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THE IMPACT OF INDUSTRY 4.0 ON BUSINESS RESULTS

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Abstract. The article aims to present the impact of Industry 4.0, which has developed worldwide as a new revolution in production and impacted manufacturing companies and changes in companies in the Czech Republic that apply it. Discussions in the engineering business emphasise the need to consider both the benefits and drawbacks of proposed modifications. In today's fast-paced environment, staying current with trends and continuing education is critical. Changes can be chaotic, affecting several industries. Businesses must change rapidly to stay caught up. The current trend is Industry 4.0, in which emphasis is placed on automation, digitisation, robotisation, artificial intelligence, etc., and this is an era of opportunities for digitalisation on a comprehensive scale. Employee change in response to new technology requires preparedness and skill development. Furthermore, business investment prioritises land and labour substitution for capital and technological equipment updates. The industry seeks to improve process quality and efficiency while promoting environmental sustainability and waste reduction in corporate production, emphasising the critical need for a comprehensive sustainable strategy. The study examines the influence of Industry 4.0 on corporate performance over five years, focusing on prospective transitions towards the new industrial age. The authors employed data collection, content analysis, and correlation approaches. The findings show varying added value patterns post-implementation, impacted mainly by firm size.

Keywords: Industry 4.0; enterprise; automation; robotization; digitalization

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JEL Classifications: M21, E31, E61

1. Introduction

Currently, Industry 4.0 is considered an industrial phase in which horizontal and vertical production processes ensure companies achieve higher performance with the help of technology (Dawale et al., 2023; Lewandowska et al., 2023; Song, 2023). With new technologies also come new opportunities in the field of work, and therefore it is necessary to prepare the current and future generations of workers for this situation Turek et al., 2023; Cramarenco et al., 2023). In developed countries, this transformation is led by digitising and integrating production processes throughout the value chain. It is therefore necessary to focus on implementation, especially in developing countries (Medić et al., 2020; Quyet, 2024). Understanding the characteristics and technical environment of Industry 4.0 is crucial for businesses, as they can formulate strategies dealing with digital transformations based on their development needs (Li, 2023). The goal is a paradigm shift from computer-controlled manufacturing to a smart factory concept in which machines, personnel, and materials are connected and adapted to digital change. It is a connection between information and operational technologies (Meyendorf et al., 2023).

It is also necessary to prepare for this revolution, especially in education. Automation is effective only if understanding digitisation and using data to improve process quality and efficiency (Udvaros et al., 2023). Following today's increasing supply and demand in chains, planning tasks to provide flexibility and avoid complexities is essential. The most important prerequisite for developing networks and applications is the flexibility of the supply chain (ERDİL, 2023). Pursuing technical and economic progress, which must align with ethical considerations, environmental sustainability, and social responsibility, is central (Mhlanga, 2023). In this direction, robots and their cognitive functions have been improved, and dynamic capabilities have expanded. These are related to kinematics, self-control, and self-diagnosis (Barasa & Etene, 2023).

The essential technologies of Industry 4.0 are virtual and augmented reality, cyber-physical systems, blockchain technology, artificial intelligence, cloud computing, and additive manufacturing (Kolupaieva & Tiesheva, 2023; Lăzăroiu et al., 2022; 2023; Androniceanu, 2023; Hrab & Minculete, 2023).

The article aims to evaluate the impact of Industry 4.0 on selected manufacturing companies that operate in the Czech Republic, apply it, and indicate whether its effect on the company's added value and the economic result is proven.

RQ1: What is the tendency of the added value of the investigated companies after the application of Industry 4.0?

RQ2: Is there a proven correlation between the added value of the selected companies and their economic result after the application of Industry 4.0?

2. Literature Review

Researchers Kai et al. (2023), using a longitudinal case study and a qualitative analysis from the point of view of creativity, state that innovations related to Industry 4.0 are very investment-intensive and should be incredibly creative and subsequently lead entrepreneurs to success. Nimawat & Gidwani's (2023) questionnaire surveys revealed that companies are moving to Industry 4.0 to ensure competitiveness in developed countries.

