from the Asian Development Bank.

### Table 1: Indonesia GDP growth in percentage

<table>
<thead>
<tr>
<th>Year</th>
<th>Indonesia GDP growth in percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>5.1 %</td>
</tr>
<tr>
<td>2018</td>
<td>5.2 %</td>
</tr>
<tr>
<td>2019</td>
<td>5.1 %</td>
</tr>
<tr>
<td>2020</td>
<td>5.2 % (forecasted)</td>
</tr>
</tbody>
</table>

At the same time it is essential to analyse the factors affecting the economic growth in these countries. In this paper we are analysing the impact of the credit on the sustainable economic growth in the ASEAN countries. The term credit is used for a wide range of purposes in the financial world. In most cases the term credit is used to define any contractual agreement that is between the borrower and the lender (Chua & Scura, 1991; Koh, 2007). The borrower is the individual or the party that receives something valuable whereas the lender is the individual or part that lends that valuable asset and agrees to pay back on a future date with interest. The purchase of goods and services that are paid for at a later date are also included in this (Cuyvers, 2014; Hill, 1994). It can be on any scale. It may be an individual getting credit from a bank for his daily needs or a business obtaining credit for expansion (Gómez-Fernández & Albert, 2020).

The term debt can also be used to describe the situation as the money is to be paid in the future. The credit or debt may be obtained on the national level in order to boost the economy or the GDP. There are many forms of credit. The most common types of credit include lines of credit, signature loans, mortgages and car loans.

For any country to have a sustainable development it is essential to keep track of the debt or credit as it can become a huge burden on the future generations. The national debts are mostly in very large amount sand it takes time and effort to pay them off (Shome & Tondon, 2010; Wei-Yen, 2005). The ASEAN countries have been working on controlling the credit. The national debt of Indonesia can be seen in the following figure 1.
It can be seen that the national debt has been increasing over the years. Instead of being paid back the debt is slowly accumulating. This is going to be a burden of the future governments (Shome & Tondon, 2010; Wong, 1979). The small scale debts also have an impact on the economic growth of any country.

2 Literature Review

The different dimensions of credit under consideration in this paper include Mortgage Credit, Household credit, Consumer credit, Business credit and Private sector credit. We will analyse the impact of each of the above on the sustainable development in the ASEAN countries.

Relation between Mortgage credit and Sustainable Economic growth in ASEAN Countries

A mortgage is a loan that is taken for the sole purpose of purchase of property or real estate. The loan enables the lender to take possession of the borrower’s property. The legal mechanism supports the lenders possession of the property (Hameed, Basheer, Iqbal, Anwar, & Ahmad, 2018; Lestari, 2016; Pradhan, Arvin, Hall, & Bahmani, 2014). In case the lender is unable to pay back the amount in the pre-agreed amount than legal action can be taken against him. Property can be mortgaged for business, residential or investment purposes. For mortgages the lender is mostly a financial institution like bank, building society and credit union (Cooperation & Nasional; Lim, 2009). Studies have shown that in ASEAN countries the increased mortgage credit is linked with the increase in the imports of the country. As a result of this the mortgage credit has an impact on the gross domestic product of the nation. The increase in mortgage credit causes an increase in the trade deficit (Chaisrisawatsuk, 2016; Sotharith, 2013). Trade deficit forces the country to increase the rate of imports. The imports of the country have a significant effect on the economic growth of the country. Without significant exports, the increasing imports causes significant fund deficits on national level.

Hypothesis one (H1) is that the mortgage credit has an impact on the sustainable economic growth in the ASEAN countries.
Relation between Household credit and Sustainable Economic growth in ASEAN Countries

The household credit can be defined as the overall debt of all the individuals in any household. It includes all the mortgage loans, home equity loans, student loans, auto loans and consumer debt. Many economists have argued that lowering the debt is necessary for economic recovery (Gochoco-Bautista & Remolona, 2012; Nguyen, Skully, & Perera, 2012). Household debt can be used for the measurement of economy as it reflects per capita income. Many researchers have been analysing the impact of household credit ad economic growth. The dynamics through which the household credit affects the economic growth is very ambiguous. The high household credit results in higher consumption by the home owners. As a result of this a greater share of the economic output is consumed (Tullao Jr, Cabuay, & Hofileña, 2018). The increased consumption results in account deficit. In cases where the account deficit of the country increases the rate of imports is also increased to meet the demands. After the economy enters the recession phase however, the imports decrease dramatically. The overall exports of the country then increase and the rate of exports becomes greater than that of the imports. This whole mechanism allows any nation that is consumed in debt to start selling goods again and keep up with the world economy (Dikko & Madi, 2015; Wattanapruttipaisan, 2003). This mechanism works well only when the other countries have constant household debts. In case the household credits of those countries also fluctuate than this mechanism is not efficient. If the household credit of many countries start to increase than the nations will have no place to export their services and goods. This will affect the nation’s ability to maintain a steady and sustainable economic growth (Hill, 1994; Sawada & Zen, 2014; Thornton & Molyneux, 1996).

Hypothesis two (H2) is that the household credit has an impact on the sustainable economic growth in the ASEAN countries.

Relation between Consumer credit and Sustainable Economic growth in ASEAN Countries

Consumer credit can be defined as the personal debt that is taken in order to purchase the services and goods. A credit card is one of the examples of consumer credit. Any type of personal loan can be categorised as consumer credit. It is however not the debt that is taken in order to purchase a house or property (Abonyi, 2012; Thornton & Molyneux, 1996). Consumer credit is granted by retailers and banks so that the goods and services can be purchased at the time being and the payment is returned in the future with pre decided amount of interest. This type of debt can be divided into resolving credit and instalment credit. Studies have shown that in ASEAN countries the increased consumer credit is linked with the increase in the imports of the country (Dikko & Madi, 2015; Nottage, Malbon, Paterson, & Beaton-Wells, 2019). As a result of this the consumer credit has an impact on the gross domestic product of the nation. The increase in consumer credit causes an increase in the trade deficit. Trade deficit forces the country to increase the rate of imports. The imports of the country have a significant effect on the economic growth of the country. Without significant exports, the increasing imports causes significant fund deficits on national level (Dee, 2011).

Hypothesis three (H3) is that the consumer credit has an impact on the sustainable economic growth in the ASEAN countries.

Relation between Business credit and Sustainable Economic growth in ASEAN Countries

Any form of credit or loan that is given to an individual or a company for business purposes is described as business credit. This loan can be used for the purchase of goods and services that are required for normal operations of any business. It can also be termed as trade credit. There are many ways in which a business credit can affect the sustainable economic growth of ASEAN countries. Most of the business loans are granted to the small and medium enterprises that are struggling to become successful. These credits give such enterprises support to grow and earn revenue. Banks carefully grant the loans to the credit worthy parties (Dee, 2011; Wattanapruttipaisan, 2003). Having access to funds help increase the rate of development in the industry. The income levels of the individuals increase. Rate of employment increases. Such loans allow the poor business setups to be able to avoid the liquidity constraints. The lack of funds or lack of access to funds can be a huge problem for the ASEAN countries. The small scale business enterprises are essential for the growth and
development of the economy. With the development in in the industrial sector the exports of the country increase (K. James, 1986; Lubis, Bustaman, & Riyanti, 2015). As the ASEAN countries have implemented a no tariff trade so the trade and exports become easier. The revenue generated by the industrial sector and small scale enterprises provide extra support to the existing economic structure and provide a steady and sustainable economic growth.

Hypothesis four (H4) is that the business credit has an impact on the sustainable economic growth in the ASEAN countries.

Relation between Private sector credit and Sustainable Economic growth in ASEAN Countries
Private sector credit or domestic credit refers to the financial resources that are provided to the private setups by the financial corporations like banks. In a wide range of countries the funds are given to the public enterprises. The provision of financial aid to the private enterprises help boost the economic activities in the country. The funds are provided by the foreign exchange companies, pension funds, insurance corporations, money lenders and leasing companies. The economic activities help to improve trade. The spending per capita increases and the revenue generated by the private enterprises help in the development of national GDP. The rate of exports increase and more revenue is generated by the country (Bruch & Hiemenz, 2019). This trend has been prominent in the ASEAN countries. The revenue generated by the private sector and small scale enterprises provide extra support to the existing economic structure and provide a steady and sustainable economic growth. Without the financial support from the corporations the private sector corporations are unable to perform efficiently and thus are unable to contribute to the national revenue.

Hypothesis five (H5) is that the private sector credit has an impact on the sustainable economic growth in the ASEAN countries.

3 Methodology
Based upon the different panel data studies (Mekhum, 2020; Rahman, Rana, & Barua, 2019) the following panel data regression equation or framework is being used in the study;

$$\text{EG}_{it} = \alpha + \beta_1 \text{MC}_{it} + \beta_2 \text{BC}_{it} + \beta_3 \text{HC}_{it} + \beta_4 \text{PC}_{it} + \beta_5 \text{CC}_{it} + \varepsilon_{it}$$ (1)

In the equation mentioned above $\alpha$ is the constant, subscript ‘i’ is being used for the country, t is used for demonstrating the year or period under consideration, the term $\alpha$ is the intercept that measures the change in the dependent variable EG and the coefficients $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$ and $\beta_5$ are the slope coefficients that are used to measure the changes being produced in the dependent variable as a consequence of increase in the explanatory variables where $\varepsilon_{it}$ is the error term or the disturbance term.

Data
The study uses annual macroeconomic data from the ASEAN countries, which is a group of ten regionally progressive and developing countries (Malaysia, Thailand, Indonesia, Singapore, Vietnam, Cambodia, Philippines, Laos, Burma and Brunei). The data has been collected from the region over the period of 1995-2018. For economic growth the study has GDP constant US dollars, For the mortgage, business, household, consumer and private sector credit the study has used national estimates of these indicators. The data regarding these indicators was available on the database of world bank, World Development Indicators. The data collection process is of imperial importance in any empirical research, and the credibility of the research process depends upon the data collection method. Therefore in order to maintain the credibility and accuracy of resources the secondary data has been collected from the credible database of WDI.
Unit Root Test
In order to verify the orders of integration as well as the stochastic properties of the variables the study has used the Levin-Lin-Chu (LLC) unit root test (Levin, Lin, & Chu, 2002). The panel unit root test is more advantageous than the generic time series approach as it permeates the issues of power and size of the time series methods. The LLC is an extension of the unit root test as mentioned in the ADF technique, adjusted for the time series approach. The LLC unit root test is carried out on the null assumption that the variables suffer from the unit root issues and the alternate hypothesis is that there is no unit root in the series. Also, the method assumes that the same autoregressive process occurs across the cross-sections. The following equation is used to express the structure of the unit root equation;

\[ \Delta y_{i,t} = \alpha + \rho \Delta y_{i,t-1} + \sum_{j=1}^{p} \Delta y_{i,t-j} + \varepsilon_{i,t} \]

Panel Cross-sectional dependency and Diagnostic Tests
Cross-sectional issues and dependence are a recurring issue in panel data studies, especially when the dataset is comprised of countries that are regionally similar and depict similar economic, financial and political frameworks. The ASEAN countries regionally belong to the same area, moreover their economic and financial structures are almost similar. Cross-sectional dependence is a common issue observed in panel data regressions to present with issues, furthermore issues like heteroskedasticity, autocorrelation and multicollinearity are common as well. Thus, the unit roots and diagnostic tests that take these issues into account will be performed on the data in order to maintain precision and robustness of results. It is forecasted that the panel data set will present with issues like cross-sectional dependence and heteroskedasticity thus, the models or methods consistent with these issues are being used for estimation of regressors so that the effect of these problems can be mitigated (Hussain, Anwar & Razimi, 2020).

PCSE Estimation
The techniques of static and dynamic estimation are being applied in this study. The Prais-Winsten regression method has been used for the application of the dynamic effect which has a correlated PCSE. The study uses the systematic generalization method of moments for the static estimation by using the one step approach. These methods account for the country fixed and time fixed effects so that the heterogeneity that results from such estimations can be accounted for. The PCSE estimation technique is efficient in such scenarios as it operates with the basic assumption that the error terms are heteroscedastic and have correlations across the panel (Greene, 2012). The following model has been used to account for the country fixed and time fixed methods proposed by the PCSE method;

\[ E_{G_{it}} = \alpha + \sum \beta_j X_{j} \varepsilon_{it} + \delta_j GDP_{dum,j} + \theta_j Y_{t} + \epsilon_{it} \]  

(2)

In the equation stated above the term \( \alpha \) represents the constant or the slope for the equation, \( i \) is used to account for the different countries included in the panel, \( t \) is used to depict the year or period under consideration, \( X_{j} \) is the collective which has been incorporated to account for the explanatory variables, \( \beta_j \) reflects the coefficient of individual independent variable, \( GDP_{dum} \) is the country fixed-effect dummy, \( \delta_j \) represents the coefficient for the fixed-effect of the country created through a dummy variable, \( Y \) is the depiction of the fixed effect of time characterized by year and the term \( \theta_j \) represents the coefficient for time fixed-effect dummy.

4 Results
Panel Unit Root Test
Panel data has been used in the analysis, which is commonly susceptible to stationarity issues, thus a panel unit root test has been performed on the data. The panel unit root test is carried out to find the stationary properties and the order of integration of the variables. Variables which display 2nd order of integration can’t be used for F, t and
chi-square tests (Im, Pesaran, & Shin, 2003). Moreover, the presence of unit roots increases the chances of presence of spurious regressions and misleading information from the results. Therefore, a panel unit root test is performed on the data. The null hypothesis of the test is that unit root is present and the alternate hypothesis states that unit root isn’t present. The results of the analysis have been displayed in table. The results show that the variables MC, CC and EG are stationary at the level, whereas PC, BC and HC are non-stationary. However, at the first difference all six variables are stationary at the 5 percent level of significance (See Table 2).

Table 2: LLC unit root

<table>
<thead>
<tr>
<th>Constructs</th>
<th>MC</th>
<th>HC</th>
<th>CC</th>
<th>BC</th>
<th>PC</th>
<th>EG</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Level</td>
<td>-2.394*</td>
<td>-1.399</td>
<td>-2.387*</td>
<td>-1.373</td>
<td>-1.394</td>
<td>-3.485**</td>
</tr>
<tr>
<td>1st difference</td>
<td>-5.304**</td>
<td>-5.399**</td>
<td>-5.388**</td>
<td>-4.483**</td>
<td>-4.989**</td>
<td>-8.409**</td>
</tr>
</tbody>
</table>

Diagnostic Tests

The panel data has been observed to present econometric issues like heteroskedasticity, autocorrelation, multicollinearity and cross-sectional dependence. These problems need to be accounted for and reviewed before conducting the estimation so that the results do not suffer. The modified Wald and Breusch-Pagan/Cook Weisberg test is applied for heteroscedasticity, the Wooldridge test is performed for checking the autoregressive properties, VIF test and a correlation matrix is constructed for analyzing the correlations and multicollinearity, the cross-sectional dependence test developed by Pesaran (2004) is used for analyzing the cross-sectional dependence. The results obtained from the diagnostic tests are presented in table 3 and table 4 below. The results depict that both heteroskedasticity and cross-sectional dependence are present in the data, confirmed by the significance of both tests whereas the results of the Wooldridge test show that autocorrelation among the error terms wasn’t found.

Table 3: Diagnostic checks

<table>
<thead>
<tr>
<th>Heteroskedasticity</th>
<th>Autocorrelation</th>
<th>Cross-section dependence</th>
<th>Multicollinearity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified wald</td>
<td></td>
<td></td>
<td>VIF</td>
</tr>
<tr>
<td>Breusch-Pagan/Cook-Weisberg</td>
<td>F-statistic: 1.94</td>
<td>Test statistic: 4.883**</td>
<td>Mean VIF: 2.39</td>
</tr>
<tr>
<td>χ2-value: 14.49**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>χ2-value: 8.39**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For detecting the problem of multicollinearity; the data was analyzed by two measures, the VIF (variable inflating factor) and the correlation matrix. The VIF is a direct indicator of the presence or absence of the multicollinearity issue, a VIF less than 10 is an indication that the issue doesn’t prevail. The correlation matrix is constructed in order to analyze the general relationships among the variables, correlations less than 0.8 are an indication that multicollinearity does not prevail. All the variables demonstrate moderate correlation i.e. values between 0.3 and 0.7 and the VIF factor is also less than 10 therefore confirming that multicollinearity doesn’t exist among the variables.

Table 4: Correlation Matrix

<table>
<thead>
<tr>
<th>Variables</th>
<th>MC</th>
<th>HC</th>
<th>CC</th>
<th>BC</th>
<th>PC</th>
<th>EG</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HC</td>
<td>.374</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC</td>
<td>.532</td>
<td>.477</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BC</td>
<td>.392</td>
<td>.484</td>
<td>.454</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>.483</td>
<td>.433</td>
<td>.399</td>
<td>.588</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EG</td>
<td>.294</td>
<td>.284</td>
<td>.389</td>
<td>.284</td>
<td>.494</td>
<td>1</td>
</tr>
</tbody>
</table>
PCSE Estimation
The data has presented the issues of cross-sectional dependence and heteroskedasticity, thus the empirical method of analysis applied to the regressors should be able to account for these issues. The PCSE estimation method has been employed in the study because the technique is adjusted to deal with the issue of panel data problems like such and mitigates the effect of these problems to produce vigorous results. The study uses the static and dynamic estimation method. The use of both methods is imperial for ensuring the robustness of the findings. The country fixed and time fixed effects have been used to adjust the unobserved heterogeneity. The PCSE estimation method has the assumption that the error disturbances are heteroskedastic and are correlated across the panels, thus the method has been modelled to cope with an unbalanced panel.

The results have been presented in table 5. According to the dynamic effect or the PCSE method the effects of mortgage credit and housing credit is insignificant. The effects of consumer credit, business credit and primary sector credit are positive and significant. A unitary change in consumer credit will initiate an increase of 21 percent in economic growth, a unitary change in business credit will be responsible for 28 percent shift in economic growth and 22 percent change will be produced due to change in primary sector credit. The static effects or the GMM estimation shows that only the effect of housing credit is insignificant whereas the mortgage credit, business, consumer and primary sector credit are all significant and positive. Thus the hypotheses are accepted for the significant relationships.

<table>
<thead>
<tr>
<th>Dependent Variable = EG</th>
<th>PCSE estimation</th>
<th>Sys-GMM estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC</td>
<td>0.0103 (0.736)</td>
<td>0.161** (0.488)</td>
</tr>
<tr>
<td>HC</td>
<td>0.043 (0.882)</td>
<td>0.100 (0.677)</td>
</tr>
<tr>
<td>CC</td>
<td>0.219** (0.309)</td>
<td>0.2R8** (0.499)</td>
</tr>
<tr>
<td>BC</td>
<td>0.282** (0.298)</td>
<td>0.384** (0.399)</td>
</tr>
<tr>
<td>PC</td>
<td>0.223** (0.477)</td>
<td>0.283** (0.385)</td>
</tr>
<tr>
<td>Constant</td>
<td>4.298** (0.264)</td>
<td>0.499** (0.399)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.688*** (0.585)</td>
<td>-</td>
</tr>
</tbody>
</table>

Discussion
Several studies focusing on the dimensions of credit and economic sustainability or other drivers of economic growth have been carried out (Cai, Song, Ma, Dong, & Xu, 2018). The effects of consumer credit, household credit, business credit, private sector credit and mortgage credit were focused in this study, the effects of household credit have been deemed inconclusive, which is in line with the previous studies. The relationship of extension of credit has been strongly linked with income level, which in the long run predicts economic sustainability and growth. In this regard Osman (2014) studied the effect of private sector credit on the economic growth in Saudi Arabia. The study uses an ARDL methodology to verify the effect of private sector credit and economic growth. The author was able to validate a positive long run relationship between private sector credit and economic growth, measured by GDP. The results of this study also depict positive relationship between PC and EC, showing that the private sector credit ability is an increasing factor for the economy, as the level of credit issued correlates with income level, the causal link between credit increase and economic growth can be
established. The study by Wood (2019) studied the effect of mortgage credit on the financial capacity of Denmark. The results intimate that increase in the mortgage payments is linked with the increase in the imports, and also has a significant effect on the BOP account (Exports-Imports), thus has substantial effects on the development of the GDP of a country. The study by Sipahutar (2018) contends on the idea that the availability of credit in the economy is viable for the effective monetary transmissions.

**Conclusion**

The primary aim of this study was to evaluate the effects dimensions of credit of the ASEAN countries on the economic sustainability of the country. For the purpose of this study the mortgage credit, business credit, consumer credit, household credit and private sector credit were considered to be the dimensions of credit. The data from 1995-2018 for the ASEAN countries has been analyzed. The relationship of the explanatory variables with the outcome variable was explored as they converge with the efficient and sustainable growth of economy and income levels in the long run. Several econometric tools and methods of assessment were applied on the data including the LLC unit root test, Wooldridge autocorrelation test, Wald and Breusch-Pegan/Cook Weisberg test of heteroskedasticity, VIF for multicollinearity and the Pesaran test for assessing the cross-sectional dependence of the panel. The PCSE estimation shows that the effects of household credit were insignificant whereas all other four dimensions were found to be significant and positive for economic growth.

**Limitations and future recommendations**

The study uses time series data, which is subject to problems like heteroskedasticity, autocorrelation, multicollinearity and cross-sectional dependence. Future researchers should consider taking cross-sectional data so that these issues can be avoided. The study only incorporates five dimensions of country credit, in order to correctly estimate the effects of credit on country’s economic growth dimensions like bank credit and credit paying ability also needs to be included. The study has used a small dataset, it is advised to researchers that a larger dataset be used so that the historical effects of these indicators can also be studied.

**Implications**

The study has the important theoretical and academic implications. The study focuses on five distinct dimensions of credit and their effect on the economic sustainability in the ASEAN region. The studies focusing on credit affects in the ASEAN region are scarce, therefore the present study has important theoretical implications. Moreover, the policy makers can source the information from this study in the development of credit policies that align with the economic growth.

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INTEGRATING FISCAL MATTERS WITH ENVIRONMENTAL SUSTAINABILITY IN ASEAN COUNTRIES: ROLE OF FISCAL DEFICIT, INTEREST RATE AND STOCK EXCHANGE INDEX

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Abstract. The current study was carried out with the objective of evaluating the relationship between environmental sustainability and fiscal deficit, stock exchange index & interest rate. A panel data methodology has been used for the period ranging 1995-2018. The econometric tests of cross-sectional dependence, cointegration, unit root and long run estimations were employed in the study. The estimation of the long run associations has been performed on the basis of the AMG estimations. The AMG estimations showed that interest rate and fiscal deficit have negative relationship with environmental sustainability, whereas increase in the stock exchange index, capitalization of the indexed companies has positive and significant effects on the environmental sustainability. The Konya causality analysis shows that the variables present bidirectional associations. The present study is novel as it is based upon studying the fiscal macroeconomic indicators and their relevance to the environmental sustainability. The novelty and significance of the study is reinforced by the fact that a new dataset has been used. The current study is also important from the regional standpoint as developments are being made in the ASEAN region. The study has some limitations which have been discussed along with the theoretical and policy making implications.

Keywords: AMG, fiscal deficit, stock exchange index, ASEAN.

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JEL Codes: O1, O53

1 Introduction
The term sustainably implies the ability of anything to exist constantly over long period of time. Environmental sustainability is they can be discussed as the preservation of the environment for a long period of time. The rate at which any country can harvest the renewable resources, the rate at which pollution is increasing in the atmosphere and the rate of depletion of the non-renewable resources are few of the parameter that are used for the calculation of environmental sustainability. In case a country is unable to protect its environmental resources indefinitely than it is not environmentally sustainable. Many countries are working worldwide to improve the sustainability of their environmental resources while keeping up with the increasing development all across the globe. They are shifting towards the renewable energy sources and promoting the trends of recycling and reusing the non-biodegradable products. The ASEAN countries are rich in natural resources and have gained significance globally due to these reservoirs of natural resources (Manzano, 2001; Severino, 2005; López, 2020). Due to the increasing demands of the population and the increased trend of economic growth, the environment of this region is under pressure. Over the recent years the region’s economic growth has been very prominent. The rate of growth of ASEAN countries is way greater than the world average. However, the downside of this increased rate of economic growth is that the pressure on the natural resources such as clean land, water and air is increasing drastically. The urbanization of the huge cities such as Manila, Bangkok and Jakarta have been consuming the natural resources from within the country and from across the borders as well. This is very prominent from the example of Indonesia (Chuanrommanee &
The main sources of energy in Indonesia are shown in the following graph (Figure 1).

![Main energy sources in Indonesia](image)

**Figure 1:** Main Energy Sources

The ASEAN countries are rich in natural resources but are still facing many challenges in keeping a balance between the economic development and the environmental sustainability (Tay, Estanislao, & Soesastro, 2001). The environmental issues corporation was first established by the ASEAN countries in 1997. The main aim was to achieve a sustainable development by promoting the green and clean environment. This can be done by promoting the natural resources (Hussain et al., 2018). The conservation of water, soil, energy, forests, biodiversity, minerals, marine and costal resources has to be monitored constantly (Hussain et al., 2020; Panjaitan et al., 2020; Sugiharti et al., 2020). The preservation of clean drinking water and fresh air are essential for the population to be able to live a healthy life (Yeganeh Kia, 2020; Monni et al., 2018; Moumen et al. 2019). The ASEAN socio cultural community has been aiming towards the creation and implementation of a more environmental friendly technology (Ferguson, 2004; Nguitragool, 2010). The community has been working towards sustainable environmental protection, production and consumption of resources and social development. In order to have sustainable environment, it is critical to find the balance between the economic growth and environmental growth (Gochoco-Bautista & Remolona, 2012). Indonesia has many renewable resources which can be used for the economic development along with the environmental sustainability. They can be seen in the table 1.

<table>
<thead>
<tr>
<th>Renewable Energy Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>72.7 %</td>
</tr>
<tr>
<td>Geothermal</td>
<td>23.22 %</td>
</tr>
<tr>
<td>Wind</td>
<td>0 %</td>
</tr>
<tr>
<td>Micro Hydro</td>
<td>0.93 %</td>
</tr>
<tr>
<td>Mini Hydro</td>
<td>0.51 %</td>
</tr>
<tr>
<td>Solar</td>
<td>0.23%</td>
</tr>
<tr>
<td>Waste</td>
<td>0.02 %</td>
</tr>
</tbody>
</table>

Over the years it has been observed that the fiscal policy has a huge impact on the environmental sustainability of any country. The fiscal policy has a major role in the transformation of an economy to become more inclusive and greener. The fiscal policies are able to promote the shift in the production, investment and consumption of resources. The fiscal reforms have been discouraging the activities causing the air pollution and use of limited and non-renewable resources. Many investment opportunities are promoted through the fiscal policies that have a major positive impact on the environment sustainability such as investing in renewable energy sources like solar energy. Such policies are able to drive the investment options and development priorities in the ASEAN countries (Plummer, 2002; Rajan, 2005). The national revenues generated are thus spent on sustainable resources so that the economy is sustained along with the environment. The market growth of sustainable resources can prove to be a
huge benefit for the ASEAN countries. This way the economy will be benefited along with the environment. This paper is focused on the impact of such fiscal policies on the environmental sustainability.

2 Literature Review
In this section of the paper we will analyse the impact of a few fiscal components on the environmental sustainability. The components that are included in this study include fiscal deficit, interest rate and stock exchange index.

2.1. The Relation between Fiscal Deficit and Environmental Sustainability in ASEAN countries
The fiscal deficits can be described as the negative balances that occur due to the excessive spending by the government of any country. During the fiscal year the government of any country has a set amount of funds that can be utilized. The excessive spending sue to any reason causes a deficit (Bende & Slater, 2003; Simatupang, 2002). This imbalance is also termed as account deficit. The government borrowing results in increasing national debt. The long term deficits can be very harmful for the economy and stability of the country (Sen, Asher, & Rajan, 2004; Vithayasrichareon, MacGill, & Nakawiro, 2012). The policy analysts and economists argue about the impact of fiscal deficit on the economic and environmental conditions of any country. It is observed that due to the increase in fiscal deficit the result in borrowing from the private sectors, capital structures are manipulated, interest rates are increased, the overall export rate is decreased, the inflation increases and more taxes are implemented (Buracom, 2014). The economists believe that there should be a balance between the deficit and revenue for the sustainable growth of the economy and environment (Sharma, 2014). The economic activities are majorly affected by the fiscal deficits. The businesses are endangered, and the investments are reducing due to increasing fiscal debt. The experts have analysed that if the any country is unable to make up for the increasing fiscal deficits it ends up in a continuous downfall as the deficits keep on accumulating each year. That is the reason they have to be balanced with the budget surplus as soon as possible. The increase in the fiscal deficit has proven to have a negative impact on both economic and environmental sustainability of the country (Anbumozi & Phoumin, 2015; Bayoumi & Mauro, 2001). Due to the increased financial presser very, few funds are allocated for the sustainable economic activities including the development of renewable energy sources. Most of the activities essential for environmental sustainability require economic funding in order to be successful. This includes various setups for the recycling and reuse of products and researching and development on sustainable resources. While having a large fiscal deficit it is not possible for the ASEAN countries to be able to fund the projects for environmental sustainability (Budina & Tuladhar, 2010; Plummer, 2002).

Hypothesis one (H1) is that the fiscal deficit has an impact on the environmental sustainability in the ASEAN countries.

2.2. The Relation between Interest Rate and Environmental Sustainability in ASEAN countries
The interest rates can be defined as the additional amount charged by the lender for the use of his assets. This amount is charged as a personage of the principal amount in most cases. It can be collected on any interval of time according to the pre-decided agreement. The asset borrowed can be in any form including vehicles, buildings, consumer goods and cash (Abdullah, Ali, & Matahir, 2010; Tan & Tang, 2016). The amount of the borrowed assets is decided along with the interest rate and time period in a pre-discussed agreement. There are a few types of interest rates including simple interest rate and compound interest rate. According to the environmental experts the increase in the interest rate is directly linked with the increase in the exploitation of the environmental resources (Ismail, Ramirez-Iniguez, Asif, Munir, & Muhammad-Sukki, 2015; Lee, 2005). In order to ensure the environmental sustainability, the interest rate have to be decreased. Many references of such situations are found in the economic history of the ASEAN countries. The high interest rates put an increased amount of pressure on the producers and industries due to which they tend to over utilize the resources that they have (Elliott, 2003; Rammal & Zurbruegg, 2006). They start increased utilization of non-renewable environmental resources. The increased pressure of production and revenue causes the furniture industry to cut down more forests. This rapid deforestation can be linked with many environmental issues. Similarly, the increased financial pressure on the other industries forces then to utilize more nonrenewable energy sources like gas, coal and oil. The waste is left untreated due to the
shortage of finances. Treatment of the waste is done in order to protect the environment (Hoang & Bui, 2015; Rüland, 2000). The untreated liquid waste goes into the lakes, ponds and rivers. This is very harmful for the marine life and the soil near the water reserves. The chemicals and pollutants destroy the marine life and the water no longer remains drinkable. Similarly, the gases exhausted from the industries cause air pollution. Their treatment is skipped out when the industries are under financial pressure. Thus the air quality decreases over the years (Bayoumi, Eichengreen, & Mauro, 2000). There are many more examples recorded in the ASEAN countries. This way the increased interest rates result in increased exploitation of the environmental resources.

Hypothesis two (H2) is that the interest rate has an impact on the environmental sustainability in the ASEAN countries.

2.3. The Relation between Stock Exchange Index and Environmental Sustainability in ASEAN countries

The stock exchange index is the measurement of various sections in the market. The prices of a selected number of shares are used for the calculation of the stock market index. It helps the various investors to compare the rates and prices of the stocks in order to calculate the performance of the market. There are some defined criteria for the stock exchange indexes. They have to be transparent and investable. The investors are able to invest in any particular stock by the buying the index fund. The tracking error occurs when the index funds performance doesn’t match with the index (Budina & Tuladhar, 2010; Plummer, 2002). Many experts and researchers have been arguing about the impact of stock market indexes on the environmental sustainability. It has been observed that the pollution control activities in various industries and businesses drive the prices of the stocks of the company. Such enterprises have lower risk stocks. The enterprises that have poor pollution control have an increased number of negative returns. The high-ranking companies have fewer negative returns than them and have more control over their pollution control. The companies require extra funds for the treatment of waste material and the use of sustainable energy sources (Elliott, 2003; Rammal & Zurbruegg, 2006). The asset size of such enterprises is different and so is the profitability. The ratio of the earnings and profit are better. They have higher earnings and lower risk. Investors tend to choose stocks for investing. The enterprises with more high-ranking stocks have more processes for preventing the environmental damaging and promoting environmental sustainability. The large size, lower systematic risk and the profitability have a major role in driving the price and performance of the stocks of an organization. This trend has been highlighted in the ASEAN countries. The increase in number of investors investing in the high-ranking companies result in a sustainable environment. The enterprises having poor pollution controls have lower stock market indexes. They have higher risks and the lower profitability. The investment in such corporations have proven to have a major negative impact on the environment.

Hypothesis three (H3) is that the stock market index has an impact on the environmental sustainability in the ASEAN countries.

3 Methodology

3.1. Data

In this study the researcher has used three independent variables, fiscal deficit, interest rate and stock exchange index and two control variables inflation and gross domestic product to evaluate their cumulative effect on the dependent variable environmental sustainability. The data for the period 1995-2018 has been collected from six ASEAN countries; Thailand, Cambodia, Indonesia, Laos, Brunei and the Philippines. The variables are defined as follows; the difference between the spending and consumption patterns of a country, the total dollars or amount excess of income is the fiscal deficit, calculated in terms of constant US dollars. The interest rate is defined in terms of the expense on investment, it is paid or charged in dollar amounts as a percentage of some value. The stock exchange index is defined in terms of yearly rate values of the listed organizations. Inflation is measured in terms of the CPI, which is the measurement of the value of goods and services by households. GDP, gross domestic product is measured in terms of constant US dollars. The dependent variable environmental sustainability is defined in terms of Co2 emissions and is measured in kilotons or kt. The data has been collected from the World bank from its database of World Development Indicators and the country government websites (Hussain et al., 2019).
The study uses the neoclassical production function for analyzing the relationship between the environmental sustainability, fiscal deficit, interest rate, stock exchange index, inflation and gross domestic product. The independent and control variables INR, SEI, FID, INF and GDP serve as individual inputs and ENS is the output. The production function is defined as follows.

\[ ENS_{it} = f(INR_{it}, SEI_{it}, FID_{it}, INF_{it}, GDP_{it}) \] (1)

The above functional relationship is converted into a linear model as follows.

\[ ENS_{it} = \alpha_{it} + \beta_1 INR_{it} + \beta_2 SEI_{it} + \beta_3 FID_{it} + \beta_4 INF_{it} + \beta_5 GDP_{it} + \epsilon_{it} \] (2)

where \( \alpha \) is the intercept and \( \beta \) is used to represent the intercept or the coefficient of each explanatory or control variables and \( \epsilon_{it} \) is used to represent the error term.

### 3.2. Cross-sectional dependence test

In result of the increasing globalization, the countries across the world are homogenizing and the economic systems are becoming more susceptible and vulnerable to change. The increasing integration of economic systems has produced the issue of cross-sectional dependence, prevalent mainly in time series data. If the associations among the cross-sectional data isn’t considered, then misleading results are produced which eradicate the authenticity and credibility of the study. The study followed the method used by Breusch and Pagan (1980) for testing the cross-sectional dependence

\[ CD_{BP} = \sum_{i=0}^{n-1} \sum_{j=i+1}^{n} \rho_{i,j}^2 \] (3)

Conversely this test statistic exhibits a disadvantage in cases where N i.e. the number of cross-sections is large and therefore it cannot be applied in such scenarios (N is large and N leads towards \( \infty \)). In order to overcome this issue Pesaran (2004) introduced the LM statistic

\[ CD_{LM} = \sqrt{1/N(N-1)} \sum_{i=0}^{n-1} \sum_{j=i+1}^{n} (T \rho_{i,j}^2 - 1) \] (4)

According to Pesaran the above-mentioned statistic is to be used when the cross-sectional size is greater than the time dimension T

\[ CD = \sqrt{2T/N(N-1)} \left[ \sum_{i=0}^{n-1} \sum_{j=i+1}^{n} T \rho_{i,j} \right] \] (4)

Where the term \( \rho_{i,j} \) is used to indicate the correlation among the errors.

The study also analyzes the slope homogeneity by using the test developed by Pesaran and Yamagata (2008).

\[ \Delta = \sqrt{N} \left[ \frac{N^{-1}S_{-k}}{\sqrt{2k}} \right] \] (5)

### 3.3. Panel Unit root test

The panel unit root test is applied to the study variables in order to assess and evaluate the stationarity issues and properties of the variables. For this purpose, the CIPS unit root has been used in the study, this test accounts for the cross-sectional dependence among variables. The following regression was used for the cross-sectional augmented DF,

\[ \Delta Y_{it} = a_i + b_i Y_{i,t-1} + c_i \overline{Y}_{t-1} + d_i \overline{Y}_t + \epsilon_{i,t} \] (6)
Pesaran proposed a cross-sectionally augmented version of the test

\[
\text{CIPS} = \frac{1}{N} \sum_{i=1}^{N} \text{CADF}
\]

(7)

Where the \( \text{CADF}_i \) is the cross-sectionally augmented DF statistic. If the test statistic is greater than the critical values, then the null hypothesis will be rejected.

3.4. Panel Cointegration Test

The cointegration test is performed in order to account for the correlations existing between the time series data. The cointegration is analyzed on the basis of the Westerlund and Edgerton (2007) bootstrap LM panel cointegration test, which also examines the effect of cross-sectional dependence. The following test statistics have been used.

\[
\text{LM}_N = \frac{1}{NT^2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\omega}_t^{-2} S_{it}^2
\]

(8)

In the above expression the term \( S_{it}^2 \) is used to express the partial sum of the error terms, \( \hat{\omega}_t^{-2} \) is used to show the long-run variance of the error terms. The present study uses the AMG estimators for analyzing the long run relationships among variables. These estimators have been used in the study because they account for the dependence and heterogeneity issues presented by panel data (Eberhardt & Bond, 2009).

3.5. Panel Causality Test

The causality analysis was also performed for studying the causal associations between the fiscal deficit, interest rate, stock exchange index and environmental sustainability. The test developed by Kónya (2006) has been used.

4 Empirical results

The first test performed on the data is for analyzing the cross-sectional dependence and slope heterogeneity among the study variables. The null hypothesis of the cross-sectional dependence test is that if the probability values are smaller than the significant statistics then the null hypothesis is rejected. The null hypothesis contends for no cross-sectional dependence, whereas the alternate hypothesis states a presence of cross-sectional dependence among the study variables. The results of the test are depicted in table. It can be seen that \( \text{CD}_{BP}, \text{CD}_{LM} \) and \( \text{CD} \) are significant thus, the null hypothesis of the cross-sectional dependence test is rejected. The analysis shows the results with different levels of significance as well. It can be seen that there is a presence of cross-sectional dependence among the variables included in the study. The slope homogeneity test is performed in order to evaluate the heterogeneous properties of the data. The null hypothesis for this test states the presence of homogeneity whereas the alternate hypothesis states the presence of heterogeneity. According to the results of the delta tests, the assumption of homogeneity has been rejected and the coefficients are found to be heterogeneous.

**Table 2: Cross-Section Dependence and Slope Homogeneity Tests Results**

<table>
<thead>
<tr>
<th>Variable</th>
<th>CD_{BP}</th>
<th>CD_{LM}</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENS</td>
<td>183.203*</td>
<td>59.255*</td>
<td>34.898*</td>
</tr>
<tr>
<td>FID</td>
<td>199.400*</td>
<td>50.256*</td>
<td>32.294**</td>
</tr>
<tr>
<td>INR</td>
<td>182.309**</td>
<td>63.424**</td>
<td>26.844*</td>
</tr>
<tr>
<td>SEI</td>
<td>193.293*</td>
<td>60.323*</td>
<td>43.677*</td>
</tr>
<tr>
<td>INF</td>
<td>187.293*</td>
<td>67.422*</td>
<td>29.329**</td>
</tr>
<tr>
<td>GDP</td>
<td>133.399**</td>
<td>79.399*</td>
<td>33.163**</td>
</tr>
</tbody>
</table>

**Slope Homogeneity Tests Results**

<table>
<thead>
<tr>
<th>Tests</th>
<th>LM Statistics</th>
<th>t-value</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta</td>
<td>54.78</td>
<td>4.897</td>
<td>.000</td>
</tr>
<tr>
<td>Adj Delta</td>
<td>44.30</td>
<td>3.868</td>
<td>.000</td>
</tr>
</tbody>
</table>
The next test applied on the data is the panel unit root test. Table 2 presents the results from the analysis. The null hypothesis for the test is that there is presence of unit root and the alternate hypothesis contends for the non-presence of unit roots. The presence of unit roots in the data are reasons for spurious regressions and faulty regressor estimates. The panel unit root test is performed in order to evaluate the stationary properties of the variables and also to find its order of integration. The results intimate that GDP, FID, SEI and INF are significant at level whereas all the variables are significant at the first difference. All variables at the first difference demonstrate stationary properties, the series is integrated at the first order I(1).

Table 3: CIPS Panel Unit Root Test Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>At Level</th>
<th>First Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENS</td>
<td>-0.1208</td>
<td>-4.2004**</td>
</tr>
<tr>
<td>FID</td>
<td>-2.3092*</td>
<td>-7.3499**</td>
</tr>
<tr>
<td>INR</td>
<td>-0.9768</td>
<td>-6.2994***</td>
</tr>
<tr>
<td>SEI</td>
<td>-1.2993*</td>
<td>-7.288**</td>
</tr>
<tr>
<td>INF</td>
<td>-3.8299*</td>
<td>-9.2844***</td>
</tr>
<tr>
<td>GDP</td>
<td>-3.3231**</td>
<td>-8.8484**</td>
</tr>
</tbody>
</table>

The LM bootstrap test has been performed on the data in order to check for the presence of cointegration among the study variables. Table 3 presents the results of this analysis. The decision criterion for this test is that if the Bootstrap p-value is less than the LM statistic value, then the null hypothesis i.e. absence of cointegration is rejected. The table demonstrates the results of the test, it can be seen that the p-values are less than the LM statistic therefore the null hypothesis is rejected, and the alternate hypothesis is accepted. The table values show that ENS, FID, INR, SEI, INF and GDPO are associated with each other in the end.

Table 4: LM Bootstrap Panel Cointegration Test Results

<table>
<thead>
<tr>
<th>Conditions</th>
<th>LM statistics</th>
<th>Bootstrap p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>5.309</td>
<td>0.788</td>
</tr>
<tr>
<td>Constant + Trend</td>
<td>3.888</td>
<td>0.209</td>
</tr>
</tbody>
</table>

The AMG estimators have been used for evaluating the long run associations among the study variables. The results of the estimation are presented in table 4. The results of the fiscal deficit show that there is presence of a negative relationship with environmental sustainability. The results for consumption show that it has a significant effect on the environmental sustainability for three ASAEN countries; the results are not significant for Cambodia, Laos, and Thailand. The results depict that an increase in the fiscal deficit will initiated a decreasing effect in the environmental sustainability. Interest rate also has a negative relationship with environmental sustainability, where the results for all six countries are significant. The effect of stock exchange index is positive and significant for the sample countries. The effects of the control variables are also significant and produce a positive effect on the environmental sustainability of the sample countries.

Table 5: AMG Estimation Results

<table>
<thead>
<tr>
<th>Countries</th>
<th>FID</th>
<th>INR</th>
<th>SEI</th>
<th>INF</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>-0.121**</td>
<td>-0.231**</td>
<td>0.212**</td>
<td>0.002</td>
<td>0.223**</td>
</tr>
<tr>
<td>Cambodia</td>
<td>-0.023</td>
<td>-0.222*</td>
<td>0.293**</td>
<td>0.022</td>
<td>0.331*</td>
</tr>
<tr>
<td>Indonesia</td>
<td>-0.112*</td>
<td>-0.199**</td>
<td>0.132*</td>
<td>0.211*</td>
<td>0.233**</td>
</tr>
<tr>
<td>Laos</td>
<td>-0.088</td>
<td>-0.283**</td>
<td>0.123*</td>
<td>0.112*</td>
<td>0.244**</td>
</tr>
<tr>
<td>Thailand</td>
<td>-0.034</td>
<td>-0.212**</td>
<td>0.288**</td>
<td>0.143*</td>
<td>0.235**</td>
</tr>
<tr>
<td>Philippines</td>
<td>-0.112*</td>
<td>-0.133**</td>
<td>0.077</td>
<td>0.122*</td>
<td>0.233**</td>
</tr>
<tr>
<td>Penal</td>
<td>-0.271**</td>
<td>-0.384**</td>
<td>0.232***</td>
<td>0.284**</td>
<td>0.393**</td>
</tr>
</tbody>
</table>

Table 5 presents the results of the causality analysis. The decision rule is simple, the relationships with probability values less than 0.05 show causality. The table values are used to determine the unidirectional and bidirectional associations. FID and ENS have a bidirectional association i.e. fiscal deficit cause environmental sustainability and vice versa. There is presence of bidirectional associations between INR and ENS and SEI and ENS as well. The
causal associations among the independent variables are also analyzed. FID and INR have a bidirectional relationship whereas FID and SEI and INR and SEI have a unidirectional association.

