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IMPROVING REVERSE E-LOGISTICS PERFORMANCE IN THE MIDDLE EAST

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Abstract. B2C e-commerce companies are increasing in number due to the significant benefits e-logistics provides, boosting profits and improving customer satisfaction. Moreover, the COVID-19 pandemic increased demand for online shopping due to lockdowns and safety concerns. Despite this, several B2C companies entering the field eventually leave due to inefficient handling of returned products and ineffective reverse e-logistics systems. This article identifies recent methods to improve Reverse Logistics performance for B2C e-commerce firms. The methodology is based on literature review, synthesis, DELPHI, and multi-scoring survey methods. The results showed that management, quality management, organisational structure and culture, IT, customer satisfaction and service, employees, and infrastructure are factors with a direct effect on REL's performance, and this study suggests methods to improve these factors.

Keywords: reverse logistics; e-logistics; e-commerce; reverse e-logistics; reverse e-logistics' performance; supply chain; sustainability

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JEL Classification: D3, I9, L23, Q27

1. Introduction

The e-logistics sector has demonstrated a significant impact on the global economy in recent years. Its importance for e-commerce and logistics operations. Approximately 10 per cent of global GDP is accounted for by the global e-logistics market (Wu et al., 2017). The projections for future growth in the e-logistics sector are promising. Experts in sustainable logistics and e-commerce indicate that the ongoing digital transformation will not only elevate logistics efficiency but also enhance overall economic productivity (Mutambik, 2025). Efficient reverse e-logistics (REL) systems are essential for implementing e-logistics effectively. A company's REL can help increase profits, improve the sustainability of its resources, and enhance customer satisfaction by improving operational performance. In other words, if a company can maintain an efficient REL system, its e-logistics system will be improved, making it a better B2C e-commerce company. To date, there is a shortage of literature in the field of REL, especially in developing countries such as the Middle East. The purpose of this article is consequently to detect means to enhance the performance of REL systems for B2C e-commerce companies. This results in the research question (RQ): how can REL's systems be improved for B2C e-commerce enterprises operating in the Middle East? The methodologies used are literature review, synthesis, DELPHI, and multi-scoring survey methods.

2. Review of Literature

2.1 Aspects of Reverse E-Logistics

Reverse logistics (RL) is a vital component of the supply chain management framework, addressing the complexities of product returns from customers to manufacturers. This process encompasses not only the physical return of goods but also various managerial and logistical considerations essential for optimising efficiency and maximising value recovery. Basically, reverse logistics (RL) involves moving finished products through the supply chain from customers to manufacturers (Panghal et al., 2022). Recent studies emphasise the significance of reverse logistics as a system that manages both forward flows from suppliers to customers and reverse flows associated with returned products from customers back to suppliers. In a more typical sense, RL refers to the tasks performed by the organisation to reduce waste, recycle, replace, reutilise, and eliminate hazardous materials (Zvarikova et al., 2024; Herrada-Lores et al., 2025). A broader perspective of RL encompasses all logistics operations that involve waste management or waste removal (Melo et al., 2022). The RL systems provide logistical value and an infrastructure capable of identifying, running, and selecting waste through all the supplementary value phases of the reverse channels, in addition to resupplying the forward supply chains (Melo et al., 2022).

Additionally, the management of reverse logistics is increasingly recognised as crucial for customer satisfaction and retention. A study by Mahindroo, Samalia & Verma (2018) indicates that understanding return frequencies and the resources committed to reverse logistics can significantly influence overall strategic performance in supply chains (Mahindroo, Samalia & Verma, 2018). RL manages the influx, storage, and removal of goods that are not considered a priority, along with associated data, utilising the conventional supply chain to restore value or dispose of them properly. RL can be employed to address the issue of unnecessary and non-renewable resources (Wardani et al., 2022). When a product cannot be used to generate revenue or cannot be reused or recycled in a new production cycle, reverse logistics is involved in its recovery (Lingaitienė, Burinskienė & Davidavičienė, 2022). In recent years, there has been growing interest in reverse logistics from both theoretical and practical perspectives, driven by ecological benefits. Reverse logistics is a process that reduces the environmental harm associated with the recovery of materials. Reverse logistics also offer ecological benefits by increasing product recycling and recovery, thereby reducing resource use. In reverse logistics, responsibilities or objective systems that encompass environmental, economic, and social features have emerged over time from a reverse flow of goods only. Firstly, reverse logistics aims to minimise waste by reutilising and recycling as much as possible. Subsequently, it seeks to provide customers with value-added service by meeting their requirements, whether it is for product returns or recycling (Lai et al., 2022). The efficient use of resources is associated with enhanced economic performance (Ivanova, Rogaczewski & Lutsenko, 2022). The COVID-19 pandemic has driven an increase in online buying, thereby boosting reverse logistics. Such unexpected crises generate new challenges and require finding other ways to operate (Zamfirache et al. 2025; Herrada-Lores et al. 2025).