According to Issa (2023), who based his study on qualitative analysis, the fourth industrial revolution is the integration of modern technologies and digitisation. He states that if companies understand the factors of Industry 4.0, they will secure a driving engine and effectively use their potential. Shadravan & Parsaei (2023) use interpretive structural modelling to illustrate relationships using different sustainability roles. The study's result points out the need to consider the concept of Industry 4.0 as a road map showing how to use technology for intelligent production. According to Labaran & Masood (2023), Green Supply Chain Management (GSCM) and renewable resources affect the sustainability of the supply chain and renewable energy. The authors stress the importance of business investments directed towards purchasing and sourcing, business relations, transport, logistics costs, sustainability, and waste reduction (Skare et al., 2023a,b; Gavurova et al., 2022a). In their study, Kılıç et al. (2023) used focus group methods and interval-valued spherical fuzzy IVSF-AHP. They concluded that a digital transformation is an effective tool for evaluating success and progress worldwide. The implementation of Industry 4.0 is necessary as a digitalisation infrastructure.

Wolniak & Grebski (2023) claim that Industry 4.0 tools are a strategic imperative leading to the continuous improvement of all business operations and will take a competitive position in a dynamic world. Using correlation and confirmatory factor analysis, Nitlar & Kiattisin (2022) conclude that the conventional investment paradigm is no longer successful, and companies focus on environmental, corporate, and social investments. Kantar's (2022) study, which dealt with the logistics 4.0 process, shows that it is essential for companies to reduce working capital, inventory, and warehousing costs and to increase the services they provide to customers.

Andrusevich et al. (2022) solve tasks related to overviews of robots used in industry. They analyse risks and, using the method of system analysis and graphical generalisation and classification, perform an analysis of the

current state of robotics in production, which results in economic, technological, environmental and financial uncertainties and challenges. Qammar et al. (2023) implemented a study, the originality of which lies in suggesting a specialised theory and creating a cyber-physical system that shows the positive impact of Industry 4.0 on waste management. Tsyba (2023) states that it is necessary to indicate steps that would allow to outline the innovative development via the revelation of decision-making capabilities of enterprises to analyse needs, define strategic goals, plan resources, and focus on financing and researching new technologies they want to implement.

Khan & Rizwan (2023), using descriptive statistics, correlation analysis, and diagnostic tests, found that corporate investment has a direct relationship with social responsibility and corporate efficiency. Therefore, managers should use their corporate resources to achieve company goals. However, some obstacles in this way are, for example, the complexity of data management, personal data protection, the high costs of implementing new technologies, and possible shortcomings and gaps in employees' skills (Gavurova et al., 2024). Based on quantitative research and interviews, Młody et al. (2023) concluded that Industry 4.0 technologies benefit from managerial decisions in the value chain through optimised business processes, eliminated errors, and reduced costs.

Wolniak & Grebski (2023) dealt with the investment in personalisation in the era of Industry 4.0. Their analysis of the literature showed that digitalisation and data employment effectively reduce waste (Gavurova et al., 2022b; Skare et al., 2024). Still, the company must plan carefully, comply with regulatory standards and ethical principles, and invest appropriately (Olah et al., 2021; Simionescu et al., 2021). The digital transformation of domestic companies should also focus on employees. Kablashova et al. (2023) point out that management must involve employees in business and organisational changes, primarily due to digital transformation, which can motivate employees to take the initiative and actively participate in projects. Mehmood & Farshchian (2023) conducted research related to information systems. Their study underlined the human factor as the cause of failure. Therefore, they assume that initiative workers are needed for digital transformation to be successful.

Pinto & Reis (2023) concluded that current and future generations should engage in hybrid-type learning. However, the technical equipment has limits, and the necessary depth in such teaching still needs improvement. Berthanila et al. (2023) used a quantitative approach and the Krijce table; hypotheses were tested via the Structural Equation Modelling analysis and came to the conclusion that employees who are more innovative and able to respond to changes quickly achieve better results; their motivation is related to their excellent performance. Udvaros et al. (2023) examined the needs of new employees who must be prepared to solve problems and develop the skills needed for the era of education 4.0, for which the infrastructure enabling virtual, digital, and technological development will be central. Using a questionnaire survey, Caha et al. (2019) found that corporate education in ICT (information and communication technologies) needs to be prioritised. This finding applies to the primary, secondary, and tertiary sectors and businesses of all sizes.

Dev (2023) used a questionnaire survey method in which almost 300 employees responded and applied multiple regressions; he found a significant influence of employees' physical, psychological, and functional comfort on their commitment and ability to engage in changes related to digitisation and automation. Deny's (2023) results show that organisational culture, digital transformation, and productivity positively affect employee performance. Business investments are also linked to storage and logistics (Tikwayo & Mathaba, 2023). In their publication, the authors employed Pareto analysis and concluded that implementing Industry 4.0 in the warehouse economy will improve efficiency and digital integration; data will be available in real time. Still, the obstacles are precisely high investment, insufficient support resources, and data security risks. Taş (2023) dealt with quantitative data analysis in a company's case study using Radio Frequency Identification (RFID) warehouse technology and came to the insight that applying Logistics 4.0 reduced the company's logistics operations costs by 13.37%.