**Table 5:** Kónya Panel Causality Test Results

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FID does not Granger Cause ENS</td>
<td>5.3103</td>
<td>0.0003</td>
</tr>
<tr>
<td>ENS does not Granger Cause FID</td>
<td>6.3993</td>
<td>0.0001</td>
</tr>
<tr>
<td>ENS does not Granger Cause INR</td>
<td>5.2001</td>
<td>0.0000</td>
</tr>
<tr>
<td>INR does not Granger Cause ENS</td>
<td>6.2003</td>
<td>0.0000</td>
</tr>
<tr>
<td>ENS does not Granger Cause SEI</td>
<td>8.0294</td>
<td>0.0000</td>
</tr>
<tr>
<td>SEI does not Granger Cause ENS</td>
<td>9.2034</td>
<td>0.0000</td>
</tr>
<tr>
<td>FID does not Granger Cause INR</td>
<td>4.3299</td>
<td>0.0055</td>
</tr>
<tr>
<td>INR does not Granger Cause FID</td>
<td>3.7649</td>
<td>0.0644</td>
</tr>
<tr>
<td>FID does not Granger Cause SEI</td>
<td>3.6499</td>
<td>0.3455</td>
</tr>
<tr>
<td>SEI does not Granger Cause FID</td>
<td>6.7492</td>
<td>0.0566</td>
</tr>
<tr>
<td>INR does not Granger Cause SEI</td>
<td>0.2984</td>
<td>0.5568</td>
</tr>
<tr>
<td>SEI does not Granger Cause INR</td>
<td>6.8133</td>
<td>0.0770</td>
</tr>
</tbody>
</table>

### 5 Discussion

This study used the AMG estimation and the causality analysis to study the relationship between environmental sustainability and different fiscal matters relevant to the macroeconomic policies of the ASEAN countries under consideration. The study by Thuy (2018) uses data from ASEAN countries to study the relations between the fiscal policies and the economic and environmental sustainability. A long run relation between the indicators of the study was established and associations between government spending, revenue and growth characteristics were found as well. The results of this study correlate with the findings of our study as the presence of long run relationships among the interest rate, fiscal deficit, stock exchange index and environmental sustainability. These variables correlate with economic growth and are associated with the environmental sustainability, the associations are also proven by the causality analysis. Another study by Fakher (2016) investigated the effects of the budget deficit, money supply, real GDP, price index of imports, interest rate, inflation on the environmental and economic performance of Asian countries, for the period of 1993-2013. The study used the pooled mean group estimation-based error correction model and the GMM. The results indicate presence of statistically significant relationships among the variables. The results of our study also indicate that significant, inverse relationships are prevalent between fiscal deficit and environmental sustainability and interest rate and fiscal deficit as well. The negative associations show that an increase of interest rate the sustainability will decrease, decreasing investment rate is associated with increasing economic activity which leads towards greater sustainability (Alola, Bekun, & Sarkodie, 2019; Arbolino, Carlucci, De Simone, Ioppolo, & Yigitcanlar, 2018).

#### 5.1 Conclusion

The primary aim of this study was to evaluate the associations among the economic sustainability, fiscal deficit, interest rate and stock exchange index on the ASEAN countries for the period 1995-2018. The relationships among the outcome and explanatory variables was analyzed as these variables relate to economic and environmental sustainability. Different econometric tools were used to analyze different properties of the data, the tests regarding cross sectional dependence, panel unit root test, homogeneity test, cointegration analysis, AMG estimation and causality tests are employed on the data. The results of the analysis show that there is a negative relationship between interest rate and environmental sustainability, which indicate that increase in the interest rate will influence decreased environmental sustainability. Inverse associations between economic sustainability and fiscal deficit were also found. The causality analysis shows majority of associations to be bidirectional i.e. FID & ENS, ENS & INR, ENS & SEI. Whereas unidirectional associations among FID & INR and SEI & INR are present.
5.2. Limitations
The study presents some limitations. The present study uses a small sample size i.e. 1995-2018, future researchers are recommended to follow a larger dataset in future studies so that the historical and future relations can be analyzed. The panel data has been used in this study which is susceptible to cross-sectional dependence and heterogeneity problems thus it is advised that the future researchers focus on using the cross-sectional data. The fiscal effects have been studied from only three dimensions, it is recommended that other variables that focus on fiscal and macroeconomic policies are also included in future studies. Future studies should also focus on diversifying the unit of analysis and integrate other countries as well so that the cross-sectional dependence issues can be overcome.

5.2. Implications
The present study focuses on the fiscal determinants and indicators related to microeconomic policy and their relevance to the environmental sustainability has also been analyzed. The area has been generating researcher interest in the last few years thus the study has important academic and theoretical implications. The policy makers of the relevant countries will be able to use the results of this study in the development of appropriate fiscal policies with a focus on the environmental sustainability.

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PRO-HUMAN ECONOMIC INDICATORS AND THEIR RELATIONSHIP WITH ENVIRONMENTAL SUSTAINABILITY IN ASEAN COUNTRIES: ANALYZING HUMAN CAPITAL INVESTMENT, BRAIN DRAIN AND IMMIGRATION THROUGH PANEL DATA

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Abstract. The focus on the human development indicators has been increasing. A number of studies focusing on the institutional and economic effects of immigration, brain drain and development of human capital through increased investments has been performed. However, the present study evaluates the effects of these variables on the environmental sustainability of the ASEAN countries for the period ranging 1990-2019. The study evaluates the causal and magnitude of these indicators on the environmental sustainability. The study focuses on the evaluation of the data by means of a unit root test, panel cointegration test, estimation procedure and the causality analysis. The results show that the variables are integrated at the first order and are stationary, also the variables showed cointegration and long run relationships. The FMOLS estimation process using the grouped and pooled estimation technique has been used. The results show that the effects of immigration are insignificant on environmental sustainability, brain drain has an inverse relation and the human capital investments show positive associations with environmental sustainability. Moreover, the causality analysis also shows positive causal associations to be present between the dependent, independent and control variables. The study has important theoretical and practical implications as well.

Keywords: FMOLS; HCI; Brain drain; ASEAN.


JEL Codes: Q01

1 Introduction

Environmental sustainability can be described as the protection of the environmental resources for the future. The increased pressure of economic development on the countries worldwide has taken a huge toll on the environmental resources. Many governments are working on sustaining the environmental resources while working hard for the economic growth. Environmental sustainability is very important for the health of the ecosystem in long term. In the recent years many environmental issues have been highlighted which are getting more and more serious with each passing year (Melville, 2010; Vezzoli & Manzini, 2008). Governments have been working together to make the strict decisions required for the preservation of the environmental resources for the future generations. The renewable energy sources are being promoted in order to decrease the use of coal and oil. Research is being done on wind and solar power sources. The issues such as global warming are too large to be handled by a few countries so joint effort is being made by all the countries including the ASEAN countries. The ecological structure is being safeguarded along with the various endangered species. Experts have even suggested that the extension of different species can be a limitation for the future technological development (Ekins, 2000; Moldan, Janoušková, & Háč,
There are many policies that have been implemented across the globe for improved sustainability of the environment. These include carbon tax, government limitations on emission of harmful pollutants, encouraging the use of more sustainable energy sources and environmental cost benefit analysis. ASEAN countries have also recognized this issue and are working on improving the sustainability of the environment (Ismail & Abdullah, 2012; Tilman & Clark, 2014). The following table 1 highlights the number of corporations in the following ASEAN countries that are accountable for their sustainability reporting.

Table 1: Sustainable Reporting

<table>
<thead>
<tr>
<th>ASEAN country</th>
<th>Number of companies with sustainable reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>More than 100</td>
</tr>
<tr>
<td>Malaysia</td>
<td>100</td>
</tr>
<tr>
<td>Singapore</td>
<td>71</td>
</tr>
<tr>
<td>Thailand</td>
<td>Greater than 90</td>
</tr>
</tbody>
</table>

According to the ASEAN association, the sustainable development can be described as keeping up with the needs of the present without compromising the resources required for fulfilling the future needs. Various experts have taken different approaches while discussing the environmental sustainability (Elliott, 2012; Vithayasrichareon, MacGill, & Nakawiro, 2012). The main aim is to cater the economic, social and environmental needs of the present without exploiting the environmental resources. The economic development should be balanced with the environmental development. ASEAN community has recognised this risk and continued to make effort to improve the situation. The Agenda for Sustainable Development was started by the ASEAN countries for improving the living standards of their population (Masud, Kari, Banna, & Saifullah, 2018; Roh, Thai, & Wong, 2016). It has been estimated that by conserving the environment in this region the economy can be boosted by approximately 7.1% till 2025. This will be helpful in generating new jobs and increasing the employment rate while maintaining the sustainability of the environment. The ASEAN region is rich with natural resources and well known across the globe for the climate change and wide range of biodiversity. Like the rest of the world the natural resources in this region are also under pressure due to the increased economic pressure (Corràs-Arias, 2020; Kanchana & Unesaki, 2014; Tongsopit, Kittner, Chang, Aksornkij, & Wangjiraniran, 2016). The demands of the population are constantly increasing, and it is becoming more and more difficult to meet those demands without exploiting the natural resources. The urbanization of the major cities in the region has resulted in the consumption of many natural resources. Malaysia has one of the largest reserves of natural resources across the globe. The following graph (Figure 2).
The exploitation of the natural resources is increasing with every passing year. There is a huge need to stop the environmental degradation so that the environment is preserved for the future generations. In order to preserve the environment effectively it is essential to study and analyse all the factors affecting it (Koh, 2007; Mulqueeny, 2004). There are numerous factors that are linked with the environmental degradation especially in the ASEAN countries. In this paper we will be focusing on the effect of pro human economic indicators on the environmental sustainability in the ASEAN region.

2 Literature Review
In this section we will analyse the relationship of pro human economic indicators with the environmental sustainability. The indicators under study in this paper include human capital investment, brain drain and immigration.

Relationship between Human Capital Investment and Environmental Sustainability in the ASEAN countries
Human capital investment can be described as one of the intangible assets that cannot be recorded on any balance sheets (Karimi, Yusop, & Law, 2010; Thangavelu & Narjoko, 2014). It is the measure of the skills and experience the individuals have. It also includes the health, intelligence, training and education of the individuals. On a larger scale it includes the business opportunities, training and guidance available to the population. Investment in these areas have proven to increase the profitability and productivity on an individual level (Kheng-Lian & Robinson, 2002; Timothy, 2003). It can help maximize the efficiency of all the resources being utilized for development purposes. Many businesses have various methods for calculating the human capital. The most commonly method is dividing the total profits by the amount invested in human capital. Through this the return on investment on human capital can calculated. Human capital has a major impact on the economic development of any business or country. The depreciation of human capital is occurred due to extended periods of unemployment. It becomes difficult to keep up with the innovation and the latest technology due to increased depreciation of human capital (Hoang & Bui, 2015; Ismail & Abdullah, 2012). The link between the economic growth and the human capital
investment is very strong. The more skills and experience the individuals have the better they perform. The relation between human capital investment and environmental sustainability has been varying through literature. Those individuals trained for the economical skills and knowledge have been shown to promote the economic and industrial development (Ferguson, 2004; Vithayasrichareon et al., 2012). The increase in industrial development has proven to have a negative impact on the environment in the ASEAN countries. The emission of pollutants and increased consumption of natural resources is directly linked with the increase in industrial and economic development (Hussain et al., 2020). The increased economic pressure on ASEAN countries has led to an increase in this trend. However, in the recent years many countries including the ASEAN nations have been investing human capital carefully. The environmental issues have been highlighted and many researchers and institutions have been working on environmental solutions. The waste treatment in industries is being promoted. Proper training and awareness regarding recycling and reuse is becoming more common. Due to the increased economic pressure, research is being conducted on sustainable energy sources like solar and wind energy. Individuals are now being trained according to the future needs of the environment (Lian & Robinson, 2002; Sovacool, 2009). Environmental studies have been added as compulsory subject in schools. Professional level studies are conducted in order to improve the environmental conditions. Such trends are not that common due to the increased economic pressure. It has been evident through literature that there is a relationship between the environmental sustainability and human capital investment.

Hypothesis one (H1) is that the human capital investment has an impact on the environmental sustainability in the ASEAN countries.

**Relationship between Brain Drain and Environmental Sustainability in the ASEAN countries**

Brain drained can be defined as the migration of professional and skilled people from one nation to the other. They mostly do this in order to get better facilities and have an improved quality of life. The political and social living conditions of the country are the main reasons behind the increasing brain drain (Asgari-Jirhandeh; Bui & Vô, 2007). This phenomenon is not only associated with the developing countries rather with the developed ones as well. The policy makers are facing this huge challenge of brain drain. After careful analysis one of the main reasons behind brain drain were found out to be the lack of human capital investment along with the creative work force. Without adequate human capital investment there are less facilities and learning opportunities for the individuals (Kittrakulrat, Jongjatuporn, Jurjai, Jarupanich, & Pongpirul, 2014; Van Minh et al., 2014). The lack of proper job opportunities is caused by this. The individuals are unable to live a comfortable life without proper employment. Research has shown that there is a connection between development opportunities, capital investment and brain drain. Due to the increased brain drain the country loses human resource (Bouchon & Rawat, 2016; Feeny & McGillivray, 2013). The educated, trained and specialized individuals leave from the nation. The government faces the loss of funds spent of the education and training of the individuals that migrate. Research has shown that the human capital has greater value than the other resources like financial capital (Broinowski, 2016; Dahlui & Aziz, 2012). Due to increased brain drain the sustainable development becomes difficult. The economic and environment development of the nation is affected. This trend has been highlighted in the ASEAN countries. Every sector of the country is affected due to it. The research and progress is reduced. The issues are not solved efficiently. A lack of funds and human resource resulted in less contribution to the environmental sustainability (Chen & Su-Yen, 2016; SALLEH & SALLEH, 2017).

Hypothesis two (H2) is that the brain drain has an impact on the environmental sustainability in the ASEAN countries.

**Relationship between Immigration and Environmental Sustainability in the ASEAN countries**

Immigration is the movement of individuals from one country to the other. These individuals leave behind their homes and jobs. There are many reasons behind immigration including the lack of facilities, job opportunities, hunger, unsuitable living conditions, lack of adequate educational facilities, increased oppression many more (Nguitragool, 2010; Timothy, 2003). They move looking for better opportunities for themselves and their families.
Each nation has a limited capacity of individuals that can reside there. The resources are limited, especially the environmental resources. Weather the immigration is legal or illegal it increases the pressure on the resources (Kheng-Lian, Robinson, & Lin-Heng, 2016; Tabucanon, 2013). The balance between the individuals and the resources is disturbed. Over population is directly linked with the changes in the environment. Resources such as fresh water, air and soil are limited. In many cases it has been observed that the economic development is increased due to increased workforce, but the environmental degradation is increased as well. Issues such as congestion, urban sprawl, pollution, water consumption, water generation and land conversion arise (Cruz, 2003; Nazeer & Furuoka, 2017). The basic human needs cannot be fulfilled such as clean drinking water and fresh air. Due to the increased individuals the traffic increases which is linked with the increase in the emission of pollutants. Many environmental changes are visible. The increased population leads to an increased amount of waste. More industries are set up in order to provide the employment opportunities. Forests are cut down to make room for more houses essential construction (Cruz, 2005; Koh, 2013). This increased deforestation has a negative impact on the environment as well. Increased number of populations requires more essential products and facilities. The production of the industries has to be increased. If these industries do not treat the waste than they cause more water and air pollution. The governments and authorities have made policies regarding the treatment of this waste but in such circumstances it becomes difficult to enforce these policies (Lian, 2009; Nonthasoot, 2017). Due to the increased human population and deforestation the animal species get extinct. Such circumstances lead to an imbalance in the environmental conditions. The resources are exploited. This is how the immigration has a direct impact on the environmental sustainability.

Such trends have been prominent in the ASEAN countries. Hypothesis three (H3) is that the immigration has an impact on the environmental sustainability in the ASEAN countries.

3 Materials and Methods

On the basis of existing literature, the study has used the neoclassical production function for the analyses of the relationship between environmental sustainability, human capital investment, brain drain, population and literacy. The independent and control variables, HCI, BRD, IMM, POP and LIT have been used as individual inputs for the study whereas ENS is the output. The production function is defined as follows.

\[ ENS_{it} = f(HCI_{it}, BRD_{it}, IMM_{it}, POP_{it}, LIT_{it}) \]  

(1)

The functional relationship is transformed into a linear model as follows.

\[ ENS_{it} = \alpha + \beta_1 HCI_{it} + \beta_2 BRD_{it} + \beta_3 IMM_{it} + \beta_4 POP_{it} + \beta_5 LIT_{it} + \epsilon_{it} \]  

(2)

In equation 2 \( \alpha \) stands for the slope and \( \beta \)’s is used as the intercepts or the coefficient of each explanatory or control variables and \( \epsilon_{it} \) is used to represent the error term.

Data

The study used annual data and focused upon the pro-human economic indicators for completing this study. The study is focused on the ASEAN region that includes a total of ten countries: Cambodia, Brunei, Indonesia, Thailand, the Philippines, Laos, Myanmar, Malaysia, Vietnam and Singapore. The data has been collected from the period ranging 1990-2019. The study focuses on the outcome variable environmental sustainability, independent variables brain drains, human capital investments and immigration and the control variables population and literacy rates. The environmental sustainability is defined in terms of emissions of the Co2 and is measured in kt, the control variables are taken from the ILO estimates and are defined as the total number of human individuals present in an economy and the number of educated individuals from the total population. Brain drain is defined as the immigration
of skilled or qualified workers from an economy to another, it is measured through human capital flight, the immigrations are evaluated in terms of country estimates of the people that have immigrated from their home country to another, human capital investments are measured in terms of the value of the efforts put for developing the human capital of an economy. The data regarding these parameters has been collected from the OECD library, WDI, ILO and country specific governmental websites.

Unit Root Test
The unit root test is performed on the data in order to evaluate the integrating relationship among the variables (Im, Pesaran, & Shin, 2003). And also, to find out the stochastic properties or stationary properties of the variables. The tests that are usually used for the above-mentioned purposes include Levin Lin Chu LLC and Im Pesaran Shin IPS unit root tests. The main point of differentiation of these tests is that LLC provides same or homogeneous autoregressive process while IPS provides heterogeneous autoregressive process (Pesaran, Shin, & Smith, 2001). Both tests are derived from the augmented Dickey Fuller tests and these are more useful as compared to the traditional unit root tests. The null hypothesis for the test is that the unit root is present in the data whereas the alternate hypothesis contends that the unit roots isn’t present in the variables.

These hypotheses can be evaluated, and the required results can be drawn in accordance with the equation given below:

\[ \Delta y_{i,t} = \alpha_i + \rho y_{i,t} - 1 + \sum_{j=1}^{p_i} a_j \Delta y_{i,t-j} + \epsilon_{i,t} \]

Here \( \Delta y_{i,t} \) is the difference that \( \Delta y_{i,t} \) shows for ith country for the specific time period of t

Panel Co-integration Test
The cointegration test is the next evaluative measure performed after discovering the order of integration and stationary properties from the unit root test. The co-integration tests are used for evaluating the cointegrating relationships among the variables and also to find out the prevalence of long run relationships among the variables. For this purpose, the Kao and Pedroni (Kao, 1999; Pedroni, 1999) cointegration test is applied. The null hypothesis in this case indicates that there is no cointegration existing among the variables while the alternate hypothesis in this particular case shows that cointegrated relationships exist among the variables (Engle & Granger, 1987). The tests are performed on the basis of within dimension and across the dimension approaches. The within dimension statistics are divided or evaluated on the basis of v-statistic, rho-statistic, PP-statistic and ADF statistic and in the same manner the between dimension approach consists of just three test statistic values rho-statistic, PP-statistic and ADF statistic. The null hypothesis is accepted or rejected on the basis of the significance of the coefficients of these statistics (Enders, 2008). The following equation has been used to estimate the cointegration test.

\[ y_{i,t} = \alpha_i + \delta_{i,t} + \beta_1 X_{1,t,i} + \beta_2 X_{2,t,i} + \cdots + \beta_n X_{n,t,i} + \epsilon_{i,t} \]

DOLS Tests
DOLS estimation techniques are used for long run estimations of the variables. The methods of evaluation are based on the OLS estimation procedure, however these tests account for endogeneity and serial correlation among the variables. If there is a cointegrating vector present in the variables and their order of integration is also one, these tests are more suitable for providing authentic results. The researcher has used FMOLS technique in this study which can be given in the form of an equation as follows:

\[ \hat{\beta}_{FM} = \left( \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - \bar{x}_{i})^2 \right)^{-1} \left( \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{i,t} - \bar{x}_{i}) ENS_{i,t} - T \delta_{eu} \right) \]
In this equation, $\hat{E}_N S_{i,t}$ is the transformed variable of environmental sustainability due to endogeneity correction while $\hat{\delta}_{eu}$ represents the serial correlation correction by DOLS.

4 Empirical Findings

Unit Root Tests
The unit root tests developed by IM, Pesaran and Shin has been used in the study. The main purpose of the application of the unit root tests are the to evaluate the order of integration and the stationary properties of the data. The results of the analysis are presented in table 1. The variables present with different values at both the constant and constant trend columns. The results show that the variables economic sustainability, human capital investment, population and literacy rate are significant at level. However, on the shift to fist difference all variables are significant and devoid of the unit root properties. The results show that upon the first difference the order of integration becomes one and the variables become stationary. The stars or the * show that the significance level at which the null hypothesis are rejected. * represents 1 percent significance, ** is an indication of 5 percent significance and *** is an indication of 10 percent significance. At the first difference the null hypothesis is rejected on the 5 and 10 percent levels of significance.

Table 2: Unit Root Test

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Level</th>
<th>1st Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant</td>
<td>Constant+ Trend</td>
</tr>
<tr>
<td>ENS</td>
<td>-2.2003*</td>
<td>-2.3004*</td>
</tr>
<tr>
<td>HCI</td>
<td>-2.9393*</td>
<td>-2.2433*</td>
</tr>
<tr>
<td>BRD</td>
<td>-0.1330</td>
<td>-0.2044</td>
</tr>
<tr>
<td>IMM</td>
<td>-2.1933</td>
<td>-2.2203**</td>
</tr>
<tr>
<td>POP</td>
<td>-3.2030*</td>
<td>-3.2477</td>
</tr>
<tr>
<td>LIT</td>
<td>-2.3293*</td>
<td>-2.2294*</td>
</tr>
</tbody>
</table>

Panel Cointegration Results
In order to evaluate the presence of cointegration between the time series as well as the long run relations between the variables the researcher has used the Pedroni cointegration method. The results of the analysis are depicted in table 2. The variables have been evaluated on the basis of within dimension and across dimensions approaches. The * represents the rejection on 1 percent level of significance, ** shows rejection on the 5 percent level of significance and *** shows rejection on the 10 percent level of significance. It can be seen from the results that PP, rho and v statistics of the within dimension statistics have rejected the null hypothesis of no cointegration. Whereas the between dimension also rejects the null hypothesis on the basis of the group rho statistic. The Kao test also rejects the null hypothesis, therefore a total of five out of eight statistics have rejected the null hypothesis of no cointegration, thus the alternate hypothesis of presence of integration and a long run relationship is accepted.

Table 3: Panel Cointegration Test

<table>
<thead>
<tr>
<th>Weighted Statistic</th>
<th>Prob.</th>
<th>Weighted Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

“Alternative hypothesis: common AR coeffs. (within-dimension)
Coefficient Estimation Results

The estimation of the regressors is performed after the absence of unit roots and presence of cointegration among the variables has been confirmed. The methods of FMOLS estimation is used in order to evaluate the magnitude and direction of the independent and control variables on the outcome variable. The results of the estimation have been presented in table 3. The table presents the results of the pooled and grouped estimations. According to the pooled effect human capital investment is significant and produces a magnitude of 28.3 (pooled) and 29 percent (grouped) in the outcome variable environmental sustainability. The change in brain drain is negative i.e. if brain drain increases the environmental sustainability decreases. The pooled estimate has a magnitude of 21 percent and grouped estimate is 22.2 percent. The effect of immigration is insignificant for both pooled and grouped statistics. The control variables population and literacy are also evaluated. Literacy has a positive and significant effect on the environmental sustainability whereas the population is insignificant. The adjusted R squared value for both estimations shows that the model is responsible for evaluating 66 and 67 percent of the variation that occurs in the dependent variable.

Table 4: Coefficient Estimation Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Pooled</th>
<th>Grouped</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCI</td>
<td>Beta</td>
<td>0.283**</td>
<td>0.290**</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.663</td>
<td>0.388</td>
</tr>
<tr>
<td>BRD</td>
<td>Beta</td>
<td>-0.210*</td>
<td>-0.222**</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.673</td>
<td>0.744</td>
</tr>
<tr>
<td>IMM</td>
<td>Beta</td>
<td>0.032</td>
<td>0.054</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.833</td>
<td>0.122*</td>
</tr>
<tr>
<td>POP</td>
<td>Beta</td>
<td>0.022</td>
<td>0.033</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.788</td>
<td>0.788</td>
</tr>
<tr>
<td>LIT</td>
<td>Beta</td>
<td>0.122**</td>
<td>0.122*</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.637</td>
<td>0.378</td>
</tr>
<tr>
<td>Adj. R Square</td>
<td>Beta</td>
<td>0.669***</td>
<td>0.677***</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.777</td>
<td>0.898</td>
</tr>
</tbody>
</table>

Granger Causality

The granger causality has test has also been used in order to evaluate the causal associations among the variables. The results from the analysis are presented in table 4. The stars present the significance i.e. the indication of causality among the variables. There is an observed causal association between the control variables literacy and population, however the association is unidirectional, the variables human capital investment, brain drain, Immigration,
environmental sustainability and literacy and population all are found to have causal associations with one another. ENS causes HCI, BRD, IMM and LIT, HCI does not cause BRD, IMM, LIT it only has significant association with POP. Whereas BRD has causal associations with IMM, POP and LIT.

Table 5: Granger Casualty Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>ENS</th>
<th>HCI</th>
<th>BRD</th>
<th>IMM</th>
<th>POP</th>
<th>LIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENS</td>
<td>0.736</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCI</td>
<td>0.548*</td>
<td>0.683</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRD</td>
<td>0.320*</td>
<td>0.473</td>
<td>0.721</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMM</td>
<td>0.399*</td>
<td>0.229</td>
<td>0.388*</td>
<td>0.710</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POP</td>
<td>0.233</td>
<td>0.399*</td>
<td>0.122*</td>
<td>0.467*</td>
<td>0.656</td>
<td></td>
</tr>
<tr>
<td>LIT</td>
<td>0.433*</td>
<td>0.299</td>
<td>0.233*</td>
<td>0.382*</td>
<td>0.288*</td>
<td>0.799</td>
</tr>
</tbody>
</table>

5 Discussion and Conclusion

The present study evaluates the effect of brain drain i.e. the movement of skilled and qualified personnel from their home country to another, human capital investments i.e. the investments made for the development of the human capital like education, training etc. and immigration i.e. the movement of the residents from their country of origin to another. These effects have been evaluated and analyzed for their implications on the environmental sustainability. The environmental resources of the world are slowly depleting as a result of increasing population and demands and scarce resources to defend these requirements. The effects of the focused variables can be detrimental for the environmental sustainability, for instance if a country reports that people in quantities of thousands have been immigrating to that area, then it becomes difficult to facilitate all these individuals and the consequence is often the deterioration of environment and economy. Moreover, the movement of qualified individuals to another area also poses deflected consequences for the environment and economic growth, if a share of the skilled and talented personnel and workforce moves from the country then there are lesser options available for leveraging these resources for the development of a sustainable environment (SHARIFF, KRISHNASWAMY, ABDULLAH, & CHAU, 2018; Zafar & Kantola, 2019). The present study used the FMOLS method and the causality analysis to evaluate the relations between these indicators and found positive relationships.

In this regard the study by Acar (2017) focuses on the environment in Turkey. The study focuses on immigrants and the development in the human capital. The study uses panel estimation to find out that the immigrants and the development in the human capital is gradually fading away over time. The study used education and the degree of immigrants received by the country, the long run effects in such a scenario can be detrimental for the economy and the environment. The environmental sustainability also accounts for the mobility and development of the surroundings or the area in which an individual life. The effect of development in human capital was found to be effective and significant in the present study as well, an individual with knowledge and capacity has the skills to develop sustainable environment. Other studies (Ha, Yi, & Zhang, 2016; Ngoma & Ismail, 2013) have also found the relations between immigrants, education, skilled worker movement (brain drain), human capital developments and economic growth in the long run. The present study evaluates these effects from the standpoint of environmental effects and sustainability, although long term economic benefits can be translated and modelled into environmental benefits as well.

Implications and limitations

The present study focuses on the effects of human capital investment, immigration and brain drain on the environmental sustainability of the ASEAN economies. The focus on these indicators has been developing in recent times and several studies have been conducted on their effects on the economic growth of countries, however the focus on environmental benefits or detrimental effects is scarce therefore the study makes important theoretical contributions. Moreover, the policy makers and the managers can focus on the results of this study and devise
policies for retaining their skilled workers and on the development of their workforce so that the environmental sustainability can be increased. Like all research studies, along with contributions the present study also faces some limitations. The researcher has only focused upon three indicators of post human indicators, other variables like schooling, education, reasons for immigration etc. can give a rationale and offer more understanding on the topic. Also, the dataset needs to be more diverse so that the effects of these indicators can be evaluated in countries other than the ASEAN region as well.

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DOES INVESTMENT PORTFOLIO MATTER FOR ENVIRONMENTAL SUSTAINABILITY IN ASEAN COUNTRIES? REGRESSING OUTWARDS FDI, INWARDS FDI, INWARDS AID AND OUTWARDS AID THROUGH PANEL DATA

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Abstract. The present study focuses on the ASEAN region to focus on the association and convergence among the environmental sustainability, inwards FDI, outwards FDI, inwards aid and outwards aid. The basic objective was to analyze the relationships among these variables for the period of 1990-2018, using data from the World Bank. Diagnostic tests for unit roots, autocorrelation, multicollinearity and cross-sectional dependence were employed on the data. For estimation of the regressors, the panel corrected standard error and the one-step generalized method of moments was used to estimate the relationships between the outcome variable and the explanatory variables. The static and dynamic estimations reveal that inwards FDI, outwards FDI, inwards aid and outwards aid are positive and increase the environmental sustainability of the ASEAN region. The current study is novel from the standpoint that focus on these dimensions is scarce especially in a developing region like the Southeast Asia. The study has employed use of a non-conventional method of estimation as well. The study is also of importance in the ASEAN region as the industry and other developmental plans are increasing thus the region is subject to environmental degradation. The study has important theoretical and practical implications.

Keywords: ASEAN, FDI, Aid; environmental sustainability

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Jel Codes: O10

1. Introduction

In literature, environmental sustainability has been described in multiple ways. Environmental sustainability is the rate at which the renewable environmental resources can be harvested, the rate of pollution creation and the rate of depletion of non-renewable resources (Melville, 2010; Vezzoli & Manzini, 2008; Dalle et al., 2020). It is the fulfilment of the needs of current population without compromising the natural resources for the future generations. It is a balance between the utilization of environmental resources and harvesting them. In order to ensure a good quality of life for the future generations the three pillars of sustainability should be strengthened. This includes economic, social and environmental sustainability. The earth and its environment has a limited capacity. Due to increased economic pressure the consumption of natural resources has increased (Ekins, 2000; Moldan, Janoušková, & Háč, 2012). Urbanization and over population has led to increased demand of these resources. This has led to an increase in environmental issues such as global warming, depletion of ozone, soil degradation, shortages of clean water and deteriorating air quality. Such issues are growing with every passing year and will continue to grow unless the nations work together to solve them. The environmental problems cannot be solved by nations independently rather joint effort is required here. For this purpose many policies have been enforced by the governments worldwide (Ismail & Abdullah, 2012; Tilman & Clark, 2014). The ASEAN countries have been working towards the preservation of environment along with other world organizations. The Southeast Asian countries are rich in natural resources. The countries included in the Association of Southeast Asian Nations are Vietnam, Papua New Guinea, Thailand, Singapore, Philippines, Myanmar, Malaysia, Laos,
Indonesia, Cambodia and Brunei Darussalam. These countries have abundance of environmental resources. This is one of the reasons behind increased tourism in this region. However, the renewable resources are not being utilized as much as they should be. The following figure 1 highlights the energy consumption in Thailand currently.

![Figure 1: Total Energy Consumption](image)

The ASEAN environment though rich in natural resources is being pressured by the economic growth and increased demands of the population. During the recent years, issues regarding the clean water, air and soil are becoming more and more common in the region. The urbanization of multiple megacities in the region has increased the consumption of the environmental resources (L. Elliott, 2012; Vithayasrichareon, MacGill, & Nakawiro, 2012). This includes the cities of Manila, Bangkok, and Jakarta. Due to this, the ASEAN region is currently suffering from imbalance between economic growth and environmental sustainability. In 1997, the association had initialized the corporation on environmental issues. The agenda of the corporation was to bring the countries together in order to work towards the achievement of a sustainable environment (Karki, Mann, & Salehfar, 2005; Roh, Thai, & Wong, 2016). Green environment can be preserved by sustainable management of forests, energy, biodiversity, mineral, water, soil and marine resources. The new ASEAN Socio Cultural Community Blueprint has been promoting the innovation and development of environmentally sound technology (Kanchana & Unesaki, 2014; Tongsopit, Kittner, Chang, Aksornkij, & Wangjiraniran, 2016). The adaption of such technology will ensure environmental protection. The production and consumption resources will be monitored more efficiently and in case of natural disasters, the response will be more efficient. Currently many renewable energy options are being explored. They have tremendous capacity for power generation through renewable sources. This capacity has been highlighted in the following table 1.

### Table 1: Power Generation Capacity of Thailand

<table>
<thead>
<tr>
<th>Renewable Energy Source</th>
<th>Power Generation Capacity of Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>26.35 %</td>
</tr>
<tr>
<td>Wind</td>
<td>6.13 %</td>
</tr>
<tr>
<td>Hydro</td>
<td>30.17 %</td>
</tr>
<tr>
<td>Biomass</td>
<td>30.84 %</td>
</tr>
<tr>
<td>Biogas</td>
<td>4.64 %</td>
</tr>
<tr>
<td>Waste</td>
<td>1.87 %</td>
</tr>
</tbody>
</table>
Regardless of being rich in natural resources and having high capacities for renewable energy sources, the environmental development still needs more attention. There are many factors that affect and hinder the environmental sustainability (Anbumozhi & Intal, 2015; Koh, 2007). It is thus essential to study the impact of all the affecting factors so that the environmental sustainability can be monitored and controlled. In this paper, we are analysing the relation between the investment portfolio and the environmental sustainability in the ASEAN region.

2. Literature Review
This section of the paper contains analysis on the relationship between the investment portfolios of a country with its environmental sustainability. The dimensions of investment portfolio discussed in this paper include the inward foreign direct investment, outward foreign direct investment, inwards aid and outwards aid.

2.1. Relation between Outward FDI and Environmental Sustainability in ASEAN countries
Outward Foreign Direct Investment is one of the business strategies in which the domestic enterprises and businesses expand their setups in foreign nations. This expansion can be done through various means including expansion of existing facility in the foreign country, an acquisition or merger and green field investment. This is done in order to avail better business opportunities and larger profits. Each organization has their own objectives for expanding in a foreign country (Karimi, Yusop, & Law, 2010; Zhang, 2001). The businesses set up industries in countries where the labour is cheap and there is an abundance of natural resources. Because of outward foreign direct investment the industries are setup in the foreign countries where as the profits are returned to the domestic country. The economic growth in the domestic country is increased without the negative impacts of the industries (R. J. Elliott & Shimamoto, 2008; Rammal & Zurbruegg, 2006; Batool, Bashir & Ch., 2020). The industries consume large amount of natural resources and emit pollutants in the environment. As the industry is not in the domestic country, so it benefits in terms of environmental sustainability. There is less pressure on the environmental resources of the domestic country (Kawai & Wignaraja, 2010; Tongzon, 2002). The local resources are not consumed and they are not affected directly by the industrial pollutants. The emission CO2 is not increased in the domestic country due to the expansion of the business. The environment of the home nation is affected positively with the increase in foreign direct investment. This way the home nation gets all the economic profits and avoid the environmental issues (Thorbecke & Salike, 2011; Webster, 2002; Sabir & Hussin, 2020). The decrease in the foreign direct investment means that the business expansions are done mostly inside the country. This links to increased pressure of the environmental resources and is one of the reasons behind environmental degradation (Park & Estrada, 2009; Rock, Murphy, Rasiah, van Seters, & Managi, 2009). Hypothesis one (H1) is that the outward foreign direct investment has an impact on the environmental sustainability in the ASEAN countries.

2.2. Relation between Inward FDI and Environmental Sustainability in ASEAN countries
The Inward foreign direct investment occurs when a foreign company invests in the home country. The businesses are expanded this way all over the world. There are many reasons for this including cheaper labour and abundance of natural resources (Baughn, Bodic, & McIntosh, 2007; Karimi et al., 2010). There are many advantages of inward foreign direct investment including the inflow of foreign currency and the latest technology. There are however a set of disadvantages of inward foreign direct investment as well. Due to an increase in the foreign investment the number of industries and businesses increase in the home country (Azam, 2016; Chakraborty & Mukherjee, 2013; Wen, 2020). This increased industrial development is good for the economic development of the country but not the environmental development. Increased number of industries are linked with an increase in the pressure on the environmental resources. The environmental degradation is accelerated. The industries require power sources for efficient working and regardless of many policies, non-renewable power sources are used. This includes oil, gas and coal. The emission of pollutants is increased (Chakraborty & Mukherjee, 2013; Cole, Elliott, & Fredriksson, 2006; Wong, Fan & Li, 2020). The air and water sources are contaminated affecting the biosphere of the home country. The CO2 emission is increased. The researchers however argue on this impact. According to a set of scholars if the inward investment is non industrial than it can have a positive impact on the environmental
conditions of the home country (Cole et al., 2006; Marcotullio, 2001). The labour-based foreign investments have a negative impact on the environmental conditions. Increased inward foreign direct investment results in an inflow of the latest knowledge and technology. In case the technology is environmental friendly and beneficial for the environment than the negative impact is reduced. The regression in the inflow on investment has a positive impact on the environment when the investment is industrial (Berkhout, Angel, & Wieczorek, 2009; Hsu, 2012). It can thus be established that a link exists between the inward foreign direct investment and the environmental sustainability. The exact nature of the impact varies however. Hypothesis two (H2) is that the inward foreign direct investment has an impact on the environmental sustainability in the ASEAN countries.

2.3. Relation between Outward Aid and Environmental Sustainability in ASEAN countries
The financial and other aid which a country provides to other countries is known as outward aid. In most cases, countries give financial aid to other countries when they have excessive funds and their own economic activities are not affected by the aid giving aid. In such circumstances there is not much prominent impact on the environmental sustainability of the country (Baughn et al., 2007; Chakraborty & Mukherjee, 2013). The relation between the outward aid and environmental sustainability is dependent on the type of aid and the purpose of the aid being given. In literature some studies argue that the impact is not that significant while the others suggest that the outward aid has a negative impact on the country’s environment (Fukasaku, Kawai, Plummer, & Trzeciak-Duval, 2005; Tarp, 2000). The funds that could be spent on the social and environmental development of the country are given as aid to the other countries (Hussain et al., 2020). Due to this the research and development on the renewable energy sources is restricted. Instead of using the funds for the development of environmental friendly technology, they are given to the other countries as aid (Goetz, 2015). In such circumstances, the increased outward aid has a negative impact on the environmental sustainability. The decrease in the outward aid here implies that the funds will be used for beneficial purposes for the country instead. Hypothesis three (H3) is that the outward aid has an impact on the environmental sustainability in the ASEAN countries.

Relation between Inward Aid and Environmental Sustainability in ASEAN countries
The inward aid is the financial and other aid provided by the other countries for the development purposes. The increased inward financial pressure is directly linked with the increases industrial and economic development. Such development is directly linked with the emission of pollutants and consumption of resources (Baughn et al., 2007; Chakraborty & Mukherjee, 2013). The increased industries require power sources and in many cases use non-renewable energy sources. Other natural resources are required for proper functioning. The environmental degradation is accelerated. The governments have implement policies for the protection of the environmental resources. Emission of carbon dioxide is increased. Air quality is degraded due to this increased CO2 emission along with the emission of nitrogen oxides and sulphur dioxide. The health of humans and animals is affected due to this. Water sources are contaminated due to the untreated water waste from the industries (Fukasaku et al., 2005; Marcotullio, 2001). The land pollution is increased due to the increased economic activities. The radiation and noise levels are increased. The researchers however argue that the impact of inward aid depend on the intent and type of aid. When the aid is given for environmental purposes and research it has a positive impact on the sustainability of the environment. Research and development of renewable energy sources require large funds. If aid is allocated for this purpose than the environmental sustainability is improved. Renewable resources such as solar and wind require funds for proper instalments of power generators (Tarp, 2000). The mechanism is expensive and with the help of aid, it is easier to set up such power generation stations. There is an impact of the inward aid on the environment but it is dependent on the purpose for which the aid is utilized (Hussain et al., 2019).

Hypothesis four (H4) is that the inward aid has an impact on the environmental sustainability in the ASEAN countries.
3. Methodology

3.1. Data
The focus of the study is the ASEAN region. The ASEAN region is comprised of ten countries from Southeast Asia with the purpose of promoting economic growth, cultural development and social progress in the Southeast Asian region through development in the member countries. The ASEAN region is comprised of ten countries: Malaysia, Myanmar, Laos, Indonesia, Cambodia, Vietnam, Singapore, Thailand, Philippines and Brunei. The study has made use of a heterogenous panel data methodology for regressing the estimators. The annual data of all ten-member countries of the ASEAN region has been collected, while the period ranging from 1990-2019 has been taken into consideration. The data from the last three decades has been included so that the recent trends in the environmental sustainability and FDI and aid can be evaluated. The data collection process is one of the most important stages in an empirical study. The authenticity of the study is dependent upon the credibility and authenticity of the used resources; therefore, the secondary data has been collected from renowned and credible databases like OECD library, WDI (Group, 2020) and the country specific governmental websites.

3.2. Variables
The dependent variable in the study is the environmental sustainability which is evaluated through the Co2 emissions by each country. The unit of measurement for co2 emissions is kt. The outwards foreign direct investment, inwards foreign direct investment, inwards aid and outwards aid are being measured in constant 2010 US dollars. Environmental sustainability is the accountability for the environmental resources so that their depletion and degradation can be avoided. It is used to evaluate the economic performance of countries, co2 emissions are considered to be a direct source of depletion of natural resources therefore it has been used for measuring environmental sustainability. The outwards and inwards FDI has been measured, as a sum of all the FDI directed towards the region, the reason for including FDI in this study is that FDI is often linked with fast-paced development, which can prove to be harmful for the environment and its resources. The inbound and outbound aid is also included as a reflection of the aid directed towards the ASEAN region, it is included in this study as the monetary aid is often directed towards the institutional development which produces wastage and releases toxic materials into the environment as well, thus to evaluate the effects of the environmental sustainability these variables have been included.

3.3. Method
On the basis of the justifications from the theoretical and empirical evidences collected from previous studies the following model has been specified for the evaluation of country and time fixed effects in the data;

\[ \text{ENS}_t = \alpha + \sum_{j=1}^{4} \beta_j \text{INFDI}_t + \sum_{j=1}^{4} \delta_j \text{INF}_{\text{dum},j} + \sum_{j=1}^{4} \theta_j \text{Y}_j + \epsilon_t \]  

(1)

The equation represents the adjustment for the changing time and different countries. The above mentioned model is efficient against changes in time considered and unit focused upon. The subscript ‘i’ is used to represent the country, whereas the subscript ‘t’ is used to depict the time period or year put under consideration. The term \( X_{it} \) is the conjoined term used for evaluating the effects of the explanatory variables. The term \( \beta_j \) reflects the coefficient of individual independent variable, \( \text{INF}_{\text{dum}} \) is the country fixed-effect dummy, \( \delta_j \) represents the coefficient for the fixed-effect of the country created through a dummy variable, \( Y \) is the depiction of the fixed effect of time characterized by year and the term \( \theta_j \) represents the coefficient for time fixed-effect dummy.

By substituting the explanatory variables in equation 1 the following expression is generated;

\[ \text{ENS}_t = \alpha + \beta_1 \text{OFDI}_t + \beta_2 \text{INFDI}_t + \beta_3 \text{INAID}_t + \beta_4 \text{OAID}_t + \sum_{j=1}^{4} \delta_j \text{INF}_{\text{dum},j} + \sum_{j=1}^{4} \theta_j \text{Y}_j + \epsilon_t \]  

(2)

The time fixed dummy term used in the model is to account for the effect of the cross-sectional or the cross-country dependence that can arise in regionally similar data. The cross-sectional dependency is a recurring problem in panel data and sometimes it affects the authenticity of the computed results. The issue of cross sectional dependency is common in datasets that include economically and regionally similar units. The dataset form the ASEAN region presents a similar issue and it is expected that the cross-sectional dependence will arise in the results. Moreover, the panel data is also susceptible to other econometric problems like heteroskedasticity, autocorrelation and multicollinearity as well. Therefore, in order to analyze the unit root issues and other problems certain diagnostic tests that evaluate the dataset for these issues will be performed so that the robustness...
of the results can be ensured. It is forecasted that the panel data set will present with issues like cross-sectional dependence and heteroskedasticity therefore the researcher uses estimation methods that account for these issues. The methods of static and dynamic regression estimations are being used so that these problems and their effects on the regressors can be mitigated. The static estimation technique has been applied by using the Prais-Winsten regression method, which has a correlated PCSE. The model computes dynamic estimation and the GMM method computes the static estimation by using the one-step approach. Both of the methods are adjusted for the country fixed and time fixed effects so that the heterogeneity that remains unobserved in such models can be accounted for. The PCSE method is considered efficient in such scenarios as it has the basic assumption that the error terms are heteroscedastic and have correlations across the panel. Thus they are equipped in dealing with unbalanced or problematic panels (Greene, 2012).