The information security of the enterprise system is also related to the application of the new era of industry (Klishin & Chechulin, 2023). For their research, the scientists used the method of analysis of standards, studied selected models that ensured information security for companies and concluded that it is necessary to analyse

the selection criteria and choose a relevant system for the corporate infrastructure, especially according to the size of the company, as the requirements will be different, and the investment impact vary significantly.

3. Methodological Approach

The methodology for the article was chosen to fulfil the research objective as best as possible. The literature search is based on professional articles from the websites Scopus and WOS, from which it is drawn. For the application part, the reports of the analysed companies will be used, and the results of this article will be derived with the help of statistical methods. Graphs and tables will be created and commented on based on the techniques used.

3.1 Data

The profit and loss statement values will be analysed, specifically the added value from the main activities of the selected companies - Vishay Electronic spol. s. r. o., Faurecia Automotive Czech Republic, s. r. o., Aisin Europe Manufacturing Czech, s. r. o., Motor Jikov Strojírenská a. s. and SINOP CB a. s. The economic results of the companies after taxes, which are recorded in the profit and loss statements, will also be examined. Data will be tracked in selected companies from 2018 through 2022, mainly due to their availability. These documents will be consulted using public internet portals on which companies publish their results so it can be concluded that the data will be reliable.

3.2 Methods

The obtained data will be processed using several statistical methods to answer the research questions. First, the data collection method will be applied. The content analysis of the documents will follow; specifically, each company's profit and loss statements from 2018 to 2022 will be evaluated. The monitored values in the statements will be sales revenue, material and service costs, added value, calculated as the difference between sales revenue and the cost of materials and services, and, finally, the economic result after taxes. The documents will be available on the public server, and the data will be recorded in Table 1 of the application section. Quantitative research will be used to compare a set of data or indicate any statistically significant differences. A comparison of the obtained data will also be applied, the results of which will be interpreted based on the created graphs. The obtained values will be correlated to determine the mutual relationship of the observed quantities and the subsequent impact on the concurrency of these values.

Here, higher values of one variable are associated with higher values of the other variable, but the reverse is also true. Therefore, if one of the monitored quantities changes, the other also changes, and the same applies in the opposite case. The correlation coefficient expresses the strength of the correlation. It can take on values from -1 to +1. If the value is +1, it means completely direct dependence; if -1, it means utterly indirect dependence, i.e., anti-correlation. The result can be interpreted so that the more the values in the first group of values increase, the more the values in the second monitored group decrease. If the result of the correlation coefficient is equal to 0, it is uncorrelated, meaning there is no statistically detectable linear dependence between the correlated values. If the value of the correlation coefficient is in the interval in absolute value from 0 to 0.3, the dependence is considered unproven. Suppose the correlation coefficient in the interval is more significant than 0.3 to 0.7 in absolute value. In that case, it is considered loosely dependent, and if it is more significant than 0.7 in absolute value and less than 1, it is considered tightly dependent. If the value of the correlation coefficient is in absolute value 1, it means functional dependence. According to the + sign, the dependence of the correlation coefficient is direct, and according to the - sign, it is indirect.

Equation 1 shows the formula for calculating the correlation:

$$\rho_{X,Y} = \frac{E(XY) - E(X)E(Y)}{\sqrt{E(X^2) - E^2(X)} \sqrt{E(Y^2) - E^2(Y)}} \quad (1)$$

4. Results and Discussion

To compare the impact of Industry 4.0 on corporate investments, 5 companies operating in the South Bohemian region of the Czech Republic with a similar focus, which applies the new industrial era to their production, were selected. The research was directed to the profit and loss statement, from which the added value was calculated, relating to the products, not the companies' goods. 5 consecutive periods were analysed from 2018 to 2022. Production value added was calculated as the difference between the company's income from sales and the cost of providing materials and services. The first selected company is Vishay Electronic spol. s. r. o., branch in Přeštice. It is a global company with 23 production plants in Europe, 4 in the Czech Republic. It also employs approximately 1,800 employees here. It owns 17 branches in America, 21 in Asia and the Pacific. Their production focuses on components for cars, telephones, robots and appliances, resistors, capacitors, and inductors. The company aims to focus on technology and constantly develop, especially emphasising technology, which they perceive as a tool and driver of progress, innovation, and positive change.