4. Empirical Results

4.1. LLC unit root test

The first test employed for conducting the analysis is the unit root test. The study is using panel data thus it is important to evaluate the stationary properties of the data. The LLC panel unit root test is being employed on the data so that the order of integration of the variables and the stationarity can be evaluated (Im, Pesaran, & Shin, 2003). The presence of unit roots in the time series data causes problems like spurious regressions. In addition, if the second order of integration is represented by the variables, then the application of t, F and chi-square tests will not be useful. The null hypothesis of the test states that there is a unit root in the study variables and the alternate hypothesis states that the variables are stationary, thus the issue of unit roots does not prevail. The results of the test are presented in table. It can be seen that at level only the inwards aid is significant. However, at the first difference all variables demonstrate stationary properties and the null hypothesis is rejected at the 5 percent level of significance. The variables are integrated at the first level and display stationary properties as well.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>ENS</th>
<th>INF DI</th>
<th>OFDI</th>
<th>INAID</th>
<th>OAIM</th>
<th>INF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>-1.389</td>
<td>-2.398</td>
<td>-0.203</td>
<td>-2.384*</td>
<td>-1.378</td>
<td>-0.384</td>
</tr>
</tbody>
</table>

4.2. Diagnostic Tests

The panel data is susceptible to issues like heteroscedasticity, autocorrelation, multicollinearity and cross-sectional dependence. Non-evaluation of these econometric issues can affect the authenticity of the results. These issues are analyzed by subjecting equation 2 to various diagnostic tests. The modified Wald and Breusch-Pegan/Cook Weisberg test is applied for heteroscedasticity, the Wooldridge test is performed for checking the autoregressive properties, VIF test and a correlation matrix is constructed for analyzing the correlations and multicollinearity, the cross-sectional dependence test developed by Pesaran (2004) is used for analyzing the cross-sectional dependence. Tables 2 and 3 present the results of the analysis. The heteroskedasticity and cross-sectional dependence tests present a strong form presence of both problems. The significance of the results of the two tests shows that the null hypothesis is rejected at the 5 percent level and the alternate hypothesis that contends for presence of both is accepted. The Wooldridge test results shows that the issue of autocorrelation does not exist. The null hypothesis that states the presence of no autocorrelation is accepted.

<table>
<thead>
<tr>
<th>Heteroskedasticity</th>
<th>Autocorrelation</th>
<th>Cross-section dependence</th>
<th>Multicollinearity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified Wald</td>
<td>Wooldridge</td>
<td>Pesaran</td>
<td>VIF</td>
</tr>
<tr>
<td>Breusch-Pagan/Cook-Weisberg</td>
<td>F-statistic: 2.11</td>
<td>Test statistic: 4.381**</td>
<td>Mean VIF: 2.02</td>
</tr>
<tr>
<td>( \chi^2 )-value: 13.00**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \chi^2 )-value: 7.40**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The issue of multicollinearity is evaluated by using the VIF indicator and constructing the correlation matrix. The correlation matrix is also used to assess the general relationships among the variables. The value of the variance-inflating factor is less than 10. In addition, the coefficients of correlation among the variables are below 0.5 thus demonstrating weak and moderate relationships among the variables. All of the coefficients are less than 0.8 thus supporting the results of the VIF test by establishing no multicollinearity. Both of the techniques therefore validate the absence of the issue of multicollinearity among the constructs (See table 4).

Table 4: Correlation Matrix

<table>
<thead>
<tr>
<th>Variables</th>
<th>ENS</th>
<th>INFDI</th>
<th>OFDI</th>
<th>INAID</th>
<th>OAID</th>
<th>INF</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENS</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFDI</td>
<td>.388</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFDI</td>
<td>.283</td>
<td>.332</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INAID</td>
<td>.288</td>
<td>.299</td>
<td>.293</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OAID</td>
<td>.399</td>
<td>.344</td>
<td>.228</td>
<td>.299</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>INF</td>
<td>.499</td>
<td>.388</td>
<td>.223</td>
<td>.399</td>
<td>.398</td>
<td>1</td>
</tr>
</tbody>
</table>

4.3. PCSE Estimation

The panel data has shown the presence of strong form cross-sectional dependence and heteroskedasticity. Thus, the empirical method of PCSE estimation has been used as it mitigates the effects of these problems and maintains the robustness of the findings. The study has used the static estimation technique with correlated PCSE and the dynamic estimation technique using the one-step generalized method of moments. The use of both the static and dynamic estimations is essential for ensuring the robustness of the findings. Both of the estimation methods are used to adjust the time fixed and country fixed effects and account for the unobserved heterogeneity that can be present in the data. The PCSE estimation has the assumption that the error disturbances are heteroskedastic and correlated across the panels and can cope with the unbalanced panel.

The PCSE estimation gives significant associations of the explanatory variables and the control variables with the outcome variable. The effect of inwards FDI is significant and has a magnitude of 22.1 percent. The results show that upon increase in INFDI the ENS will increase by 22 percent. The OFDI has significant and positive effects on ENS as well; the magnitude of the association is 27.7 percent, demonstrating that upon a unit change in the OFDI the environmental sustainability will be affected by 27 percent. The inwards and outwards aid are also significant on the ENS and have magnitudes of 12.3 and 19.9 percent. The GMM estimation also shows significant effects. It can be seen that all relations are significant, and the magnitudes are 38, 23.3, 23.1 and 29.9 percent respectively. The adjusted R squared of the model reveals that the regressors explain 65 percent of the variation in the dependent variable (See table 5).

Table 5: Results from PCSE estimation

<table>
<thead>
<tr>
<th>Dependent Variable = ENS</th>
<th>PCSE estimation</th>
<th>Sys-GMM estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFDI</td>
<td>0.221** (0.344)</td>
<td>0.381** (0.494)</td>
</tr>
<tr>
<td>OFDI</td>
<td>0.277* (0.334)</td>
<td>0.233** (0.399)</td>
</tr>
<tr>
<td>INAID</td>
<td>0.123** (0.299)</td>
<td>0.231** (0.274)</td>
</tr>
<tr>
<td>OAID</td>
<td>0.199** (0.498)</td>
<td>0.299** (0.364)</td>
</tr>
<tr>
<td>INF</td>
<td>0.033 (0.574)</td>
<td>0.045 (0.335)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.387** (0.649)</td>
<td>0.227** (0.374)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.657** (0.388)</td>
<td>-</td>
</tr>
</tbody>
</table>

Arellano-Bond test for AR (1) (Pr W z) - 0.033
Arellano-Bond test for AR (2) (Pr W z) - 0.293
Hansen test of overid restrictions - 1.297
5. Discussion

The main objective of the current study was to evaluate the effects of the foreign direct investment and foreign aid on the environmental sustainability of the countries under consideration. The foreign aid or investments are usually focused towards the development of industry, institutions or infrastructure in the developing and developed countries. The processes of setting up industries often uses natural resources like land and also releases toxins in the environment which ultimately affect the environment negatively and also put a strain on the natural resources (Asongu & Odhiambo, 2019; Huang & Quibria, 2018; Kardos, 2014). Kablan (2018) studied the relationship between foreign aid and environmental sustainability. The study focuses on the development practices that can be focused towards building green cities in developing countries, the focus is on the design, public policy, infrastructure, transport and other dimensions that can be converted into sustainable options. The study finds that foreign aid is useful in controlling the Co2 emissions especially when the focus is on the development of residential, commercial and public spaces build with the green initiative. The results of the present study also depict positive associations among the foreign aid and environmental sustainability. The studies by Bokpin (2017) and Joshua and Alola (2020) present varying results for the effects of FDI and environmental sustainability. The study by Bopkin shows that the increase in FDI in Africa discourages co2 emissions whereas the study by Joshua contends that FDI inflows in a country prove to be detrimental for the development of the environment. The results of the present study show that the increase in FDI inflow and outflow is beneficial for the environmental sustainability.

5.1. Conclusion

The present study was carried out with the objective of evaluating the associations between the environmental sustainability, foreign direct investment inflow and outflow and foreign aid inflow and outflow. The control variable of inflation was also introduced in the study. The data from 1990-2019 was taken into consideration. The results of these variables were studied as literature has found varying evidence regarding the associations among these variables. Several econometric tests were employed on the data so that the properties of the data could be studied. The LLC unit root test, the Wald and Breusch-Pegan/Cook Weisberg test for heteroscedasticity, the Wooldridge test autoregressive properties, VIF for multicollinearity and the Pesaran test for cross-sectional dependence were employed. The method of PCSE was used to estimate the regressors. The estimation results demonstrate the presence of significant and positive associations among the study variables.

5.2. Limitations

The present study uses a longitudinal design and uses time series panel data due to which problems like cross-sectional dependence, heteroskedasticity, autocorrelation and multicollinearity can occur. Therefore, it is recommended to future researchers that cross-sectional approach be used. The present study only analyzed the effect of FDI and Aid on environmental sustainability, it is recommended that future researchers focus on factors like environmental degradation, trade openness and industrialization as well.

5.3. Implications

The study focuses on the ASEAN region and the environmental sustainability which has been a focus of researchers, moreover, the studies analyzing diverse factors like aid and investment on the environment are scarce, thus the study has important academic and theoretical considerations. The policy makers and managers will be able to use the results of this study to devise solutions for increasing the environmental sustainability of the ASEAN economies.
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THE EFFECT OF ORGANIZATION CHARACTERISTICS ON OPTIMAL LEADERSHIP DECISION

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Abstract. Purpose - The implementation of the process of decision making by the leadership of the organization, including organizations in local governments, needs useful information so that it can help in the decision-making process. The need for information systems that can produce high-quality information is essential to help users in making decisions, and its impact can improve the performance of leaders.

Design/methodology/approach - This study was conducted to examine the effect of organization characteristics on the successful implementation of an accounting system and the optimal decision of leaders in local governments by using Structural Equation Modeling (SEM) analysis tools.

Fundings - The results of tests conducted concluded that organizational characteristics have a positive effect on the successful implementation of accounting information systems to provincial/regency/city governments in the provincial regions in Java. The results of this research show that the more adequate characteristics of the organization are, the more successful the implementation of accounting information systems will be. Organizational characteristics also positively influence the optimal leader decisions of the provincial/regency/city government in the provincial regions in Java. Originality/value - Empirical evidence obtained from this research is that the more successful implementation of accounting information systems will make optimal leaders' decisions.

Keywords: Local government, accounting information systems, organizational characteristics, optimal leader decisions


Jel Codes: M54

1. Introduction

Background of research: The process of decision making by the leaders of the organization, including the organizations in the local government, requires good information so that it can help before decision making, during the decision-making process, and after decision making (Socea, 2012; Iqbal, Farooqi & Ahmed, 2020). The information intended is relevant information that is useful for management decisions (Mulyani, 2016). According to Dahlan (2019), management information systems can have a significant effect, and with a positive direction on performance. The need for information systems that can produce high-quality information performance and the need for information systems that can produce high-quality information is essential because they will help users in making decisions and the impact can improve managerial performance. The implementation of a good accounting information system also improve the decision-making process carried out by managers, improve organizational internal control, improve the quality of financial statements, and assist various transaction processes in the company (Saeed & Abdinnour-Helm, 2008; Kanwal, Khan & Kanwal, 2020).
As important as the role of accounting information in the private sector, accounting information in the public sector also has an important role; the government sector also has a role in promoting good governance (Sukmadilaga et al., 2015). A good government will be realized with good quality of financial reports (Safkaur et al., 2019), while good quality financial reports will be realized with the help of information systems. According to Ramakrishnan (2013), the country has a very important role in ensuring welfare for everyone. This service generally costs a large amount and other resources are available but are limited. Therefore, the public sector is collectively the largest service provider in the world. Traditionally, the public sector has been a vehicle for implementing social policies mandated by law.

PP No. 71 of 2010 concerning Government Accounting Standards (Standar Akuntansi Pemerintah/SAP) states that the government implements accrual-based SAP compiled by the Government Accounting Standards Committee (Komite Standar Akuntansi Pemerintahan/KSAP) which is independent and stipulated by Government Regulation after first being considered by the Indonesian Audit Board (Badan Pemeriksa Keuangan/BPK). The implementation of accounting systems in government presents new challenges, so for the implementation process to run properly, it needs support from human resources including the makers and users of financial information, facilities, and infrastructure as well as information systems in government.

The implementation of accounting information systems for local governments in Indonesia is still not perfect. Based on the observations of researchers in several local governments, the existing accounting information system is not yet fully integrated. Recording and calculating depreciation of assets both tangible and intangible fixed assets and other assets such as income/expenses received/paid in advance, still employ manual methods and are carried out at the end of the year. Based on the manual calculation, the existing data are then transferred to the available accounting information system (SIMDA/SIPKD or others). This method allows recording errors to occur, both when recording and manual calculation as well as when transferring it to the available information system.

To implement an accounting system in an integrated manner depends on local government organizations. The organization, through its leaders, has full authority to enforce the implementation of the system. If the policy has been made, surely no one can reject it.

According to Petter, Delone, and McLean (2013) organizational characteristics are part of an organizational structure that directly or indirectly influences the technology used by organizations. The organization is influenced by organizational characteristics that can have an impact on the success of organizing or technological support of the organization. Information system success is influenced by organizational characteristics which include management support, management processes, extrinsic motivation, information technology infrastructure, and organizational competence.

According to Romney and Steinbart (2018), top management support is how top management defines the information and processing needed, makes goals and objectives of the system, conducts system reviews, and allocates funds. Thus, the support given by top management to the accounting information system is an important factor in achieving information system success related to activities. The form of assistance provided by the leader can be in the form of leadership support to subordinates. If top management gives full support in the development of information systems and the support can be received by users of information, it will give satisfaction to users of that information.

Identification of problems: Based on observations made by the authors on the local government in Java, the implementation of accounting information systems is influenced by organizational characteristics. The
phenomenon shows that there is often a change in organizational structure, where the Regional Work Unit (SKPD) is separated or merged. All existing assets will be broken down or combined, of course along with depreciation and the accumulated depreciation due to the large number of asset units that often result in errors in recording. Besides that, there is another problem, namely the difficulty in assessing/measuring the assets received if there are additional costs to the acquisition price, especially at the end of the year, where additional costs are incurred the following year. Problems also occur in the selection of IAS that is not uniform; some use the SIMDA implementation, SIPKD and some even build their systems which can be a constraint. Problems that are addressed are: Do organizational characteristics have a positive effect on the successful implementation of the system of the local government accounting information? Do organizational characteristics have a positive effect on optimal leadership decisions? Can the optimal leadership decision be influenced by the success of the accounting information system? Do organizational characteristics have a positive effect on optimal leadership decisions through successful accounting information systems implementation?

2. Literature Review

2.1. Organization Characteristics:
Organizational characteristics are part of the organizational structure that can affect technology used by organizations both directly and indirectly (Petter et al., 2013). Organizational characteristics are significantly correlated with employee solidarity. Centralization, hierarchical culture, information exchange both formal and informal as well as transformational leadership are important matters as togetherness between managers, employees, managers, and other professionals in the long run of the organization, but such matters are not transactional leadership styles (Cramm et al., 2012). The positive effect is held by the sustainability of the corporate culture of the company (Mulyani et al., 2019). Asgari et al. (2008) define organizational characteristics as rules and procedures established to deal with organizational problems. Lande (2005) argues that organizational factors will influence the implementation of information systems in the public sector. What encourages the government of a country to apply an accrual basis include encouragement from countries that are the members of the Organization for Economic Co-operation and Development (OECD).

2.2. Successful implementation of Accounting Information System:
Romney and Steinbart (2018) say that information system is a combination of at least two sub-system components that are related and interact with each other and are interrelated to achieve a goal. Data having been organized and processed to provide meaning and improvement in the decision-making process is called information. A system that receives input data and instructions, processes the data according to instructions and releases the results is called information system (Cristófoli & Fronti, 2020; Davis, 1989; Wu, 2020). The method of recording on an accrual basis is performed when a financial transaction event occurs, in contrast to recording a cash basis where financial transactions are recorded when a payment transaction/cash transaction occurs (Weygandt, Jerry J., Kimmel, Paul D, Kieso, 2012; Xiong, Wang & Wu, 2020). Ernst&Young (2012) explain the differences in the recording based on a cash basis and accrual basis, that the recognition of a transaction in accounting is divided into 2 (two) bases, namely the accrual basis and cash basis. Accrual-based transaction recognition is the recognition of a transaction when a transaction occurs, even though money has not been received. While the recognition of cash-based transactions is the transaction recorded when the payment is received. DeLone and McLean (2003) suggested seven dimensions of measurement for the success of Information Systems, namely: quality system, information quality, service quality, intention to use, use, user satisfaction, and net benefit (Hussain et al., 2020). Romney and Steinbart (2018) explain that the characteristics of quality information have characteristics that are relevant, reliable, complete, timely, understandable, verifiable, and accessible. From the results of research and discussion, it is empirically proven that the state-owned company’s commitment to the organization and
management of change affects the quality of accounting information systems and impacts on the quality of information (Ladewi et al., 2017). In the organizations, the success of accounting information technology investment technology is influenced by the role of culture and the level of management knowledge (Mulyani & Endraria, 2017).

2.3. Optimal Decision of Leader:
The optimal decision is the result of the best decision of all alternatives (Besedes et al., 2012). McLeod and Schell (2007) say that every problem needs a solution so that it can be said that the final result of problem-solving is problem decision. According to Ehsani, Makui, and Nezhad (2010) the optimal decision is an effective decision, which will consider and evaluate a number of alternative choices available. The good decision-making process is a process carried out systematically and incrementally by using the function of utilities, such as information systems.

Hypotheses
1) H1: Organizational characteristics have a positive effect on the successful implementation of accounting information systems.
2) H2: Organizational characteristics have a positive effect on optimal leader decisions.
3) H3: Successful implementation of accounting information systems has a positive effect on optimal leader decisions.
4) H4: Organizational characteristics have a positive effect on optimal leader decisions through the successful implementation of accounting information systems.

3. Methods

3.1. Research Object:
This research was conducted to test/predict the effect of organizational characteristics on the successful implementation of an accounting system and optimal leadership decisions. Following the classification of scientific research objectives described above, one of the existing analytical tools, Structural Equation Modeling (SEM), was used.

This is cross-sectional research if viewed from the time horizon because the data collection was done only once, which was completed in a few months. Research conducted by only collecting data once, which may be for several days, weeks or months needed to conduct research is called cross-sectional studies (Sekaran & Bougie, 2013). Thus, the operational variables that have been described can be summarized in tabular form as shown below (Table 1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Dimensions</th>
<th>Indicators</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Support</td>
<td>1</td>
<td>Leadership commitment</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Encouragement of the leadership</td>
<td>2</td>
</tr>
<tr>
<td>Extrinsic Motivation</td>
<td>3</td>
<td>Incentives</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Organizational pressure</td>
<td>4</td>
</tr>
</tbody>
</table>

TABLE 1. OPERATIONALIZATION OF RESEARCH VARIABLE
This study takes the entire unit of analysis of the Financial Management Agency and Regional Assets (BPKAD), and the Regional Finance Management Agency (BPKD) provincial and regency/city governments in Java by using primary data by conducting questionnaire and interview techniques. The data analysis technique used in this study is covariance-based structural equation modeling.

The data used in this study is the data of the entire population or a census, therefore, no significance test was performed, so to answer the research hypothesis, the path coefficient obtained is directly compared to zero. If the path coefficient of the variable being tested is greater than zero, then \( H_0 \) is rejected and vice versa if the path coefficient of the variable being tested is smaller than zero then \( H_0 \) is accepted.

### 3.2. Research Hypotheses:

**Hypothesis 1:** Organizational characteristics positively influence the successful implementation of accounting information systems.

Statistical Hypothesis:

\( H_0: \gamma_{11} \leq 0 \) Organizational characteristics do not have a positive effect on the successful implementation of accounting information systems.
H₂: $\gamma_{1,1} > 0$ Organizational characteristics have a positive effect on the successful implementation of accounting information systems.

If the value $\gamma_{1,1} > 0$ then $H_0$ is rejected, conversely if the value $\gamma_{1,1} \leq 0$ then $H_0$ is accepted. The path diagram for testing the first hypothesis is described as follows (figure 1):

**Fig. 1. First Hypothesis Testing Path Chart**

**Hypothesis 2:** Organizational characteristics positively influence optimal leader decisions.

Statistical Hypotheses:

$H_0 : \gamma_{2,1} \leq 0$: organizational characteristics do not have a positive effect on optimal leader optimal decisions.

$H_a : \gamma_{2,1} > 0$: organizational characteristics positively influence the leader optimal decisions.

If the value $\gamma_{1,1} \times \beta_{2,1} > 0$ then $H_0$ is rejected, conversely if the value $\gamma_{1,1} \times \beta_{2,1} \leq 0$ then $H_0$ is accepted. The path diagram for testing the second hypothesis is illustrated as follows (figure 2):

**Fig. 2. Second First Hypothesis Testing Path Chart**

**Hypothesis 3:** Successful implementation of accounting information system positively influences optimal leader decisions.

Statistical Hypothesis:

$H_0 : \beta_{2,1} \leq 0$ The successful implementation of an accounting information system does not have a positive effect on the optimal leader decisions

$H_a : \beta_{2,1} > 0$ The successful implementation of an accounting information system has a positive effect on the optimal leader decisions

If the value $\beta_{2,1} > 0$ then $H_0$ is rejected, conversely if the $\beta_{2,1} \leq 0$ then $H_0$ is accepted. The path chart for the third hypothesis test is illustrated as follows (figure 3):
**Hypothesis 4:** Organizational characteristics positively influence optimal leader decisions through the successful implementation of accounting information systems.

Statistical Hypothesis:

H<sub>0</sub>: $\gamma_{1.1} \times \beta_{2.1} \leq 0$  Organizational characteristics do not have a positive effect on the optimal leader decisions through the successful implementation of an accounting information system

H<sub>a</sub>: $\gamma_{1.1} \times \beta_{2.1} > 0$  Organizational characteristics positively influence the optimal leader decisions through the successful implementation of accounting information systems

If the value $\gamma_{1.1} \times \beta_{2.1} > 0$ then $H_0$ is rejected, conversely if the value $\gamma_{1.1} \times \beta_{2.1} \leq 0$ then $H_0$ is accepted. The path diagram for testing the fourth hypothesis is illustrated as follows (figure 4):
4. Results

From 119 questionnaires distributed to 119 provincial/regency/city local governments, 111 questionnaires of 111 local governments were returned with the following details (Table 2):

<table>
<thead>
<tr>
<th>Local Government</th>
<th>Questionnaire Distributed</th>
<th>Returned Questionnaire</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Java</td>
<td>28</td>
<td>28</td>
<td>100%</td>
</tr>
<tr>
<td>Central Java</td>
<td>36</td>
<td>32</td>
<td>89%</td>
</tr>
<tr>
<td>East Java</td>
<td>39</td>
<td>38</td>
<td>97%</td>
</tr>
<tr>
<td>DKI Jakarta</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>DI Yogyakarta</td>
<td>6</td>
<td>6</td>
<td>100%</td>
</tr>
<tr>
<td>Banten</td>
<td>9</td>
<td>6</td>
<td>67%</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>111</td>
<td>93%</td>
</tr>
</tbody>
</table>

Profile of respondents from the incoming questionnaire answers was grouped into five categories, namely: gender, education level, age, duration of service, and position as presented in Table 3.

<table>
<thead>
<tr>
<th>No.</th>
<th>Characteristics</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>56</td>
<td>51%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>55</td>
<td>49%</td>
</tr>
<tr>
<td>2</td>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor</td>
<td>88</td>
<td>79%</td>
</tr>
<tr>
<td></td>
<td>Master’s</td>
<td>23</td>
<td>21%</td>
</tr>
<tr>
<td>3</td>
<td>Duration of service</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤ 5 years</td>
<td>16</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>&gt;5 – ≤ 10 years</td>
<td>15</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>&gt;10 – ≤ 20 years</td>
<td>46</td>
<td>42%</td>
</tr>
<tr>
<td></td>
<td>≥ 20 years</td>
<td>34</td>
<td>31%</td>
</tr>
<tr>
<td>4</td>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 20 years</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>20 – 40 years</td>
<td>48</td>
<td>43%</td>
</tr>
<tr>
<td></td>
<td>&gt; 40 – 50 years</td>
<td>50</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>&gt; 50 years</td>
<td>13</td>
<td>12%</td>
</tr>
</tbody>
</table>

4.1. Descriptive Analysis:

Descriptive analysis of the results of the response data can be used to enrich the discussion. Through the description of the data, the condition of the variable being studied can be identified. According to Cooper and Schindler (2014) descriptive analysis can be done through central symptoms and measures of variability. Measures of central symptoms are mean, median, and mode, while measures of variability include the range of scores and standard deviations. In this study, the average value and standard deviation are used to describe the condition of each variable.
The average value and standard deviation of the respondents’ answer score are useful to provide the overall picture of the characteristics of the organization, the successful implementation of an accounting information system, and the optimal leader decisions of the leadership of the provincial/regency/city government in the Provincial Region in Java (see table 4).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>5.31</td>
<td>0.71</td>
<td>7</td>
<td>3.1</td>
<td>64</td>
<td>47</td>
</tr>
<tr>
<td>Y</td>
<td>5.61</td>
<td>0.70</td>
<td>7</td>
<td>3.9</td>
<td>57</td>
<td>54</td>
</tr>
<tr>
<td>Z</td>
<td>5.68</td>
<td>0.61</td>
<td>7</td>
<td>4.1</td>
<td>49</td>
<td>62</td>
</tr>
</tbody>
</table>

Organizational characteristics (X) are measured using 8 indicators and are based on the results of the responses of respondents, and an average score of 5.31 is obtained and closer to a score of 5 on a scale of 1-7. This means that most provincial/regency/city governments in the provincial regions in Java have sufficient organizational characteristics. The number of regions that have scores above the average is more than the regions that have scores below the average.

The success of the implementation of accounting information system (Y) is measured using 8 indicators and is based on the results of the responses of respondents, and an average score of 5.61 is obtained and closer to a score of 6 on a scale of 1-7. This means that most provinces/regencies/cities in the provinces in Java are quite successful in implementing the accounting information system. The number of regions that have scores above the average is more than the regions that have scores below the average.

The optimal decision of leader (Z) is measured using 4 indicators and based on the results of the responses of respondents an average score of 5.68 is obtained and closer to a score of 6 on a scale of 1-7. This means that a number of provincial/regency/city leaders in the provincial regions in Java are optimal. The number of regions that score above average is less than the regions that score below average.

### 4.2. Structural Equation Modeling

The purpose of this research is to examine the effect of organizational characteristics on the successful implementation of accounting information systems and their impact on the optimal decision of the leader. The modeling used in this study is the structural equation. There are two types of models that are formed, namely the measurement model and structural model in modeling this structural equation. The proportion of variance from each manifest variable (indicator) that can be explained through latent variables will be explained in this measurement model.

### 4.3. Fit Model Test

Model fitness test (goodness of fit) is carried out to determine whether the model obtained has been appropriate in describing the relationship between the variables being studied so that it can be categorized into good models (Beckett et al., 2017). Model suitability test in structural equation modeling can be seen based on several criteria for testing the suitability of the model as presented in table 5.
The results of testing the model fit using the \( \chi^2 \) test (chi-square) obtained a value of 264.1 with a p-value of 0.001. According to Beckett et al. (2017) in structural equation modeling, it is not desirable that the p-value is less than 0.05. Returning to the results above, it can be seen that the p-value less than 0.05 indicates that the \( \chi^2 \) test is significant. Thus, when referring to the results of the \( \chi^2 \) test, the model obtained does not meet the overall criteria of a good model. However, according to (Hair et al., 2014), it is difficult to get a p-value greater than 0.05 in the chi-square test so that several other model match sizes are developed.

Another measure that still has a relationship with the \( \chi^2 \) test is the Root Mean Square Error of Approximation. What is a good RMSEA value is still being debated, but according to Beckett et al. (2017) if the RMSEA value is below 0.08 the model can be accepted. In table 5 it can be seen that the RMSEA value of 0.077 is still smaller than 0.08 so that when referring to the RMSEA value the model meets the criteria of a good model. Likewise, when viewed from the Normed Fit Index (NFI), Incremental Fit Index (IFI) and Comparative Fit Index (CFI) all are greater than 0.9 and meet good model criteria. Match test results show the model obtained meets the criteria of goodness of fit on the size of RMSEA and RMR (<0.08), then NFI, NNFI, IFI and CFI (>0.90) so that it can be concluded that the estimation results of the model can be accepted, meaning that the model is empirically obtained according to theoretical models.

### 4.4. Evaluation of Measurement Model

The measurement model is a model that connects latent variables with manifest variables. Through the measurement model, it will be known which indicator is more dominant in reflecting latent variables. According to Hair et al. (2014; 605) if the manifest variable has a factor loading value less than 0.50, the corresponding manifest variable is recommended to be removed from the model. In this study there are 10 latent variables with the number of manifest variables as many as 20. The latent variables of organizational characteristics consist of 4 dimensions and 8 manifest variables; the successful implementation of an accounting information system consists of 3 dimensions and 8 manifest variables, and the optimal leader decisions consist of 4 manifest variable.

The model fitness test (goodness of fit) concludes that the model can be accepted, meaning that the model obtained can be used to test the research hypotheses that have been set. Using the robust maximum likelihood estimation method a full model path diagram is obtained for the effect of organizational characteristics on the successful implementation of an accounting information system and its impact on optimal leader decisions as shown in Figure 5 below.

<table>
<thead>
<tr>
<th>Goodness of Fit</th>
<th>Estimation Result</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>264.1 (p-value 0.000)</td>
<td>Not Fit</td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.077*</td>
<td>Fit</td>
</tr>
<tr>
<td>RMR</td>
<td>0.062*</td>
<td>Fit</td>
</tr>
<tr>
<td>GFI</td>
<td>0.806</td>
<td>Not Fit</td>
</tr>
<tr>
<td>NFI</td>
<td>0.948*</td>
<td>Fit</td>
</tr>
<tr>
<td>NNFI</td>
<td>0.975*</td>
<td>Fit</td>
</tr>
<tr>
<td>IFI</td>
<td>0.979*</td>
<td>Fit</td>
</tr>
<tr>
<td>RFI</td>
<td>0.938*</td>
<td>Fit</td>
</tr>
<tr>
<td>CFI</td>
<td>0.979*</td>
<td>Fit</td>
</tr>
</tbody>
</table>

*Good Model
Through the weight of the factors contained in Figure 4 it can be seen in the latent variables of organizational characteristics (X), the ITI (information technology infrastructure) dimensions are the strongest in reflecting the latent variables of organizational characteristics, whereas the dimensions of EM (extrinsic motivation) are weakest in reflecting the latent variables of organizational characteristics. Then in the latent variable the successful implementation of accounting information system (Y), the IQ dimension (information quality) is the strongest in reflecting the latent variable in the successful implementation of accounting information system, conversely, the SQ (system quality) dimension is the weakest in reflecting the latent variable in the successful implementation accounting information system.

Finally, in the optimal leader decisions latent variable (Z), indicator Z3 (commitment can be carried out) is the strongest in reflecting the optimal leader decisions latent variable, while the Z4 indicator (satisfaction with decision results) is the weakest in reflecting the optimal leader decisions latent variable. Furthermore, to find out whether the indicators used to measure dimensions and latent variables have a high degree of conformity, construct reliability and variance extracted calculations are performed. The following are the results of the calculation of construct reliability and variance extracted for each indicator of latent variables (see table 6).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Loading Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS</td>
<td>0.771</td>
</tr>
<tr>
<td>EM</td>
<td>0.998</td>
</tr>
<tr>
<td>OC</td>
<td>0.85</td>
</tr>
<tr>
<td>ITI</td>
<td>0.701</td>
</tr>
<tr>
<td>SQ</td>
<td>0.806</td>
</tr>
<tr>
<td>IQ</td>
<td>0.906</td>
</tr>
<tr>
<td>NB</td>
<td>0.906</td>
</tr>
<tr>
<td>CR</td>
<td>0.844</td>
</tr>
<tr>
<td>AVE</td>
<td>0.732</td>
</tr>
</tbody>
</table>
According to Beckett et al. (2017) the composite reliability (CR) which is considered satisfactory is greater than 0.70 and the average variance extracted (AVE) is greater than 0.50. In table 6 it can be seen that the composite reliability of each dimension is greater than 0.70, indicating that the indicators used to measure each dimension already have reliability. Then the average variance extracted for each dimension greater than 0.50 indicates that the dimensions are able to reflect more than 50% of the information contained in the indicators that make it up (see table 7).

<table>
<thead>
<tr>
<th>Dimension/Indicator</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.863</td>
<td>0.942</td>
<td>0.799</td>
</tr>
<tr>
<td>2</td>
<td>0.622</td>
<td>0.987</td>
<td>0.730</td>
</tr>
<tr>
<td>3</td>
<td>0.921</td>
<td>0.979</td>
<td>0.841</td>
</tr>
<tr>
<td>4</td>
<td>0.980</td>
<td>0.979</td>
<td>0.593</td>
</tr>
<tr>
<td>CR</td>
<td>0.915</td>
<td>0.979</td>
<td>0.832</td>
</tr>
<tr>
<td>AVE</td>
<td>0.735</td>
<td>0.940</td>
<td>0.558</td>
</tr>
</tbody>
</table>

In the organizational characteristics latent variable, the extracted variance value of 0.735 indicates that on average 73.5% of the information contained in each dimension can be represented through the latent variable of organizational characteristics. Then the construct reliability value of the latent variables of organizational characteristics (0.915) is still greater than the recommended one which is 0.70. Furthermore, on the latent variable the success of the implementation of accounting information systems, the extracted variance value of 0.940 shows that on average 94.0% of the information contained in each dimension can be represented through the latent variable of the successful implementation of accounting information systems. Then the value of the construct reliability of latent variables the success of the implementation of accounting information systems (0.979) is still greater than the recommended one, 0.70. Finally, in the optimal leader decisions latent variable, the extracted variance value of 0.558 shows that on average 55.8% of the information contained in each indicator can be represented through the optimal leader decisions latent variable. Then the construct reliability value the optimal leader decisions latent variable (0.832) is still greater than the recommended one, 0.70.

4.5. Evaluation of Structural Models

After the measurement model for each latent variable is described, a structural model will then be elaborated which will examine the effect of the exogenous latent variable on the endogenous latent variable. Based on the results of data processing, the structural equation obtained will be tested as presented in Table 8.

<table>
<thead>
<tr>
<th>Line</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>p-value</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>X → Y</td>
<td>0.573</td>
<td>5.240</td>
<td>0.000</td>
<td>0.329</td>
</tr>
<tr>
<td>X → Z</td>
<td>0.279</td>
<td>3.864</td>
<td>0.000</td>
<td>0.909</td>
</tr>
<tr>
<td>Y → Z</td>
<td>0.765</td>
<td>9.271</td>
<td>0.000</td>
<td>-</td>
</tr>
<tr>
<td>X → Y → Z</td>
<td>0.439</td>
<td>6.466</td>
<td>0.000</td>
<td>-</td>
</tr>
</tbody>
</table>

Through the R-square value, it can be seen that the characteristics of the organization have an effect of 30.9% on the successful implementation of accounting information systems. Then the organizational characteristics and successful implementation of accounting information systems have an effect of 90.09% on the optimal leader decisions.
5. Discussion

5.2. The Influence of Organizational Characteristics on the Successful Implementation of Accounting Information Systems

H₀: \( \gamma_{1.1} \leq 0 \) Organizational characteristics do not have a positive effect on the successful implementation of accounting information systems.
Ha: \( \gamma_{1.1} > 0 \) Organizational characteristics have a positive effect on the successful implementation of accounting information systems.

Based on the data in table 8, \( t_{\text{statistic}} \) value of organizational characteristics variables is seen on the successful implementation of accounting information systems (5.240) and is greater than \( t_{\text{critical}} \) (1.64). Because \( t_{\text{statistic}} \) value is greater than \( t_{\text{critical}} \), then at a level of error of 5% it was decided to reject H₀ so that Ha was accepted. Therefore, based on the results of the test it can be concluded that organizational characteristics have a positive effect on the successful implementation of accounting information systems to provincial/regency/city governments in the provincial regions in Java. The results of this study provide empirical evidence that the more adequate the characteristics of the organization are, the more successful the implementation of accounting information systems will be.

The results of the study are that organizational characteristics support the successful application of accounting information systems. This research shows that local governments should apply rewards and encouragement to employees so that there is a motivation for their performance. Improvement of facilities and infrastructure of information systems and enhancing the capabilities of leaders have to be improved to encourage the success of the accounting information system.

This is following the research of Petter et al. (2014) that organizational characteristics are part of the organizational structure, which gives influence to the technology used by organizations both directly and indirectly. Lande (2005) found that organizational factors will influence the implementation of information systems in the public sector. As for what encourages the government of a country to apply the accrual basis, among others, there is encouragement from countries that are members of the OEDC. The quality of information systems can be improved by maximizing management support (Darmansyah et al., 2019). This study is in accordance with Bakri and Mulyani (2019) stating that the use of enterprise resource planning (ERP) technology affects the quality of accounting information systems, because IT infrastructure, which includes the sophistication of information technology and the readiness of IT facilities, can improve organizational characteristics.

5.2. The Influence of Organizational Characteristics on Optimal Leader Decisions

H₀: \( \gamma_{2.1} \leq 0 \) Organizational characteristics do not have a positive influence on optimal leader decisions.
Ha: \( \gamma_{2.1} > 0 \) Organizational characteristics have a positive effect on optimal leader decisions.

Based on the data in table 8, it is seen that \( t_{\text{statistic}} \) value of the organizational characteristics variable toward optimal leader decisions (3.864) and is greater than \( t_{\text{critical}} \) (1.64). Because \( t_{\text{statistic}} \) value is greater than \( t_{\text{critical}} \), then at a level of error of 5% it was decided to reject H₀ so that Ha was accepted. Thus, based on the results of the test it can be concluded that organizational characteristics positively influence the optimal leader decision of the provincial/regency/city government in the provincial regions in Java. The results of this study provide empirical evidence that the more adequate the characteristics of the organization are, the more optimum decisions of the leader will be.
This study is in accordance with the research of (Duncan, 1972) denoting that organizational characteristics can influence leadership decisions to be effective. According to Nooraie (2012) internal organizational characteristics such as organizational size and organizational capability will influence the strategic decisions of leaders.

Management support is one of the dimensions of organizational characteristics that greatly influences the optimal decision of the leadership. Therefore, strong management support is highly demanded. In the field implementation, management support still needs to be improved in quality. Leaders in local governments have not yet involved their subordinates in full to participate in a discussion of the problem; they do not want to take risks if it is not in accordance with the established path.

The other organizational characteristics that can still be improved are the encouragement and motivation of leaders to their subordinates. There is something inappropriate regarding employee discipline, where the assessment is only focused on absenteeism, while the quality of time is not assessed. This continues to happen, as if as a matter of course, this omission will have a negative impact on performance and will hamper the completion of work and will ultimately result in less optimal leadership decisions.

5.3. The Effect of Successful Implementation of Accounting Information Systems on Optimal Leader Optimal Decisions

H₀: β₂₁ ≤ 0 Successful implementation of accounting information systems does not have a positive effect on optimal leader decisions.
Ha: β₂₁ > 0 The successful implementation of an accounting information system has a positive effect on optimal leader decisions.

Based on the data in table 8, the t_{statistic} value of the success of applying an accounting information system the optimal leader decisions (9.271) is seen as greater than t_{critical} (1.64). Because the t_{statistic} value is greater than the t_{critical}, then at a level of error of 5% it was decided to reject H₀ so that Ha was accepted. Therefore, based on the results of the test it can be concluded that the successful implementation of the accounting information system has a positive effect on the optimal leader decisions of the provincial/regency/city government in the provincial regions in Java. The results of this study provide empirical evidence that the more successful implementation of accounting information systems will make the decision of the regional leader to be optimum.

This is in accordance with Chang, Chang, and Paper (2003) stating that accounting information systems (AIS) are computer-based systems that process accounting/financial information that supports the task of making decisions in controlling organizational activities. In a variety of organizations, decision-making is one of the most important managerial functions. Therefore, over the past few decades much research has been carried out on building models to assist managers and executives in making better decisions regarding complex and highly uncertain business environments (Nooraie, 2012; Adeniran, Hamid, Noor, 2020).

From the research conducted by Fitriati & Mulyani (2015) the success of the system of accounting information is influenced by the commitment and organizational culture, while the research of Darma et al. (2018) shows that financial accounting information systems are strongly supported by top management. However, this research is not similar to the research of Nurhayati and Mulyani (2015) explaining that top management commitment does not give any influence on the successful implementation of the accounting information system.

Studies conducted at large banking companies throughout the world show that the quality of information influences decision making, where the leader is the party most blamed for making the wrong decision Abumandil
and Hassan (2016). Information system is a collection of two or more interrelated components that interact to achieve a goal, while information is data that has been organized and processed to provide meaning and improvement in the decision-making process (Romney & Steinbart, 2018). Information system is a system that receives input data and instructions, processes the data according to instructions and releases the results (Davis, 1989).

5.4. The Effect of Organizational Characteristics on the Optimal Leader Decisions through the Successful implementation of Accounting Information Systems

H₀: γ₁₁ × β₂₁ ≤ 0: Through the successful implementation of accounting information systems, organizational characteristics do not have a positive effect on the optimal leader decisions.
Ha: γ₁₁ × β₂₁ > 0: Through the successful implementation of accounting information systems, organizational characteristics positively influence the optimal decision of the leader.

Based on the data in table 8, it can be seen that t_{statistic} of the organizational characteristics variable toward the optimal leader decisions through the successful implementation of an accounting information system is 6.466 and is greater than t_{critical} (1.64). Because t_{statistic} is greater than t_{critical}, then at a level of error of 5% it was decided to reject H₀ so that Ha was accepted. Thus, based on the results of the test it can be concluded that through the successful implementation of accounting information systems, organizational characteristics have a positive effect on the optimal leader decisions of the provincial/regency/city government in the provincial regions in Java.

This study is in accordance with the research of Raymond (1985) denoting that organizational characteristics can influence the success of information systems, where these variables include a high percentage that affects information systems, and this in turn affects leader decision making. Organizational characteristics are one of the supporters of the successful implementation of accounting information systems. Moreover, accounting information systems can facilitate the leader in decision making so that decisions taken can be effective and produce good managerial performance, (Mollanazari & Abdolkarimi, 2012). In general, the findings of (Mbelwa, 2015) the public sector in Tanzania show that the education and experience of employees in finance and accounting have a significant effect on the quality of the budgeting decision-making process in the public sector. In addition, this research also proves that the quality of good decision-making will be influenced by a good accounting information system.

5. Conclusion
Organizational characteristics have a positive effect on the successful implementation of accounting information systems to provincial/regency/city governments in the provincial regions in Java. The results of this study provide empirical evidence that the more adequate the characteristics of the organization are, the more successful the implementation of accounting information systems will be. Organizational characteristics positively influence the optimal leader decisions of the provincial/regency/city government in the provincial regions in Java. The results of this study provide empirical evidence that the more adequate the characteristics of the organization are, the more optimum the decisions of the leader will be. The optimal decision of provincial/regency/city government leaders in the provinces in Java is influenced by the successful application of the system of accounting information, and has it a positive direction. Organizational characteristics have a positive effect on the optimal leader decisions of the provincial/regency/city government in the provincial regions in Java throught the successful implementation of accounting information systems.
References


DEFENSE EXPENDITURE, INTERNAL THREATS, POLITICAL INSTABILITY AND ECONOMIC GROWTH: A CASE OF AN ASEAN COUNTRY

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Abstract. The main purpose of the study is to explore the impact of defense expenditure, internal threats, and political instability on the economic growth of Thailand. This study focuses mainly on investigating the impact of Thailand’s defense expenditures at its aggregate and disaggregate components on the economic growth. The study has used ARDL to examine the data of 33 years gathered over the period from 1986 to 2018. It specifically examines the impacts of defense expenditures in the presence of internal threat, political instability and arms import on the Thailand’s economic growth. This study is constrained by the availability of similar data on other countries particularly the ASEAN countries. Thus, it induces the researcher to focus on Thailand alone. The study has argued that the rising instability, regional conflicts and terrorism in recent years have given rise the demand for greater defense outlays and domestic security in developed and developing countries. These conflicts generally emerge due to resource conflicts and disputes arising from power tussle. The nature of conflicts, wars, economic, political, technological, military and industrial compositions have been changing. Such trends influence budget allocation process which in turn influence the share of defense expenditures. Defense expenditures has implications for RGDP and needs to be analyzed explicitly as a significant input to the political process engaged to determine the composition of public spending. The research is concerned with the expenditure within the defense sector, threats and political instability and their effects on Thailand’s economic growth. It also examines the impacts of the disaggregate defense expenditures components on economic growth. Data is accessed from the SIPRI, World Bank Development Indicators Data Bank, Thailand’s Ministry of Defense. The findings of the study have provided support to the hypothesized results. This analysis could isolate a direct economic contribution of the defense activities in Thailand.