The other company is called Faurecia Automotive Czech Republic s. r. o., which is based in Písek. It employs approximately 5,000 employees here. It is a leader in automotive technology and inspires the future of mobility. It has 8 branches in the Czech Republic but operates in 33 countries worldwide. The branch in Písek is focused on producing metal car seat structures, using classic welding methods and modern methods such as lasers. The company's goal is to be an example for other companies, to consider the exhaustibility of resources, and to be responsible for its decisions. The third selected company is Aisin Europe Manufacturing Czech, s. r. o., which also operates in Písek. It employs approximately 1,000 employees here. It is a leading manufacturer and supplier of auto components for customers such as Volvo, Toyota, Renault, Dacia, Nissan, and JTEKT. In its production, it uses automated and robotic workplaces mainly to produce gearboxes and engine castings, as well as for the assembly of plastic components. The company's production processes are machining, assembly, vibration welding, and pressure casting of aluminum. The fourth company is Motor Jikov Strojírenská a. s. Their production is focused on components for trucks, consumer equipment, handling equipment, hydraulic and filter systems, or woodworking. It employs approximately 1,000 employees. Their production lines are partly robotic and automated. Regular investments are aimed at new production technologies with a high degree of automation, process stability, and reliability. According to their studies, the investments in these projects are realised with a maximum return within five years. They also draw on subsidy sources from European programs. The company manufactures tools, casts semi-finished products and machines, and assembles and constantly optimises its production and technological processes. Their goal is to increase the utility value of products and services. The last monitored company is SINOP CB a. s., based in České Budějovice, which focuses on producing industrial cooling, air conditioning, cooling tap technology, and beverage technology. They employ approximately 700 employees here. They also provide components such as filters, regulators, air dampers, valves, and spare parts.

Table 1 shows selected companies' performance for 2018–2022. Values are given in thousands. CZK. Revenues from sales, costs of materials and services, and value-added are calculated as the difference between sales revenue and costs of materials and services, and finally, the economic result after taxes are captured. The mentioned values are influenced by applying Industry 4.0 to production, which all companies implement.

Table 1. Monitored companies

Monitored years	VISHAY ELECTRONIC spol. s r.o.			
	Sales revenue	Cost of materials and services	Value added	Profit
2018	1 944 840	1 146 074	798 766	75 814
2019	2 060 769	1 163 917	896 852	82 183
2020	1 818 429	931 563	886 866	71 619
2021	2 128 567	1 518 850	609 717	82 068
2022	2 519 790	1 695 072	824 718	103 588
	Faurecia Automotive Czech Republic s.r.o.			

Monitored years	Sales revenue	Cost of materials and services	Value added	Profit
2018	11 833 450	11 302 235	531 215	230 169
2019	13 941 716	13 033 987	907 729	544 014
2020	13 400 718	13 000 035	400 683	293 460
2021	16 929 553	16 238 505	691 048	268 218
2022	17 974 781	16 974 382	1 000 399	404 762
Monitored years	Aisin Europe Manufacturing Czech s.r.o.			
	Sales revenue	Cost of materials and services	Value added	Profit
2018	2 390 387	1 919 323	471 064	17 550
2019	2 381 701	1 850 178	531 523	20 026
2020	2 201 707	1 669 841	531 866	9 846
2021	2 045 217	1 518 158	527 059	54 252
2022	2 295 116	1 703 820	591 296	53 383
Monitored years	MOTOR JIKOV Strojírenská a.s.			
	Sales revenue	Cost of materials and services	Value added	Profit
2018	985 720	900 125	85 595	-5 962
2019	938 903	833 266	105 637	1 543
2020	810 674	728 455	82 219	-20 637
2021	944 758	932 310	12 448	31 685
2022	1 092 316	1 048 964	43 352	39 983
Monitored years	SINOP CB a.s.			
	Sales revenue	Cost of materials and services	Value added	Profit
2018	516 655	459 454	57 201	64 063
2019	735 248	509 464	225 784	110 022
2020	625 035	468 458	156 577	95 162
2021	629 708	445 571	184 137	60 775
2022	672 824	544 357	128 467	70 263

Source: Custom processing, 2023

The values shown in Table 1, i.e., the company's movements and results, were correlated according to the formula in the methodology for all the years listed so that their dependence was apparent. The given values are rounded to 3 decimal places. The results of the correlations at VISHAY ELECTRONIC s. r. o. were as follows: In the case of correlated values from sales revenue and material and service costs, the result was 0.929, which implies that the more the sales revenue grows, the more their material and service costs also grow. The correlation of added value and costs of materials and services was -0.536, i.e., the more the added value increases, the more the cost of materials and services will be reduced, and there is an inverse relationship. A negative value of -0.187 was found for the correlation of sales revenue and value-added.

The more the income from sales increases, the more the added value will decrease; again, the inverse ratio applies here. Sales revenue and economic results show a correlation coefficient of 0.992, which means that the more sales revenue increases, the more economic results will increase, and it is a close relationship. The result of the correlation coefficient of 0.877 came out when calculating the values of the costs of materials and services and the economic result. Again, it is very close to the value of +1, so direct proportionality applies, and the dependence of the values is right here. A correlation coefficient of -0.065 resulted in added value with the economic result. We can also interpret the result so that there is almost no statistically linear dependence

between the selected values, and an indirect relationship applies here. The results of the correlations at Faurecia Automotive Czech Republic s. r. o. came out as follows.

In the case of correlated values from added value and economic result, the correlation coefficient was 0.741. The more the added value grows, the more the economic result will increase, and the result is closely dependent. 0.141 is the result of correlating the costs of materials and services with the economic result, from which it follows that there is no proven dependence. The correlation coefficient of 0.996 is based on sales revenue and costs of materials and services. It is very close to the value of +1, so we can say that the more the sales revenue increases, the more the cost of materials and services will also increase, and this is a tight relationship. The value added correlated with sales revenue was 0.654, meaning there is a loose dependence here. 0.205 is the resulting correlation coefficient for sales revenue and economic result; there is an unproven dependence, and 0.592 is obtained after the correlation of the costs of materials and services with added value, which indicates a free dependence. Results of calculated correlations at Aisin Europe Manufacturing Czech s. r. o. they came out like this. The added value with the economic result shows a result of 0.566, i.e., free dependence. The costs of materials and services, which were correlated with the economic result, took on values of 0.87 and are approaching the value of +1, so once again, there is a direct relationship and a tight dependence. The correlation coefficient charged negative values of -0.499 after entering the income values from sales and economic results; here, it is an indirect ratio. The correlation coefficient calculated from sales revenue and costs of materials and services, which was 0.973, was closest to +1 for this company, and the dependence is right here. -0.197 is the result for sales revenue and value-added data; again, an inverse relationship applies here. The coefficient closest to -1, i.e., the indirect ratio, is -0.715. The result is for material and service costs and added value.

The more the costs of materials and services rise, the more the added value will fall. Results of calculated correlations at MOTOR JIKOV Strojírenská a. s. are as follows. The added value correlated with the economic result is -0.778, closest to -1. In this case, it is true that the more the added value increases, the more the economic result will decrease, i.e., an inverse relationship. The costs of materials and services and the economic result show a correlation coefficient of 0.898, which is a direct correlation and close dependence. Sales revenue and economic results have a coefficient of 0.766, and the correlations from the values of sales revenue and costs of materials and services are closest to +1. The dependence is also tight in this case. If sales revenue increases, the cost of materials and services will also increase. The negative value of -0.326 represents the correlation coefficient of sales revenue and value-added. -0.592 is the result of the cost of materials and value-added services. Again, indirect proportionality applies here in both cases. The last values are the results of calculated correlations at SINOP CB a. s.

All their correlation coefficients come out positive. Added value with the economic result has a coefficient correlation value of 0.626; it is a free dependence, and the cost of material, and the economic result is 0.306; there is also a case of free dependence. Revenue from sales and economic results after correlation have a value of 0.650, that is, free dependence, and revenue from sales and costs of materials and services have a correlation coefficient of 0.622, i.e., free dependence of these values. The +1 coefficient of sales revenue and added value comes closest because it comes out to be 0.865, and the dependence of these values is tight. Again, direct proportionality applies here, that the more the income from sales grows, the more the added value will increase. The lowest result was achieved by the correlation coefficient for the costs of materials and services with an added value of 0.145. It comes closest to 0, which means that statistical linear dependence is not proven for these values.