Keywords: Defense Expenditure; Economic growth; Thailand


JEL Codes: H11

1 Background
Real economic growth (RGDP) is a much-desired goal of every nation of the world. The need to study RGDP in countries became more attractive at the end of the Second World War. Then it became glaring that some nations experienced growth while others experienced either very minimal or no growth or even negative growth (Breitenlechner, Gächter, & Sindermann, 2015). The search for RGDP started from the works of Adam Smith, who led an enquiry into the ‘Wealth of Nations’ and Thomas Malthus, who postulated that population growth would affect economic growth. To the view of scholars, such as Caporale, Sova, and Sova (2015), investment in dams, roads and machines would lead to growth in backwards countries. Aparicio, Urbano, and Gomez (2018) However, argues that investment in tools would not lead to growth, but it is technological change that would
stimulate growth in a weak economy. This debate persists where economists built more sophisticated models in which one or more of the factors are endogenously determined.

While the search for RGDP continues, there has been rising debate over the impact of government expenditure on economic growth. Sothan (2017) for instance, found insignificant coefficient for government expenditure on economic growth. When the military expenditures’ impact is narrowed down to the field of defense expenditure (DEFEx) on growth, an array of conclusions are reached using varying empirical and statistical methods. From the time Desli, Gkoulgkoutsika, and Katrakiliidis (2017) delivers a seminal paper on DEFEx and growth, a host of scholars prove on the impact of DEFEx on growth have also been investigated. The causal relationship, the budgetary trade-offs between military spending and other sectors, i.e., education and health sectors which are considered the key players to any economic growth. These studies adopt various models, including augmented Solow Model, the Feder-Ram model (1986), Harrod-Domar model (1956), and the Barro growth model for analyzing if economic growth (RGDP) has any influence of DEFEx.

The world’s DEFEx has increased significantly. However, there have been variations among regions and countries around the globe in the scale and economic burden of DEFEx. Although the surprising scale of DEFEx raises a lot of questions of affordability and sustainability. DEFEx’ impact on RGDP and weakening contributions to the fiscal deficit have also been criticized for perceived inadequacies of defense preparedness and insufficient resources (Umar, 2016). There are calls for growth seeking countries to notice the policy advice made by civil society organizations and international institutions, to reduce their spending on the defense sector. Such spending is to be channeled to non-defense sectors, such as health and education. By 2012, the world’s DEFEx stood at $1.756 trillion representing 2.5% of GDP or $249 for each person in the world. In 2013, it was $1.750 trillion recording a fall of 1.9% in real terms since 2001. In 2014 world DEFEx is estimated as $1776 billion, then deceases to $1676 billion in 2015, this figure is equal to 2.3% share of military expenditure to the world GDP. The trend of the global DEFEx is depicted in Figure (1.1). The world total DEFEx fell to 0.4 percent in real terms between 2013 and 2014 (Sipri, 2015).

The distribution of the worldwide DEFEx in 2014 indicates what might be the beginning of a shift from the Western countries to other parts of the World, precisely Eastern Europe and some developing countries. In fact, military expenditure around the globe has inflated by 1.8%, except for USA. USA, China, Saudi Arabia, and Russia are the ones with the highest DEFEx with 36%, 13%, 5.2%, and 4.0 % share of GDP, respectively, accounting for 19%. Indeed, China, Russia and Saudi Arabia have doubled their defense spending since 2004. There are not many changes in the list of 15 top defense spenders of 2015, over the years. The USA has DEFEx of $596 billion, it retains the position of world’s largest defense spender which is three times more of the second defense spending country i.e. China. Nonetheless, the third rank is occupied by Saudi Arabia by excelling Russia in military expenditure. The fall in oil prices meant that Russia’s increase of 7.5 per cent in 2015 was considerably lower than projected in its budget. However, a relative decrease in defense expenditure is witnessed in 2016’s budget. Yet, Russia and Saudi Arabia besides USA and China recorded highest levels of defense spending since 1990, with 5.4% and (13.7%) for Russia and Saudi Arabia, respectively.

Though defense is not considered productive in the economic sense, however it is has been established that a strong defense is necessary to assure security. Which is very crucial for the RGDP of the nation (Töngür & Elveren, 2016; Mehmood & Farooqi, 2020; Ye, Y. 2020). Ewetan and Urhie (2014) and Sharpley (2018) argue that scholars have identified strong connection between security and RGDP and development. It is believed that development is not attainable in any country where there are conflicts, crises and war. In the study of Sharpley (2018), there is a consensus that development and security are the interrelated variables having each other’s influence. The Thailand’s defense has been contending both external as well as internal threats to security. The external threats being faced by the Thailand’s defense among others includes: the persistent attacks, forceful tax collections by the militia groups of the neighboring countries on the Thailand’s nationals on the neighboring borders, water piracy and illegal smuggling. However, the internal threats in Thailand include the civil war, ethnic and religious violence, the armed militia groups, illegal arms trafficking, and the pipeline vandalism as well as willful destruction of public goods (Akpan, 2018; Qabar & Waheed, 2020).
The rising instability, regional conflicts and terrorism in recent years have given rise to a demand for greater defense outlays and domestic security in developed and developing countries \cite{shcherbakov2018}. These conflicts generally emerge due to resource conflicts and disputes arising from power tussle. The nature of conflicts, wars, economic, political, technological, military and industrial compositions have been changing. Such trends influence budget allocation process, which in turn influence the share of DEFEx. DEFEx has implications for RGDP and needs to be analyzed explicitly as a significant input to the political process engaged to determine the composition of public spending.

A concave and non-linear function exhibits the DEFEx's net effect on growth \cite{arshad2017, ye2020}, therefore indicating a diminishing marginal productivity in the defense sector. This indicates that when there are lower DEFExs then a positive net effect of DEFEx is obtained on growth however, after reaching a certain level, further increase in DEFEx would result in the reduction in economic growth and can result in negative economic growth. In another study \cite{li2018}, it is found that ideological and mobilization intensity may result in greater mobilization of production factors, particularly during a perceived threat which may result in greater output. This implies that mobilization efforts positively influence short run economic growth. The military expenditure in Thailand are increasing as evident from the figure 1 that during the course of the st five years the defense expenditures of Thailand has increased significantly.

![Figure 1: Thailand's budget expenditures](source: Ministry of Finance)

The previous studies conducted in the field of defense economics especially in developing countries are limited to either testing for causality among RGDP and DEFEx, or whether DEFEx affects economic growth, or examining the DEFEx’s impact on RGDP using aggregated values. Additionally, these studies do not adequately address DEFEx’s impact during political instability, arms importations and in the presence of threat, especially in developing countries. However, few studies attempted only to examine the impact of DEFEx in presence of external threats \cite{heo2016, umar2016, yolcu2017}. Scholars argue that, future studies should analyze DEFEx’s impact on economic growth.

Study includes the data for 1983-2015. The period is chosen base on the availability of data considered adequate for a time series analysis \cite{vural2018}. The research is concerned with the expenditure within the defense sector,
threats and political instability and their effects on Thailand’s economic growth. It also examines the impacts of the disaggregate DEFEx components on economic growth. Data is accessed from the SIPRI, World Bank Development Indicators Data Bank, Thailand’s Ministry of Defense. Finally, data on threat and political instability are taken from the International Country Risk Guide (ICRG).

Empirical Literature Review

Pioneering work of Desli et al. (2017), has given rise to the emergence of large number of research studies regarding DEFEx and economic growth. Benoit found positive impact of DEFEx on RGDP in 44 developing countries. This finding has explored research interest in defense economics. In contrast to this popular notion is that RGDP slows down with DEFEx due to its crowding-out effect on productive expenditure such as health and education. Studies have been conducted on both developed and developing economies applying all sort of methods, using simple to complex methods (Fernando & Carlos, 2020). Diverse and varied literature is found for RGDP and DEFEx, providing various conclusions and results. This section provides a literature review on the RGDP and DEFEx linkage in both developing and developed countries. However, the literature shows inconsistent findings regarding RGDP and DEFEx nexus. Various scholars have examined the nature of DEFEx and RGDP relationship by integrating various techniques. Therefore, the literature review presented below provides the association between RGDP and DEFEx in both developing and developed economies, particularly in Thailand.

A parsimonious new growth model has been employed by Kamoun, Abdelkafi, and Ghorbel (2019), to analyze the association among in US, during 1959-2001, using powerful techniques for estimation, i.e. error-correction method, Johansen co-integration, innovation accounting and VAR model. The study shows no statistical or economic impact of growth and DEFEx on each other. It has also been reported that all those US political debates that either were opposed or in favor of economic merits of DEFEx have no relevance or are baseless. Another study employed the augmented Solow and Feder Ram models to analyze the linkage between RGDP and DEFEx in US, during 1954-2005. The results revealed no significant effect of DEFEx on the RGDP of USA. Similar findings were obtained, while assessing the US DEFEx and RGDP relationship. They added GDP as a proxy variable for debt, DEFEx, and growth in their study.

Similarly, Khalid and RAZAQ (2015) investigates the possible connections between RGDP and military spending based on the production function of two sectors. Concerning the possibility of DEFEx cut in the US. The study revealed a significant and positive RGDP and DEFEx relationship. It further shows that there is no significant changes in the country’s changes in military expenditure would continue to exhibit minimal impact on the US economic growth, unless there is a large and sustained cut in DEFEx. In addition unless if there are large and sustained DEFEx cuts, the impact of changes in DEFEx on US RGDP is minimal. Khalid and Mustapha (2014) found similar findings while investigating the case of China. They employed ARDL cointegration technique and found inconclusive long-run association between RGDP and DEFEx.

Smith (2016) study 18 OECD countries using VAR model estimates. While they analyze if there are any employment effects of military expenditure on the employment generation in 18 OECD countries. Using simple dynamic reduced form regressions. The finding does not suggest any significant influence on the rate of unemployment by military expenditure in these countries. By implication when analyzing unemployment in OECD no, much account is to be reserved for military. Equally, the fear that the reductions in the military share is associated with unemployment rate is erroneous. Author examines DEFEx and RGDP nexus for Taiwan’s’ economy by using a production function, to explore of military and non-military expenditure’s direct and indirect impact on economic growth. The findings revealed that Taiwan had an opportunity cost of high defense burden to civilian sector of the economy, which has high marginal productivity compared to defense sector.

In order to investigate the indirect and direct associations among RGDP and DEFEx, for 161 economies during 1990-2012, Heo and Ye (2016) integrated both supply side and demand side models. Thus, a comprehensive analysis was conducted for the RGDP and DEFEx relationship in the context of cold world war. The study
reported that private investments are greatly reduced with global DEFExs, regardless of the fact that it shrinks the unemployment level. Thus, RGDp and DEFEx only has a minimal direct impact at best. The long-run and causal relationship among DEFEx and RGDp has been reexamined by Pan, Chang, and Wolde-Rufael (2015), using a sample of 62 non-OECD and 27 OECD economies, during the years 1988-2003. For this purpose, the study used cross-sectional and time series data and concluded a positive long-run RGDp and DEFEx association in case of OECD economies, whereas, in case of non-OECD countries, a negative association is found. Furthermore, the results obtained by using dynamic panel-based model indicated no short run causal relationship between DEFEx and economic growth. However, it revealed a bidirectional long-run relationship for OECD and non-OECD economies.

Topcu and Aras (2015) investigated the impact of DEFExs on RGDp in China, using a data for the time period 1952-2012. Study employed augmented Solow model and Feder Ram model for examining the RGDp and DEFEx relationship. The results of augmented Solow model indicated 15-19 percent increase in RGDp by a one percentage increase in the China’s DEFExs. The DEFExs’ impact on RGDp is found to be well explained by augmented Solow model instead of Feder-Ram. In a meta-analysis, Yildirim and Öcal (2016) included 32 empirical researches for analyzing if RGDp is affected by the DEFEx as a whole, for this purpose they used random and fixed effect analyses.

The results therefore indicate a positive net effect of DEFEx on the economic growth. However, this impact was small but positive. It is revealed in this study that all variations are characterized by sample, functional form and time. In addition, for G6 countries, a causal relationship is investigated by Destek (2016) among RGDp and DEFEx, by employing asymmetric causality approach. Negative RGDp has been witnessed with high spending on defense in UK, France, and Germany. Similarly, for Italy and Canada, the study supports the neutrality hypothesis. Furthermore, Malizard (2014), investigated how aggregate output is affected through DEFEx in France during 1980-2010, by incorporating Keynesian model. The study employed log of interest rate, log of non-military expenditures and real GDP as the variables.

The study concluded that since non-military expenditure has greater impact on output, military expenditure also contributes in stimulating output. This unique contribution arise by incorporating disaggregated data that allowed the use of characterize composition effects of DEFEx. Using the Malmquite Productivity Index (MPI) and bootstrapping in establishing statistical inferences in providing effective analyses of the DEFEx in OECD countries’ productivity from 1993-2009. The study observed that the MPI average with the DEFEx was higher compared to that without defense spending. By extension, the analysis indicates appropriate DEFEx can stimulate regional productivity, especially in Oceania Asia and Europe. It was further confirmed that if defense spending is strategically embarked on by the government, it will help in improving economic productive capacity (Gokmenoglu, Taspinar, & Sadeghieh, 2015).

In another study Awaworyi and Yew (2014), the researchers drawn 243 meta-observations from 42 primary studies. They tried to assess the nature of association between RGDp and military expenditure. The results revealed that DEFEx pose growth retarding effects on the country’s economic growth. In addition, a positive distinctive effect is also found on RGDp particularly in case of developed economies, as compared to developing economies. Similarly, Aminu and Bakar (2016) have examined the impact of military threats, expenditures and economic growth, by employing Penn world data, and concluded that there exists a negative association among RGDp and DEFEx. Furthermore, Rahman and Siddiqi (2019) also found similar findings i.e. DEFEx is not likely to positively influence growth, rather it may cause adverse effects on growth. This is certainly true because no evidence is found for the positive impact caused by DEFEx on the economic growth. According to scholar also attempted to investigate what effects are caused by military spending on the RGDp of Greece, during post-war time. This study also reported that DEFEx causes combined negative effects on output growth rate, irrespective of the significance level, which is used for computing a relevant multiplier. Another study involving a sample of 21 OECD countries, confirmed the adverse impact of military burden on the growth, this study incorporated income per capita as proxy variable for the military variables, rate of labour, growth, and investment (Hou & Chen, 2014).
Zhang, MacKenzie, and Huggins (2016) also studied the case of 11 OECD economies to find out the causality between debt burden and DEFEx and applied the causality analysis on the heterogeneity and cross-sectional data of these countries. The findings suggest unidirectional causality in Japan, Portugal and US from DEFEx to debt burden and from debt burden to DEFEx in Canada and UK. In addition, bidirectional causality is reported for Spain and other countries. Although, no significant association is found between debt burden and DEFEx. These findings are inconsistent with the previous literature on debt burden and DEFEx relationship. Another study Dudzeviciute, Peleckiene, and Peleckis (2016) examined the RGDP and defense expenditure relationship in EU economies, keeping in view the economic development of these countries during 2004-2013. The result of causality test indicates the direction of causality i.e. from defense spending to RGDP for economies with higher economic growth. However, in case of moderate economic growth, this causality runs from RGDP to defense expenditure, whereas, no causal relationship is found between the two variables for the all other economies. The study also mentioned that since every economy has a unique feature therefore, any increase or decline in RGDP might not bring any immediate change in the country’s defense expenditure. One of the most significant factor is the threat perception. Wolde-Rufael (2016) conducted a study for investigating the causal and long-run association among income distribution and DEFEx in South Korea, during 1965-2011. The study employed Bounds testing approach and found a log-run association between income distribution and military expenditure; in addition, a statistically significant and positive impact of DEFEx is reported on the income inequality, according to the Gini coefficient. The study also revealed unidirectional causality from military spending to income inequality. Similarly, scholar found a U-shaped linkage among RGDP and defense expenditure for Portuguese economy, by applying ARDL bound testing approach. The results of Granger causality test indicate the causality from military expenditure to economic growth. Thus, the study concluded that defense expenditure significantly contributes in Portugal’s economic growth. Moreover, Desli et al. (2017) attempted to analyze the dynamic connection among RGDP and defense expenditure, using data for 138 economies for the years 1988-2013. With a purpose of assessing short and long run association among these two variables, a wide methodological variety was employed, and the countries were categorized into three groups, considering their development stage and income level. For developed economies, study failed to find any short-term causal relationship among RGDP and defense expenditure, whereas, short run causality does exist among RGDP and defense expenditure in case of developing economies. For analyzing the case of developed countries, a study attempted to re-examine the relationship between growth and military expenditure, using data for the top 6 defense dealers, during the years 1988-2013. The results of asymmetric Granger causality test have shown that causality runs from defense expenditure to growth for the countries, such as China and Japan. Contrarily, for the rest of economies, i.e. KSA, USA, France, and Russia, the proposition that causality runs from growth to defense expenditure is maintained. Therefore, countries such as, Japan and China tend to spend more during perceived threat. Thus, in order to examine RGDP and defense expenditure, Augmented Solow-Swan model is employed using time series and panel techniques. Khalid and Mustapha (2014) also conducted a study for re-examining the economic growth-military expenditure nexus in China by applying Granger causality test and ARDL approach. Empirical findings have shown a unidirectional causality i.e. from GDP to DEFEx. Furthermore, Bellos (2017) also reported one-way causality i.e. from RGDP to military expenditure, using Granger causality and VAR model. Still on the causality perspective, H. Wang and Swallow (2016) use disaggregate and aggregate data which further classified into five expenses, physical resource expenditure, net interest payment, human resource expenditure, and other expenses. Therefore, results reveal that total federal government spending is more consistent with the Keynesian theory. While there are diversified causal relationships among five subcategories of federal expenditures. Moreover, using a data for only few Asian countries, tried to investigate RGDP and military expenditure linkage, during 1989-2004. Thus, a cointegrating relationship is revealed among RGDP and defense expenditure, using panel cointegration test, whereas, the empirical result for panel error-correction technique shows that in Asia, the DEFEx and RGDP are unrelated. Agostino, Dunne, and Pieroni (2016) examines some of the empirical irregularities in the RGDP and DEFEx literature in the developing economies reference to Asian countries. The
study shows that Asian countries invest in defense sector lower than the global standard, and it corresponds to its security as well as political realities. The study shows that there exist no one size fits all policy regarding defense and growth in Asian countries. Largely the study conclude that reduction in the defense spending is more appealing if channeled to projects that stimulates growth and development. Babu, Kiprop, and Gisore (2014) observed significant positive effects of defense and health expenses on the growth of an economy. Contrarily, statistically insignificant results are obtained for agricultural and education expenses. Thus, it implies that a policy must be formulated to increase defense budget and health spending in East Asian to stimulate economic growth, and only fewer funds must be devised to other sectors of the economy. Shahbaz et al. (2011) also applied ARDL bounds testing approach and error-correction method for analyzing the long-run and short-run co-integration, respectively. The cointegration coefficient for non-military expenses of government shows that defense expenditure positively influences the economic growth, however, study also found an inverse RGDP and real interest rate relationship. Using an endogenous growth model, Wang and Wang (2016) examined that in what way foreign threat and defense expenditure affect supply-side and demand-side economic growth. Their study indicated that home defense expenditure affects RGDP in three ways, i.e. spin-off effect, resource mobilization effect, and crowding out effect. However, ambiguous net effect is reported for all three channels. Thus, the study observed an optimal defense burden that triggers the rate of economic growth.

Scholar examines if defense spending impacts on China’s economic growth. Analyzing a recently published data from 1952 to 2012 on government and DEFEx. Moreover, employing both Feder-Ram and augmented Solow model to explore the relationship between DEFEx and economic growth. The augmented Solow model, however, shows that a percentage increase in defense stimulates the China1s RGDP by approximately 0.15–0.19%. The augmented Solow appears to explain the impact of DEFEx on RGDP in the case of China better than Feder-Ram. Yildirim and Öcal (2016), made a meta-analysis on 32 empirical works, to examine the overall effect of DEFEx on economic growth. Using fixed and random effect analysis. The findings revealed that there exists positive net defense effect on economic growth. The net effect was found positive, and the magnitude was found small. The study revealed that the main source of variations are attributed to time, sample and functional form. Destek (2016) examines the causal relationship between DEFEx and RGDP in G6 countries, using asymmetric causality approach developed by Alper and Oguz (2016). The result shows that high DEFEx affects RGDP negatively in the case of UK, Germany, and France. Likewise, in the case of Canada and Italy neutrality hypothesis is supported. Malizard (2014) examines the effects of DEFEx on aggregate output in France, covering the period 1980 - 2010, using a Keynesian model. The variables employ are the real GDP, the log of interest rate and log of non-military expenditure.

The study reveals that defense spending stimulate output, even if non-military expenditure exert higher impact. The uniqueness of the contribution came from the use of disaggregated data that allowed the use of characterize composition effects of DEFEx. Using the Malmquilt Productivity Index (MPI) and bootstrapping in establishing statistical inferences in providing effective analyses of the DEFEx in OECD countries’ productivity from 1993-2009. The study observed that the MPI average with the DEFEx was higher compared to that without defense spending. By extension, the analysis indicates appropriate DEFEx can stimulate regional productivity, especially in Oceania Asia and Europe. It was further confirm that if defense spending is strategically embarked on by the government, it will help in improving economic productive capacity Gokmenoglu et al. (2015). Awaworyi and Yew (2014) use a sample of 243 meta-observations drawn from 42 primary studies. The study examines the relationship between military expenditure and economic growth. The finding reports growth-retarding effects of DEFEx on economic growth. It further reveals that positive effects of DEFEx on growth are peculiar to developed countries than developing countries.

Zhang et al. (2016), study a causal relationship between DEFEx and debt burden in 11 OECD economies using causality analysis on both cross-sectional and heterogeneity across countries. The empirical findings show that there is unidirectional causality from defense to debt burden US, Japan and Portugal; one-way causation from debt burden to DEFEx for both UK and Canada. There is also bidirectional causation in the case of Spain; and the rest of countries.
The study has not found any significant relationship between defense spending and debt burden. The empirical result does not support the consistent results on the relationship between DEFEx and debt burden in the 11 OECD countries. Dudzевичiute, Peleckis, and Peleckiene (2016), investigates the relationships of defense expenditure and RGDP in the European Union (EU) countries, considering the level of these countries’ economic development between 2004 and 2013. The causality test reveals that the direction is from defense expenditure to RGDP in the group of countries with a very high level of economic growth. However, in the countries with mid-level of RGDP the causality is from RGDP to defense expenditure. For the rest of the countries, no causal relationship has been established. However, the study emphasized that every country is unique decline or increase in RGDP do not imply immediate change in defense expenditure. Threats perception is the most the most important factor. According to the studies a long-run and the causal relationship between DEFEx and income distribution in the South Korean economy for the period between 1965 and 2011. It applies the bounds test approach to cointegration. The study found a long-run relationship between military expenditure and the Gini coefficient with DEFEx having a positive and a statistically significant impact on income inequality. The result also reveals that a unidirectional causality running from DEFEx to income inequality. Author using ADRL bound testing approach on Portuguese economy, found U shaped relationship between defense spending and economic growth. The Granger causality confirms the causality running from defense to economic growth. The study concludes that defense spending can play a significant role in Portuguese economy. They examine the dynamic interaction between DEFEx and RGDP of 138 countries from 1988 to 2013. Employing wide range of methodologies in examining both the short run and long run relationship, three groups are considered among these countries, based on income level as well as developmental stage. The study shows that there are no evidence of short run causality between defense and RGDP in developed countries. However, there exist an evidence of causality in developing countries. Adding that this interaction is more prominent in a period prior to economic crises. Still on developed economies, Sulaiman, Karim, and Khalid (2017) re-examine military expenditures-growth relationship for the top 6 world defense dealers from 1988-2013. Using asymmetric Granger causality, the results shows that the DEFEx-led premise held in Japan and China. Conversely, the growth-led proposition is maintained in the other four countries (i.e. USA, Russia, Saudi Arabia and France). With the exception of Saudi Arabia, which it strong economy is by no means expansion of DEFEx. For China and Japan it has been a matter of using their limited resources for attaining their policies. They spend more as they perceived threat. The findings explain useful insight on the behavior of defense suppliers. The study examines defense spending and economic growing in these countries using augmented Solow-Swan model with both panel and time series methods. Similarly, investigates DEFEx and RGDP nexus in South Asian, using annual data from 1988 to 2014. Applying logistic smooth transition regression (LSTR) model, the study found that the relationship between defense and RGDP in South Asian is U shaped in nature. Thus the study recommends a cut in DEFEx, which should equally be channeled to other productive sectors.  

**Theoretical Model**

The underlying model was formulated by the extension of Yolcu Karadam et al. (2017) model which depicts the interaction between DEFEx, external threats, and growth, to assess the defense expenditure’s impact on growth. It included following assumptions to the study; i) output per worker gets positively influenced by public sector infrastructure and negatively influenced by the size of external threat; and ii) zero population growth. Aizeiman and Glick started the initiative to investigate the assumption i.e. in a growth equation; the DEFEx is a non-linear function of a potential internal or foreign threat. Therefore, in the absence of DEFEx, these threats pose negative effect on the economy, however, making DEFExs during non-existence of threats lead to growth reduction, whereas defense expenditure during sufficient threats lead to an increasing growth. As presented:

\[
\frac{dg}{df} = a_1 + a_2 \text{th}_t; \ a_1 < 0, a_2 > 0
\]

(1)
Therefore, the suggested growth model is described as follows:

$$\frac{dg}{df} = d1 + d2thl; d1 < 0, d2 > 0$$

(2)

Therefore, the suggested growth model is described as follows:

$$gy = a1df + a2(tr)
df + d1(tr) + \beta X; a1 < 0, a2 > 0, d1 < 0, d2 > 0$$

(3)

Here \(X\) is taken as a set of independent variables. The threats and defense expenditure are expected to have negative influence on economic growth, while positive interaction is revealed between threat and defense. The study includes the assumption of zero population growth. Output per worker is found to be positively influenced by infrastructure supply and negatively influenced by political instability, arms importation and internal threat. Thus, the output can be stated as follows:

$$y = A(K)^{t} - \alpha(g)^{a}f$$

(4)

where \(A\) represents indigenous productivity, \(k\) equals the capital divided by labour, \(g\) shows the proportion of infrastructural government expenditure in terms of labor, and \(1-f\) shows output cost of threats led by the external rivalries or other conflicts. This burden is assumed to be positive dependent upon the magnitude of threat and negatively on the defense expenditure. Its functional form can be stated as follows:

$$f(be, thl) = \frac{be}{be + thl}; fbe > 0, fthl < 0, f(0, thl) = 0, f(co, thl) = 10 < f < 1$$

(5)

Here, \(thl\) shows internal level of threat, and \(be\) shows domestic spending on defense. There are certain considerations of this model, these are: the arm procurement, threat, and political instability are added into this model may be as part of those practices which soak up public spending on non-defense and DEFExs, at a certain rate, thus, the output including political instability as threat is as follows:

$$y = A(K)^{t} - \alpha(g[1-s])^{a}\frac{be[1-s]}{be[1-s] + thl}$$

(6)

de \(g = \theta\) shows the defense to non-defense ratio of infrastructure expenditure. Therefore, sum of fiscal expenditure on non-defense and DEFEx can be stated as \((1 + \theta)\). However, the remaining model specifications are the same as used by Barro (1995), Aizenman and Glick (2006). Another assumption of this model is the undepreciated capital. Moreover, proportional tax rate finances the fiscal burden. When there are no threats, the defense expenditure will be equal to zero at optimal level, resulting in zero output cost i.e. \((f=1)\). Whereas, if there are hostile activities or threats, then it indicates positive expenditures of defense, resulting in output cost equal to \((f < 1)\), thereby adding a non-linear multiplicative term i.e. \(f\) to output, which adds to the model’s expenditure rate and optimal tax rate consideration, and can be written as:

$$\alpha \theta = 1 - f = \frac{thl}{be[1-s] + thl}$$

(7)
Where, $b\hat{e} = \frac{\partial \tilde{y}}{\partial \hat{\theta}}$. The optimal ratio of defense to non-DEFEx times the output share of defense expenditure equals the output cost of internal threat that is in turn equal to the magnitude of domestic threat to.

It is described as the optimal proportion of defense to non-defense spending ($\hat{\theta}$) multiplied by the share of output in terms of non-defense spending ($\alpha$) which is equal to $(1-f)$ which is the output cost of internal threat, which equals to the size of domestic threat. Therefore, it can be determined as follows:

$$\frac{\partial \tilde{y}}{\partial \hat{\theta}} < 0 \text{ and } \frac{\partial^2 \tilde{y}}{\partial \hat{\theta} \partial \text{thnl}} > 0$$

(8)

Thus, confirming the presence of non-linearity among DEFEx, political instability and growth, as assumed by Lin and Lee (2012).

2 Method

The aim of this section is to explain the relevant econometric procedures used in estimating the relationship of interest. To determine the interaction relationship between DEFEx, threat, political instability, arms procurement and economic growth, both in the short-run and long-run, Pesaran, Shin, and Smith (2001) model of Autoregressive Distributed Lag (ARDL) is used. The model examine the long-run relationship, irrespective of whether the variables are stationary in levels, different or mutually integrated (Khalid & RAZAQ, 2015). To take care of short-term deviations, while determining the long-run cointegration, an error correction representation is included in the ARDL model (Pesaran et al., 2001). The model provides efficient and unbiased estimation even if the sample size employed is small. The following steps were followed in the estimation process of the ARDL model.

According to Pesaran et al. (2001), testing for the cointegration between DEFEx, threat, political instability, arms procurement and economic growth, both in the short-run and long-run, is done by estimating the following ARDL unrestricted error-correction model (UECM) as well as the significance $F$- joint test on the lagged one period of the level variables as follows:

$$\Delta \ln RGDP_t = \frac{a_0}{\mu(1)} + a_1 \ln DEFEx_{t-1} + a_2 \ln thl_{t-1} + a_3 \ln ARMS_{t-1} + a_4 \ln Poll_{t-1} + \sum_{i=1}^{m_1} a_1 \Delta \ln DEFEx_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_2} a_2 \Delta \ln thl_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_3} a_3 \Delta \ln ARMS_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_4} a_4 \Delta \ln Poll_{t-1} + \varepsilon_{t}$$

(9)

$$\Delta \ln RGDP_t = \frac{a_0}{\mu(1)} + a_1 \ln DEFEx_{t-1} + a_2 \ln thl_{t-1} + a_3 \ln ARMS_{t-1} + a_4 \ln Poll_{t-1} + a_5 (ln DEFEx * ln Poll)_{t-1} + a_7 (ln DEFEx * ln ARMS)_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_1} a_1 \Delta \ln DEFEx_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_2} a_2 \Delta \ln thl_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_3} a_3 \Delta \ln ARMS_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_4} a_4 \Delta \ln Poll_{t-1} +$$

$$\frac{1}{\mu(1)} \sum_{i=1}^{m_5} a_5 (\Delta \ln DEFEx * \Delta \ln thl)_{t-1} + \frac{1}{\mu(1)} \sum_{i=1}^{m_6} a_7 (\Delta \ln DEFEx * \Delta \ln Poll)_{t-1} + \varepsilon_{t}$$

(10)

Where,

RGDP: real RGDP
DEFEx: Defense expenditure
thI: internal threat
ARMS: Arms purchase
PollI: political instability

Results
The results of the correlation test between dependent variable and independent variables proved to be very useful in pre estimation analysis especially as regards potential relationships suggested by theories. Therefore prior to the econometrics analysis, the statistical correlation of the variables are examined which helped in determining the statistical relationships between and amongst the variables.

Table 1: Correlation Analysis

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnRGDP</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnDEFEx</td>
<td>2</td>
<td>0.830**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnthI</td>
<td>3</td>
<td>0.257**</td>
<td>0.243**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnARMS</td>
<td>4</td>
<td>0.810*</td>
<td>0.118**</td>
<td>0.829*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnPoll</td>
<td>5</td>
<td>0.145**</td>
<td>0.463*</td>
<td>0.129</td>
<td>0.579*</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnDEFEx * lnthI</td>
<td>6</td>
<td>0.130*</td>
<td>0.247**</td>
<td>0.828</td>
<td>0.674*</td>
<td>0.882</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>lnDEFEx * lnPoll</td>
<td>7</td>
<td>0.234**</td>
<td>0.323**</td>
<td>0.212*</td>
<td>0.214*</td>
<td>0.352*</td>
<td>0.653*</td>
<td>1</td>
</tr>
<tr>
<td>lnDEFEx * lnARMS</td>
<td>8</td>
<td>0.342**</td>
<td>0.091**</td>
<td>0.052*</td>
<td>0.541*</td>
<td>0.152*</td>
<td>0.109*</td>
<td>0.899*</td>
</tr>
</tbody>
</table>

To examine the long run and short run relationship among the variables under consideration using ARDL bound test by Pesaran et al. (2001), there is a need to get the order of integration of the variables. The main argument is that variables have to be integrated at level 1(0) or at first difference 1(1) and or the mixture of relationship not beyond, otherwise the idea of F-statistics in the cointegration analysis is invalid. The appropriate lag length is chosen using BIC, this is because the computation of the F-statistics requires the selection of the lag order in the model (Feridun & Shahbaz, 2010). The argument is based on the basis that if the calculated F-statistic is greater than the upper critical bound value, then the long run relationship exist. provides the evidence of the existence of long-run relationship between DEFEx, internal threat, political instability and arms importation and economic growth.

Table 2 summarize the results of GDP, agricultural output and agricultural export models respectively based on the selected ARDL models. An ARDL ARDL (2,1,0,2,1) and (2,1,0,2,1,1,2) were was chosen for the GDP model. The results of R2 (78.7%), the adjusted R2 (65.9%) in along with the F-statistic for GDP equation model show that the model obtained best goodness of fit and variations of the selected independent variables explained certain the changes of the dependent variable. The significance of the F-statistics test justifies the inclusion of all the explanatory variables existing in the GDP model.

Table 2: Optimal ARDL Model Selection

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t-statistics</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnRGDP(-2)</td>
<td>0.000</td>
<td>0.000</td>
<td>3.427</td>
<td>0.024*</td>
</tr>
<tr>
<td>lnDEFEx(-1)</td>
<td>-0.000</td>
<td>0.000</td>
<td>5.938</td>
<td>0.000*</td>
</tr>
<tr>
<td>lnthI</td>
<td>-0.477</td>
<td>0.137</td>
<td>3.498</td>
<td>0.002*</td>
</tr>
<tr>
<td>lnARMS(-2)</td>
<td>-0.001</td>
<td>0.001</td>
<td>3.202</td>
<td>0.003**</td>
</tr>
<tr>
<td>lnPoll(-1)</td>
<td>-0.023</td>
<td>0.043</td>
<td>3.526</td>
<td>0.000</td>
</tr>
</tbody>
</table>
C  7.406  2.882  2.570  0.018*
T  0.045  0.009  4.731  0.000***

The direct relationship indicates that DEFEx is negatively related to real per capita gross domestic products. This generally hold true irrespective of the specified models (model 1 to model 5) except when threat and political instability are included in the model without arms importation and its interaction terms. However, the coefficient is found positive but statistically not significant. Models 1 and 4 show negative but not significant coefficients of DEFEx. This is in line with findings of Barro (1991) who fail to establish evidence of significant relationship between DEFEx and economic growth. More specifically the results relates to that of Aizenman and Glick (2006) when they also estimated their models without interaction term of threat and DEFEx. Nevertheless, the estimated coefficient of DEFEx becomes statistically significant when political instability, threat and arms importation as well as their interaction terms are accounted for in the model (see model 5). The coefficient suggests that a percentage point increase in military expenditure will lead to decrease in the level of real per capita economic growth by 2.32 percent. The statistical significance and increase in the magnitude of the coefficient of military expenditure may not be unconnected to including the threat, political instability and arms importation. Moreover, the result indicates that there has a significant and direct negative effect on the RGDP. The result evidently support the conjecture of this study following Aizenman and Glick (2006). Impliedly the result suggests that an increase in Thailand’s internal threat will significantly reduce the real RGDP of the country. Interestingly, the finding is not first in its kind. The result is similar to that reported in Aizenman and Glick (2006) and Heo and Ye (2016).

Conclusion
This study is set primarily to investigate the impacts of DEFEx in the presence of internal threat, political instability on the RGDP in Thailand. The study also examines the impact of the aggregated and disaggregated components of DEFEx on RGDP as well as examining the causality between DEFEx and RGDP in Thailand from 1983 to 2015. The study uses ARDL, and Asymmetric causality test approaches. It employs both absolute and orthogonalised values of the interaction term in the analysis of the interacted variables in order to check the robustness of the results. The findings reveal that DEFEx has negative impact on the Thailand’s economic growth, so also threats, political instability and arms importation. On the contrary, the study shows that DEFEx in the presence of internal threats and political instability is productive in Thailand. On the causal relationship between DEFEx and RGDP in Thailand, the asymmetric causality establishes unidirectional causation. However, the causation from DEFEx to RGDP happens during the good time. The trends of DEFEx in Thailand, therefore, lends credence to Keynes theory. This indicates that during the economic prosperity fund has been allocated to defense in Thailand to ensure security against internal and external aggressions. On the other hand, resources are made available during recessions to finance defense and ensure security and maintains law and order. This is true when activities of Niger Delta Militants hinder oil production which has been the main source of revenue to the Thailand’s government. This study focuses mainly on
investigating the impact of Thailand’s DEFEx at its aggregate and disaggregate components on the economic growth. It specifically examines the impacts of DEFEx in the presence of internal threat, political instability and arms import on the Thailand’s economic growth. This study is constrained by the availability of similar data on other countries particularly the Asian countries. Thus, it induces the researcher to focus on Thailand alone. Access to data and information regarding defense activities worldwide has always been shrouded with a secrecy in spite of the so-called freedom of information. Unavailability of data has limited this study from disaggregating oil GDP from non-oil GDP and to relate it with DEFEx. Last but not the least, insufficient data has also limited this study to carry out a sort of micro study on defense sector in Thailand. This include using the revenue generation in the defense sector and compare it with the amount spent on the defense sector. This analysis could isolate a direct economic contribution of the defense activities in Thailand.

References


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SUSTAINABLE DEVELOPMENT AND CIRCULAR ECONOMY: FUNCTIONAL VS. ECONOMIC WELLBEING IN ASEAN

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Abstract. The purpose of this study is to investigate the relationship between sustainable development and the circular economy in ASEAN region. To address this objective, five economies (Malaysia, Indonesia, Thailand, Singapore, and Philippine) were selected from 1995 to 2013 with annual observations. For measuring the factor of sustainable development, overall, two pak dimensions have been observed; functional wellbeing and economic wellbeing. Besides, circular economy is measured through three measures in terms of generation of municipal waste per capita, per GDP, and per DMC respectively. Based on the panel nature of the data, present study has applied three models under the title of OLS estimator, fixed effect and random effect. The findings of the study indicate that there is a significant impact of various factors of functional and economic wellbeing on the circular economy in the ASEAN region. In terms of originality/value, country representatives and policymakers specifically those working for better economic output through circular economy can get significant knowledge with current findings. Additionally, sustainable development is also under significant attention of the researchers in recent years for the betterment of planet earth. This study will also provide a good contribution to the field of sustainability as it observes its two dimensions, functional wellbeing and economic well-being. However, future research contributions can meaningful contributions while integrating the CE ownership models, and operational principles of CE for sustainable development in different regions too.

Keywords: circular economy, sustainable development, functional and social wellbeing, ASEAN


Jel Codes: E01, H5

1. Introduction and Literature background

The concept of economic growth is widely linked with sustainable development in contemporary literature. However, it is believing that sustained economic growth under the shadow of linear production model is not acceptable on the planet earth where there is a limited capacity to absorbs the waste and related output (Suárez-Eiroa, Fernández, Méndez-Martínez, & Soto-Oñate, 2019). Since the time of 1960s, a debatable discussion is going on, covering the horizon of global environment, overall ecological system and its prevention from various industrial and economic activities (Kamran & Omran, 2018; Meinert, Robinson, & Nassar, 2016; Nunes & Bennett, 2010; Omran & Kamran, 2018; Sharfman, Ellington, & Meo, 1997; Welford, 2016). In this regard, the role of circular economy has attained significant attention and regarded as a good alternative which can further provide the growth to the economy and overall ecological system too (Genovese, Acquaye, Figueroa, & Koh,
During the period of past couple of decades, CE has been widely observed by the different economies and industries as well. Meanwhile, policy-makers have also focused on the circular economy, significantly in developed economies (Geng, Fu, Sarkis, & Xue, 2012; Genovese et al., 2017; Yong, 2007; Zhang, et al., 2020). Since 2008, it is observed as national development model and scientific literature about CE is not widely presented and it is still in emerging phase. Various authors have discussed the role of CE and its linkage with the sustainable development (Geissdoerfer, Savaget, Bocken, & Hultink, 2017; Geng & Doberstein, 2008; Yong, 2007). On the other hand, some authors have stated the fact that the role of CE and its integration with sustainable development can provide a good understanding for the consideration of social objectives too (Martínez, 2020).

In addition, a range of studies is providing their empirical contribution, concerning the circular economy and sustainable development. For example, (Geng & Doberstein, 2008; Yi, 2020) have focused on the economy of China, for the new sustainable development model under the situation of resource productivity and eco-efficiency. Authors have clearly defined that this model of sustainable development is formally accepted during the period of 2002 in terms of circular economy and provided a good realization for the material flows in overall economic system of China. In addition, this study has contributed by providing the contemporary measure of long-term promotion of circular economy with the formulation of various objectives in order to leapfrog the country’s way from environment-damaging development.

In recent years, (Murray, Skene, & Haynes, 2017; Zeb, et al., 2020; Mazzoni, 2020; Kudryavtseva, Skhvediani, Ali, 2020; El Idrissi, Ilham Zerrouk, Zirari, Monni, 2020) have investigated the concept of circular economy in the global context through its interdisciplinary exploration. Authors have stated that there have been calls from the different industries for significance guidance regarding the implantation of sustainable development and related strategies. In this regard, circular economy presents the contemporary trend for the conceptualization and integration of economic activities under the title of environmental wellbeing. Meanwhile, their paper has found that circular economy is reasonably focusing on redesigning and recycling the materials which can further contribute towards sustainable business models. Additionally, their findings lead towards the revised definition of circular economy which specifies an economic model integrating the planning, resourcing, production, and some other process.

Another study conducted by Corona, Shen, Reike, Carreón, and Worrell (2019) has investigated the factor of sustainable development and circular economy under the title of critical review of circularity metrics. Authors claim that the idea of circular economy is believed as a sustainable economic system through which economic growth can be achieved. In addition, the shift of products and services in the circular economy also provides a good solution for contemporary challenges. Furthermore, it is believed that for the sustainability practices, role of circular economy cannot be ignored. Lacson, Lu, and Huang (2019) have indicated the fact that industrial process can increase the risk for the toxicity exposure. However, the circular economy can be reflected as a tool for sustainable development. Another research study conducted by has specified that transformation of the production and various consumption patterns in today’s economy can preserve the current and future life of humanity. In this regard, circular economy is a model that can be adapted for the functioning of overall ecosystem with social strength as well. Some other studies have also provided their contribution while focusing the concept of circular economy, regional sustainability, competitive advantage, sustainable development, environmental science, renewable energy system, and its relationship with circular economy too (Husgafvel, Linkosalmi, Hughes, Kanerva, & Dahl, 2018; Pla-Julián & Guevara, 2019; Pukšec, Foley, Markovska, & Dulić, 2019; Iqbal, Adeel & Khan., 2020). The present research has provided an initial contribution in the field of sustainable development and circular economy from the context of ASEAN region. To the best of authors’ findings, this research has covered this significant literature gap through applying the panel regression models. The rest of the paper is structured as follows; section two discusses the variables of the study; section three covers the research methods. Section four provides the discussion over results. The last section concludes the study.
2 Research Methods

Based on both dimensions of time period (>1) and units of observation (>1), this study has considered the panel regression models. Various studies have provided documentary evidence for the application of these panel models (Brüderl & Ludwig, 2015; Kao, 1999; Moon & Weidner, 2017; Phillips & Moon, 1999). For this purpose, three-panel regression models under the title of ordinary least square or OLS regression model, fixed-effect model, and random effect regression models were applied. In addition, these models are widely accepted in the literature of economics and finance and similar other fields as they are providing some robust and unbiased regression coefficients. More specifically, OLS regression estimator specifies the error terms or those factors which are not included in the model but can influence from outside. In addition, the model under the title of fixed effect indicates the control for the heterogeneity or difference between the entities which may or may not influence the predictors and outcome factors of the study. Additionally, on the other hand, random effect model specifies the assumptions that variance across the entities is not related to predictors or outcome variable of the study. For the better understanding, following equations are under consideration. Equation 1-9 shows the relationship of sustainable development as measured through functional wellbeing-indicators with selected proxies of circular economy.

Circular Economy (GMWPC) = B0 + B1(HALE) + B2(PPPSE) + B3(TDFN) + B4(QAWA) + B5(FNH) + \( \epsilon \)

**Equation 1: OLS for GMWPC**

Circular Economy (GWPGDP) = B0 + B1(HALE) + B2(PPPSE) + B3(TDFN) + B4(QAWA) + B5(FNH) + \( \epsilon \)

**Equation 2: OLS for GWPGDP**

Circular Economy (GWPDMC) = B0 + B1(HALE) + B2(PPPSE) + B3(TDFN) + B4(QAWA) + B5(FNH) + \( \epsilon \)

**Equation 3: OLS for GWPDMC**

Circular Economy (GMWPC) = B0 + B1(HALE) + B2(PPPSE) + B3(TDFN) + B4(QAWA) + B5(FNH) + u \( it \)

**Equation 4: Fixed Effect for GMWPC**

Circular Economy (GWPGDP) = B0 + B1(HALE) + B2(PPPSE) + B3(TDFN) + B4(QAWA) + B5(FNH) + u \( it \)

**Equation 5: Fixed Effect for GWPGDP**

Circular Economy (GWPDMC) = B0 + B1(HALE) + B2(PPPSE) + B3(TDFN) + B4(QAWA) + B5(FNH) + u \( it \)

**Equation 6: Fixed Effect for GWPDMC**

Circular Economy (GMWPC) = B0 + B1(HALE) + B2(PPPSE) + B3(TDFN) + B4(QAWA) + B5(FNH) + u \( it \) + e \( it \)

**Equation 7: Random Effect for GMWPC**
Equation 8: Random Effect for GWPGDP

\[
\text{Circuair Economy (GWPGDP)} = B_0 + B_1(HALE) + B_2(PPPSE) + B_3(TDFN) + B_4(QAWA) + B_5(FNH) + \epsilon_{it} + e
\]

Equation 9: Random Effect for GWPDMC

\[
\text{Circuair Economy (GWPDMC)} = B_0 + B_1(HALE) + B_2(PPPSE) + B_3(TDFN) + B_4(QAWA) + B_5(FNH) + \epsilon_{it} + e
\]

Equation 10 considers the effect of sustainable development as measured through economic wellbeing-indicators.

Equation 10: OLS for GMWPC

\[
\text{Circuair Economy (GMWPC)} = B_0 + B_1(RPCFFAH) + B_2(RPCPC) + B_3(RPCHC) + B_4(RER) + B_5(TRS) + B_5(RMR) + \epsilon
\]

Equation 11: OLS for GWPGDP

\[
\text{Circuair Economy (GWPGDP)} = B_0 + B_1(RPCFFAH) + B_2(RPCPC) + B_3(RPCHC) + B_4(RER) + B_5(TRS) + B_5(RMR) + \epsilon
\]

Equation 12: OLS for GWPDMC

\[
\text{Circuair Economy (GWPDMC)} = B_0 + B_1(RPCFFAH) + B_2(RPCPC) + B_3(RPCHC) + B_4(RER) + B_5(TRS) + B_5(RMR) + \epsilon_{it}
\]

Equation 13: Fixed Effect for GMWPC

\[
\text{Circuair Economy (GMWPC)} = B_0 + B_1(RPCFFAH) + B_2(RPCPC) + B_3(RPCHC) + B_4(RER) + B_5(TRS) + B_5(RMR) + \epsilon_{it}
\]

Equation 14: Fixed Effect for GWPGDP

\[
\text{Circuair Economy (GWPGDP)} = B_0 + B_1(RPCFFAH) + B_2(RPCPC) + B_3(RPCHC) + B_4(RER) + B_5(TRS) + B_5(RMR) + \epsilon_{it}
\]

Equation 15: Fixed Effect for GWPDMC
Equation 16: Random Effect for GMWPC

\[ \text{Circular Economy (GMWPC)} = B0 + B1(RPCFFAH) + B2(RPCPC) + B3(RPCHC) + B4(RER) + B5(TRS) + B5(RMR) + uit + eit \]

Equation 17: Random Effect for GWPGDP

\[ \text{Circular Economy (GWPGDP)} = B0 + B1(RPCFFAH) + B2(RPCPC) + B3(RPCHC) + B4(RER) + B5(TRS) + B5(RMR) + uit + eit \]

Equation 18: Random Effect for GWPDMC

\[ \text{Circular Economy (GWPDMC)} = B0 + B1(RPCFFAH) + B2(RPCPC) + B3(RPCHC) + B4(RER) + B5(TRS) + B5(RMR) + uit + eit \]

Table 1: Description of the Variables

<table>
<thead>
<tr>
<th>Title of Variable</th>
<th>Title of Indicators</th>
<th>Literature Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular Economy Indicator I</td>
<td>Generation of municipal waste per capita, GMWPC</td>
<td>(Kawai &amp; Tasaki, 2016)</td>
</tr>
<tr>
<td>Circular Economy Indicator II</td>
<td>Generation of waste per GDP, GWPGDP</td>
<td>(Yanrong, Cuili, &amp; Han, 2011)</td>
</tr>
<tr>
<td>Circular Economy Indicator III</td>
<td>Generation of waste per DMC, GWPDMC</td>
<td>(Antanasijević, Pocajt, Popović, Redžić, &amp; Ristić, 2013)</td>
</tr>
<tr>
<td>Sustainable Development</td>
<td>Health-adjusted life expectancy, HALE</td>
<td>(Colin, Lidia, &amp; Bernard, 2017)</td>
</tr>
<tr>
<td></td>
<td>Percentage of population with post-secondary education, PPPSE</td>
<td>(Gándara, 2001)</td>
</tr>
<tr>
<td></td>
<td>Temperature deviations from normal, TDFN</td>
<td>(Ishihara et al., 1995)</td>
</tr>
<tr>
<td></td>
<td>Quality-adjusted water availability, QAWA</td>
<td>(Kumar &amp; Managi, 2010)</td>
</tr>
<tr>
<td></td>
<td>Fragmentation of natural habitats: FNH</td>
<td>(Kruess &amp; Tscharntke, 1994)</td>
</tr>
<tr>
<td>Economic Well-being</td>
<td>Real per capita net foreign financial asset holdings, RPCFFAH</td>
<td>(Lee, 2008)</td>
</tr>
<tr>
<td></td>
<td>Real per capita produced capital, RPCPC</td>
<td>(Lee, 1995)</td>
</tr>
<tr>
<td></td>
<td>Real per capita human capital, RPCHC</td>
<td>(Engelbrecht, 1997)</td>
</tr>
<tr>
<td></td>
<td>Reserves of energy resources, RER</td>
<td>(Caramanis, Ntakou, Hogan, Chakrabortty, &amp; Schoene, 2016)</td>
</tr>
<tr>
<td></td>
<td>Timber resource stocks, TRS</td>
<td>(Hultkrantz, 1992)</td>
</tr>
<tr>
<td></td>
<td>Reserves of mineral resources, RMR</td>
<td>(Meinert et al., 2016)</td>
</tr>
</tbody>
</table>

3 Results and Discussion

Descriptive findings are presented under Table 2; covering means, deviation, minimum, and maximum points of the data set throughout the study. It is observed that overall observation of the data set is 90 covering the time duration of 18 years, for five ASEAN economies. For the first measure of circular economy, GMWPC has a mean score of 11.82 with a deviation from the mean of 4.72 respectively. For GWPGDP, a common trend is 17.70 and deviation of 8.68 respectively. Similarly, for the third indicator of circular economy (GWPDMC) an average score is 2.281 and standard deviation of 1.69 accordingly. Additionally, to analyze the functioning wellbeing factors like HALE, PPPSE, TDFN, QAWA, and FNH are added in the regression model and same are presented for the descriptive findings. It is observed that the mean score of HALE is 1.05, 29.07 for PPSE, 2.75 for TDFN, and 13.56 for QAWA. Whereas the factor of FNH has shown a mean value of 1.67 as explained in Table 1. Besides, rest of the indicators
are added and presented to show the title of economic wellbeing in ASEAN region over the sample period of the study.

Table 2: Descriptive Statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Obs</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMWPC</td>
<td>90</td>
<td>11.82</td>
<td>4.72</td>
<td>1.41</td>
<td>22.36</td>
</tr>
<tr>
<td>GWPGDP</td>
<td>90</td>
<td>17.706</td>
<td>8.685</td>
<td>5.064</td>
<td>46.862</td>
</tr>
<tr>
<td>GWPDNC</td>
<td>90</td>
<td>2.281</td>
<td>1.694</td>
<td>.091</td>
<td>5.285</td>
</tr>
<tr>
<td>HALE</td>
<td>90</td>
<td>1.05</td>
<td>2.26</td>
<td>-.579</td>
<td>8.42</td>
</tr>
<tr>
<td>PPPSE</td>
<td>90</td>
<td>29.079</td>
<td>12.007</td>
<td>-.221</td>
<td>38.835</td>
</tr>
<tr>
<td>TDFN</td>
<td>90</td>
<td>2.751</td>
<td>6.421</td>
<td>-.014</td>
<td>6.705</td>
</tr>
<tr>
<td>QAWA</td>
<td>89</td>
<td>13.56</td>
<td>8.771</td>
<td>.0367</td>
<td>27.249</td>
</tr>
<tr>
<td>FNM</td>
<td>90</td>
<td>1.661</td>
<td>1.451</td>
<td>-4.25</td>
<td>7.882</td>
</tr>
<tr>
<td>RPCFFAH</td>
<td>90</td>
<td>53.188</td>
<td>32.475</td>
<td>7.63</td>
<td>110.475</td>
</tr>
<tr>
<td>RPCPC</td>
<td>90</td>
<td>2.86</td>
<td>1.692</td>
<td>1.462</td>
<td>5.77</td>
</tr>
<tr>
<td>RPCHC</td>
<td>90</td>
<td>3.004</td>
<td>1.002</td>
<td>1.101</td>
<td>5.007</td>
</tr>
<tr>
<td>RER</td>
<td>90</td>
<td>13.36</td>
<td>3.024</td>
<td>6.684</td>
<td>19.652</td>
</tr>
<tr>
<td>TRS</td>
<td>90</td>
<td>13.185</td>
<td>8.384</td>
<td>1.625</td>
<td>27.946</td>
</tr>
<tr>
<td>RMR</td>
<td>90</td>
<td>7.362</td>
<td>4.605</td>
<td>3.085</td>
<td>1.555</td>
</tr>
</tbody>
</table>

Table 3 provides the findings for the correlation matrix of the study, between various factors of economic and functional wellbeing in the region of ASEAN. It is observed that there is a significant and positive correlation between HALE and TDFN, but this correlation is low and significant at 5 percent. For the correlation between HALE and QAWA, correlation is -.230, indicating a negative and insignificant association. For the correlation between HALE and the rest of the indicators, it is observed that only the highly negative but significant correlation is observed with RPCPC; -.618. However, rest of the indicators have shown their low and negative correlation with HALE under full sample of the study. For the PPPSE, highly significant and negative correlation with RPCFFAH is observed. Meanwhile, there is a negative and significant correlation between TDFN and QAWA; -.672. While correlation between TDFN and TRD is -.563. Additionally, correlation between QAWA and RER is positively significant but low. Whereas for the FNH and RPCFFAH, there is a weak and negatively significant association. The rest of the indicators for both functional wellbeing and economic wellbeing have shown their low level of association with each other.

Table 3: Pairwise correlations

<table>
<thead>
<tr>
<th>Variables</th>
<th>HALE</th>
<th>PPPSE</th>
<th>TDFN</th>
<th>QAWA</th>
<th>FNM</th>
<th>RPCFFAH</th>
<th>RPCPC</th>
<th>RPCHC</th>
<th>RER</th>
<th>TRS</th>
<th>RMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) HALE</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) PPPSE</td>
<td>.212</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) TDFN</td>
<td>.167*</td>
<td>.190*</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) QAWA</td>
<td>-0.230</td>
<td>-0.071</td>
<td></td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) FNM</td>
<td>.402*</td>
<td>.510</td>
<td>.567</td>
<td>-0.171</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) RER</td>
<td>.402*</td>
<td>.510</td>
<td>.567</td>
<td>-0.171</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7) TRS</td>
<td>.402*</td>
<td>.510</td>
<td>.567</td>
<td>-0.171</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8) RMR</td>
<td>.402*</td>
<td>.510</td>
<td>.567</td>
<td>-0.171</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### Table 4: Panel Regression Findings for the impact of Functional wellbeing on circular economy indicators

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
<th>Model 7</th>
<th>Model 8</th>
<th>Model 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>HALE</td>
<td>-286.5***</td>
<td>-2.97e-07***</td>
<td>-5.41e-10</td>
<td>-337.9***</td>
<td>-4.36e-07***</td>
<td>3.75e-09</td>
<td>-223.5***</td>
<td>-2.12e-07***</td>
<td>-4.36e-10</td>
</tr>
<tr>
<td>(39.01)</td>
<td>(6.63e-08)</td>
<td>(2.90e-09)</td>
<td>(81.68)</td>
<td>(1.39e-07)</td>
<td>(6.06e-09)</td>
<td>(29.01)</td>
<td>(4.52e-08)</td>
<td>(3.50e-09)</td>
<td></td>
</tr>
<tr>
<td>PPPSE</td>
<td>9.137e+07***</td>
<td>0.791***</td>
<td>0.00256</td>
<td>2.043e+07</td>
<td>5.99***</td>
<td>0.00847</td>
<td>8.369e+07***</td>
<td>0.651***</td>
<td>0.00226</td>
</tr>
<tr>
<td>(4.665e+07)</td>
<td>(0.0793)</td>
<td>(0.00347)</td>
<td>(1.100e+08)</td>
<td>(0.187)</td>
<td>(0.00816)</td>
<td>(2.565e+07)</td>
<td>(0.0723)</td>
<td>(0.00367)</td>
<td></td>
</tr>
<tr>
<td>TDFN</td>
<td>1.378***</td>
<td>8.74e-10***</td>
<td>3.641***</td>
<td>1.517***</td>
<td>1.23e-09***</td>
<td>0.3681</td>
<td>1.218***</td>
<td>6.62e-10***</td>
<td>0.368**</td>
</tr>
<tr>
<td>(0.130)</td>
<td>(2.22e-10)</td>
<td>(0.00125)</td>
<td>(0.224)</td>
<td>(3.81e-10)</td>
<td>(0.6742)</td>
<td>(0.120)</td>
<td>(1.32e-10)</td>
<td>(0.0257)</td>
<td></td>
</tr>
<tr>
<td>QAWA</td>
<td>4.472e+08**</td>
<td>-0.891***</td>
<td>0.0684***</td>
<td>-0.726**</td>
<td>0.0624***</td>
<td>-</td>
<td>-</td>
<td>-0.239***</td>
<td>0.0252***</td>
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<tr>
<td>(1.833e+08)</td>
<td>(0.312)</td>
<td>(0.0136)</td>
<td>(2.025e+08)</td>
<td>(0.344)</td>
<td>(0.0150)</td>
<td>-</td>
<td>(1.032e+08)</td>
<td>(0.112)</td>
<td>(0.0036)</td>
</tr>
<tr>
<td>FNH</td>
<td>22.10**</td>
<td>7.62e-08***</td>
<td>8.21e-09***</td>
<td>22.78**</td>
<td>7.23e-08***</td>
<td>8.12e-09***</td>
<td>-19.10**</td>
<td>-6.52e-08***</td>
<td>-5.61e-09***</td>
</tr>
<tr>
<td>(8.894)</td>
<td>(1.51e-08)</td>
<td>(6.62e-10)</td>
<td>(10.76)</td>
<td>(1.82e-08)</td>
<td>(7.97e-10)</td>
<td>(6.894)</td>
<td>(1.21e-08)</td>
<td>(1.62e-10)</td>
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</tr>
<tr>
<td>Constant</td>
<td>2.872e+09**</td>
<td>12.99***</td>
<td>-0.0674</td>
<td>2.403e+09</td>
<td>13.06***</td>
<td>-0.0204</td>
<td>1.202e+09**</td>
<td>10.36***</td>
<td>-0.0374</td>
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<tr>
<td>(1.294e+09)</td>
<td>(2.201)</td>
<td>(0.0963)</td>
<td>(1.170e+09)</td>
<td>(2.901)</td>
<td>(0.127)</td>
<td>(1.365e+09)</td>
<td>(3.201)</td>
<td>(0.0263)</td>
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</tr>
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</table>

* shows significance at the .05 level

### Table 5: Panel Regression Findings for the impact of Economic wellbeing on circular economy indicators

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
<th>Model 7</th>
<th>Model 8</th>
<th>Model 9</th>
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<tbody>
<tr>
<td>Generation of municipal waste per capita</td>
<td>-286.5***</td>
<td>-2.97e-07***</td>
<td>-5.41e-10</td>
<td>-337.9***</td>
<td>-4.36e-07***</td>
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<td>(39.01)</td>
<td>(6.63e-08)</td>
<td>(2.90e-09)</td>
<td>(81.68)</td>
<td>(1.39e-07)</td>
<td>(6.06e-09)</td>
<td>(29.01)</td>
<td>(4.52e-08)</td>
<td>(3.50e-09)</td>
<td></td>
</tr>
<tr>
<td>Generation of waste per GDP, GMWPDG</td>
<td>9.137e+07***</td>
<td>0.791***</td>
<td>0.00256</td>
<td>2.043e+07</td>
<td>5.99***</td>
<td>0.00847</td>
<td>8.369e+07***</td>
<td>0.651***</td>
<td>0.00226</td>
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<td>(4.665e+07)</td>
<td>(0.0793)</td>
<td>(0.00347)</td>
<td>(1.100e+08)</td>
<td>(0.187)</td>
<td>(0.00816)</td>
<td>(2.565e+07)</td>
<td>(0.0723)</td>
<td>(0.00367)</td>
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<tr>
<td>Generation of waste per DMC, GMWPDG</td>
<td>1.378***</td>
<td>8.74e-10***</td>
<td>3.641***</td>
<td>1.517***</td>
<td>1.23e-09***</td>
<td>0.3681</td>
<td>1.218***</td>
<td>6.62e-10***</td>
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<td>(0.130)</td>
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<td>(0.00125)</td>
<td>(0.224)</td>
<td>(3.81e-10)</td>
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<td>(0.120)</td>
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<tr>
<td>Generation of waste per GDP, GMWPDG</td>
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<td>0.0684***</td>
<td>-0.726**</td>
<td>0.0624***</td>
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<td>-</td>
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<td>0.0252***</td>
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<tr>
<td>(1.833e+08)</td>
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<td>(0.112)</td>
<td>(0.0036)</td>
</tr>
<tr>
<td>Generation of waste per DMC, GMWPDG</td>
<td>22.10**</td>
<td>7.62e-08***</td>
<td>8.21e-09***</td>
<td>22.78**</td>
<td>7.23e-08***</td>
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<td>(8.894)</td>
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<td>(1.21e-08)</td>
<td>(1.62e-10)</td>
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<tr>
<td>Generation of waste per GDP, GMWPDG</td>
<td>2.872e+09**</td>
<td>12.99***</td>
<td>-0.0674</td>
<td>2.403e+09</td>
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<td>-0.0204</td>
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<td>(1.294e+09)</td>
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<td>(0.127)</td>
<td>(1.365e+09)</td>
<td>(3.201)</td>
<td>(0.0263)</td>
<td></td>
</tr>
</tbody>
</table>

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

R-squared 0.918 0.930 0.996 0.798 0.686 0.712 0.639 0.881 0.639
Table 4 provides the regression output for all three-panel models, covering the title of OLS estimator, fixed effect and random effect in all five ASEAN economies. Meanwhile, the impact of functional wellbeing as measured through selected indicators on all three measures of circular economy is also presented through robust coefficients. It is observed that the effect of HALE on GMWPC under Model 1 (OLS estimator) is significantly negative. It means that HALE is negatively impacting on generation on the municipal waste per capita under OLS regression model. In addition, the effect of HALE on second measure of circular economy through OLS regression is also found to be significant and negative with the coefficient of -2.97. This effect is also consistent for the third measure of circular economy as observed through OLS regression model (3). It means that for all three measures of circular economy, there is a significant and negative influence from HALE under OLS.

Meanwhile, regression model from 4-5 observes the effect of all indicators of functional wellbeing on three measures of CE. It is found that for GMWPC and GWPGDP, effect of HALE is highly significant and negative, but for GWPDMC, the effect of HALE is positively insignificant over study time duration. However, the effect of HALE as presented through random effect models (7-9) on all three measures of CE is found to be negatively significant except for GWPDMC. It means that the factor of HALE is adversely influencing CE in ASEAN region.

Besides, the effect of PPSE on GMWPC and GWPGDP is positive and significant at 10 percent and 1 percent respectively. However, the factor of GWPDMC has shown its positive but insignificant relationship with PPPSE under OLS regression model. Meanwhile with the application of fixed effect model, it is observed that GWPGDP is observing a highly significant and positive influence from PPSE. Additionally, random effect (Model 7-8) has also shown a positive and significant impact on GMWPC and GWPGDP, respectively. The third indicator of functional wellbeing Temperature deviations from normal (TDFN) has shown its positive influence on CE as measured through three measures under OLS, fixed and random effect, except for GWPDMC under Model 6 (Table 3).
Further, the impact of QAWA on generation of municipal waste per capita is significantly negative under all three-panel models of the study. The last indicator of functional wellbeing; FNH has also shown its significant and positive impact on GMWPC, GWPGDP, and GWPDMC as observed under OLS regression estimators (Model 1-3). Similarly, fixed-effect regression models have also presented the fact that FNH has its positive and significant influence on all three measures of CE in ASEAN. However, random effect has shown the adverse causal relationship between FNH and circular economy.

Table 5 provides the regression outcomes for the economic wellbeing indicators and their impact on all three measures of the circular economy. It is observed that the impact of RPCFFA on generation of municipal waste per capita, generate of municipal waste per GDP, and generation of municipal waste per DMC is positive, but significant for the first two measures accordingly. Meanwhile similar findings have been observed through fixed effect and random effect as presented through Model 4-9 respectively.

In addition, the effect of RPCPC on the first two measures of the circular economy is found to be positively significant with a coefficient of 12.51 and 1.81 respectively. It means that there is a positive and direct influence of RPCPC on municipal waste generation in terms of per capita, and per GDP under full sample of the study. However, the effect of RPCP on generation of municipal waste per DMC is found to be positively insignificant with the coefficient of 0.0237 and standard error of 0.0362 respectively. Similarly, findings for the fixed effect and random effect have also provided the fact that RPCPC is positively impacting on circular economy in ASEAN.

The third indicator of economic wellbeing is presented through the title of RER, showing its negatively and significant influence on all three measures of the circular economy under panel regression models. However, the effect of TRS on generation of municipal waste per capita is significant and positive through OLS and random effect regression methods. Meanwhile, the last indicator of economic wellbeing is observed through RMR which shows that none of the factors of circular economy is significantly is associated with it as observed through OLS, fixed effect, and random effect coefficients. In terms of explained variation, model highest value of R2 is observed for GWPDMC as observed under Model 2 (Table 5), followed by Model 1 and Model 7 respectively.

4 Conclusions and Future Direction

This study is based on exploring the relationship between sustainable development and circular economy in the region of ASEAN. For a better understanding, overall sustainable development is divided into two major components: functional and economic wellbeing. Data were collected from the five ASEAN economies over the last 18 years of the study, and panel regression models like OLS estimator, fixed and random effect was applied. For circular economy, three measures have been added in the model as main outcome factors. Through panel regression models, study has observed that for the circular economy in terms of generation of municipal waste per capita, it is observed that there is a significant and negative influence from HALE, PPPSE, and QAWA. Meanwhile, the factor of TDFN and FNH have shown their positive and significant impact on generation of municipal waste per capita as examined through OLS regression. For the second measure of CE, generation of waste per GDP, it is observed that again HALE and QAWA have shown their negative influence, while PPPSE TDFN and FNH have shown their highly significant and positive impact under full sample of the study. For the third measure of CE; generation of municipal waste per DMC, there is a significant influence from all the indicators of functional wellbeing as observed through health-adjusted life expectancy, percentage of population with post-secondary education, temperature deviation from the normal, quality-adjusted water availability and fragmentation of natural habitats. For the second measure of sustainable development, economic wellbeing, it is observed that there is a significant influence from all measures on generation of municipal waste per capita, except TRD and RMR under OLS estimator. More specifically, the influence from RPCFFA, RPCPC, and RER on 2nd measure of circular economy is found to be positively significant. These findings have provided a good understanding of the empirical association between economic and functional wellbeing with the circular economy.
indicators. Country representatives and policymakers specifically those working for better economic output through circular economy can get significant knowledge with current findings. Additionally, sustainable development is also under significant attention of the researchers in recent years for the betterment of planet earth. This study will also provide a useful contribution to the field of sustainability as it observes its two dimensions, functional and economic well-being. However, future research contributions can meaningful contributions while integrating the CE ownership models, and operational principles of CE for sustainable development in different regions too.

References


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TAX MORAL AND COMPLIANCE OF INDIVIDUAL TAXPAYER

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Abstract. This study aims to obtain empirical evidence about the relationship between income level, tax sanctions, and trust in government with individual taxpayer's compliance through tax morale. This study is designed as a quantitative, and the data analysis used is path analysis. The research sample was 100 individual taxpayers in Pamekasan Regency. We are using path analysis techniques with the help of SPSS software. The results of this study are the income level has a relationship with individual taxpayer's compliance through tax morale, but tax sanctions and trust in the government do not have a relationship with individual taxpayer's compliance through tax morale. The limitation of this research is that the research scope is still limited, only in Pamekasan Regency. Further research related to tax morale can add other independent variables and expand the research sample's scope.

Keywords: Income level; tax sanctions; trust in government; tax morale; individual taxpayer's compliance


Jel Codes: O1, O53

1 Introduction

In carrying out its activities, Indonesia is in dire need of funds whose numbers are increasing every year. A significant income source in the nation is revenue from government taxes (Ajzen, 1991; Hosseini Kondelaji, Sameti, Amiri, & Moayedfar, 2016; Panjaitan, Tarmizi, Daulay, & Ginting, 2019; Olaoye, Ogunleye, & Solanke, 2019; Sasongko, Huruta, Wardani, 2019; Vergara, 2020).

Taxes are people's contributions to the government with counter-achievements that are not directly obtained, regulated by law. There are two problems in increasing tax revenue: taxpayer compliance and bribery cases committed by tax officials. Tax compliance is crucial for a nation. Tax compliance is one of the factors for government tax revenue. When the country's tax compliance is high, the country will also receive high tax revenues and vice versa. Taxpayer compliance in Indonesia is one of the challenges in efforts to increase tax revenue. Indonesia's low tax ratio evidences this statement. The tax ratio reflects the tax contribution in the national budget by comparing tax revenue with the Gross Domestic Product (GDP) of the year concerned.
Table 1 shows that Indonesia's tax ratio (source: Ministry of Finance of the Republic of Indonesia, 2019) was 11.5% in 2018, this figure increased from 2017, which was at 10.7%. However, this figure is still the lowest among the tax ratios of countries in the Asia Pacific. Another tax problem in Indonesia is that the income tax of individual taxpayers is still far below the income tax for corporate taxpayers. Income tax receipts for individual taxpayers is IDR 9,406.75 billion (approx. USD 627 million) compared to IDR 254,024.73 billion (approx. USD 16,935 million) for corporate taxpayers in 2018 (Source: Directorate General of Taxes, 2019). Therefore, it is vital to make comprehensive strategies for increasing taxpayer compliance in Indonesia.

Several cases that occurred in Indonesia related to bribery committed by tax officials can trigger a taxpayer's reluctance to pay taxes. In other words, it will affect tax morale and tax compliance. Taxpayers may have some intrinsic motivation, which is the main instrument that helps them respect the law and pay taxes or feel some moral guilt due to failure to comply (Luttmer & Singhal, 2014; Vythelingum, Soondram, & Jugurnath, 2017). Therefore, research is needed on the factors that can influence tax morale and the relationship between tax morale and taxpayer's compliance using the Theory of Planned Behavior and the Theory of Slippery Slope.

This study aims to obtain empirical evidence about the relationship between income levels, tax sanctions, and trust in the government with individual taxpayer compliance through tax morale. This study used a questionnaire with a Likert scale of 1-5 as the primary data source. The research sample was selected using probability sampling, and the Slovin formula found 100 individual taxpayers in Pamekasan Regency in 2019 as research samples. The Pamekasan Tax Office is a tax office that has had an increase in individual taxpayers for the last five years with a decreasing level of compliance every year. Therefore, in this study, Pamekasan Tax Office was chosen to obtain empirical evidence whether the variables in this study were the cause of individual taxpayers in Pamekasan Regency not fulfilling their tax obligations accurately. This research is expected to contribute to the development of policy recommendations for the Directorate General of Taxes regarding efforts to increase individual taxpayers' tax morale, which are expected to help increase individual taxpayer compliance (Vythelingum et al., 2017).

The remainder of this paper is structured as follows. Section 2 literature review and develops the research hypotheses. Section 3 describes the sample, variables, and research design. Section 4 specifies the empirical result. Section 5 summarizes the paper and presents concluding remarks.
2 Literature Review and Hypotheses Development

2.1 Theory of Planned Behavior

The theory of Planned Behavior describes a central factor in individual behavior influenced by individual intentions for certain behaviors (behavioral intention). The intention to act is influenced by attitude, subjective norm, and perceived control behavior (Ibrahim, Musah, & Abdul-Hanan, 2015; Sukoco, Hardi, & Qomariyah, 2018; Herachwati, Sulistiawan, & Alfirdaus, 2018). Income level variables and tax sanctions are variables included in perceived behavioral control, while trust in government is a variable that is included in subjective norm. Perceived behavioral control is related to whether someone is affluent to do a particular behavior. A person's belief in the driving or inhibiting factors of behavior is called control belief. Meanwhile, the subjective norm is a person's understanding of the social impact of modeling behavior (Alasfour, Samy, & Bampton, 2016). The views of another group or individual can be a consideration in one's behavior. If another group or individual encourages someone to do a behavior, that individual will do it, and vice versa (figure 1).

![Figure 1. Theory of Planned Behavior](image)

2.2 Theory of Slippery Slope

Theory of Slippery Slope is a theory which states that tax compliance will be formed because of two things, namely the power of authorities and trust in authorities. The power of authority is the taxpayer's perception of the tax authorities' ability to detect and provide penalties for taxpayers who violate tax regulations. Trust in authority is the opinion of an individual or social group that the tax authority has a dependable performance and works for the good of society. This theory explains that social psychology and deterrence variables can affect tax compliance (Cyan, Koumpias, & Martinez-Vazquez, 2016).

2.3 Mediation Role of Tax Moral in Relationship between Income Level and Individual Taxpayer Compliance

The effect of income levels with tax morale is challenging to assess theoretically (Cyan et al., 2016). It depends on individual risk preferences and progressive rates that apply. Individuals prefer to spend their income on their daily needs rather than pay taxes. Individuals with sufficient or even high-income levels will be better able to meet their daily needs and, at the same time, fulfill their tax obligations. Meanwhile, individuals with an income level that can only be used to meet their daily needs will find it more challenging to fulfill their tax obligations. The level of income in the theory of planned behavior is related to control belief. It means that how healthy one's income level influences one's tax morale is in encouraging or inhibiting tax morale.
Research conducted by Solichah and Soewarno (2019) stated that an individual's income level has no relationship with the tax morale of the individual. In contrast to the research of Grundmann and Lambsdorff (2017) also Tambun and Kopong (2017) which explains how income and tax rates encourage someone to commit tax fraud. In this study, the results show that the level of income has a negative relationship with tax morale, meaning that the increase in an individual's income leads to a decrease in the moral tax he has.

Based on the theory of planned behavior, the level of income can affect a person's intention to behave; this intention will later encourage or hinder the behavior of taxpayers in complying with their obligations. It is human nature to think that if you cannot pay, why should you. If you can pay less, why should you pay more (Kamil, 2015; Rahmiati & Sandi, 2018). Taxpayers who have high incomes will tend to use their income for their own needs and have low motivation to act in compliance with taxes. Meanwhile, those with low income are considered to have high motivation to pay taxes because if they violate and are known by the tax authorities, then the sanctions they must bear will be much burdensome for them in the future. The level of income has a relationship with taxpayer compliance (Williams & Krasniqi, 2017; Mahestyanti, Juanda, & Anggraeni, 2018).

H1: The income level has relationship with individual taxpayer compliance through tax moral

2.4 Mediation Role of Tax Moral in Relationship between Tax sanctions and Individual Taxpayer Compliance

The theory of Planned Behavior describes tax sanctions related to control belief, which means that tax sanctions can encourage or inhibit an individual's intention to behave in compliance with taxes. The imposition of strict tax sanctions for violators will boost taxpayers' tax morale, which will later influence their behavior to comply with their tax obligations. This relationship is in accordance with the control belief in the Theory of Planned Behavior. Following the theory of decision making, giving strict sanctions to those who do not comply with tax regulations is one of the alternatives expected to reduce the perpetrators of tax fraud. Taxpayers who think about the tax sanctions that will be received if they commit tax fraud will be motivated to carry out their obligations honestly. Research conducted by Williams and Horodnic (2015) and Bejaković and Bezeredi (2019) states that tax sanctions have a relationship with tax morale. Tax sanctions relate to taxpayer compliance based on research conducted by (Basri & Dwimulyani, 2018).

H2: Tax sanctions has relationship with individual taxpayer compliance through tax moral

2.5 Mediation Role of Tax Moral in Relationship between Trust in the Government with Individual Taxpayer Compliance

In the Theory of Planned Behavior, trust in the government is included as normative belief, which means normative expectations from other people. The reliable performance of the government will motivate taxpayers to comply with their tax obligations (Hussain et al., 2020). Trust is not an attitude that can be demanded by the government to taxpayers, but the taxpayer who determines whether he or she gives confidence in the government or not (Torgler & Schneider, 2005; Sitorus, 2018). However, the government can encourage this sense of trust by building a good reputation. According to Brink and Porcan (2016), there are two essential aspects, namely, first, the transparency of procedures established by the government. This transparency means that if the procedures are communicated clearly and openly, and taxpayers can easily understand decisions by the government and tax officials, the motivation to comply with tax laws is much higher, and vice versa. Second, taxpayers respond systematically to the treatment of members of the government, meaning that proper treatment from the government will tend to increase the taxpayer's intrinsic motivation to comply. Trust in government relate to tax morale (Pratama, 2018). Also, the government's tax services in the form of facilities or activities that can support taxpayers in carrying out their obligations. The tax services will also increase taxpayer confidence in the government and obey in carrying out tax obligations (Paramaduhita & Mustikasari, 2018; Rahmat et al., 2019). Service is considered to have value-added when service providers can work according to precise procedures,
rules, and standards (Leonardo & Martinez-Vazquez, 2016, Fernandes & Rinaldo, 2018). The existence of services through the online system also makes it easier for taxpayers to carry out their tax obligations and rights, so that compliance will increase (Blaufus, Braune, Hundsdoerfer, & Jacob, 2015; Astutik, Harymawan, & Nasih, 2018). It is vital to building trust between citizens and the government to eliminate one's intention to avoid taxes (Williams & Horodnic, 2016). This importance means that when a person has confidence in the government, he or she will believe that the taxes flowing into the government treasury will be adequately used by the government so that he or she will be motivated to comply in paying his taxes. Trust in government can relate to taxpayer compliance (Dulleck et al., 2016; Dobrovič et al., 2016; Rajnoha et al., 2017; Chong & Arunachalam, 2018; Musimenta, Naigaga, Bananuka, & Najjuma, 2019; Liu et al., 2019).

**H3: Trust in the government has relationship with individual taxpayer compliance through tax moral**

3 **Research Methodology**

3.1 **Sample and Data Sources**

This research is included in quantitative research with a questionnaire as the primary data source, namely a questionnaire with 1-5 Likert scale measurements. Individual taxpayers in Pamekasan Regency in 2019 are the population in this study using probability sampling and the Slovin formula. The number of research samples obtained is 100 individual taxpayers in Pamekasan Regency.

3.2 **Operational Definition and Variable Measurement**

All variables in this study used a Likert scale measurement with numbers 1 - 5 with a number 1, which means strongly disagree and number 5 means strongly agree to describe the level of respondent's approval of the statements in the questionnaire.

3.2.1 **Dependent Variable**

Taxpayer Compliance

Taxpayer compliance is an obedient attitude and conscious behavior to be orderly in fulfilling their tax obligations and rights (Jimenez & Iyer, 2016; Hasan, Gusnardi, & Muda, 2017; Paramaduhita & Mustikasari, 2018; Rita et al., 2018). The research questionnaire for taxpayer compliance variables was developed from Bruno (2019) research with taxpayer compliance variable indicators, namely (1) compliance in registering as taxpayers, (2) compliance in submitting a tax return, (3) compliance in paying taxes payable, (4) has no tax arrears, and (5) has never been sentenced to criminal taxation.

3.2.2 **Independent Variable**

**Income Level**

Based on the Indonesian Income Tax Law Article 4 paragraph 1, income is defined as additional economic capacity received by taxpayers from inside and outside Indonesia, which can be used for consumption or added to the taxpayer's wealth, regardless of name and form. The income level variable questionnaire was developed from Haswidar's (2016) research with variable indicators of income level: (1) income level, (2) high and low income, and (3) taxable income.

**Tax sanctions**

Tax sanctions guarantee that taxpayers will comply with the applicable Indonesian Taxation Laws (Cvrlje, 2015). So, tax sanctions can be interpreted as a preventive tool to ensure that taxpayers do not violate applicable tax rules. The research questionnaire was developed from research by Horodnic (2018) with variable indicators of tax sanctions, namely (1) understanding of taxpayers on tax penalties, and (2) taxpayer compliance with tax sanctions.
Trust in the Government
Trust in the government is a taxpayer's belief to the government regarding the implementation of the applicable taxation system. The research questionnaire on trust in government was developed from Çevik (2016) and Juwanti (2017) with indicators of trust in the government, namely, (1) Trust in the government, (2) Trust in the legal system, (3) Trust in the judiciary, (4) Trust in levies taxes that are reallocated back to the public, (5) Trust in tax collectors.

3.2.3 Intervening Variable
Tax morale is an intrinsic motivation that an individual has to pay taxes (Parlaungan, 2017). The research questionnaire for the tax morale variable was developed from the research of Belmonte, Dell'Anno, and Teobaldelli (2018) with indicators of the tax morale variable, namely (1) one's actions, (2) motives, and (3) circumstances.

3.3 Research Design
This study uses path analysis techniques to determine the relationship directly or indirectly by using SPSS software. This study uses several analytical techniques, such as descriptive statistics, data quality testing (reliability and validity), ordinary least square regression, and determination coefficient test. The path analysis equation is formulated in the following equation:

\[ Z = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \varepsilon_1 \]  
\[ Y = \alpha + \beta_4X_1 + \beta_5X_2 + \beta_6X_3 + \beta_7Z + \varepsilon_2 \]  

Where Z is the tax morale, α is a constant, β is the path coefficient, X_1 is the income level, X_2 is the tax sanctions, X_3 is the trust in the government, and ε is the tolerable error.

4 Result and Discussion
4.1 Respondent Characteristics (see table 2)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years old</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-25 years</td>
<td>14</td>
<td>14%</td>
</tr>
<tr>
<td>26-40 years</td>
<td>33</td>
<td>33%</td>
</tr>
<tr>
<td>More than 40 years</td>
<td>53</td>
<td>53%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>61</td>
<td>61%</td>
</tr>
<tr>
<td>Female</td>
<td>39</td>
<td>39%</td>
</tr>
<tr>
<td>Job</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td>75</td>
<td>75%</td>
</tr>
<tr>
<td>Entrepreneur</td>
<td>18</td>
<td>18%</td>
</tr>
<tr>
<td>Freelance</td>
<td>7</td>
<td>7%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior High School</td>
<td>24</td>
<td>24%</td>
</tr>
<tr>
<td>Associate’s Degree</td>
<td>8</td>
<td>8%</td>
</tr>
<tr>
<td>Bachelor</td>
<td>59</td>
<td>59%</td>
</tr>
<tr>
<td>Master</td>
<td>9</td>
<td>9%</td>
</tr>
<tr>
<td>Doctoral</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Lain-lain</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

This research makes individual taxpayers registered at Pamekasan Tax Office as research subjects. The total amount of individual taxpayers at Pamekasan Tax Office are 94,549 people. The number of samples in this study was 100 individual taxpayers in Pamekasan Regency.
4.2 Data Quality Test

Table 3. Result of Reliability and Validity Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Item</th>
<th>Cronbach’s Alpha</th>
<th>Corrected Item-Total Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0.612</td>
<td>0.542</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.611</td>
<td>0.537</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.623</td>
<td>0.511</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.692</td>
<td>0.389</td>
</tr>
<tr>
<td>Income Level (X1)</td>
<td>1</td>
<td>0.782</td>
<td>0.371</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.679</td>
<td>0.649</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.707</td>
<td>0.562</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.691</td>
<td>0.588</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.715</td>
<td>0.526</td>
</tr>
<tr>
<td>Tax Sanctions (X2)</td>
<td>1</td>
<td>0.780</td>
<td>0.394</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.723</td>
<td>0.493</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.665</td>
<td>0.656</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.680</td>
<td>0.624</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.714</td>
<td>0.519</td>
</tr>
<tr>
<td>Trust in the Government (X3)</td>
<td>1</td>
<td>0.720</td>
<td>0.413</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.657</td>
<td>0.653</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.692</td>
<td>0.480</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.746</td>
<td>0.343</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.678</td>
<td>0.554</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0.680</td>
<td>0.525</td>
</tr>
<tr>
<td>Tax Moral (Z)</td>
<td>1</td>
<td>0.720</td>
<td>0.413</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.657</td>
<td>0.653</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.692</td>
<td>0.480</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.746</td>
<td>0.343</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.678</td>
<td>0.554</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0.680</td>
<td>0.525</td>
</tr>
<tr>
<td>Taxpayer Compliance (Y)</td>
<td>1</td>
<td>0.714</td>
<td>0.733</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.823</td>
<td>0.407</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.770</td>
<td>0.558</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.733</td>
<td>0.688</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.763</td>
<td>0.583</td>
</tr>
</tbody>
</table>

The reliability test results prove that the Cronbach's Alpha value for each item of each variable is > 0.6, meaning that all of the research variables can be said to be reliable in their use. Table 3 also shows the validity test results on the indicators in all variables with the Corrected Item-Total Correlation for all indicator variables being more than 0.3. This value means that all indicators of the research variables are valid and sufficient to be used as indicators in this study.

4.3 Analysis of Ordinary Least Square Regression

Table 3. Result of Ordinary Least Square Regression

<table>
<thead>
<tr>
<th>Model</th>
<th>Coeff.</th>
<th>t</th>
<th>Sig.</th>
<th>Coeff.</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>1.716</td>
<td>0.089</td>
<td></td>
<td>3.804</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Income Level</td>
<td>0.427</td>
<td>4.642</td>
<td>0.000</td>
<td>-0.182</td>
<td>-1.776</td>
<td>0.079</td>
</tr>
<tr>
<td>Tax Sanctions</td>
<td>0.250</td>
<td>2.942</td>
<td>0.004</td>
<td>0.304</td>
<td>3.274</td>
<td>0.001</td>
</tr>
<tr>
<td>Trust in the Government</td>
<td>0.141</td>
<td>1.712</td>
<td>0.090</td>
<td>0.189</td>
<td>2.237</td>
<td>0.028</td>
</tr>
<tr>
<td>Tax Moral</td>
<td>0.470</td>
<td>4.558</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.440</td>
<td></td>
<td>0.434</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.423</td>
<td></td>
<td>0.410</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Table 4. Result of Indirect Relationship Test**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Direct Relationship</th>
<th>Indirect Relationship</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₁: Income Level (X₁) → Taxpayer Compliance (Y) through Moral Tax (Z)</td>
<td>-0.182</td>
<td>0.201</td>
<td>Significant relationship</td>
</tr>
<tr>
<td>H₂: Tax Sanctions (X₂) → Taxpayer Compliance (Y) through Moral Tax (Z)</td>
<td>0.304</td>
<td>0.122</td>
<td>Not significant relationship</td>
</tr>
<tr>
<td>H₃: Trust in the Government (X₃) → Taxpayer Compliance (Y) through Tax Moral (Z)</td>
<td>0.189</td>
<td>0.066</td>
<td>Not significant relationship</td>
</tr>
</tbody>
</table>

The indirect relationship on hypothesis 1 is 0.201 (0.427 x 0.470). (See table 3 and table 4). This relationship value is greater when compared to the direct relationship, which has a beta value of -0.182; this means that H₁ is accepted. Besides, a Sobel test was also conducted to determine whether tax morale significantly mediates the relationship between income levels and individual taxpayer compliance:

\[
z = \frac{p_1 p_7}{\sqrt{p_1^2 S_{p_7}^2 + p_7^2 S_{p_1}^2}}
\]

(3)

\[
z = \frac{0.624 \times 0.337}{\sqrt{0.624^2 \times 0.074^2 + 0.337^2 \times 0.134^2}}
\]

(4)

\[
z = \frac{0.210288}{0.06458969022}
\]

(5)

\[
z = 3.2558923379
\]

(6)

The results obtained are 3.256 because the z value obtained is 3.256> 1.96 indicates that tax morale significantly mediates the relationship between income levels with individual taxpayer compliance. The indirect test value in hypothesis 2 shows a number of 0.122 (0.259 x 0.470) lower than the beta value of the direct relationship of 0.304. This value means that there is no relationship between income levels with individual taxpayer compliance through tax morale, meaning that H₂ is rejected. The third hypothesis has an indirect test value of 0.066 (0.141 x 0.470) lower than the direct relationship beta value of 0.189. Like the second hypothesis, the third hypothesis is rejected as there is no relationship between trust in the government and individual taxpayer compliance through tax morale. This conclusion is derived as indirect relationship value is lower than the direct relationship value.