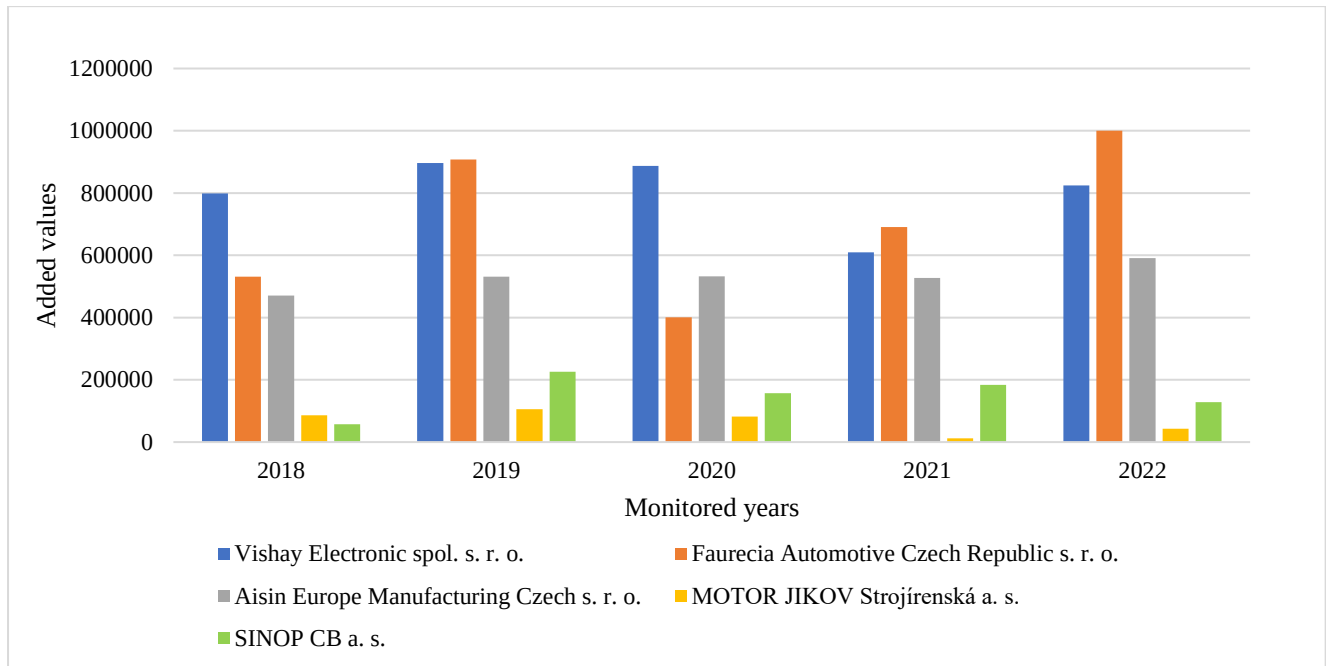


Figure 1. Comparison of added value at selected companies
Source: Custom processing, 2023

Figure 1 shows a graph in which the added value of selected companies is compared in thousands. CZK applies elements from Industry 4.0 in its corporate environment. Vishay Electronic spol. s. r. o. (First Company) and Faurecia Automotive Czech Republic s. r. o. (Second Company) Aisin Europe Manufacturing Czech s. r. o. (Third Company), SINOP CB a. s. (Fourth Company) and MOTOR JIKOV Strojírenská a. s. (Fifth Company) are comparable in terms of size. In 2018, Vishay Electronic spol. ranked first according to the added value results. s. r. o. with a result of 798,766, then Faurecia Automotive Czech Republic, s. r. o. with a result of 531,215, Aisin Europe Manufacturing Czech s. r. o. with a result of 471,064, then MOTOR JIKOV Strojírenská a. s. with a result of 85,595, and SINOP CB a. s. with 57,201. In the following year, 2019, the added value of the First Company increased to 896,852, the Second Company to 907,729, the Third Company to 531,523, the Fourth Company to 105,637, and the Fifth Company to 225,784.

Compared to the previous year, all companies increased their added value. In 2022, the first company saw a drop in value added to 886,866, the Second Company saw a noticeable drop to 400,683, the Third Company remained at very similar values of 531,866, the Fourth Company saw a drop to 82,219, and the Fifth Company also dropped to 156,577. In 2021, there is a decrease in value added for the First Company to 609,717, compared to the Second Company, which increased it to 691,048. The Third Company's values slightly decreased to 527,059, the fourth company had a significant decrease in added value to 12,448, and the fifth company saw an increase to 184,137. In the monitored year 2022, the First Company increased its added value to 824,718, the Second Company also rapidly increased to 1,000,399, the Third Company increased to 591,296, the Fourth Company also increased its added value to 43,352, and the Fifth Company saw a decrease in its added value to 128,467.