### 4.4 Coefficient of Determination

Table 3 shows that the R² result in model 1 is 0.440. This value means that the variable level of income, tax sanctions, and trust in government can explain the variances of tax morale by 44%, while the remaining 56% tax morale is influenced by other variables that excluded in this study. Whereas in model 2, R² shows the number 0.434. Like the previous explanation, 43.4% of taxpayer compliance variances are explained by tax morale, income level, tax sanctions, trust in the government, and other variables defining the rest (56.6%).

### 4.5 Relationship between Income Level and Individual Taxpayer Compliance through Tax Moral

The results of the first hypothesis test empirically prove the existence of the relationship between income levels with individual taxpayer compliance through tax morale. The test results prove that the relationship between income levels with taxpayer compliance is mediated by tax morale. The results of this test are consistent with the Theory of Planned Behavior, namely, the level of income can raise tax morale, which will later influence taxpayer behavior, in this case, the behavior to comply with taxes (Zattoni et al., 2017).
Most individual taxpayers state that the amount of tax that taxpayers pay depends on their income, whether the taxpayer's income is big or small, does not prevent them from paying taxes, and taxpayers are transparent in reporting taxes. Most of the respondents also agreed that the respondent reported the actual amount of income in the income tax return continued to pay taxes even though he or she could neglect to pay the income tax. Although it did not cause the government to lose, the respondents still reported the actual income. These indicators can indicate that the level of taxpayer income can boost tax morale and make taxpayers obey the taxpayer regulations. The results of this study are in line with Lisi (2015) research with the results that the income level has a relationship with tax morale. Tax morale having a relationship with tax compliance (Mickiewicz, Rebmann, & Sauka, 2019; Musimenta et al., 2019).

4.6 Relationship between Tax Sanctions and Individual Taxpayer Compliance through Tax Moral
The second hypothesis test results prove that there is no relationship between tax sanctions and taxpayer compliance. These results indicate that tax morale cannot mediate the relationship between tax sanctions with taxpayer compliance so that the second hypothesis is rejected. Therefore, the results of this test are not in line with the Theory of Planned Behavior (Buallay, Hamdan, & Zureigat, 2017), which explains that control belief can influence individual behavior to mediate it. However, the test results are consistent with the Theory of Slippery Slope. This theory states that taxpayer compliance will be formed with the power of authorities, which is the taxpayer's perception of the tax authorities' ability to impose penalties on taxpayers who do not comply with tax regulations in the form of tax sanctions (Chan, Supriyadi, & Torgler, 2017). That is, tax sanctions can directly relate to taxpayer compliance without being mediated by other variables.

The majority of respondents felt that they agreed to understand tax sanctions well, heavy tax sanctions could encourage taxpayer compliance, and tax sanctions could prevent taxpayers from neglecting to fulfill their tax obligations (Vandebeek, Voordeckers, Lambrechts, & Huybrechts, 2016). Most of these respondents also agreed with the statement that they registered their tax identity number after meeting the requirements as a tax subject or tax object, submitted their income tax return by March 31, and did not have tax arrears. The imposition of tax sanctions is intended so that taxpayers do not violate tax regulations (Yucedogru & Hasseldine, 2016). Tax sanctions will encourage them to fulfill their tax obligations because they will see tax sanctions will make them paid additional cash for tax sanctions if they think not to carry out their tax obligations.

4.7 Relationship between Trust in the Government and Individual Taxpayer Compliance through Tax Moral
The results of the third hypothesis test prove that there is no relationship between trust in the government with taxpayer compliance through tax morale (Agyapong, Ellis, & Domeher, 2016). This mediation result is smaller than the result of the direct relationship test, so this second hypothesis is rejected. This result is different from the Theory of Planned Behavior, which shows that belief in government is included in a normative understanding which will encourage someone's intrinsic motivation, which will affect taxpayer compliance. However, this result is consistent with the Theory of Slippery Slope (Ciftci, Tatoglu, Wood, Demirbag, & Zaim, 2019), which states that taxpayer compliance will emerge with trust in authorities, which are taxpayers' perceptions of the tax authorities' performance. Taxpayers think that the tax authorities' performance is trustworthy and works best for the public welfare (Paniagua, Rivelles, & Sapena, 2018).
5 Conclusion

This study aims to obtain empirical evidence about the relationship between income levels, tax sanctions, and trust in the government with individual taxpayer compliance through tax morale. The results of path analysis with SPSS software on the results of a survey of 100 individual taxpayers in Pamekasan Regency provide several conclusions. The results of this study are the income level has a relationship with individual taxpayer compliance through tax morale, but tax sanctions and trust in the government do not have a relationship with individual taxpayer compliance through tax morale. This research is expected to contribute to the development of policy recommendations for the Directorate General of Taxes regarding efforts to increase the tax morale of individual taxpayers, which are expected to help increase individual taxpayer compliance.

The limitation of this research is that the research scope is still limited, which is only in Pamekasan Regency. Meanwhile, tax morale can be researched on all taxpayers throughout Indonesia, limiting the generalizability of research results to measure the relationship between tax morale and individual taxpayer compliance. Further research related to tax morale can add other independent variables. In addition, further researchers can research with a more extensive scope.

Acknowledgement

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References


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THE EFFECT OF INTELLECTUAL CAPITAL, RATE OF GROWTH OF INTELLECTUAL CAPITAL (ROGIC) ON FINANCIAL PERFORMANCE WITH THE PROPORTION OF INDEPENDENT COMMISSIONERS AS MODERATED VARIABLES

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Abstract. Purpose of this study is to empirically examine the effect of intellectual capital, the average intellectual capital growth (ROGIC) on the company's financial performance with the proportion of independent commissioners as a moderating variable. The data sample of this research is insurance companies listed on the Indonesia Stock Exchange (BEI) for the period 2011-2018. This study uses multiple linear regression analysis techniques and regression analysis moderated (MRA) to test the hypothesis. The results of this study indicate that intellectual capital has a significant positive effect on financial performance and independent commissioners moderate the significant negative relationship between intellectual capital and financial performance. However, we fail to prove that ROGIC has no relationship with financial performance and the proportion of independent commissioners does not moderate the relationship between ROGIC and financial performance.

Keywords: intellectual capital; financial performance; rate of growth of intellectual capital; risk based capital; insurance


Jel Codes: O1, O53

1 Introduction

The development of insurance in Indonesia has shown a fairly rapid rate of progress. This increase has made insurance companies have a larger number of clients (Chahal & Bakshi, 2015). According to the Minister of Finance Regulation No.53 / PMK.10 / 2012, insurance companies are required to set a solvency level target each year of at least 120% of the minimum capital and must meet a solvency level of at least 100% of the risk-based minimum capital. Risk Based Capital (RBC) is the ratio of the capital adequacy ratio to the risks borne by the company (Murray et al., 2016; Valencia et al., 2020), and is an indicator in assessing the performance and health of insurance companies. Capital structure is an important aspect for the company (Ahlers; Cumming, Günther, & Schweizer, 2015; Sadalia et al 2017).

The company's financial performance will be good and the company will excel in business competition if the company owns, controls, and utilizes tangible and intangible assets (Abualoush, Masa’deh, Bataineh, & Alrowwad, 2018). Based on the Resource Based Theory to create added value for the company, the company must be able to utilize and manage its existing resources, both tangible and intangible resources. Companies are also increasingly aware that the ability to compete does not only lie in the ownership of tangible assets but more in intangible assets (Inkinen, 2015). One of the intangible assets that can add value to the company is intellectual capital (Nimtrakoon, 2015). Human capital and structural capital are major components that determine asset diversity decisions (Duho & Onumah, 2019; Agusman et al., 2019; Massingham & Tam, 2015). The higher human
capital, primarily reflected in the work experience, will result in increasing the capital of culture in the working environment (Friede, Busch, & Bassen, 2015; Rossi, Nicolò, & Polcini, 2018; Nirwana, 2018).

**Intellectual capital (IC)** is the accumulated performance of the three main elements of the company human capital, structure capital, and customer capital that can provide added value to the company in the future (Sawarjuwono and Kadir, 2003; Valantine & Collins, 2015). Various studies on intellectual capital have been conducted in Indonesia (Naser, Al Shobaki, & Amuna, 2016; Tjahjadi et al., 2019; Hariyati et al., 2019; Utama & Mirhard, 2016; Naimah & Mukti, 2019). The development of intellectual capital (IC) is growing very rapidly as seen from the number of business organizations that use intellectual capital (IC) as a plan to increase financial performance and create value for the company (Singh, Sidhu, Joshi, & Kansal, 2016). In companies in the financial sector, especially insurance companies, intellectual capital is a very important intangible asset. Research studies state that 50-90 percent of the value generated for business organizations or companies in the economy is due to intellectual capital compared to capital production and sales (Secundo, Dumay, Schiuma, & Passianate, 2016). In line with this, a research study conducted by (Secundo et al., 2016) shows that intellectual capital is proven to improve financial performance. We argue that the rate of growth of intellectual capital (ROGIC) can be used to predict future financial performance (Qiu, Shaukat, & Tharyan, 2016).

A business organization needs to balance aspects of good corporate governance (Kianto, Sáenz, & Aramburu, 2017; Sari et al., 2018). One of the good corporate governance mechanisms is an independent commissioner (North & Kumta, 2018; Muda et al., 2018). According to (Dumay & Guthrie, 2017) independent commissioners can act as moderators and decomposers in disputes that occur between internal managers and supervise management policies and provide consultation to management. Therefore, when the components of the independent board of commissioners are getting bigger, it will encourage management to improve the company's financial performance.

Research on intellectual capital still shows inconsistent results. (Hussinki, Ritala, Vanhala, & Kianto, 2017) states that IC has an effect on ROA, while (Engelman, Fracasso, Schmidt, & Zen, 2017) states that IC has no significant effect on ROA. Research GAP also occurs in research by (Žilvinas & Leitner, 2015) The study states that the independent commissioner as an independent variable has a significant effect on financial performance, whereas according to research from (Žilvinas & Leitner, 2015) when the independent commissioner is a moderating variable, the independent commissioner is unable to moderate it (Agostini & Nosella, 2017). IC on financial performance. Therefore, in this study, we want to analyze the relationship between intellectual capital and company performance and the effect of independent commissioners as a moderating variable between the relationship between intellectual capital and company performance (Han & Li, 2015).

This type of research is quantitative research. The sampling technique used purposive sampling on insurance companies listed on the Indonesia Stock Exchange in 2011-2018. The hypothesis in this study was tested using multiple regression analysis techniques and moderating regression analysis (MRA) with SPSS version 23 for windows. The results showed that intellectual capital had a significant positive effect on financial performance (risk-based capital), and the presence of an independent commissioner was able to moderate the relationship of intellectual capital to financial performance. However, ROGIC has no effect on financial performance (risk-based capital) and the proportion of independent commissioners does not moderate ROGIC on financial performance (Zambon & Dumay, 2016).

The remainder of this paper is structured as follows. Section 2 literature reviews and develops the research hypotheses. Section 3 describes the sample, variables, and research design. Section 4 specifies the empirical result. Section 5 summarizes the paper and presents concluding remarks.
2 Literature Review

2.1 The Effect of Intellectual Capital on Financial Performance

This hypothesis was developed based on stakeholder theory and resource-based theory. Stakeholder theory is not a theory that only principled that business organization operating only for personal interest of the company itself but also to be able to provide benefits to all stakeholders, namely shareholders, customers, suppliers, creditors, communities, governments, and other parties. The main objective of this theory is to help managers create added value from company operations and minimize losses that may arise for stakeholders (De Villiers & Sharma, 2017). To create added value for stakeholders, the resource-based theory put forward by (Secundo, Del Vecchio, Dumay, & Passiante, 2017) explains that companies will excel in market competition and get good financial performance by means of owning, controlling, and utilizing tangible assets and intangible assets. In creating value added, a company must be able to manage all its potential, including physical assets physical (capital), employees (human capital), and structural capital, which is known as the component of the Value Added Intellectual Efficiency Method (Khalique, Bontis, Bin Shaari, & Isa, 2015). So that it can improve the company's financial performance for the benefit of stakeholders (Khalique et al., 2015). When the company's financial performance increases, the company's value will also increase (Bontis, Janošević, & Dženopoljac, 2015). According to research by (Osadchy & Akhmetshin, 2015) that intellectual capital has a relationship with financial performance and is able to encourage financial performance variables. Based on the description above, the hypothesis can be stated, namely:

H1: Intellectual capital has a positive effect on financial performance.

2.2 The influence of intellectual capital on financial performance is moderated by the proportion of independent commissioners.

This hypothesis was developed based on Resource Based Theory, Agency Theory and Stakeholder Theory. With the implementation of good corporate governance (GCG), companies can overcome or reduce agency problems. The company realizes that the implementation of GCG is a form of upholding business ethics and work ethics which have long been the company's commitment. The implementation of GCG helps companies report relevant information regarding tangible assets and intangible assets. Companies that practice GCG, will experience improved image, and increased company performance, as well as increased corporate value (Cuozzo, Dumay, Palmaccio, & Lombardi, 2017; Sagiyeva, Zhuparova, Ruzanov, Doszhan, Askerov, 2018). One form of the GCG mechanism is the existence of an independent commissioner. In accordance with the resource-based theory, having an independent commissioner can improve the supervisory function of the company in managing the assets intellectual company's. (Cricelli, Greco, Grimaldi, & Dueñas, 2018) show that IC performance has a significant effect on ROA, which means that any increase in intellectual capital growth will increase the company's profitability. The size of the board of commissioners, the size of the independent commissioners, and the size of the board of directors can strengthen the relationship between IC and profitability. Based on the description above, the following hypothesis can be stated.

H2: The proportion of independent commissioners positively moderates intellectual capital on financial performance.

2.3 The Effect of Rate of Growth of Intellectual Capital (ROGIC) on Financial Performance

In line with the Resource Based Theory, if the company has high intellectual capital, it will tend to have an increase in financial performance in the future. According to (Khalique, Bontis, Shaari, Yaacob, & Ngah, 2018) the increasing average IC growth will also have a positive relationship with financial performance in the future. For this reason, the third hypothesis in this study is as follows:

H3: ROGIC has a positive effect on future financial performance
2.4 Effect of Rate of Growth of Intellectual Capital (ROGIC) on Financial Performance as moderated by the Proportion of Independent Commissioners

Independent commissioners are a form of control mechanism for achieve a balanced relationship between stakeholders. Companies will get the maximum and optimal IC if resources intellectual (Resource Based) are equipped with good operations and systems (Hamdan, 2018) show that GCG is able to moderate IC on financial performance. So that when GCG is able to moderate IC on financial performance, it is hoped that GCG will also be able to moderate ROGIC on future financial performance. Rate of Growth Intellectual Capital (ROGIC) as an independent variable has a significant positive effect on financial performance at Islamic commercial banks (Ozkan, Cakan, & Kayacan, 2017). Based on this, the hypothesis is as follows.

H₄: The proportion of independent commissioners positively moderates the Rate of Growth of Intellectual Capital (ROGIC) on financial performance.

3 Methods

3.1 Sample and Data Source

This research uses data sources from insurance companies in Indonesia which are listed on the Indonesia Stock Exchange for the years 2011-2018. The final sample for this study amounted to 72 observations from 9 different companies. This study uses secondary data in the form of annual reports in the years 2011-2018. The data in this study were obtained through the company's annual reports which have been published on website the Indonesia Stock Exchange(www.idx.co.id).

3.2 Variable Measurement

3.2.1 Dependent Variable

Risk Based Capital

The dependent variable in this study is financial performance using as a proxy risk-based capital (RBC). The risk-based capital method is a method of measuring financial performance by using the minimum level of solvency required by law (Ozkan et al., 2017). According to the Decree of the Minister of Finance No.424 / KMK.06 / 2004, the formula used is:

\[ \text{Risk Based Capital} = \frac{\text{Solvency}}{\text{Minimum Solvency Level}} \times 100\% \]

To see the acquisition of risk-based capital an insurance company, it can be assessed from the ratio of the difference in wealth owned. And obligations that must be paid (solvency level). This measurement is carried out with the minimum limit that may arise as a result of deviations in the management of assets and liabilities.

3.2.2 Independent Variable of Intellectual Capital

The independent variable in this study is intellectual capital (IC). The Public (1998) method for measuring intellectual capital in a company can be done using the Value-Added Intellectual Efficiency Method (VAIC). The advantage of this method is that it uses data that is easily obtained from the company's financial statements (Dženopoljac, Janošević, & Bontis, 2016). Steps in calculating VAIC are as follows:

a. First is to calculate the company's ability to create added value for the company or value added (VA), (Alhassan, Asare, Adcroft, & Murphy, 2016) calculates added value by means of the difference between outputs (OUT) and input (IN).

\[ \text{VA} = \text{OUT-IN} \] (1)

where OUT is the total income earned by the company and IN is all costs and expenses except employee expenses.
b. Second is measuring human capital (HC). This measurement is related to the relationship of human capital to create *added value* for the company. Namely, how much added value is generated by the company at the costs incurred by the company for employees.

\[ \text{VAHU} = \frac{\text{VA}}{\text{HC}} \]  
(2)

Where VAHU is a *value-added human capital coefficient*; VA is a value-added company and HC is *Human capital* (total employee expenses).

c. Third is calculating *Structural Capital Value Added* (STVA). This ratio indicates how *structural capital* is in value creation.

\[ \text{STVA} = \frac{\text{SC}}{\text{VA}} \]  
(3)

Where STVA is *Structural capital value added*; SC is the *Structural capital* (VA-HC) and VA is the added value of the company.

d. Fourth is calculating the value added between VA (value added) with net income and total equity (CE). Value Added Capital Employed (VACA) is an indicator created by a company for investment in net income and total equity.

\[ \text{VACA} = \frac{\text{VA}}{\text{CE}} \]  
(4)

e. The fifth is to add up equations (1), (2), (3), and (4) namely Value-added Capital Employed (VACA), Value Added Human Capital Employment (VAHU), and *Structural Capital Value Added* (STVA). So that the formula for *Value added Intellectual Coefficient* (VAIC) as follows:

\[ \text{VAIC}^{TM} = \text{VACA} + \text{VAHU} + \text{STVA} \]  
(5)

**Rate of Growth of Intellectual Capital (ROGIC)**

The independent variable besides VAIC™ in this study is the *Rate of Growth Intellectual Capital* (ROGIC). ROGIC is the difference between the value *intellectual capital* from year t and the value of year t-1. ROGIC can be calculated by equation (6):

\[ \text{ROGIC} = \text{VAIC}^{TM}_{t} - \text{VAIC}^{TM}_{t-1} \]  
(6)

**Moderation**

Variable The moderating variable in this study is the size of the independent board of commissioners (INDCOM). The proportion of the Board of Independent Commissioners is carried out using the percentage method of the number of independent commissioners compared to the number of members of the board of commissioners (Alhassan et al., 2016).

**3.3 Methodology**

This type of research is quantitative research. The hypothesis in this study was tested using multiple regression analysis techniques and *moderating regression analysis* (MRA) with the SPSS 23 application. Multiple linear analysis was conducted to determine the effect of intellectual capital and logic variables on financial performance variables measured using risk-based capital. Multiple linear regression models are shown in model (7).

\[ \text{RBC} = \alpha + \beta_1\text{VAIC} + \beta_2\text{ROGIC} + e. \]  
(7)

This study also analyzed the size of the independent commissioners as the moderating variable. *Intellectual capital*, ROGIC is moderated by an independent proportion with a regression equation as in model (8).
The partial test aims to determine how far the interested variable affects company performance. This study also uses a significance level of 5% and 10%, so that the hypothesis will be accepted if the significance value is less than 10%.

4 Empirical Result
4.1 Descriptive Statistics

<table>
<thead>
<tr>
<th>Variabel</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAIC</td>
<td>72</td>
<td>-24.9005</td>
<td>10.4188</td>
<td>2.571988</td>
<td>3.8368114</td>
</tr>
<tr>
<td>ROGIC</td>
<td>72</td>
<td>-26.5090</td>
<td>24.5786</td>
<td>-0.247632</td>
<td>5.2574768</td>
</tr>
<tr>
<td>RBC</td>
<td>72</td>
<td>130.7464</td>
<td>572</td>
<td>241.75991</td>
<td>102.6112843</td>
</tr>
<tr>
<td>INDCOM</td>
<td>72</td>
<td>0.2</td>
<td>0.75</td>
<td>0.478072</td>
<td>0.1402826</td>
</tr>
</tbody>
</table>

Variable VAIC has a range of values from -24.9005 to 10.4188. The mean value of VAIC is 2.571988 and the standard deviation is 3.8368114. ROGIC is the level of intellectual capital growth of a company. The calculation results show that the lowest ROGIC value is -26.5090 while the highest ROGIC value is 24.5786 and the average value is -0.247632, and the standard deviation is 5.2574768. RBC is risk-based capital that shows the percentage of the insurance company's capital adequacy ratio. The healthier the insurance industry, the greater the solvency level of the insurance. The calculation results show that the lowest RBC value is 130.7464, while the highest RBC is 572 and the average value is 241.75991, and the standard deviation is 102.6112843. The variable KI is a proxy for the size of the independent commissioners in a company at the end of the year. The calculation results show that the lowest number of independent commissioners is 1 person, while the highest number of independent commissioners is 4, with the highest independent commissioner size ratio being 0.75 and 0.2 for the lowest. The average proportion of independent commissioners is 0.478072. Because independent commissioners have a major influence in making decisions for companies, the size and composition of independent commissioners must be considered and considered according to the company's needs.

4.2 The Influence of Intellectual Capital on Financial Performance

In Table 2, the t-test value on the VAIC variable is 2.117 with a significance level of 0.038. This significance value is less than 0.05 so that H1 is accepted. It can be concluded that intellectual capital or VAIC has a positive effect on risk-based capital. Companies with high intellectual capital tend to show a high level of risk-based capital. The higher the intellectual capital, the better the company's financial performance. With this result, the first hypothesis is accepted.

This can be explained through three interconnected relationships between Value added Capital Employed (VACA), Value Added Human Capital Employment (VAHU), and Structural Capital Value Added (STVA). Companies with high VACA will improve the financial performance of insurance companies. The existence of a productive VAHU with a level of knowledge, expertise, understanding and experience can benefit the company and become a potential element in improving financial performance. The STVA element provides a high efficiency of structural capital so as to improve the financial performance of insurance companies. Efficiency in using STVA is important because it is related to the level of financial health of the insurance company. The results of this study are also in accordance with the concept of resource-based theory (RBT) which explains that company resources consist of three types of physical, human and organizational resources to gain profitability.
Therefore, when VACA, VAHU, and STVA are added up, it will become intellectual capital (VAIC) which has an influence on financial performance, which is proxied by using risk-based capital.

Table 2: Results of Model 2 Regression Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple Linear Regression</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>T</td>
</tr>
<tr>
<td>Constants</td>
<td>4.829</td>
<td>12.976</td>
</tr>
<tr>
<td>VAIC</td>
<td>0.194</td>
<td>2.117</td>
</tr>
<tr>
<td>ROGIC</td>
<td>-0.084</td>
<td>-1.577</td>
</tr>
<tr>
<td>INDCOM</td>
<td>0.815</td>
<td>1.224</td>
</tr>
<tr>
<td>VAIC *INDCOM</td>
<td>-0.279</td>
<td>-1.714</td>
</tr>
<tr>
<td>ROGIC* INDCOM</td>
<td>-0.099</td>
<td>1.286</td>
</tr>
<tr>
<td>R</td>
<td>0.353</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.125</td>
<td></td>
</tr>
<tr>
<td>F Test</td>
<td>1.885</td>
<td></td>
</tr>
<tr>
<td>Significance</td>
<td>0.109</td>
<td></td>
</tr>
</tbody>
</table>

4.3 The Influence of Intellectual Capital on Financial Performance Moderated by the Independent Commissioner

The t-test value on the interaction between the intellectual capital variable and the independent commissioner is -1.714, with a significance level of 0.091. This significance value is less than 0.1, so that H2 is accepted. This means that independent commissioners moderate the effect of intellectual capital on risk-based capital. This implies that independent commissioners weaken the positive effect of intellectual capital on risk-based capital.

The results showed that the independent commissioners moderate the effect of intellectual capital on financial performance as proxied using risk-based capital. The existence of independent commissioners has a negative relationship between intellectual capital and risk-based capital. These results support the findings of (Wang, Wang, Cao, & Ye, 2016) which states that independent commissioners as an independent variable have a significant negative effect on financial performance.

4.4 Effect of Rate of Growth of Intellectual Capital (ROGIC) on Financial Performance

In table 2, the t test value on the ROGIC variable is -0.084 with a significance level of 0.120. This significance value is greater than 0.05 so that H3 is rejected. It can be concluded that the rate of growth of intellectual capital has no significant effect on risk-based capital. This shows that regardless of the level of growth, its intellectual capital does not make risk-based capital increase or decrease. This study supports the research of (Gogan, Artene, Sarca, & Draghi, 2016) that ROGIC does not affect the company's future financial performance. This research is also in line with the research conducted by (Dzenopoljac, Yaacoub, Elkanj, & Bontis, 2017) that ROGIC has no effect on future financial performance. This can be due growth of intellectual capital to the insignificant from the previous year. This also shows that the component of intellectual capital has not become a component yet. The main company so that its growth rate is difficult to measure the company's performance in the future.

4.5 The effect of Rate of Growth of Intellectual Capital (ROGIC) on Financial Performance Moderated by Independent Commissioners

In table 2, the t test value on the interaction between the ROGIC variable and independent commissioners is by 1286 the 0203 level of significance. This significance value greater than 0.1 so H4 is rejected. This means not moderate ROGIC independent directors on financial performance is proxied with risk-based capital. this research differs from research conducted (Saeidi, Sofian, Saeidi, Saeidi, & Saaeidi, 2015) which states that every increase
in IC growth will increase financial performance and independent commissioners will be able to strengthen intellectual capital on financial performance.

5 Conclusion
Based on the research conducted, it can be concluded that the Intellectual capital is proxied by VAIC has a positive effect on financial performance as proxied by risk-based capital. This shows that the higher the intellectual capital of the company, the higher the risk-based capital of an insurance company. In addition, independent commissioners moderated the effect of intellectual capital on risk-based capital, which was significantly negative. This shows that the higher the level of independent commissioners, the weaker the positive effect of intellectual capital on financial performance is proxied by risk-based capital.

However, we failed to proof that the rate of growth of intellectual capital or the average growth of intellectual capital has a significant effect on risk-based capital. In addition, independent commissioners do not moderate the influence of ROGIC on risk-based capital.

The limitation in this study is the measurement of the moderating variable, which is only proxied by using independent commissioners where independent commissioners are a component of good corporate governance. So, it is suggested for further research to use other measures good corporate governance such as managerial ownership, audit committee, institutional ownership, or board size. This study only uses companies in the insurance sector that are listed on the IDX. It is hoped that for further research, the entire sector on the IDX can be used to obtain more generalizable results. Companies in Indonesia are expected to increase the application of intellectual capital to improve the quality of the company's financial performance and provide benefit in the eyes of external parties.

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References


MODERATION ROLE OF RESEARCH AND DEVELOPMENT IN RELATIONSHIP BETWEEN FAMILY OWNERSHIP AND FINANCIAL PERFORMANCE

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Abstract. This study examines the research and development as a moderating variable in the relationship between family ownership and financial performance. This research uses a quantitative approach and secondary data. The population in this study is manufacturing firms listed on the Indonesia Stock Exchange in 2014-2018 using a 169 firm-year observation sample and selected by the purposive sampling method. Data analysis techniques for this study used moderated regression analysis (MRA). In this study, family ownership is measured through the proportion of shares owned by a family deflated by the total number of outstanding shares, research, and development are measured through a ratio between research and development expense with total sales and financial performance proxied with return on assets. The results found that family ownership has a positive relationship with financial performance, and research and development acts as a pure moderator that strengthens the relationship between family ownership with financial performance. This study provides practical implications for family firms to prioritize the research and development budget to enhance financial performance.

Keywords: Research and development; family ownership; financial performance


Jel Codes: L25, G32. O30

1 Introduction

In an increasingly dynamic digital market era (Astutik et al., 2018), concern and consistency with the implementation of research and development (R&D) which prioritizes innovation is essential to pay attention (Sopiyah et al., 2020; Teirlinck, 2017; Lincenyi, Michal, 2020) to both in corporations, in small-medium enterprises (Fawzeea et al., 2019; Hartanti, 2017; Muda et al., 2017; Hasan et al., 2020), and government (Puryantini et al., 2017; Plēta et al., 2020). Recent studies showed that the average firm that implements R&D activities produced a higher sales and profit rate of 4 to 13 percent compared to firms that did not implement R&D (Vandebeek et al., 2016). In line with that, believes that R&D is an intangible asset that contributes to a positive influence on financial performance. Indeed, every business entity is a house of innovation which, to improve its performance, firms must be innovation-oriented (Amar et al., 2016; Ilmi, 2017; Ilyas et al., 2017; Munizu & Hamid, 2018) where one of them is through R&D. R&D activities will be an alternative that will have a significant impact on the productivity of the firm's achievements. R&D activities are also closely related to the emergence of high technology, which can undoubtedly improve firm competitiveness and sustainability (Agyapong et al., 2016; Hasibuan & Hidayati, 2019).

One of the firm's achievements is assessed from financial performance. The fast pace of the business world must stimulate firms in improving financial performance. Financial performance can be measured by the profitability ratio, namely the firm's ability to earn a high profit through sales, assets, and capital. Various factors affect firm performance, one of which is the composition of share ownership (Iskandar et al., 2012; Zattoni et al., 2017).
In Indonesia, most firms with ownership characteristics are dominated by families. Based on data from the Indonesian Institute for Corporate and Directorship 2010, more than 95 percent of Indonesia's businesses are owned and controlled by families. The existence of a family is closely related to financial performance. Family firms are expected to behave better performance compared to its peers. (Revilla et al., 2016) states that agency conflict can be suppressed as families have strong incentives and more information from a long-term perspective, thereby reducing opportunistic actions and manager discretion. The family firm is identical to self-actualization, where the family is fully committed to running the business efficiently and effectively. The firm is an asset of the family itself and supports the heritage of the firm itself (Garcés et al., 2016). The existence of kinship ties followed by a sense of trust and loyalty (Fatemi et al., 2018; Burhan et al., 2020), as well as effective monitoring, firms with family ownership will bring more satisfying performance (Sardo & Serrasqueiro, 2017).

Various studies have been conducted on the relationship between family ownership with financial performance, but the results are still debatable. Although it can reduce agency costs, on the other hand, it triggers new agency conflicts, namely between majority and minority shareholders (D’Angelo et al., 2016). The family tends to distrust non-family (minority) shareholders so that all decisions tend to prioritize the family but disadvantage the minority. Conflict is more complicated when there is a dispute between family members that can damage the firm's reputation (Arteaga & Requejo, 2017). In addition, the family focuses too much on the internal, relying on what has existed from generation to generation and perpetuates the continuity of corporate traditions (Tsao et al., 2015). This behavior tends to make family firms complacent in competing in the global era. Thus, other factors are needed to strengthen the relationship between family ownership and performance, especially the problem of choosing a strategy that focuses on improving business performance. The inconsistency of the relationship between family ownership and performance is this study's motivation, where we examine the possibility of R&D as a moderating variable in the relationship (Abdullah & Ismail, 2016).

This study used 169 observations from manufacturing firms listed on the Indonesia Stock Exchange in the period 2014 to 2018. We used a purposive sampling method to collect data. To test the hypothesis of this study, we used Ordinary Least Square regression and Moderated Regression Analysis (MRA). We also use a multicollinearity test to ensure that the variables used in this study are free from the multicollinearity issue. This study found that family ownership has a positive relationship with firm performance. Furthermore, we also document that R&D strengthens the positive relationship between family ownership and firm performance. Therefore, it can be concluded that all the hypotheses proposed by this study have been accepted (Abbasi & Malik, 2015).

This research has several contributions, both practically and academically. First, this study provides essential information for family firms to prioritize R&D budgets if they want to improve their performance. This study finding also highlights that the agency conflict of family firms can be minimized with the prioritization of R&D activities. Second, this study contributes to the literature related to family firms, especially R&D in family firms, especially the debatable issue regarding the financial performance of family firms muffled by R&D activities (De Massis et al., 2015).

The remainder of this paper is structured as follows. Section 2 literature reviews and develops the research hypotheses. Section 3 describes the sample, variables, and research design. Section 4 specifies the empirical result. Section 5 summarizes the paper and presents concluding remarks.

2 Literature Review

Jensen and Meckling (1976) explained that the separation of ownership and management triggers contradictory situations or what is better known as agency conflict. This agency problem is faced by all firms (Gottardo & Moisello, 2015; Fitri et al., 2019), including family firms. In general, family ownership is considered to reduce type I agency problems due to strong incentives in the monitoring function (Hatak et al., 2016). The monitoring function is strengthened because the family better understands the business, and at the same time, they have superior control (Akhtar et al., 2015). On the other hand, the problem that often occurs in firms with family ownership dominance is the type II agency problem which incurred between the principals (Wagner et al., 2015),
namely majority and minority shareholders. This problem happens because intense domination by the family leads to acts of family expropriation, such as influencing management in decision making (Pittino et al., 2018).

The reduction in agency problems and the addition of other agency problems made the existence of family ownership unable to improve firm performance optimally. Resource-Based View (RBV) is a theory that describes how an organization creates a competitive advantage (Lee & Chu, 2017; Daengs et al., 2019; Nurhilalia et al., 2019). According to this theory, firms must be able to build unique and differentiated resources (Diéguez et al., 2016), which will increase public perception regarding the firm (Minichilli et al., 2016; Herlambang & Nasih, 2019; Sipayung et al., 2019). The RBV approach is useful for finding and exploring the organization's potential to be managed effectively and efficiently. In other words, this RBV implies that activities related to technology, namely R&D, are crucial for dealing with firm problems in increasing performance excellence (Munizu et al., 2019). This statement is in line with the research of Minichilli et al (2016) and Fernandes and Taba (2019), which found that high technology as a part of internal resources can increase human resources excellence in a firm (Minichilli et al., 2016).

2.1 Family Ownership and Financial Performance

The main concern of agency theory is that concentration of ownership can improve financial performance (Paniagua et al., 2018). Paniagua et al. (2018) explain that family ownership has the sensitivity and power to supervise managerial agents, which can reduce information asymmetry. This statement is also in line with the understanding that families even better understand their business (Ciftci et al., 2019). This understanding is because families have an intimate connection to the firm (Buallay et al., 2017). Agency problems can be reduced because, as a shareholder, the family will maintain and monitor the firm's running well (Lee, 2004). The family adheres to the commitments that are built into its long-term goals and tries to make the best decisions for the future and survival of the family's next generation. Based on this description, the hypothesis is proposed as follows:

H1: Family ownership has positive relationship with financial performance

2.2 Moderation Role of R&D in Relationship between Family Ownership and Financial Performance

Family businesses’ challenges for the next five years are rapid growth, the number of business competitors, and the importance of innovating. R&D can be an alternative for firms with family ownership because it is in line with a long-term perspective and a bright future for business sustainability in the future generations (Jaskiewicz et al., 2017; Harymawan et al., 2020). Based on the RBV perspective, firms with family ownership have great potential for innovation that can increase growth with R&D (Sardo & Serrasqueiro, 2017). In connection with the previous argument of agency theory, family ownership can overcome type I agency conflicts while raising type II agency conflicts. R&D activities as a part of intellectual capital will undoubtedly be able to help minimize the problem of differences in interests between shareholders faced by firms and family ownership (D’Angelo et al., 2016; Sadalia et al., 2019). Reducing these problems will enable managers to be more focused on better operational and strategic activities (Solakoglu & Demir, 2016). Based on this concept, the following hypothesis is proposed:

H2: R&D strengthen the positive relationship between family ownership with financial performance

3 Research Methodology

3.1 Sample and Data Sources

In this study, data sources are annual reports and financial reports of manufacturing firms listed on the Indonesia Stock Exchange (BEI) 2014-2018, which can be accessed through the website www.idx.co.id. The sample was taken by a purposive sampling method, which is required to provide complete data related to research variables. The final sample of this study was 169 firm-year observations.

3.2 Variable Operationalization

Family ownership as an independent variable is measured through the identification of founders in share participation. Family ownership is calculated by dividing the number of shares owned by the family divided by the number of shares outstanding.
R&D expenses are all costs incurred by the firm in the research and development of a product or sales. R&D expenses in this research include all development research costs that are charged in the current period. Measurement of R&D uses the same proxies as (Pindado & Requejo, 2015), namely R&D expenditure divided by total sales.

Financial performance acts as a dependent variable proxied based on accounting, which is explained by the profitability ratio, namely Return on Assets (ROA) (Wang & Shailer, 2017; Zulaikah et al., 2019). ROA is a comprehensive indicator to evaluate the effectiveness and efficiency of management in managing all firm assets (Sciascia et al., 2015; Egbonike & Okerekeoti, 2018). ROA calculation uses net income such as (Sciascia et al., 2015) because net income takes into account the income from all income and expenses in the current period to determine whether the firm's operations is success or failure.

Leverage (LEV) is a ratio that reflects the amount of debt used in financing assets (Simamora & Hendarjatno, 2019). According to Pratama and Wibowo (2017), leverage can be measured by a debt ratio, namely total liabilities divided by total assets. Firm size (SIZE) or quantitative scale describes the size of the business operation, which can affect the ability to manage capital resources that impact performance. Based on Mukras (2015), firm size is calculated through the natural logarithm of total assets. Also, the firm's existence period (AGE) or age can show a firm's ability to survive in competing in the business world. According to Gordini and Rancati (2017), the firm's age is measured by how long the firm has operated since the firm was founded.

### 3.3 Research Design

The analysis techniques used in this research are Ordinary Least Square regression and Moderated Regression Analysis (MRA). We also tested the regression model’s multicollinearity of this study. Here are two regression models for this study, where the first model is to test the first hypothesis and the second model is to test the second hypothesis:

\[
ROAi,t = \alpha + \beta_1 FAMOWNi,t + \beta_2 LEVi,t + \beta_3 SIZEi,t + \beta_4 AGEi,t + e \quad (1)
\]

\[
ROAi,t = \alpha + \beta_1 FAMOWNi,t + \beta_2 RNDi,t + \beta_3 (FAMOWNi,t \times RNDi,t) + \beta_4 LEVi,t + \beta_5 SIZEi,t + \beta_6 AGEi,t + e \quad (2)
\]

Where ROA is return of asset, FAMOWN is family ownership, RND is research and development, LEV is leverage, AGE is firm age, and SIZE is firm size.

### 4 Result and Discussion

#### 4.1 Descriptive Statistics (Table 1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>169</td>
<td>-0.155</td>
<td>0.253</td>
<td>0.057</td>
<td>0.060</td>
</tr>
<tr>
<td>FAMOWN</td>
<td>169</td>
<td>0.000</td>
<td>0.843</td>
<td>0.323</td>
<td>0.302</td>
</tr>
<tr>
<td>RND</td>
<td>169</td>
<td>0.000</td>
<td>0.032</td>
<td>0.002</td>
<td>0.005</td>
</tr>
<tr>
<td>LEV</td>
<td>169</td>
<td>0.071</td>
<td>0.845</td>
<td>0.421</td>
<td>0.192</td>
</tr>
<tr>
<td>AGE</td>
<td>169</td>
<td>16.000</td>
<td>65.000</td>
<td>36.930</td>
<td>11.125</td>
</tr>
</tbody>
</table>

Financial performance, measured using a return on assets (ROA), shows the lowest value of -15.48% and the highest value of 25.32% in generating profits through asset management. ROA average value of 5.71% with a standard deviation of 0.60. Family ownership (FAMOWN), measured by the ratio of the number of shares owned by the family, has the lowest value of 0.000 and the highest value of 0.843. Besides, the average family ownership is 32.32%, and the standard deviation is 0.302. Research and development (RND), which is proxied by the ratio of research and development expenditure to total sales, has a minimum value of 0.000. Meanwhile, the maximum RND value is 0.2% of sales with a standard deviation of 0.005.
4.2 Multicollinearity Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Tolerance</th>
<th>Model 1 VIF</th>
<th>Model 2 Tolerance</th>
<th>Model 2 VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAMOWN</td>
<td>0.911</td>
<td>1.098</td>
<td>0.629</td>
<td>1.590</td>
</tr>
<tr>
<td>RND</td>
<td></td>
<td></td>
<td>0.033</td>
<td>30.622</td>
</tr>
<tr>
<td>FAMOWN_RND</td>
<td></td>
<td></td>
<td>0.031</td>
<td>32.554</td>
</tr>
<tr>
<td>LEV</td>
<td>0.842</td>
<td>1.188</td>
<td>0.827</td>
<td>1.209</td>
</tr>
<tr>
<td>SIZE</td>
<td>0.892</td>
<td>1.121</td>
<td>0.874</td>
<td>1.144</td>
</tr>
<tr>
<td>AGE</td>
<td>0.845</td>
<td>1.183</td>
<td>0.812</td>
<td>1.232</td>
</tr>
</tbody>
</table>

In Table 2, both the first and second models, family ownership (FAMOWN), leverage (LEV), firm size (SIZE), and firm age (AGE) have no symptoms of multicollinearity where the tolerance value is more than 0.10 and the VIF value is less than 10. Whereas in RND and FAMOWN_RND, it was found that a tolerance value was less than 0.10, and a VIF value was more than 10. This result could occur because there were interactions that both involved RND so that the multicollinearity problem could not be avoided.

4.3 Regression Result

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-0.006</td>
<td>-0.103</td>
<td>0.918</td>
</tr>
<tr>
<td>FAMOWN</td>
<td>0.048</td>
<td>3.668</td>
<td>0.000 ***</td>
</tr>
<tr>
<td>LEV</td>
<td>-0.112</td>
<td>-5.256</td>
<td>0.000 ***</td>
</tr>
<tr>
<td>SIZE</td>
<td>0.002</td>
<td>0.937</td>
<td>0.350</td>
</tr>
<tr>
<td>AGE</td>
<td>0.001</td>
<td>3.435</td>
<td>0.001 ***</td>
</tr>
<tr>
<td>R²</td>
<td>0.351</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>169</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Family ownership (FAMOWN) has a positive coefficient of 0.048 with a significance level of 0.000, so that family ownership has a statistically significant and positive relationship with ROA at the 1% level. Thus, the first hypothesis which states that family ownership has a positive relationship with financial performance is acceptable (see Table 3).

The leverage variable (LEV) has a coefficient of -0.112 with a significance level of 0.000 indicates that leverage has a negative relationship or reduces financial performance (ROA). Firm size (SIZE) has a coefficient value of 0.002 with a significance level of 0.350, meaning that size has no relationship with financial performance (ROA). Firm age (AGE) has a coefficient value of 0.001 and a significance level of 0.000, indicating that firm age has a significant and positive relationship with financial performance (ROA).

The R square value of 0.335 means family ownership (FAMOWN), leverage (LEV), firm age (AGE) can explain the financial performance (ROA) by 33.5%. In comparison, the remaining 66.5% is explained by other variables that excluded in the research model.
Table 4. Moderated Regression Analysis Result

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>0.020</td>
<td>0.345</td>
<td>0.731</td>
</tr>
<tr>
<td>FAMOWN</td>
<td>0.031</td>
<td>1.989</td>
<td>0.048**</td>
</tr>
<tr>
<td>RND</td>
<td>-5.944</td>
<td>1.551</td>
<td>0.123</td>
</tr>
<tr>
<td>FAMOWN*RND</td>
<td>12.524</td>
<td>1.758</td>
<td>0.081*</td>
</tr>
<tr>
<td>LEV</td>
<td>-0.112</td>
<td>-5.226</td>
<td>0.000***</td>
</tr>
<tr>
<td>SIZE</td>
<td>0.001</td>
<td>0.657</td>
<td>0.512</td>
</tr>
<tr>
<td>AGE</td>
<td>0.001</td>
<td>3.020</td>
<td>0.003***</td>
</tr>
<tr>
<td>R²</td>
<td>0.366</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>169</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The family ownership variable (FAMOWN) has a positive relationship with a coefficient of 0.031 on financial performance with a significance level of 0.048. RND has a coefficient of -5.944, with a significance level of 0.123. Therefore, RND has no relationship with financial performance. Interaction (FAMOWN) with (RND) has a coefficient of 12.524, with a significance level of 0.081, moderating the relationship between family ownership and financial performance (see table 4).