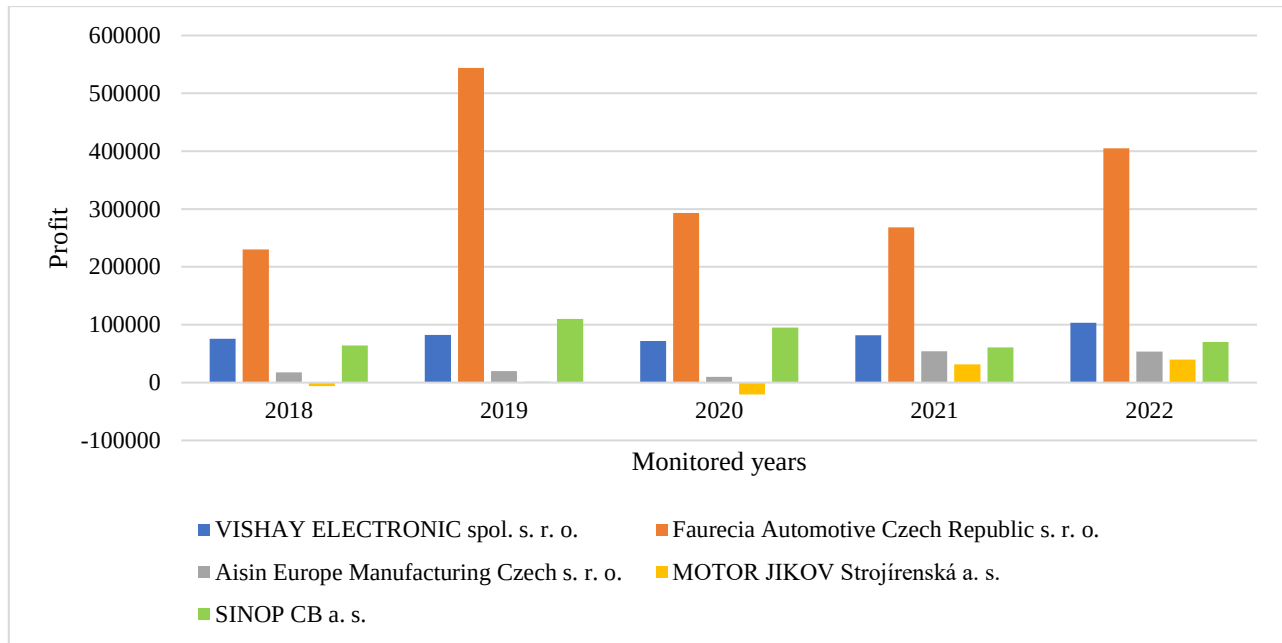


Figure 2. Comparison of profit at selected companies

Source: Custom processing, 2023

Figure 2 shows a graph in which the economic results after taxation of selected companies are compared. CZK applies elements from Industry 4.0 in its corporate environment. Vishay Electronic spol. are comparable in size. s. r. o. (First Company) and Faurecia Automotive Czech Republic s. r. o. (Second Company). Furthermore, Aisin Europe Manufacturing Czech s. r. o. (Third Company), SINOP CB a. s. are comparable in terms of size. (Fourth Company) and MOTOR JIKOV Strojírenská a. s. (Fifth Company). In 2018, the First Company reported a profit after tax of 75,814, the Second Company of 230,169, the Third Company of 17,550, the Fourth Company -5,962, and the Fifth Company 64,063. In the following year, 2019, all companies increased their economic results.

The First Company had a result of 82,183, the Second Company saw a rapid increase to 544,014, the Third Company increased its results to 20,026, the Fourth Company also increased its results to 1,543, and the Fifth Company increased to 110,022. The following year, 2020, was, on the other hand, when the economic results of all monitored companies decreased. For the First Company, it was 71,619; for the Second Company, it dropped rapidly to 293,460; for the Third Company, it was 9,846; the Fourth Company showed negative values and a rapid decrease to -20,637 and the result of the Fifth Company was 95,162. In 2021, the First Company had 82,068, a slight increase; the Second Company saw a decrease to 268,218; the Third Company had an increase to 54,252; the Fourth Company reported 31,685, a noticeable increase; and the Fifth Company saw a decline to 60,775. In the last monitored year, 2022, the First Company's profit after tax increased to 103,588, the Second Company rapidly increased to 404,762, in the case of the Third Company, there was a slight decrease to 53,383, the Fourth Company had an increase to 39,983, and the last Fifth Company saw an increase in the economic result to 70 263. All numerical values are given in thousands of Czech crowns.