The leverage variable (LEV) has a coefficient of -0.112 with a significance level of 0.000, which concluded as LEV has a statistically significant and negative relationship with financial performance (ROA). Firm size (SIZE) also documented has a significant relationship with financial performance (ROA). Firm age (AGE) has a relationship coefficient of 0.001 and a significance level of 0.003 with financial performance (ROA). The R square value of 0.366 means that FAMOWN, RND, FAMOWN_RND, and LEV, SIZE, AGE can explain the financial performance (ROA) of 36.6% and the remaining 63.4% is explained by other variables that excluded in the research model.

As it was found coefficients with extreme values exceeding -1 and 1 and multicollinearity symptoms were also found, processing was carried out using the z-score method by converting the data values into standard form results are presented in Table 5.

Table 5. Moderated Regression Analysis Result with Z-Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-0.059</td>
<td>0.071</td>
<td>0.405</td>
</tr>
<tr>
<td>Zscore(FAM OWN)</td>
<td>0.302</td>
<td>0.077</td>
<td>0.000***</td>
</tr>
<tr>
<td>Zscore(RND)</td>
<td>-0.171</td>
<td>0.147</td>
<td>0.245</td>
</tr>
<tr>
<td>Zscore(FAM OWN_RND)</td>
<td>0.342</td>
<td>0.194</td>
<td>0.081*</td>
</tr>
<tr>
<td>Zscore(LEV)</td>
<td>-0.359</td>
<td>0.069</td>
<td>0.000***</td>
</tr>
<tr>
<td>Zscore(SIZE)</td>
<td>0.044</td>
<td>0.067</td>
<td>0.512</td>
</tr>
<tr>
<td>Zscore(AGE)</td>
<td>0.210</td>
<td>0.069</td>
<td>0.003***</td>
</tr>
<tr>
<td>R²</td>
<td>0.366</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>169</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Family ownership (FAMOWN) has a coefficient of 0.302 with a significance level of 0.000, so that family ownership has a statistically significant and positive relationship with ROA at the 1% level. Research and development (RND) has a coefficient of -0.171 with a significance level of 0.245, so RND has an insignificant relationship with financial performance. The coefficient value on the interaction of family ownership variables with research and development (FAMOWN_RND) is 0.342, with a significance level of 0.081. This value confirms that RND moderates the relationship between family ownership with financial performance, at a significance level of 10%. It can be concluded that R&D strengthens the positive relationship between family ownership with financial performance.
The leverage variable (LEV), firm size (SIZE), and firm age (AGE) did not change significantly from the previous model on their relationship with financial performance (ROA). The results showed that the higher family ownership and the interaction of family ownership with R&D, the better the financial performance. However, the R&D expense independently does not have a relationship with financial performance. In addition, the older firm leads to better performance. Greater leverage level resulting in a worse financial performance. Meanwhile, size has no relationship with financial performance. The second hypothesis, which states that R&D strengthens the positive relationship between family ownership with financial performance, is acceptable. To be noted, R&D moderation in this study roles as pure moderation.

4.4 Discussion of Family Ownership and Financial Performance

Family ownership has a relationship with financial performance. These results are consistent with those of (De Massis et al., 2015). Share ownership by the family is proven to suppress type I agency conflict, as explained by agency theory because of the strong incentive in the manager's monitoring function. The problem of information asymmetry can also be reduced because families have more access to information and knowledge from both short- and long-term perspectives. This access minimizes the opportunistic possibilities of managers that can minimize financial performance. The results of this study are not in line with (De Massis et al., 2015), which found that family firms tend to have lower financial performance and (Matzler et al., 2015), who state that decision making prioritizes family will, and performance pressures become less impactful. This study found the opposite result that family ownership has a positive relationship with financial performance because families have superiority, intimate connections, and proper alignment.

Based on Rees and Rodionova (2015) agency theory, family ownership is considered capable of overcoming the problem of type I agency, because of the tendency of families to withhold diversity. Share ownership is more concentrated on creating power in the supervision of managerial agents. That way, the synchronization of objectives between the principal and the agent is easily achieved, and conflicts can be avoided, and financial performance can be improved. The agency cost will also be lower than that of non-family firms because the involvement of the family in the management can also solve agency problems.

Apart from that, family firms also consider business operations as assets that must be preserved for future generations. So that there is a strong motivation to continue to evaluate and improve better performance. On the other hand, the family, which is considered to dominate, prioritize personal interests, and exclude minorities is not empirically proven in this finding, as the family is concerned with a long-term orientation, for the next generation, it is not merely seeking profit. The family will continuously monitor the firm operational where it results in the agency conflicts can be avoided, and financial performance can be improved.

4.5 Discussion of R&D as Moderation Variable in Relationship between Family Ownership and Financial Performance

The result of moderation regression analysis shows that the interaction between family ownership and research and development shows a positive and statistically significant coefficient value. This result means that R&D moderates (strengthens) the relationship between family ownership with financial performance. These results are supported by the Resource-Based View theory, which states that an organization can create a competitive advantage if it can understand and manage resources appropriately. With increasing R&D, the firm's ability to develop products or improve processes has also expanded to meet market needs (Wagner et al., 2015; Waqas et al., 2019). This ability can stimulate sales and make the previous process more efficient so that financial performance can improve. R&D improvement generates innovation, which is crucial for both the private and public sectors (Khamis et al., 2015; Narsa, 2018).

In addition, firms with family ownership are considered the main source of entrepreneurship and innovation, so that they have the potential to carry out R&D well. Through R&D, firms can seize opportunities with differentiation and cost leadership; however, because R&D requires large funds and high risk. It is necessary to formulate good strategic planning alternatives and sustainable, consistent implementation so that its implementation of R&D activities can provide maximum results.
R&D only affects if it acts as moderation. On the other hand, as an independent variable, R&D does not relate to financial performance because R&D is an ongoing activity that benefits cannot be felt instantly. This result also causes independent R&D to have an insignificant negative relationship with financial performance because directly visible from these activities need funds to be done where that has the potential to reduce profits. There is a need for organized integration, such as the choice of strategy that will be carefully studied. Families can sort and choose the right strategy by considering the costs and benefits. In addition, families who better understand their business will find it easier to explore the firm's potential, transfer knowledge related to the firm's progress. So that as a moderating variable, R&D can stimulate the firm to improve financial performance for the better.

5 Conclusion

Based on research on manufacturing firms listed on the IDX for the 2014-2018 period, family ownership (FAMOWN) has a positive relationship with financial performance (ROA). The higher the level of family share ownership, the higher the financial performance as measured by ROA. Research and development (R&D) strengthen the influence of family ownership on financial performance. R&D acts as a pure moderator on the relationship between family ownership with financial performance. The control variable, namely, leverage has a negative relationship with financial performance, firm size has no relationship with financial performance, and firm age has a positive relationship with financial performance as measured by ROA.

In further research, other measurements can be used that can describe and better represent the real R&D effect. The use of ROA is less relevant, reflecting the long-term impact of R&D. Although R&D in this study acts as a moderator that does not directly affect ROA, further research can be added to testing with financial performance as measured by long-term proxies, such as ROI. Proxies from a market point of view can also be tested in future research. In addition, this study only examines the linear relationship so that further research can be done testing the non-linear relationship, especially on the variable of family ownership in relating financial performance.

Acknowledgement

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References


DECENTRALIZATION AND TAX HOLIDAY AS STRATEGIES TO BOOST FOREIGN DIRECT INVESTMENT OF INDONESIA

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Abstract. Investment is one of the keys to the economic development of a country, one of which is Foreign Direct Investment, which turns out to bring not only physical capital but also affects the absorption of technology in a country. The number of FDI inflows to Indonesia increased significantly after the decentralization system was implemented. This study aims to test and analyze the relationship of the variables of Fiscal Decentralization, Tax Holiday, GDP Growth, Inflation, and Openness with Trade on Foreign Direct Investment in Indonesia. The method used in this study is the Error Correction Model using the period 1975-2016. In the long term, we found that fiscal decentralization variables have a negative relationship with FDI and tax holidays have a positive relationship with FDI in Indonesia. Inversely, both fiscal decentralization and tax holiday variables have no relationship with FDI in the short term. This result posits crucial implication for the government not to rely on fiscal decentralization and tax holidays to enhance FDI amount in the short-term. The government must come up with different strategies if wanted to increase the FDI amount in the short-term.

Keywords: degree of fiscal decentralization; foreign direct investment; tax holiday


Jel Codes: L25, G32, O30

1 Introduction

Indonesia's economic development's main objective is social welfare for all Indonesian people (Azam & Ahmed, 2015; Tanjung, Afifuddin, Daulay, & Ruslan, 2017). Investment can be one of the national economy drivers and improve welfare (Nuradi & Fatimah, 2015). When domestic investment is no longer sufficient to meet the development needs, foreign investment is present to complement the development needs of a country (Buckley et al., 2018; Nuradi, Badaruddin, & Lutfi, 2017). For developing countries, Foreign Direct Investment (FDI) is believed to be one of the essential financing sources. It is considered more useful in overcoming the problem of lack of capital resources than foreign portfolio investment, as FDI provides positive externalities in the long run. The FDI's advantages can be through asset transfers, technology upgrades, employment opportunities, increasing national income, improving the balance of payments, and managerial skills that can contribute to sustainable economic (Nguyen, 2018).

Foreign direct investment is a foreign investment where investors can invest directly by buying real assets that involve tangible assets such as purchasing productive assets, establishing factories, opening mining, opening plantations, and purchasing (Rakhman, 2016; Van der Kamp, Lorentzen, & Mattingly, 2017). FDI is a real investment in the form of company establishment, factory construction, purchase of capital goods, land, raw materials, and supplies by foreign investors where the investor is directly involved in the management and controlling the investment (Fajgelbaum, Grossman, & Helpman, 2015; Ilmi, 2017).

FDI can help facilitate economic growth in developing countries because it not only brings a lot of physical capital but also provides better absorption of foreign technology (Sari, Khalifah, & Suyanto, 2016; Yang & Li, 2019; Táncošová, 2019).). In recent years, many developing countries have realized the potential value of foreign
direct investment and liberalized their investment strategies to attract foreign direct investment to increase economic growth and improve living standards (Dupasquier & Osakwe, 2006).

Based on figure 1, the development of FDI inflows to Indonesia has fluctuated from year to year. The years 1975 - 1986 tend to have a stable trend. After that, in 1987-1995 it continued to increase until its peak in 1996. This positive trend is decreased dramatically in 1997-2000, which was the reform era. In 1998 or the peak of the reform era marked by the monetary crisis, it demanded a shift in a centralized government system's paradigm to become decentralized. So in 2001, there was a substantial decentralization phenomenon, which has become a history that has occurred in Indonesia. In 2001, there was a major change, including a pattern of government affairs division and a balanced financial structure between the center and the regions. This shift lead amount of Indonesia's FDI inflows has increased after the decentralization system was implemented from 2001 until now.

![Graph showing the development of FDI inflows in Indonesia (1975-2016)](image)

**Figure 1.** Development of FDI Inflow ($) in Indonesia for period 1975-2016

Decentralization describes the granting of authority over regions to make their own administrative, political, and fiscal decisions. Different types of decentralization must be distinguished because they have other characteristics, policy implications, and success conditions. Much research has been done looking at the developments of this decentralization and its impact on economic growth, inequality, investment climate, and political stability. Although research on decentralization is increasing, there is still a lot of conceptual confusion. Researchers attach a surprising diversity of definitions and measures to the concept of decentralization. The availability of cross-national statistics has only exacerbated this proliferation (Schneider, 2003; Seker, Ertugrul, & Cetin, 2015). The concept or type of decentralization is divided into several, among others: political, fiscal, administrative, and market. The different concepts of decentralization are used to describe the many dimensions and problems that exist. There is a need for coordination between decentralization concepts so that those definitions can spur one another.

More than 80% of the developing countries analyzed experienced decentralization of authority at the beginning of the millennium (Wu, Ye, & Li, 2019). In Indonesia, decentralization arises from high inequality in society; besides that, the poverty rate is increasing, and corruption is rampant due to the openness of the central government. At the same time, the semi-authoritarian nature of the New Order government made society suffer even more, especially in terms of economic and social aspects. So the reform era in 1998 became a strong momentum for the birth of an understanding of decentralization, which is expected to improve the welfare of the community (Seoane, Bermúdez & Montes, 2020).

In 2001 Indonesia entered a new government system, namely decentralization, through Indonesian Law no. 22 of 1999 concerning Regional Government and Indonesian Law no. 25 of 1999 concerning the Financial Balance between Central and Regions, which regulates the division of authority and regional rights, especially in revenues and expenditures. Those regulations were then refined into Indonesian Law no. 32 of 2004 concerning Regional Government and Indonesian Law no. 33 of 2004 concerning the Financial Balance between Central and
Regions due to regions' demands in granting broader autonomy. This law explains the division of authority and autonomy rights given to regions. This regulation is said to be the handover of government tasks to a lower level. Besides that, the essential thing is financial responsibility, which is the core of fiscal decentralization. Indonesian Law no. 33 of 2004 has explained the financial balance between central and regional governments. This regulation divides revenue rights, namely through taxes that have been divided according to the needs of each region. In this case, the balancing fund is given to the regions as a form of decentralization, which will be used by the regions for regional development.

In the revenue assignment approach, regions are given the authority to determine tax rates and tax objects collected. Decentralization presence becomes more substantial as it transferring the tax types that are now being managed by both the provincial and district or city regions. It is hoped that regions will no longer depend on transfer funds and can be independent and improve the quality of their respective regions. With the existence of decentralization, it is hoped that it will positively impact FDI inflows because decentralization will be able to increase competitiveness between other regions (horizontal competition) in increasing regional development to attract FDI.

However, there is a criticism of the existence of decentralization which can cause concern to investors, because governments with many layers mean that there are several similarities in the tax base between central and regional governments as emphasized by several studies (Keen, 1998; Wrede, 2000; Liu, Wang, Zhang, Zhan, & Li, 2018; Sasongko, Huruta, Wardani, 2019). Taxes that vary due to decentralization can lead to inefficiencies as it will lead to overlapping tax bases between the central and regional governments. He and Sun (2018) suggest that the importance of lowering administrative costs to attract FDI as a variety of tax bases varies can reduce the amount of FDI. Also, legal uncertainty due to overlapping regulations between the central and regional governments will result in investment uncertainty. Also, notably, if it is too decentralized, it will tend to increase the level of corruption.

In the last two decades, competition between countries in attracting FDI has become increasingly fierce, so that many countries have used fiscal incentives to attract FDI into their countries. In Indonesia, the central government has carried out various stimuli provided to foreign investors to invest in Indonesia, providing fiscal incentives. There are two views regarding fiscal incentives. The first is a supporting view; for example, Cibils et al. (2015) argue that fiscal incentives can increase investment, create jobs, and other socio-economic benefits under certain conditions. Second, according to the views of opponents such as (Kuswanto, Hoen, & Holzhacker, 2016; Liu et al., 2018) believe that financial incentives may not be the best mechanism for attracting FDI as the costs of incentives to attract FDI may outweigh the benefits. So, the question is whether fiscal incentives have ever been proven to influence in attracting FDI?

Table 1 shows the various types of fiscal incentives that exist; tax holidays are the most widely used incentives in various countries. 55% of developing countries use tax holidays as a fiscal incentive to attract FDI. A tax holiday is an incentive given to companies that are newly built in a country for a certain period. Various countries have used the tax holiday in ASEAN. Each country implements different policies in implementing tax holidays, both from the minimum investment provided by investors, the grace period for tax holidays, and certain types of sectors that can be given tax holidays.
In Indonesia, tax holidays have long been implemented since the New Order era until now. History records that tax holidays have been enforced in Indonesia, with the issuance of Indonesian Law No. 1 of 1967 and Indonesian Law No. 11 of 1967 concerning Foreign Investment. However, in the 15 years since the tax holiday was enforced, the number of foreign direct investment approved was only around 473 projects or 28 projects per year. The approved project realization only reached 75 percent (355 projects realized or 21 projects per year). On the practice, it was not sufficient that through Indonesian Law No. 7 of 1983 concerning Income Tax, which took effect on January 1, 1984, the provisions on tax holidays were revoked. In exchange, the government applies general tax provisions that provide several conveniences. However, along the way, through Law No. 25 of 2007 on Investment, there are more regulations regarding tax exemption. With the tax holiday, it is hoped that foreign investors will be interested in investing in the regions. This incentive is expected to encourage industrial development outside Java to reduce social and economic inequality. Thus, the state benefits from foreign investment in infrastructure development outside Java, while revenue from various other tax sources can still be optimized. Therefore, the tax holiday is expected to encourage industrial sectors to develop and impact the economy in the long run.

The provision of incentives such as tax holidays must be scrutinized and watched out for because, in the short term, this can cause losses to the state by reducing the amount of tax revenue. However, if the provision of these incentives can be given to leading sectors and can have a positive impact through high employment, in the long run, it will provide greater benefits to the economies of each country. A country known to took multiple steps in attracting investors, and in ASEAN, there has also been an "incentive war" where each ASEAN country provides stimulus through tax incentives. Of course, not all countries have the courage to provide this kind of incentive, so it is necessary to conduct a study, does tax holiday affect attracting FDI into Indonesia?

This study aims to examine and analyze the relationship of fiscal decentralization and tax holidays with foreign direct investment in Indonesia for the period 1975 - 2016. This study uses control variables, which are determinant variables of foreign direct investment, including Gross Domestic Product Growth, Inflation, and Openness to trade (Tang & Tan, 2015). Based on the test results using the Error Correction Model (ECM) linear regression method using the STATA 13 software, several conclusions were found. In the long run, fiscal decentralization and inflation have a negative relationship with foreign direct investment. It is different from the tax holiday, which has a positive relationship with foreign direct investment. Meanwhile, all variables are not proven to have a relationship with foreign direct investment in the short term. The remainder of this paper is structured as follows. Section 2 literature review and develops the research hypotheses. Section 3 describes the sample, variables, and research design. Section 4 specifies the empirical result. Section 5 summarizes the paper and presents concluding remarks.

Table 1. Fiscal Incentive Types that Used in Various Countries

<table>
<thead>
<tr>
<th>Fiscal Incentives</th>
<th>Africa</th>
<th>Asia</th>
<th>Latin America &amp; Carib.</th>
<th>Central &amp; Eastern Europe</th>
<th>Western Europe</th>
<th>Other Countries</th>
<th>Total</th>
<th>OECD</th>
<th>Developing</th>
</tr>
</thead>
<tbody>
<tr>
<td>(# of Countries)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Holidays</td>
<td>16</td>
<td>13</td>
<td>8</td>
<td>19</td>
<td>7</td>
<td>4</td>
<td>67</td>
<td>20</td>
<td>55</td>
</tr>
<tr>
<td>Accelerated Depreciation</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>12</td>
<td>10</td>
<td>5</td>
<td>47</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Investment Allowances</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>3</td>
<td>5</td>
<td>-</td>
<td>26</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Import duty Exemption</td>
<td>15</td>
<td>13</td>
<td>11</td>
<td>13</td>
<td>7</td>
<td>4</td>
<td>63</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Duty Drawback</td>
<td>10</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>49</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

2 Literature Review and Hypothesis Development

2.1 Fiscal Decentralization and Foreign Direct Investment

Fiscal decentralization is a government system that gives autonomy to regions in regulating their governmental activities. Fiscal decentralization provides opportunities for regions to provide more efficient and democratic public services. Besides, the existence of a decentralized system reflects a more open or transparent government. The decentralized system will make regional governments know and be closer to the people so that regional governments can provide services for the production and supply of public goods effectively and efficiently. Fiscal decentralization can also increase efficiency in the economy concerning economic growth. However, in the context of Foreign Direct Investment, it has a potentially detrimental effect, meaning that high fiscal decentralization will cause a decrease in the amount of incoming FDI (Iamsiraroj, 2016). As measured by the revenue side, the high rate of fiscal decentralization illustrates the amount of autonomy given to regions in extracting their revenues, one of which is through taxes.

For foreign investors, tax is the cost of the investment they invest, the amount of tax paid means the amount of the investment cost. A country with a decentralized system means giving autonomy to the regions in determining the tax rates those investors must pay. Excessive fiscal decentralization will have a negative relationship with FDI (Kessing, Konrad, & Kotsogiannis, 2009; Gaur, Ma, & Ding, 2018). This relationship due to the vertical disintegration between the central and regional governments. Therefore, the existence of fiscal decentralization will cause provincial revenues to increase due to FDI, but for investors. The existence of decentralization will increase investment costs or taxes paid (Hanif, Raza, Gago-de-Santos, & Abbas, 2019).

H₁: Fiscal decentralization has negative relationship with foreign direct investment in both long and short term

2.2 Tax Holiday and Foreign Direct Investment

The tax holiday is one of the tax incentive policies given to foreign direct investment. This incentive is provided in the form of a reduction in corporate income tax for a certain period. This policy is enforced in Indonesia because it is a form of tax reform facing global competition in which all countries compete to attract FDI (Hossain, 2016; Williams, 2017). Tax holidays have been implemented in several Asian countries such as China, Japan, Indonesia, Thailand, Malaysia, Vietnam, and Korea (Iamsiraroj, 2016). Tax Holiday policy is a secondary factor in attracting FDI after seeing economic stability, politics, bureaucracy, labor wages, infrastructure, and legal certainty. The relationship between the tax holiday and foreign direct investment can be through the deduction of corporate income tax given to foreign investors within a certain period depending on the amount of investment given (Shahbaz, Balsalobre-Lorente, & Sinha, 2019). As tax is an investment cost so that if the tax withholding facility is given, investors will reduce costs on their investment. Thus, with this policy, it is hoped that it will attract FDI into Indonesia so that FDI can boost the country's economic growth, accelerate infrastructure development, and absorb domestic labor (Sunde, 2017). The tax holiday policy results can be felt in the long term by increasing employment opportunities so that they can absorb labor, which will have an impact on increasing government revenue through individual income taxes.

H₂: Tax holiday has relationship with foreign direct investment in both long and short term

3 Research Methodology

Based on the problems studied, the approach used is a quantitative descriptive approach. This study uses time-series data with the period 1975 - 2016. The data source uses secondary data obtained from the World Bank for foreign direct investment variables, GDP growth, inflation, and openness to trade. In addition, data is also obtained from the Government Financial statistics of the IMF, the Indonesian Statistical Yearbook, the Central Bureau of Statistics, and the website of the Ministry of Finance of the Republic of Indonesia for fiscal decentralization variables and tax holidays.
3.1 Operational Definition and Variable Measurement

3.1.1 Foreign Direct Investment
Foreign direct investment (FDI) is the dependent variable in this study. FDI is a direct flow of foreign funds that occurs between countries used for economic activity in the form of physical assets. We used total FDI inflow in US million dollars in this study to measure FDI.

3.1.2 Fiscal Decentralization
Fiscal decentralization (DESFIS) is a fundamental policy to promote economic growth and reduce inter-regional disparities. In this study, we are using a proxy ratio of total central tax revenue to state revenue. State taxes were collected and collected by regional tax offices in 34 provinces in Indonesia. Central tax, in this case, includes income tax, value-added tax, property tax, and stamp duty. The fiscal decentralization variable is an independent variable measured in percentage units. To calculate it is done with the following equation:

\[ DESFIS = \left( \frac{\text{Total central tax}}{\text{Total regional receipts}} \right) \times 100\%
\]

3.1.3 Tax Holiday
The policy for the presence of tax holidays in Indonesia in the period 1975-2016 in this study uses a dummy variable to see the impact on the amount of FDI that enters Indonesia. The tax holiday will be valued by 1 if there is a presence of tax holiday policies on observation year and number 0 for the policy’s absence.

3.1.4 GDP Growth
GDP growth is the rate of development of the production of goods and services in Indonesia. GDP growth is a reflection of a country's potential demand, which is market size. If GDP growth is high, the country's economic condition is good and vice versa (Young, 2017; Farabi, Abdullah, & Setianto, 2019). The calculation is taken from the result of reducing the real GDP of a particular period with the real GDP of the previous period then divided by the previous period's real GDP.

\[ GDPGROWTH = \left( \frac{\text{real GDP}_t - \text{real GDP}_{t-1}}{\text{real GDP}_{t-1}} \right) \times 100\%
\]

3.1.5 Inflation
Inflation is one of the economic phenomena that often occur in a country, but inflation is a stabilizer of real economic activity. Inflation can also be interpreted as an increase in general prices and an increase in the money supply continuously (Zheng, 2019). Inflation is calculated using the growth in the Consumer Price Index (CPI) as a reflection of Indonesia's inflation rate. To calculating the inflation rate, this equation is used:

\[ INF = \left( \frac{\text{CPI}_t - \text{CPI}_{t-1}}{\text{CPI}_{t-1}} \right) \times 100\%
\]

3.1.6 Openness to Trade
Openness to trade or the trade openness level is an indicator that sees how a country can be active in foreign trade. Suppose a country has a low level of openness to trade. In that case, it means that there are many obstacles in such international trades such as quotas, dumping, and large fees, investors will choose another country with low barriers. We including openness to trade variables as implied by Meidayati (2017); it has a positive relationship with FDI in both the short and long-term. The calculation of openness to trade consists of exports, imports, and nominal GDP through the following equation:

\[ TRADE = \left( \frac{\text{Export} + \text{Import}}{\text{Nominal GDP}} \right) \times 100\%
\]
3.2 Research Design

To test the hypothesis proposed in this study, the econometric model of this study is as follows:

Long-term:
\[ ln(FDI_t) = \beta_0 + \beta_1 DESFIS_t + \beta_2 TAXHOL_t + \beta_3 GDPGROWTH_t + \beta_4 INF_t + \beta_5 TRADE_t + \varepsilon_t \]

Short-term:
\[ \Delta ln(FDI_t) = \gamma_0 + \gamma_1 \Delta DESFIS_t + \gamma_2 \Delta TAXHOL_t + \gamma_3 \Delta GDPGROWTH_t + \gamma_4 \Delta INF_t + \gamma_5 \Delta TRADE_t + \gamma_6 ECT_{t-1} + \varepsilon_t \]

Where \( \beta_0 \) is the regression constant, \( \beta_1 - \beta_5 \) is the regression coefficient, FDI is Foreign Direct Investment (million US $), TAXHOL is the dummy variable for the presence of a tax holiday in Indonesia (1 if there is a tax holiday, 0 if vice versa), GDPGROWTH is the GDP growth rate (%), INF is the inflation rate (%), TRADE is the trade openness level (%), \( \varepsilon_t \) is the error term, \( \gamma_1 - \gamma_6 \) is the short-run coefficient, and ECT is the error correction term.

The analysis used is a long-term balance analysis using cointegration equations and short-term balance analysis using the Error Correction Model (ECM) linear regression method using STATA 13 software. In this method, the time series data used must be stationary to avoid sharp regression. Stationary data is also a prerequisite for continuing cointegration and ECM analysis.

4 Result and Discussion

4.1 Root Unit Test

Time-series data is not stationary, so the data faces the unit root problem. Data containing the unit root is subject to spurious regression. We are using the stationarity test procedure on data by using the ADF test procedure to address the issue.

Table 2. Stationary Test for Level-Intercept and First Difference-Trend and Intercept

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of Prob. ADF</th>
<th>Explanation</th>
<th>Prob. ADF First Difference Level</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Direct Investment</td>
<td>0.568</td>
<td>Stationary</td>
<td>0.000**</td>
<td>Stationary</td>
</tr>
<tr>
<td>Fiscal Decentralization</td>
<td>0.127</td>
<td>Not Stationary</td>
<td>0.000**</td>
<td>Stationary</td>
</tr>
<tr>
<td>GDP growth</td>
<td>0.000**</td>
<td>Stationary</td>
<td>0.000**</td>
<td>Stationary</td>
</tr>
<tr>
<td>Inflation</td>
<td>0.000**</td>
<td>Stationary</td>
<td>0.000**</td>
<td>Stationary</td>
</tr>
<tr>
<td>Openness Trade</td>
<td>0.014**</td>
<td>Stationary</td>
<td>0.000**</td>
<td>Stationary</td>
</tr>
</tbody>
</table>

The first step in the ECM method is to carry out a stationarity test. The stationarity test is an essential concept in time series data analysis. Time series data is said to be stationary if the mean, variance, and covariance at each lag is the same at all times. If this assumption is not fulfilled, it can be said that the data is not stationary. Based on table 2, the stationary test at the level of the four variables is stationary, namely FDI, GDP Growth, Inflation, and Openness to Trade. In contrast, the fiscal decentralization variable is not stationary at the level. The tax holiday variable is not tested for stationarity because it is a dummy variable. Therefore, to stationary all variables, the next step is needed, namely the first difference. If one has a first difference, then all variables must be in a first difference.

The stationary test results at the first difference level in table 2 show that all the variables are stationary at the first difference level. The test results show that all variables have a probability value of less than 5%, so it can be said that all variables do not have a unit root problem.
4.2 Cointegration Test

The cointegration test is carried out to see the cointegration of the variables in the model. Based on the hypothesis and testing criteria, $H_0$ is rejected if the long-term residual probability value is less than 5% significance. The residue from the long-run equation must be stationary at the level. So it can be said that there is cointegration of the variables in the model. The test results of the level-level ADF cointegration test for long-term residual variables show a stationary probability value at the level with a probability of 0.005.

4.3 Long and Short-Term Estimation

Table 3. Long-term Estimation Result

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1) lnFDI</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Decentralization (DESFIS)</td>
<td>-0.071***</td>
<td>(0.025)</td>
</tr>
<tr>
<td>Tax Holiday (TAXHOL)</td>
<td>1.263***</td>
<td>(0.440)</td>
</tr>
<tr>
<td>GDP Growth (GDGPROWTH)</td>
<td>0.222</td>
<td>(0.142)</td>
</tr>
<tr>
<td>Inflation (INF)</td>
<td>-0.235***</td>
<td>(0.059)</td>
</tr>
<tr>
<td>Openness to Trade (TRADE)</td>
<td>0.052</td>
<td>(0.040)</td>
</tr>
<tr>
<td>Constant</td>
<td>24.431***</td>
<td>(3.112)</td>
</tr>
<tr>
<td>Observation</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.569</td>
<td></td>
</tr>
</tbody>
</table>

Standard errors in parentheses *** p<0.01, ** p<0.05, *p<0.1

Table 3 shows that based on the long-term estimation results, fiscal decentralization variables and inflation are proven to have a statistically significant negative relationship with foreign direct investment. This statement is evident from the coefficient value of each variable of -0.071 and -0.235. This result is different from the tax holiday, which proved to be has a statistically positive relationship with FDI with a coefficient value of 1.263.

Table 4. Short-Term Estimation Result

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1) (\Delta\lnFDI)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>First different – Fiscal Decentralization ((\Delta)DESFIS)</td>
<td>-0.024</td>
<td>(0.021)</td>
</tr>
<tr>
<td>First different - Tax Holiday ((\Delta)TAXHOL)</td>
<td>-0.219</td>
<td>(0.218)</td>
</tr>
<tr>
<td>First different - GDP Growth ((\Delta)GDGPROWTH)</td>
<td>0.021</td>
<td>(0.068)</td>
</tr>
<tr>
<td>First different - Inflation ((\Delta)INF)</td>
<td>-0.026</td>
<td>(0.038)</td>
</tr>
<tr>
<td>First different - Openness to Trade ((\Delta)TRADE)</td>
<td>0.018</td>
<td>(0.025)</td>
</tr>
<tr>
<td>ECT</td>
<td>-0.162*</td>
<td>(0.098)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.271</td>
<td>(0.161)</td>
</tr>
<tr>
<td>Observation</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.247</td>
<td></td>
</tr>
</tbody>
</table>
Table 4 shows the results of short-term estimates. From the test result, it can be concluded that all variables are not proven to have a statistically significant relationship with foreign direct investment.

4.4 Discussion

4.4.1 Fiscal Decentralization and Foreign Direct Investment

Based on the ECM results above, fiscal decentralization negatively relates to foreign direct investment inflow in Indonesia in the long run. This negative relationship happens because taxes, which are the primary source of government revenue, become an obstacle for foreign investors. High taxes, both in terms of rates and tax objects, will only reduce profits for investors (Corcoran & Gillanders, 2015). In Indonesia, the amount of central tax is increasing from year to year. This increasing trend shows that the government's ability to provide public services is getting better to boost public enthusiasm in paying taxes. In business activities, the central government's performance in collecting taxes will only reduce investors' desire to carry out investment activities. If taxes are only relied on to be the only government revenue, this will not boost foreign investment (Manyuchi, 2019).

The above results are consistent with the KC model by (Markusen & Markus, 2002; Iamsiraroj & Ulubasoglu, 2015) showing that FDI decreases as the number of government's bureaucracy levels in the host country increases. Besides that, according to Alvarado, Iniguez, and Ponce (2017), fiscal decentralization that is too substantial will have a negative impact on FDI because of the vertical disintegration between the central and regional governments. Fiscal decentralization will also cause the tax bases between central and regional governments to overlap (Bermejo Carbonell & Werner, 2018). The more decentralized a region is, the tax base and object can also increase; this, of course, a concern for investors, because high taxes will increase production costs and reduce their profits (Agrawal, 2015).

Fiscal decentralization must be balanced (Shahbaz, Nasreen, Abbas, & Anis, 2015), meaning that a high level of fiscal decentralization will have an adverse impact, and vice versa, a low level of decentralization will also negatively impact a country. So that fiscal decentralization must be following the needs and conditions of a country. Decentralization is not always good or bad, policies made by the government must also be appropriate and lead to public interests, not personal interests. The results of this study are different from (Braunstein, 2019), which state that fiscal decentralization has a positive relationship with foreign direct investment.

4.4.2 Tax Holiday and Foreign Direct Investment

Tax incentives are one of the methods used to attract more foreign direct investment. Various types of tax incentives have been implemented in many countries, including Indonesia. Of the existing tax incentives, tax holidays are the most popular tax incentives used, especially in ASEAN countries. The tax holiday is an incentive in reducing or deducting corporate income tax within a certain time. This policy has been regulated by the Indonesian Law (Zhang & Zhou, 2016), from the minimum investment, the length of withholding tax, the sector that receives taxes, and other regulations. However, some studies reveal that tax holidays do not have a relationship with foreign direct investment, as economic stability, politics, minimum wages, and market share are the main factors in investing. This argument is consistent with (Behera & Dash, 2017; He, Zhou, & Huang, 2016; Salahuddin, Alam, Ozturk, & Sohag, 2018) which states that tax holidays do not have a relationship with foreign direct investment.

Based on the ECM results above, tax holidays positively correlate with foreign direct investment in Indonesia in the long term. The tax holiday policy's existence will cause an increase in FDI by 1.263 percent, ceteris paribus. In Indonesia, tax holidays have been around since 1967, and this policy has been continuously improved to attract foreign investors. There are many fundamental changes in the length of time for granting tax holidays, the types of sectors receiving tax holidays, and the minimum investment that has been made easier. The bureaucracy for managing this incentive is also getting better and better. The management duration evidenced this is not more than three months (Kathuria, Ray, & Bhangaonkar, 2015; Li, 2016; You, Zhang, & Yuan, 2019). This
government policy is considered both consistent and attractive, plus the legal certainty of this policy is also clear. This promising system made many foreign investors interested in investing in Indonesia. However, the existence of a tax holiday is a matter of debate because the presence of a tax holiday is considered to reduce government revenue in the short term.

5 Conclusion
This study examines and analyzes the relationship between fiscal decentralization, tax holiday, GDP growth, inflation, and openness to trade with foreign direct investment in Indonesia for the period 1975 - 2016. Based on the test results using the Error Correction Model (ECM) linear regression method using STATA 13 software, we can conclude several things. In the long run, fiscal decentralization and inflation have a negative relationship with foreign direct investment. It is different from the tax holiday, which has proven to have a positive relationship with foreign direct investment. Meanwhile, in the short term, all variables are not proven to have a relationship with foreign direct investment. This study's results are expected to contribute as a reference and consideration for the government in formulating policies related to foreign direct investment. The limitation of this research is that it is limited to the territory of Indonesia only. So that further research can develop research related to foreign direct investment by expanding the area used as research samples and using other determinants of foreign direct investment and other macroeconomic variables, such as the exchange rate (Reviane, 2017; Purwono, Mucha, & Mubin, 2018), interest rate, and political stability.

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INDEPENDENT COMMISSIONER ROLE IN EARNINGS MANAGEMENT AND INVESTMENT EFFICIENCY RELATIONSHIP

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Abstract. This study aims to examine the role of independent commissioners in moderating the relationship between earnings management with investment efficiency. This study uses quantitative data with secondary data sources that will be processed using SPSS 22 software. This study's population are manufacturing firms listed on the Indonesia Stock Exchange from 2016 through 2018 with 346 observations. This study found that earnings management had a negative relationship with investment efficiency. The higher the level of earnings management in a firm, the lower the investment efficiency. In addition, this study also found that independent commissioners could weaken the relationship between earnings management with investment efficiency.

Keywords: earnings management; investment efficiency; agency theory; corporate governance


Jel Codes: L25, G32. O30

1 Introduction

The firm's financial statements provide the information needed, especially by investors, as consideration for investing (Shan, 2015). Investors need a qualified financial report to consider investing. One of the indicators proving the quality of financial statements is that it is seen from the low level of earnings management by the firm or the firm has small total accruals (Levine, Lin, & Xie, 2016). Earning management occurs when management uses its authority by manipulating financial reports to match investors' expectations, but this is misleading users (Fang, Huang, & Karpoff, 2016).

Earnings management can be detrimental to users of financial statements because the financial statements' information is not the actual one. This behavior will impact management who creates earnings management because indirectly, they have taken the incorrect steps in making investment decisions (Christiawan & Rahmiati, 2012; Nguyen & Truong, 2017). Mistakes in making investment decisions could impact inefficient investment; this is because the management is unable to process the funds invested by investors (Nguyen & Truong, 2017). As a result, investors will receive returns that are not as expected. Therefore, to create efficiency, an investment must be in accordance with the place to avoid under-investment and over-investment.

A good governance structure is needed to achieve investment efficiency. An independent commissioner as one of the components in the Good Corporate Governance (GCG) environment. Independent commissioners have full responsibility to shareholders to oversee the effectiveness and efficiency of utilizing the firm's resources for the benefit of shareholders (Carpenter, Lu, & Whitelaw, 2020). In addition, independent commissioners have the responsibility to ensure the reliability of financial reports. The existence of independent directors can increase the quality of management supervision so that it can minimize the level of financial reporting fraud and improve the quality of earnings, which affects the improvement of investment decision-making (Razzaque, Ali, & Mather, 2016). It is felt that management needs to get supervision, especially from independent commissioners, to avoid opportunistic management behavior that prioritizes their interests to gain wealth. This opportunistic behavior triggers a tendency to make investment decisions that are not in accordance with the interests of shareholders (Pan...
& Tian, 2017). Using independent commissioners as a moderating variable in conjunction with the opportunistic attitude of management, which can lead to information asymmetry that is detrimental to shareholders. However, with the presence of independent commissioners, information asymmetry can be minimized because it is known that independent commissioners are parties from outside the firm who does not have any relationship with the firm. Their presence can increase the creation of GCG to minimize the occurrence of earnings management to realize efficient investment (Yang, Cao, Andrikopoulos, Yang, & Bass, 2020). This statement is reinforced by previous research by (Yang et al., 2020) that firms can create investment efficiency with qualified financial reports. Low earnings management efforts characterize qualified financial reports, and this can be realized if the management is transparent to shareholders by eliminating their opportunistic attitude. In the end, it is hoped that they can make investment decisions that are in line with both parties.

Phenomena related to earnings management have occurred several times in Indonesia, one of which happened to PT Garuda Indonesia (Persero) Tbk. In recent years, the firm has continued to experience losses, during the first nine months of 2018 the firm recorded a loss of US $ 114.08 million. However, surprisingly at the end of 2018 PT Garuda Indonesia (Persero), Tbk reported that it experienced a profit. This issue made two commissioners from PT Garuda Indonesia (Persero) Tbk, namely Chairul Tanjung and Dony Oskaria, not willing to sign the 2018 annual Garuda report. Both were representatives of PT Trans Airways and Finegold Resources Ltd as the owner and holder of 28.08% of Garuda shares. Chairul Tanjung and Dony Oskaria disclosed the irregularities in the financial statements of PT Garuda Indonesia (Persero) Tbk in a letter sent at the Annual General Meeting of Shareholders (AGMS). Still, the letter did not change management's attitude on the pretext that the financial report had undergone an audit process. This case illustrates that PT Garuda Indonesia (Persero) Tbk has carried out earnings management so that the financial statements look promising. The decision of Garuda management has indeed succeeded in making the market complacent with a positive note in the financial statements. But actually, this is detrimental to the firm in terms of cash flow because PT Garuda Indonesia (Persero) Tbk has to pay Income Tax (PPh) and Value Added Tax (VAT). This harmful effect is in the form of an additional amount paid by PT Garuda Indonesia (Persero) Tbk from the profits earned (Jiang, Cai, Wang, & Zhu, 2018). The phenomenon of earnings management is the background of this research. Earnings management harms users of financial statements and indirectly harms the firm because it is based on the management's opportunistic attitude.

This study aims to examine the role of independent commissioners in moderating the relationship between earnings management with investment efficiency in 346 firm-year observation. This study uses manufacturing firms listed on the Indonesia Stock Exchange for 2016-2018 as a research sample. Manufacturing firms are chosen to be the object of research as they have a large scale compared to other firms to make comparisons between firms. In addition, manufacturing firms have stocks that tend to be resistant to economic crises because products from manufacturing firms are needed continuously so that they are less likely to experience losses. The results show that earnings management has a negative relationship with investment efficiency based on the test results of ordinary least square regression analysis and moderated regression analysis with SPSS 22 software. The higher the level of profit management in a firm, the lower the level of investment efficiency. In addition, this study also found that independent commissioners were able to weaken the relationship between earnings management with investment efficiency.

The remainder of this paper is structured as follows. Section 2 literature review and develops the research hypotheses. Section 3 describes the sample, variables, and research design. Section 4 specifies the empirical result. Section 5 summarizes the paper and presents concluding remarks.

2 Literature Review and Hypothesis Development
2.1 Agency Theory
Agency theory involves two parties: the management as the direct manager of the firm's internal activities hereinafter referred to as the agent and the principal, which includes shareholders and investors (Jensen & Meckling, 1976; O'Toole, Morgenroth, & Ha, 2016; ADB, Furceri, & IMF, 2016). Agency theory arises because
of the principal's cooperation contract, which authorizes the agent to manage the firm. Agency theory states that organizational results are a function of management behavior in using firm resources (Prabowo et al., 2017; Zeng, Jiang, Ma, & Su, 2018). This agency relationship creates problems, namely asymmetric information, where one party has more information than the other (Campa, 2015; Nasution, 2019). The existence of granting of authority makes the agent have power over the management of the firm (Prabowo et al., 2017; Majeeed, Zhang, & Umar, 2018). This unequally information distribution can lead to agency problems due to differences in interests between the agent and the principal, which makes the principal not always benefit from decision making done by the agent. According to classical agency theory, shareholders and management tend to maximize their benefits and position (André, Filip, & Marmousez, 2014; Elmanizar, Nugraha, Yakub, & Cahyono, 2019). In this case, the principal appoints an independent commissioner to ensure that what the agent does is appropriate.

2.2 Earnings Management and Investment Efficiency

Audit quality can be seen from the audit firm size that carries out the audit process when considering a firm's investment decisions. Management has expectations about the returns provided by investment and expectations about its future growth based on revenue and profit information (McNichols & Stubben, 2008; André et al., 2014). If information about growth is misreported due to earnings management actions, the firm will experience over-investment and under-investment (Lenard & Yu, 2012; Dong, Dong, & Lv, 2020).

According to Demerjian, Lewis-Western, and McVay (2020), earnings management is opportunistic because management tends to prioritize its interests and ignore shareholders' interests. This argument can lead to information asymmetry between management and users of financial reports, especially investors. Information asymmetry causes the information presented to be less transparent. This lack of transparency is evidenced by Samet and Jarboui (2017) which found that managers concerned with their interests to get wealth will tend to make investments that are not in accordance with the expectations of shareholders (Flores & Rojas, 2020).

Chen, Xie, and Zhang (2017) said that qualified financial reports could produce a fair investment efficiency level by minimizing information asymmetry. Information asymmetry can be minimized by increasing transparency between management and users of financial reports. Transparent information will increase investor confidence that invested capital is safe so that investment efficiency can be created that is in line with all parties' expectations. This process reflects that earnings management actions can reduce the quality of financial reports, which results in inefficient investment (Guo, Huang, Zhang, & Zhou, 2015). This argument is reinforced by Hanousek, Shamshur, and Tresl (2019) findings, which states that earnings management has a negative relationship with investment efficiency, and the findings of Wang, Zhu, and Hoffmire (2015) show that earnings management has a positive relationship with over-investment. Over-investment shows that the investment made by the firm is inefficient. This over-investment means that earnings management has a negative relationship with investment efficiency.

H1: Earnings management has negative relationship with investment efficiency

2.3 Moderating Role of Independent Commissioners

An independent commissioner is an ideal position to carry out his function, namely, to supervise the firm to realize GCG (Shahzad, Rehman, Colombage, & Nawaz, 2019; Jurkevičius, Bublienė, 2017). According to Shahzad et al. (2019), independent commissioners must carry out independent supervision and must not be influenced by other parties. In accordance with the agency theory that to increase the board of commissioners' independence level, it is necessary to dominate the board of commissioners who do not come from the firm itself (outsider commissioners). Outsider directors are needed to supervise and control the opportunistic behavior of directors so that that management can act in the interests of all parties, especially stakeholders (Chen, Young, & Zhuang, 2013).