5. Discussion

For the research in the article, two research questions were set, which deal with the influence of Industry 4.0 on the selected enterprises and their added value and economic result. The research questions are as follows: What is the tendency of the added value of the investigated companies after the application of Industry 4.0? Is there a proven correlation between the added value of the selected companies and their economic result after the application of Industry 4.0? Synthesis, deduction, and induction are also used to answer questions.

Research question 1: What is the tendency of the added value of the investigated companies after the application of Industry 4.0?

To answer this question, a table was prepared, from which a graph was subsequently created, in which the comparison of individual companies in the monitored years 2018–2022 is presented. At Vishay Electronic spol. s. r. o., the added value for 2018 and 2019 had an increasing tendency. However, it decreased in the following years, 2020 and 2021, and the increase did not follow until 2022. The next monitored company was Faurecia Automotive Czech Republic s. r. o., whose added value trend was increasing in 2018 and 2019. In 2020, it recorded a decrease, i.e., the tendency was downward, but in the following years, 2021 and 2022, the added value increased again. The trend of added value at Aisin Europe Manufacturing Czech s. r. o. was increasing from 2018 to 2019.

The following years, 2020 and 2021, were balanced with 2019, so it was a constant trend. In 2022, this value was increasing. Another monitored company was MOTOR JIKOV Strojírenská a. s., whose added value increased in 2018 and 2019 and decreased in 2020 and 2021. In the last year, 2022, the added value grew again. The last monitored sample was the company SINOP CB a. s. It recorded an increase in added value in 2018 and 2019, but in 2020, it decreased slightly again. Until the following year, 2021, the value-added had an increasing tendency, and in the last year, 2022, it decreased again. From these results, it can be concluded that all the selected companies recorded an increase in added value in 2018 and 2019, but in the following years, their results differed. The company Aisin Europe Manufacturing Czechs. r. o. had the most constant added value, and Faurecia Automotive Czech Republic s. r. o. recorded the biggest jumps in added value values. According to the author Tsyba (2023), it is necessary first to develop steps that outline enterprises' innovative development and decision-making capabilities to analyse needs, define strategic goals, plan resources, and focus on financing and researching new technologies they want and can implement.

Research question 2: Is there a proven correlation between the added value of the selected companies and their economic result after the application of Industry 4.0?

To answer this question, correlations between the added value and the economic result of the monitored companies were calculated for $\varnothing$ consecutive years, 2018-2022. The following results emerged from these calculations: At Vishay Electronic spol. s. r. o. the result of this correlation was 0.065, and we can also interpret the result in such a way that there is almost no statistically linear dependence between the selected values because the result approaches 0. An indirect ratio applies here. For Faurecia Automotive Czech Republic s. r. o., the correlation coefficient between these values was 0.741. The more the added value increases, the more the economic result increases as the value approaches +1, and the dependence is right here. The correlation coefficient between the added value and the economic result at Aisin Europe Manufacturing Czechs. r. o. was 0.566, which means free dependence, and a direct correlation applies here. MOTOR JIKOV Strojírenská a. s. showed a result after correlation - 0.778, which means an indirect correlation. The last monitored company was SINOP CB a. s., whose correlation coefficient was 0.626, whose dependence is considered free, and a direct ratio applies here.

The correlation between the added value and the economic result was proven for the companies Faurecia Automotive Czech Republic s. r. o., Aisin Europe Manufacturing Czech s. r. o. and SINOP CB a. s. In this case, the authors agree with Issa (2023), who states that it is necessary that when implementing Industry 4.0, they understand and thus secure the driving engine and use their potential effectively. The authors also agree with the views of Labaran & Masood (2023), who state in their publication that the application of Industry 4.0 is related to Green Supply Chain Management (GSCM), which has an impact on the sustainability of the supply chain, business investments, relations between companies, transport, and logistics. In this case, all these items impact the economic result and added value.

6. Conclusions

The article aims to evaluate the impact of Industry 4.0 on selected manufacturing companies that operate in the Czech Republic, apply it, and state whether its effect on the company's added value and the economic result is proven. Based on the content analysis, a correlation and comparison of the obtained data was carried out, based on which it was found that, based on the application of Industry 4.0 in companies, the tendency of added value is not only increasing in the monitored periods, but in some cases also decreasing and constant, but it is essential on the size of the business in which this era of industry is applied. The correlation between the added value and the economic result of the selected companies was proven only for three selected companies, in which the rule that they were large companies was not confirmed, and even the smallest selected companies had positive correlation values. The interrelation between added value and economic results is proven.

Based on these findings, the goal of the work was achieved. The limits of this research are found in the absence of the author in the field on which the study was focused and in the limited access to company materials.

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