An opportunist attitude of management that can lead to information asymmetry that is detrimental to shareholders. However, with the presence of independent commissioners, information asymmetry can be minimized because as it is known that independent commissioners are parties from outside the firm who does not
have any relationship with the firm. Independent commissioners' presence can increase the creation of GCG to minimize the occurrence of earnings management to realize efficient investment (Jaehong, Eunjung, & Hyunjung, 2016). Jaehong et al. (2016) argue that independent commissioners can minimize the opportunistic attitude of management. This argument is reinforced by the results of research conducted by Oh and Kim (2018) that independent commissioners can moderate the relationship between earnings management with firm value.

**H2**: Independent commissioner weakens the negative relationship between earnings management with investment efficiency

### 3 Research Methodology

#### 3.1 Sample and Data Sources

This study uses a quantitative approach. This study refers to data sources in the form of secondary data from the financial statements of manufacturing firms listed on the Indonesia Stock Exchange (BEI) 2016-2018 by accessing www.idx.co.id. Meanwhile, data for independent commissioners are taken from firm management reports. This study uses time-series data in a 3-year range, namely 2016-2018. The sample collection method uses the unbalanced panel data approach, which is used when the cross-sectional unit has a different number of observations each year so that 346 observational data are determined to be the sample in this study.

#### 3.2 Operational Definition and Variable Measurement

This study using earnings management as an independent variable, investment efficiency as a dependent variable, and the independent commissioners as a moderating variable. Earnings management is an accounting policy chosen by management to achieve goals as expected; this is done by increasing the amount of profit or reducing the amount of reported loss (Lin, Hutchinson, & Percy, 2015). Earnings management can be seen through the absolute value of the residual value of the regression. According to Lin et al. (2015) investment efficiency is a combination of financial efficiency and non-financial efficiency. This efficiency is related to risk, total investment costs incurred by the firm, and return rate. According to Zhong and Gao (2017), independent commissioners are members of the board of commissioners who come from outside the firm who have no share ownership or relatives with other boards of commissioners, financial relations, management relations, relationships with directors and shareholders. Independent commissioners also do not have any connection that can influence the independent attitudes of an independent commissioner. Management and supervision carried out effectively by the board of commissioners can help create efficient investment decisions (Chen, El Ghoul, Guedhami, & Wang, 2017).

This study contains control variables, including firm size, cash flow from the operation, and tangibility. The firm size is measured by measuring the size of the firm's total assets (Harymawan & Nowland, 2016; Chen et al., 2017). The greater the total assets owned, the greater the size of the firm (Kacperczyk, Sundaresan, & Wang, 2018). Cash flow from operation is used to control the effect of cash on investment efficiency (Zhao, Zhang, & Shao, 2016). Tangibility is the firm's fixed assets ratio divided by the total assets (Muttakin, Khan, & Azim, 2015), see table 1 below.
Table 1. Variable Measurement

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent</strong></td>
<td></td>
</tr>
<tr>
<td>Earnings Management (DAC)</td>
<td>DAC obtained from absolute value of residual from this regression model. (Kothari, Leone, &amp; Wasley, 2005)</td>
</tr>
<tr>
<td></td>
<td>$TAC_{it} = \frac{1}{A_{it-1}} + \alpha_2 \left( \frac{\Delta SALES_{it}}{A_{it-1}} \right) + \alpha_3 \left( \frac{PPE_{it}}{A_{it-1}} \right) + \alpha_4 ROA_{it} + \varepsilon_{it}$</td>
</tr>
<tr>
<td></td>
<td>Where: $TAC$ is total accrual, $A$ is total asset, $\Delta SALES$ is sales change, $PPE$ is property, plant, and equipment. While $ROA$ is defining result of total earnings with total asset and $\varepsilon$ is error term.</td>
</tr>
<tr>
<td><strong>Dependent</strong></td>
<td></td>
</tr>
<tr>
<td>Investment Efficiency (INVEFF)</td>
<td>$INVEFF_{it} = \beta_0 + \beta_1 \times SALESGROWTH_{it-1} + \varepsilon_{it}$</td>
</tr>
<tr>
<td></td>
<td>Where: $INVEFF$ is total investment that calculated based on every tangible and intangible asset deflated by lagged total asset. While $SALESGROWTH$ is change in percentage of sales level from year t-2 to t-1 (Biddle et al., 2009)</td>
</tr>
<tr>
<td><strong>Moderation</strong></td>
<td></td>
</tr>
<tr>
<td>Independent Commissioners (INDCOM)</td>
<td>$INDCOM = \frac{Total \ independent \ commissioners}{Total \ board \ of \ commissioners} \times 100%$</td>
</tr>
<tr>
<td></td>
<td>(Yapono &amp; Khomsatun, 2018)</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
</tr>
<tr>
<td>Firm Size (FSIZE)</td>
<td>$FSIZE = \ln (Total \ assets)$</td>
</tr>
<tr>
<td></td>
<td>(Arifuddin &amp; Usman, 2017; Wang et al., 2015; Anzella et al., 2019; Harymawan et al., 2019; Irawati et al., 2019)</td>
</tr>
<tr>
<td>Cash Flow From Operation (CFO)</td>
<td>$CFO_{it} = \frac{Total \ operating \ cash \ flow}{Total \ asset}$</td>
</tr>
<tr>
<td>Tangibility (TANG)</td>
<td>$TANG_{it} = \frac{Fixed \ assets_{it}}{Total \ Assets_{it}}$</td>
</tr>
<tr>
<td></td>
<td>(Yapono &amp; Khomsatun, 2018; Saputra &amp; Wardhani, 2017; Biddle et al., 2009)</td>
</tr>
</tbody>
</table>

3.3 Research Design
We use ordinary least square regression analysis to test the hypothesis in this study. The following regression models:

\[ P(INVEFF)_{it} = \beta_0 + \beta_1 DAC_{it} + \beta_2 FSIZE_{it} + \beta_3 CFO_{it} + \beta_4 TANG_{it} + \varepsilon_{it} \]

This study also uses Moderated Regression Analysis which is used to determine whether the independent commissioners can weaken the relationship between earnings management with investment efficiency by using the following regression model:

\[ P(INVEFF)_{it} = \beta_0 + \beta_1 DAC_{it} + \beta_2 INDCOM_{it} + \beta_3 DAC_{it} * KOMIND_{it} + \beta_4 FSIZE_{it} + \beta_5 CFO_{it} + \beta_6 TANG_{it} + \varepsilon_{it} \]

Where P(INVEFF) is the probability of the level of investment efficiency, DAC is the level of discretionary accruals, INDCOM is the proportion of the independent board of commissioners, FSIZE is the size of the firm, CFO is the cash flow from operation, TANG is the ratio of fixed asset levels, \( \beta_5 \) is a constant, \( \beta_1 - \beta_6 \) is the regression coefficient, and \( \varepsilon \) is the error. In addition, descriptive statistical tests, Pearson correlation tests, t-test statistical tests, and determination coefficient tests were also carried out in this study.

4 Result and Discussion

4.1 Descriptive Statistics

<table>
<thead>
<tr>
<th>Table 2. Statistics Descriptive</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>INVEFF</td>
</tr>
<tr>
<td>DAC</td>
</tr>
<tr>
<td>INDCOM</td>
</tr>
<tr>
<td>FSIZE</td>
</tr>
<tr>
<td>CFO</td>
</tr>
<tr>
<td>TANG</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
</tr>
</tbody>
</table>

Based on table 2, investment efficiency (INVEFF) has an average of -0.146 and a standard deviation of 0.352. The earnings management variable, as proxied by discretionary accruals and calculated using the Kothari model, has an average of 0.096 with a standard deviation of 0.327. Meanwhile, independent commissioners, seen from the comparison between the number of independent commissioners and the total number of commissioners in the firm, have an average of 0.415 independent commissioners and a standard deviation of 0.115.

4.2 Pearson Correlation Test

| Table 3. Pearson Correlation Test Result |
|---|---|---|---|---|---|
| INVEFF | DAC | INDCOM | FSIZE | CFO | TANG |
| INVEFF | 1 | -0.091** | 0.081 | 0.085 | -0.048 | -0.217*** |
| (0.046) | (0.065) | (0.058) | (0.185) | (0.000) |
| DAC | -0.091** | 1 | 0.088 | -0.044 | 0.930*** | -0.023 |
| (0.046) | (0.051) | (0.208) | (0.000) | (0.334) |
| INDCOM | 0.081 | 0.088 | 1 | 0.010 | 0.077 | -0.023 |
| (0.065) | (0.051) | (0.428) | (0.078) | (0.336) |
| FSIZE | 0.085 | -0.044 | 0.010 | 1 | 0.030 | 0.174*** |
| (0.058) | (0.208) | (0.428) | (0.291) | (0.001) |
| CFO | -0.048 | 0.930*** | 0.077 | 0.030 | 1 | 0.020 |
| (0.185) | (0.000) | (0.078) | (0.291) | (0.359) |
From the Pearson correlation test in Table 3, it is found that earnings management and tangibility have a negative relationship with investment efficiency with a significance of 0.046 and 0.000, respectively. In addition, this test also found that cash flow from operation had a positive relationship (sig. 0.000) with earnings management. Meanwhile, tangibility has a positive relationship with firm size (sig. 0.001). It was also found that earnings management has a positive relationship with cash flow from operation (sig. 0.000). The last one is related to tangibility, which we found that investment efficiency has a negative relationship with tangibility (sig. 0.000) and vice versa, firm size has a positive relationship with tangibility (sig. 0.001).

### 4.3 Ordinary Least Square Regression

<table>
<thead>
<tr>
<th>Model</th>
<th>Independent Variable</th>
<th>Regression Model</th>
<th>B</th>
<th>t</th>
<th>Sig.</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td></td>
<td>-0.682</td>
<td>-2.038</td>
<td>0.042</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>DAC</td>
<td></td>
<td>-0.153**</td>
<td>-2.332</td>
<td>0.020</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>FSIZE</td>
<td></td>
<td>0.025**</td>
<td>2.093</td>
<td>0.037</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>CFO</td>
<td></td>
<td>0.159</td>
<td>1.603</td>
<td>0.110</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td>TANG</td>
<td></td>
<td>-0.425***</td>
<td>-4.515</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$R^2$</td>
<td>0.078</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>346</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F Statistic</td>
<td>7.210</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F Sig.</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$p$-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The results of the ordinary least square regression analysis in table 4 show that earnings management is proven to have a statistically significant negative relationship with investment efficiency. This result is evidenced by the DAC coefficient's value, which shows the number -0.153 with a significance level of 0.020 (<0.050). Therefore, the first hypothesis of this study is accepted. Meanwhile, for the control variable, firm size has a significant positive relationship (sig. 0.037), and tangibility has a significant negative relationship with investment efficiency (sig. 0.000).

### 4.4 Moderated Regression Analysis

<table>
<thead>
<tr>
<th>Model</th>
<th>Independent Variable</th>
<th>Regression Model</th>
<th>B</th>
<th>t</th>
<th>Sig.</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>(Constant)</td>
<td></td>
<td>-0.434</td>
<td>-1.283</td>
<td>0.200</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>DAC</td>
<td></td>
<td>-4.468***</td>
<td>-4.777</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>INDCOM</td>
<td></td>
<td>-0.512**</td>
<td>-2.268</td>
<td>0.024</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>DAC*INDCOM</td>
<td></td>
<td>8.706***</td>
<td>4.618</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>FSIZE</td>
<td></td>
<td>0.026**</td>
<td>2.249</td>
<td>0.025</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>CFO</td>
<td></td>
<td>0.086</td>
<td>0.887</td>
<td>0.376</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td>TANG</td>
<td></td>
<td>-0.476***</td>
<td>-5.117</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$R^2$</td>
<td>0.139</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>346</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F Statistic</td>
<td>9.095</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F Sig.</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$p$-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Based on the results of the Moderated Regression Analysis in table 5, it shows that independent commissioners can significantly weaken the relationship between earnings management with investment efficiency. This result is evidenced by the number of significances 0.000 (p <0.050). The coefficient of 8.706 is positive, indicating that independent commissioners can weaken the relationship between earnings management with investment efficiency, so if there is an increase in earnings management with independent commissioners by 1, investment efficiency will increase by 8.706.

Table 6. Moderation Type Regression Result

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Model</th>
<th>B</th>
<th>t</th>
<th>Sig.</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td></td>
<td>-0.778</td>
<td>-2.290</td>
<td>0.023</td>
<td>Significant</td>
</tr>
<tr>
<td>DAC</td>
<td></td>
<td>-0.159**</td>
<td>-2.424</td>
<td>0.016</td>
<td>Not significant</td>
</tr>
<tr>
<td>INDCOM</td>
<td></td>
<td>0.247</td>
<td>1.553</td>
<td>0.121</td>
<td>Not significant</td>
</tr>
<tr>
<td>FSIZE</td>
<td></td>
<td>0.025**</td>
<td>2.076</td>
<td>0.039</td>
<td>Significant</td>
</tr>
<tr>
<td>CFO</td>
<td></td>
<td>0.155</td>
<td>1.560</td>
<td>0.120</td>
<td>Not significant</td>
</tr>
<tr>
<td>TANG</td>
<td></td>
<td>-0.421***</td>
<td>-4.487</td>
<td>0.000</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Table 6 shows that in this study, independent commissioners are pure moderation because independent commissioners can moderate the relationship between earnings management and investment efficiency, but independent commissioners as an independent variable do not have a statistically significant relationship with investment efficiency. This result is evident from the significance value, which shows a value above 0.050, which is equal to 0.121.

4.5 Coefficient of Determinant Test

Based on tables 4 and 5, the $R^2$ value in model 1 is 0.078. This value means that earnings management, firm size, cash flow from the operation, and tangibility can explain investment efficiency by 7.8%, while variables excluded by the study explains the remaining 92.2%. Meanwhile, the $R^2$ value in model 2 is 0.139. So, it can be concluded that earnings management, independent commissioners, firm size, cash flow from the operation, and tangibility can explain the investment efficiency of 13.9%. In comparison, the remaining 86.1% is explained by other variables that are excluded from this study. The increase in the $R^2$ value before and after being influenced by independent commissioners proves that independent commissioners can moderate the relationship between earnings management with investment efficiency.

5 Discussion

Earnings Management and Investment Efficiency

The results of the study show that earnings management has a negative relationship with investment efficiency. The negative value on the earnings management coefficient indicates if the level of earnings management in a firm is high, the level of investment efficiency is low. Benlemlih and Bitar (2018) proved that earnings management behavior tends to be carried out by management who prioritizes individual wealth, resulting in investments that are not in line with shareholders’ interests. This argument is reinforced by Chen, Dong, Tong, and Zhang (2018), statement that management who exercise discretion in earnings management tends to misbehave in investing. The results of this study are in line with research conducted by (Huang & Wang, 2015). They stated that earnings management has a negative relationship with investment efficiency. According to Liu, Miletkov, Wei, and Yang (2015), qualified financial reports are indicated by a minimized discretionary accruals occurrence, which reduces the investment inefficiency level.

Independent Commissioners in Moderating Earnings Management and Investment Efficiency

The results of this study indicate that independent commissioners can weaken the relationship between earnings management with investment efficiency. The positive coefficient value of 8.706 suggests that independent commissioners can weaken the negative relationship between earnings management with investment
efficiency. This result means that the role of independent commissioners in a firm can weaken the possibility of earnings management efforts by management so that investment efficiency can be achieved. This argument is supported by the agency theory that to increase the board of commissioners’ independence; it is necessary to dominate the number of outside directors against the total number of the board of commissioners (Suprianto, Suwarno, Murtini, Rahmawati, & Sawitri, 2017). With outside directors, management's actions can be monitored and controlled independently to reduce management's opportunistic behavior (Muda, Maulana, Sakti Siregar, & Indra, 2018). Reducing this opportunistic attitude can reduce earnings management actions so that the quality of financial reports improves and investment efficiency is achieved. The results of this study are following with (Muda et al., 2018), which states that independent commissioners moderate the negative relationship between earnings management with investment efficiency. Meanwhile, the results of this study contradict Shen, Luo, and Huang (2015), who found that independent commissioners cannot moderate the negative relationship between earnings management with investment efficiency.

6 Conclusion

This study aims to examine the role of independent commissioners in moderating the relationship between earnings management with investment efficiency in 346 firm-years observations. The research sample is manufacturing firms listed on the Indonesia Stock Exchange for the period 2016-2018. Based on the test results of ordinary least square regression analysis and moderated regression analysis with SPSS 22 software, the results show that earnings management has a negative relationship with investment efficiency. The higher the earnings management level in a firm, the lower the investment efficiency level. In addition, this study also found that independent commissioners were able to weaken the negative relationship between earnings management with investment efficiency. This study has a limitation in the sample used that earnings management can only explain investment efficiency of 7.8%, and after being affected by moderation, it only increases to 13.9%. For future research, it is possible to test other variables that are thought to be capable of related to investment efficiency. In addition, future research is expected to use other earnings management techniques, namely real earnings management, as real earnings management focuses on increasing or decreasing firm earnings by manipulating real activities such as delaying promotional activities and accelerating sales. This approach is different from this study, which uses accrual earnings management that focuses on increasing or decreasing firm earnings with accounting policies.

Acknowledgement

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References


MANAGERIAL OWNERSHIP MODERATES THE EFFECT OF EXECUTIVE RISK PREFERENCE AND GENDER DIVERSITY ON TAX AVOIDANCE

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Abstract. This study aims to examine the effect of executive risk preference and gender diversity on tax avoidance. This study also analyzes managerial ownership's role in moderating the effect of executive risk preference and gender diversity on tax avoidance. This study used 224 manufacturing companies listed on the Indonesia Stock Exchange (IDX) in 2014-2018 and analyzed using multiple linear regression. The results of this study indicate that executive risk preference has a positive effect on tax avoidance, and gender diversity has a negative effect on tax avoidance. At the same time, managerial ownership does not moderate the effect of executive risk preference on gender diversity on tax avoidance. This study's results can be a consideration for the owner to pay attention to gender diversity in the process of forming a board of directors or executives within the company.

Keywords: Tax Avoidance; Executive Risk Preference; Gender Diversity; Managerial Ownership

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Jel Codes: O10

1 Introduction

The government, in order to improve the welfare of the community, carries out a series of development projects. In implementing these projects, of course, an adequate source of funding is needed, where taxes play an important role in financing the country's development projects. It can be seen from the posture of the state revenue budget released by the Ministry of Finance of the Republic of Indonesia, in 2019 of IDR 2,165.1 trillion, IDR 1,786.4 trillion state revenue was obtained from taxation revenue (www.kemenkeu.go.id). The size of the tax contribution in the revenue budget indirectly results in taxes becoming an important aspect for the government that affects the smooth running of the country's development program (Sasongko et al., 2019; Samimi et al., 2020). To improve the welfare of the community, the government carries out a series of development projects. In implementing these projects, of course, an adequate funding source is needed, where taxes play an important role in financing the country's development projects. It can be seen from the posture of the state revenue budget released by the Ministry of Finance of the Republic of Indonesia, in 2019 of IDR 2,165.1 trillion, IDR 1,786.4 trillion state revenue was obtained from taxation revenue (www.kemenkeu.go.id). The size of the tax contribution to the revenue budget indirectly results in taxes becoming an essential aspect for the government that affects the country's development program's smooth running (Whait et al., 2018; Beltrán, Pascual & Virseda, 2020).

However, in practice, the realization of state revenue from the taxation sector often does not reach the target. It causes the government to be unable to carry out development projects optimally. One reason for not achieving this tax revenue target is the difference in interests between the government and companies. Companies in carrying out their business processes have one goal of maximizing profits, where taxes are the burden most companies avoid (Butje and Tjondro, 2014; Sejati and Prasetsianingrum, 2019; Dimmock et al., 2015; Liu et
al., 2019). This naturally occurs, even though taxpayers are aware of the company's responsibility to record, report, and be responsible as in research (Abrahams and Kristanto, 2016; Wahab et al., 2018). The company is still trying to minimize the tax burden it bears of which is tax avoidance.

According to Abdelfattah and Aboud, (2020), the decision to implement tax avoidance practices is a decision made by the company (in this case, the executive) and is not a coincidence. Here, company executives are also involved in monitoring management using company resources (Aguilera et al., 2020; Mulazid et al., 2017). So the executive's character is one of the essential aspects in the decision-making process, one of which is executive risk preference. Executives will tend to show their preference for decision making as a risk-taker or risk-averse. The risk-taker characteristic will be more willing to take risks than risk-averse as long as the risk-return is profitable.

The risk-taker characteristics inherent in executives will make executives more willing to take risks because of the understanding that the high risk taken is in line with the high rate of return or benefits that will be obtained by Lewellyn, (2017). This statement is in line with Ylönen, (2018), which states that there is a positive relationship between executives who are risk-takers and tax avoidance, where the more executives with risk-taker characteristics, the higher the tax avoidance by the company (Hussain et al., 2020).

On the other hand, executives with risk-averse characteristics will choose to “play it safe” by still choosing decisions or investments that are safe and do not pose a high risk. Kashmiri and Brower, (2016) states that executive character has a negative effect on tax avoidance. Although the nature of executives in the company is a risk-taker, they will still be careful because of the existence of binding laws in terms of tax avoidance.

In addition to risk preferences, the diversity of committees within the company can influence the company's decision-making process (Mulazid et al., 2017; Song et al., 2015). According to Huang and Bowblis, (2018), the instinct for gender diversity is caused by both men's and women's inherent nature. There is an attitude tendency in making decisions; women with a tendency to be risk-averse are considered to be less likely to risk the company than men. Huang and Bowblis, (2018); Marzuki et al., (2019) add another, more complex perspective regarding the difficulty of preparing adequate conditions or environments to support their work. Huang and Bowblis, (2018) reveal that women's presence on the board of directors can reduce the amount of corporate tax avoidance. Different results are obtained by (Gul et al., 2018), which state that gender is not the main factor affecting tax payments in tax avoidance, aggressive tax, and tax compliance.

Based on the description above, executive character and gender diversity are not the only things influencing corporate tax avoidance decisions. According to Chalmers et al., (2019), managerial ownership in Good Corporate Governance also deserves consideration. Good Corporate Governance (GCG) is considered because it can increase company value and assist more effective monitoring activities and improve corporate governance practices Nasih et al., (2019); Plöckinger et al., (2016) controlling the company to achieve a balance between the power of authority needed (Sari, M et al., 2018). GCG ownership is expected to increase managers' motivation to improve performance and minimize the risks faced by companies, especially regarding tax avoidance decisions. In Plöckinger et al., (2016) for example, managerial ownership is chosen as a moderating variable that will strengthen management compensation's effect on tax avoidance. Still, it does not moderate the impact of executive characteristics on tax avoidance.

Therefore, this research is made for several purposes, first, to obtain empirical evidence about the effect of executive risk preference on tax avoidance. Second, obtain empirical evidence on the effect of gender diversity on tax avoidance. Third, obtain empirical evidence on managerial ownership's role in moderating the effect of
This study uses a quantitative research approach with a sample of manufacturing companies listed on the Indonesia Stock Exchange in 2014-2018. The basis for selecting the research sample is that manufacturing companies are the largest contributor to state revenue, so that they have a significant impact on state tax revenues.

The results of this study state that there is a significant positive influence between executive risk preference on tax avoidance, which means that the higher the executive with the risk-taker characteristics, the higher the corporate tax avoidance action and the executive gender diversity has a significant negative effect on tax avoidance, where the greater the proportion. Women on the board of directors will reduce the level of corporate tax evasion. However, managerial ownership does not moderate the effect of executive risk preference or gender diversity on tax avoidance, which means that the greater proportion of shares owned by management does not strengthen or weaken the influence of executive risk preference and gender diversity on tax avoidance.

This research contributes to theoretical development, particularly regarding executive risk preference, gender diversity, managerial ownership, and tax avoidance. This research also contributes practically as consideration for company owners and is a reference for the Directorate General of Taxes in paying attention to companies that can-do tax avoidance.

This research is organized in the following series: Section 2 contains an explanation of the research hypothesis; Section 3 explains the research methodology; Section 4 contains empirical analysis, hypothesis testing results, and classical assumption test results. Section 5 provides conclusions and suggestions.

2 Literature Review

2.1 Upper Echelon Theory
Li and Zeng, (2019) argue that the managing director's characteristics influence the decisions made and every action adopted by the company being led. In Li and Zeng, (2019) research, the upper-echelons theory's main premise is that executives' experiences, values, and personality have a significant influence on the interpretation of the situation at hand and influence the choices of executives. Upper echelon characteristic can be represented in terms of psychology and other characteristics that are easier to observe, such as age, career experience, education, socio-economic conditions, financial condition, group character and leadership style.

The upper echelon theory in this study focuses on executive characteristics characterized by risk preferences and gender. First, risk preference relates to the executive's nature, which affects the way the company acts and makes decisions. Second, gender diversity positions, men, to be more confident than women, thus implying that women undertake significantly fewer projects and decisions than men. Women are considered to be more likely to avoid risk so that this character will impact corporate decision-making (Huang and Kisgen 2013). It may be possible in tax avoidance efforts.

2.2 Agency Theory
Agency theory is based on the assumption that individuals in companies will act in their interests, assumed to be rational economic beings (Nasution, 2019; Liu, 2019). From this situation, there arises a conflict of interest between the principal and agent. There are two types of agency problems. First is the issue of agency conflict arising from the principal-agent conflict. The second is the problem of agency conflicts that arise from conflicts of interest between principals (Fitri et al., 2019, Villalonga dan Amit, 2006; Kachouri et al., 2020). This research is based on the type one agency problem, namely agency conflicts between principals and agents. The imbalance of information strengthens agency conflicts. Management is the party that runs the business so that the information
they have about the company is more detailed and broad. According to (Kovermann and Velte, 2019; Jurkevičius, Bublienė, 2017) good corporate governance can help reduce agency conflicts. Several corporate governance types can be used to reduce agency conflicts, one of which is managerial share ownership.

2.3 Hypothesis Development

2.4 Effect of Risk Preference on Tax Avoidance

According to Menard et al., (2018), executives in a company aim to achieve company goals by influencing the organization they lead so that they have a considerable influence on the company and result in making decisions that have risks. Executive influence in decision making is always associated with two characteristics, namely risk-taker and risk-averse (Shayan-Nia et al., 2017). As a result, executives with a risk-taker nature tend to be brave enough to avoid taxes due to personal impulses related to compensation or corporate welfare. (Shayan-Nia et al., 2017) stated that managers might want high compensation, so they do tax avoidance. The benefits obtained from this tax avoidance decision are considered commensurate with the risks that must be faced by risk-taker executives. Meanwhile, Risk-Averse tends to “play it safe” by still choosing decisions or investments that are safe and do not pose a high risk. This is because, in tax avoidance, Risk-Averse will remain cautious due to binding laws.

(Tanaka, 2016), in his research, states that leaders as company agents have a moral responsibility to optimize company profits, which is a particular executive character, namely a risk-taker or risk-averse, which is reflected in the size of the company's risk. Tax avoidance, in this case, poses a significant enough threat for the company. An executive with a risk-averse character will focus on decisions that do not produce a considerable risk, so that the higher the risk-averse executive characteristics, the less tax avoidance practice will be. Likewise, on the other hand, the higher the executive with the nature of the risk-taker, the more corporate tax avoidance practices will be. Another study was also conducted by (L.-H. Wang et al., 2015) and obtained the same results. Company executives who tend to have risk preferences, executive risk-takers will be more courageous in determining a corporate tax avoidance policy even though the risks to be faced are high.

Based on the description above, the following research hypothesis is proposed:

H1: Executive risk-taker risk preference has a positive effect on tax avoidance.

2.5 The Effect of Gender Diversity on Tax Avoidance

According to (Jeong and Harrison, 2017), there are many advantages to applying gender diversity in companies, including additional knowledge, new insights to solve problems, improved strategic planning, and new perspectives and experiences. Board gender diversity is also considered to improve the quality of supervision in companies. In gender diversity, according to (Emami, 2017) executives with risk-taker characters tend to have men who are more courageous in making business decisions, while risk-averse characters who tend to be owned by women are more careful in making decisions. The higher the proportion of women on the company's board of directors is considered to impact the company positively. Women tend to be more objective in making decisions and uphold ethical values that exist in society. In this case, tax avoidance practices are considered inconsistent with the moral values of society.

According to (Garcia-Sanchez et al., 2017), companies with gender diversity on the board show better performance because women bring significant changes in human resources and business. The existence of gender diversity in the board of directors is considered to provide various decision-making perspectives. Women on the board of directors are considered to uphold values and morals more, help companies make more informed, and responsible decisions, and have high compliance (Dallyn, 2017). This is in line with the upper echelon theory, which states that differences in character caused by gender differences lead to differences in corporate decision making. Based on the description above, the following research hypothesis is proposed:

H2: Gender diversity has a negative effect on tax avoidance.
2.6 The Effect of Managerial Ownership in Moderating the Effect of Executive Risk Preferences on Tax Avoidance

One of the proxies contained in Good Corporate Governance is managerial ownership. This proxy explains the number of company shareholdings owned by company management. According to Tenidou et al., (2015), increasing the percentage of share ownership by management in a company will make management more motivated in running the business because it will also bear the consequences for making wrong decisions. By having company shares, it is hoped that management will align the objectives between management and company owners with increasing the company's value and performance and minimizing company risk. The more significant the proportion of outstanding shares owned by government, the lower the existing conflicts of interest between company owners (shareholders) and management. This is because management will also bear the risk of the business decisions it makes, so that management will be more objective and careful in making risky decisions, one of which is corporate tax avoidance practices.

According to Leung et al., (2019), the increase in the percentage of managerial shares in the company makes management more active and focused on shareholders' interests because if there is a wrong decision, management will also bear the consequences. The ownership of shares by management will reduce the existing agency conflicts because of the separation of functions between the owner (shareholder) and management. Because management has a proportion of the company's shares, it will also run the company according to the interests of the owners as shareholders. So, in this case, share ownership reduces tax avoidance. Even executives with a risk-taker nature will be more careful in making decisions because it will impact their share ownership. This is in line with research conducted by Tauringana and Chithambo, (2015), which explains the effect of managerial ownership, independent commissioners and audit committees on tax avoidance, and results that increase the number of managerial ownership the tendency to do tax avoidance will be lower.

Based on the description above, the following research hypothesis is proposed:

**H3: Managerial ownership weakens the effect of executive risk preference on tax avoidance**

2.7 The Effect of Managerial Ownership in Moderating the Influence of Gender Diversity on Tax Avoidance

The existence of share ownership by management in companies that apply the principle of gender diversity is considered to reduce tax avoidance practices in the company. Companies with gender diversity are considered to produce more diverse considerations in the business decision-making process, including tax avoidance decisions. Kazemian and Sanusi, (2015) in their research also stated that the presence of women on the company board helps improve the performance of the board of directors so that companies with female directors show lower tax avoidance. The existence of managerial ownership in companies that can reduce agency conflicts is considered to strengthen the effect of decreasing tax avoidance practices by companies that adhere to the principle of gender diversity.

According to the upper echelon theory, women individually have psychological characteristics that cause company performance to increase and reduce company risk. Women are considered to be more careful so that the presence of managerial ownership will reduce executive subjectivity and indirectly reduce corporate tax avoidance practices.

Based on the description above, the following research hypothesis is proposed:

**H4: Managerial ownership strengthens the effect of gender diversity on tax avoidance**

3 Methodology

This study used 224 manufacturing companies listed on the Indonesia Stock Exchange for 2014-2018, which were analyzed using multiple linear regression. In sample selection, we use the following criteria:

1. Manufacturing companies listed on the Indonesia Stock Exchange in 2014-2018 and were not delisted during the research observation period.
2. Manufacturing companies that Initial Public Offering before 2011.
3. The company is not experiencing a loss during the study period.
4. The company has complete data related to the research variables.
5. The company has an ETR value < 1

3.1 Variable Definition
The following is an explanation of the operational definitions of the variables we chose in this study:

3.1.1 Dependent Variable
Tax Avoidance
The tax avoidance measurement in this study uses the current ETR, which is calculated as the current year tax expense with total accounting income before tax. The measure of this variable refers to (Cardillo et al., 2020).

\[ \text{Current ETR} = \frac{\text{Current income tax expense}}{\text{Total pretax income}} \]

3.1.2 Independent Variable
Risk Preference
According to Ye et al., (2019), risk preference can be reflected in the company's risk obtained from the division between the standard deviation of the profitability measure before interest, tax, and depreciation (EBITDA) with the company's total assets. Referring to Ye et al., (2019) risk preferences are formulated as follows:

\[ \text{RISK} = \frac{\text{Standard Deviation of EBITDA}}{\text{Total Asset}} \]

Gender Diversity
This study measures gender diversity by referring to Nengsih et al., (2018) using the following formula:

\[ \text{Gender Diversity (GD)} = \frac{\text{Number of woman in the Board}}{\text{Number of BoD} + \text{Number of BoC}} \]

Managerial Ownership
This study refers to Wirawan and Wirakusuma (2018) who define the measurement of managerial ownership with the following formula:

\[ \text{Managerial Ownership (KM)} = \frac{\text{Shares owned by the manager}}{\text{Total shares outstanding}} \]

3.1.3 Control Variable
Leverage
Leverage can be calculated using the DAR ratio. The greater the company's ratio, the greater the level of dependence of the company on creditors and the greater the cost of debt that must be borne by the company (Florackis et al., 2015). The following is the formula used in measuring leverage as a control variable, according to (Florackis et al., 2015):

\[ \text{LEV} = \frac{\text{Total Debt}}{\text{Total Asset}} \times 100 \]

Return on Equity (ROE)
High Return on Equity also reflects how high the profit a company can get from the use of its equity (Wen et al., 2020). According to Wen et al., (2020), Return on Equity can be calculated using the following ratio:

\[ \text{Return on Equity (ROE)} = \frac{\text{Earning After Tax}}{\text{Total Equity}} \times 100\% \]

Firm Size
The logarithm of total assets can measure the company Size (Hasan et al., 2017; Namazi et al., 2016), so this study calculates company size using the following formula:

\[ \text{FSIZE} = \ln(\text{Total Assets}) \]
3.2 Empirical Model

This study examines the proposed hypothesis using risk preference as the independent variable (X1) and gender diversity as the independent variable (X2) which will affect tax avoidance as the dependent variable (Y) and managerial ownership as the moderating variable. The regression model for testing the hypothesis is formulated as follows:

To test Hypothesis 1:

\[ TA_{it} = \alpha + \beta_1 RISK_{it} + \beta_2 LEV_{it} + \beta_3 ROE_{it} + \beta_4 FSIZE_{it} + \epsilon_{it} \]

To test Hypothesis 2:

\[ TA_{it} = \alpha + \beta_1 GD_{it} + \beta_2 LEV_{it} + \beta_3 ROE_{it} + \beta_4 FSIZE_{it} + \epsilon_{it} \]

To test Hypothesis 3:

\[ TA_{it} = \alpha + \beta_1 RISK_{it} + \beta_2 GD_{it} + \beta_3 KM_{it} + \beta_4 RISK_{it} \times KM_{it} + \beta_5 LEV_{it} + \beta_6 ROE_{it} + \beta_7 FSIZE_{it} + \epsilon_{it} \]

To test Hypothesis 4:

\[ TA_{it} = \alpha + \beta_1 RISK_{it} + \beta_2 GD_{it} + \beta_3 KM_{it} + \beta_4 \times GD_{it} \times KM_{it} + \beta_5 LEV_{it} + \beta_6 ROE_{it} + \beta_7 FSIZE_{it} + \epsilon_{it} \]

Notes:

TA = Tax Avoidance
RISK = Risk Preference
GD = Gender Diversity
KM = Managerial Ownership
LEV = Leverage
ROE = Return on Equity
FSIZE = Company size

4 Result and Discussion

4.1 Descriptive Statistics

Table 1 is the descriptive statistics test results based on 224 samples of companies listed on the Indonesia Stock Exchange in 2014 - 2018.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA</td>
<td>224</td>
<td>-0.3907</td>
<td>-0.0951</td>
<td>-0.25406</td>
<td>0.0480353</td>
</tr>
<tr>
<td>RISK</td>
<td>224</td>
<td>0.0037</td>
<td>0.0872</td>
<td>0.032151</td>
<td>0.0184821</td>
</tr>
<tr>
<td>GD</td>
<td>224</td>
<td>0.0000</td>
<td>0.5000</td>
<td>0.102734</td>
<td>0.1033173</td>
</tr>
<tr>
<td>KM</td>
<td>224</td>
<td>0.0000</td>
<td>0.8944</td>
<td>0.046394</td>
<td>0.1222735</td>
</tr>
<tr>
<td>LEV</td>
<td>224</td>
<td>0.0985</td>
<td>0.8436</td>
<td>0.404983</td>
<td>0.1841765</td>
</tr>
<tr>
<td>ROE</td>
<td>224</td>
<td>0.0018</td>
<td>1.3585</td>
<td>0.175070</td>
<td>0.2161600</td>
</tr>
<tr>
<td>SIZE</td>
<td>224</td>
<td>25.6723</td>
<td>33.4737</td>
<td>28.884097</td>
<td>1.6389714</td>
</tr>
</tbody>
</table>

In the above, the lowest TA value in this study is -0.3907 or 39.07% and indicates the amount of tax burden borne by the company while the largest value is -0.0951 or 9.51%. The average value of TA acquisition is -0.25406. This means that the company has an average tax base of 25%. The risk preference in this study has the smallest value of 0.0037 and the largest value of 0.0872. The gender diversity variable shows an average value of 0.102734 with a minimum value of 0.0000 and a maximum value of 0.5000. Meanwhile, managerial ownership has an average value of 0.046394 or 4.639% with a minimum value of 0% and a maximum value of 0.8944 or 89.44%. Furthermore, the mean values of LEV, ROE, and FSIZE are 0.404983 and 0.175070, and 28.884097.
4.2 Estimation Results and Verification of Research Hypotheses

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Coef</th>
<th>Sig</th>
<th>Coef</th>
<th>Sig</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>(constant)</td>
<td>-0.400</td>
<td>0.000</td>
<td>-0.410</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>RISK</td>
<td>0.488</td>
<td>0.006***</td>
<td>0.416</td>
<td>0.025**</td>
<td>H₁ diterima</td>
</tr>
<tr>
<td>GD</td>
<td>-0.060</td>
<td>0.056*</td>
<td>-0.073</td>
<td>0.035**</td>
<td>H₂ diterima</td>
</tr>
<tr>
<td>KM</td>
<td>-</td>
<td>-</td>
<td>-0.033</td>
<td>0.551</td>
<td></td>
</tr>
<tr>
<td>RISKxKM</td>
<td>-</td>
<td>-</td>
<td>1.212</td>
<td>0.329</td>
<td></td>
</tr>
<tr>
<td>GDxKM</td>
<td>-</td>
<td>-</td>
<td>0.154</td>
<td>0.444</td>
<td>H₃ ditolak</td>
</tr>
<tr>
<td>LEV</td>
<td>-0.026</td>
<td>0.148</td>
<td>-0.024</td>
<td>0.185</td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>0.005</td>
<td>0.748</td>
<td>0.007</td>
<td>0.656</td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>0.005</td>
<td>0.011**</td>
<td>0.005</td>
<td>0.008***</td>
<td></td>
</tr>
</tbody>
</table>

Adjusted R² | 0.071 | 0.074 |
F statistic  | 4.425 | 3.225 |
F sig        | 0.001 | 0.002 |

*, **, *** Shows significance at the 0.1 level; 0.05; and 0.01

The following is an explanation of the regression analysis results in Table 2.

4.3 Effect of Risk Preference on Tax Avoidance

The results of testing hypothesis 1 are accepted. This study's risk preference shows that the risk preference variable has a significant positive effect with a significance value of 0.025, which is greater than 0.1. So it can be concluded that hypothesis 1 is accepted, where executive risk preference has a significant positive effect on tax avoidance. The greater the executive who has a risk-taker character, the company executives are more courageous in making risky decisions, in this case, tax avoidance decisions.

This is also supported by the upper-echelon theory, which states that the organization is a reflection of organizational actors, in this case, the company executives. In the upper-echelon theory, it is also said that one of the main factors that influence the interpretation of the situation that the company will run is the experience, values, and personality of the executives, so it can be concluded that the character of the company's executives will greatly influence the decision-making process and actions that will be carried out by the company. The results of this study support the research conducted by Faccio et al., (2016), which states that company executives who tend to have a risk preference for executive risk-takers will be more courageous in determining a corporate tax avoidance policy even though the risks to be faced are high.

4.4 The Effect of Gender Diversity on Tax Avoidance

The results of testing hypothesis 2 are accepted. This study's gender diversity variable shows that the gender diversity variable has a significant negative effect with a significance value of 0.035, which is greater than 0.1. So it can be concluded that hypothesis 2 is accepted, where gender diversity has a significant negative effect on tax avoidance. If analyzed, the more influential the proportion of women on the company board, the less corporate tax avoidance decisions; this is because women's level of compliance is higher than that of men. This result is also consistent with the upper-echelon theory, where gender differences in board members are closely related to the board of directors' mindset or characteristics. Where gender differences significantly affect differences in leadership styles and psychological characteristics of a person. Upper-echelon theory states that these differences in character can cause differences in the decision-making process, one of which is the company's tax avoidance decision. This study's results support the research of G. Wang et al., (2018), which states that the presence of women on the company board helps improve the performance of the board of directors so that companies with female directors show lower tax avoidance.
4.5 The Effect of Risk Preference on Tax Avoidance with Managerial Ownership as a Moderation Variable

The results of testing hypothesis 3 are rejected. The risk preference, which is moderated by managerial ownership, does not affect tax avoidance. This is evidenced by the significance value results, which shows the number of 0.329 is greater than 0.1, so it can be interpreted that managerial ownership does not moderate the effect of executive risk preference on tax avoidance.

The risk preference variable in this study explains executives' tendency to choose the risk, where the higher the value of the executive risk preference, the higher the risk borne by the company, one of which is the risk of tax avoidance decisions. Management or company executives are considered more daring to take high risks due to the nature of opportunism motivated by the conflict of interest in agency theory. This supports Adhikari, (2016), which states that managerial ownership does not moderate the effect of executive character on risk on tax avoidance because even though executives have ownership in the company, it will not affect tax avoidance. After all, executives do not have sufficient authority in decision-making.

4.6 The Effect of Gender Diversity on Tax Avoidance with Managerial Ownership as a Moderation Variable

The results of testing hypothesis 4 are rejected. Gender diversity, which is moderated by managerial ownership, does not affect tax avoidance. This is evidenced by the results of the significance of the variables, which show the number of 0.444 is greater than 0.1. So it can be interpreted that managerial ownership does not moderate the effect of gender diversity on tax avoidance. The results of testing hypothesis 4 are rejected and, at the same time, reject the research conducted by Zalata et al., (2018). In the upper-echelon theory, decisions due to gender diversity are influenced by the characteristics of company executives. These characteristics affect the way executives view risks and make decisions. This is where the role of managerial ownership is expected to align interests between owners and executives and reduce the opportunistic nature of company executives. However, the characteristics of gender in dealing with risk are very inherent to the individual (L.-H. Wang et al., 2017). The perspective of the individual responding to threat is difficult to change, whether it is the size or the small of the managerial ownership they have.

5 Conclusion

This study was conducted to examine managerial ownership to moderate the effect of executive risk preference and gender diversity on tax avoidance. Several things can be concluded from this study. First, the character of executive risk preferences greatly influences the company's decision-making process. Where the high level of executives with risk-taker characteristics will increase corporate tax avoidance level because executives with risk taker characteristics tend to be more courageous in taking risks. Second, the high gender diversity in board members is considered to reduce the level of corporate tax avoidance. This is because the optimal ratio of gender diversity in board members will provide more diverse input due to men's and women's different characteristics. Women on board members are more risk-averse and uphold ethical values, which will lead to lower levels of corporate tax avoidance. Third, managerial ownership does not moderate the effect of executive risk preference on tax avoidance. This is due to the low average proportion of shares owned by management, which causes executives not to have sufficient authority to make decisions so that managerial ownership in the company cannot weaken the effect of executive risk preference on tax avoidance. Fourth, managerial ownership also does not moderate the effect of gender diversity on tax avoidance. This is because the characteristics of gender in responding or dealing with risk are felt to be very inherent to the individual, so that the individual's perspective on responding to risk is difficult to change, either with the size or smallness of the managerial ownership they have.
Our study also recognizes limitations. First, there are still possible variables outside the test that can be explored further. Second, there is no synchronization between variables where the risk variable as measured by the standard deviation of EBITDA which results in an executive tendency to be risk-taker or risk-averse, is it in line with the gender diversity variable which measures risk based on gender generalization. So, we provide suggestions for further research to analyze other variables that can influence tax avoidance, such as management compensation and corporate social responsibility, or to deepen the synchronization of executive risk preference variables with gender diversity.

This study contributes to the theoretical development of research in the field of tax accounting, more specifically on the development of executive risk preferences, gender diversity, managerial ownership, and also tax avoidance. Besides, this study also contributes to providing considerations for company owners to pay attention to gender diversity in the process of forming a board of directors or executives within the company. At the same time, it can also be ignorance for the Directorate General of Taxes in giving attention to companies that can do tax avoidance.

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