A reverse e-logistics (REL) approach is based on reverse logistics. It is often referred to as reverse logistics with ICT activation. According to REL, products flow from consumption to production in reverse order after an online order is placed (Morgan et al., 2018). The REL is an element of logistics that focuses on reducing resource use by recycling, discarding waste, re-establishing, and refabricating products sold through e-commerce (Mahindroo, Samalia, & Verma, 2018). As part of its role, REL is responsible for ensuring that e-commerce firms' supply chain procedures are effective and efficient. In other words, focusing on the reverse flow of materials aligns with REL's goal of maximising supply chain value by increasing reverse flow (Han & Trimi, 2018). REL is responsible for the recovery of consumer goods that have reached the end of their lifespans (Batarfi, Jaber & Aljazzar, 2017). By reducing costs, improving customer satisfaction, and improving internal processes, an effective REL's management can improve organisational performance (Han & Trimi, 2018). It is asserted that the REL can contribute to the recovery of economic value in an operational and strategic manner, providing services with enhanced value to reduce risks and enhance business reputation (Da Silveira Guimarães & Salomon, 2015). By integrating economic, environmental, and legal services, REL streamlines the return of products back into the business cycle. REL is the most popular and modern form of reverse logistics.

2.2 Barriers to Improving REL's Systems

It is the management's responsibility to make sure REL's systems operate effectively within the organisation. Despite this, management faces major obstacles, including a lack of commitment, inadequate strategic planning, limited experience, and a reluctance to accept change (Sirisawat & Kiatcharoenpol, 2018). A manager's influence, governance, and emergency response can affect REL's operations. It is viewed as a substantial barrier to an effective settlement of REL when managers from several departments lack interest, information, awareness, and engagement (Waqas et al., 2018).

The presence of unskilled employees appears to be the cause of negative REL performance in some companies (Sirisawat & Kiatcharoenpol, 2016). It is considered valuable for a company to have skilled employees capable of handling REL's supply chain operations by involving them in decision-making, providing appropriate training, improving communication and coordination, and enhancing their competencies (Waqas et al., 2018). It is crucial to continuously monitor the supply chain encompassing REL's systems and the company's activities to maintain the maximum number of workers, as any reduction will negatively impact REL's performance (Bal & Satoglu, 2018). Incompetence or lack of training can lead to poor employee performance. In turn, this will negatively impact REL's performance because of unprofessional, unskilled, and inexperienced employees.

The fact that IT processes are lacking, outdated technology is used, and poor infrastructure are the main factors affecting REL's effective settlement. To solve this problem, companies should invest more in research and development. A firm's technological systems must also be updated constantly. In fact, REL's performance is strongly influenced by the information technology system (Batarfi, Jaber & Aljazzar, 2017). IT is required to facilitate electronic commerce, and thus, REL cannot operate without strong IT systems. REL's performance is adversely affected by several factors related to customer returns, including warranty issues (Pandian & Abdul-Kader, 2017). Returned goods and warranty repair costs can negatively impact REL's operations. A poor guarantee, on the other hand, will undermine customer confidence in the product, making them less likely to purchase it. Because a significant portion of returns is due to warranty claims, many firms began combining REL tactics with their own strategies and supply networks. Companies handle REL differently, especially regarding product warranties, because it affects their sales constantly (Panigrahi et al., 2018). The return policy must include other objectives, such as recycling and disassembly, rather than being limited to defective goods (Waqas et al., 2018). Since providing a guarantee to online customers is seen as a "reassuring factor" for subsequent transactions, its significance is beyond debate. However, to avoid unnecessary returns and related costs, such warranties should be carefully drafted.

The effective settlement of REL activities is recognised as hindered by defection, the removal of amenities, infrastructure, and typical employed resource markets (Chinda, 2017). The supply chain and a company's infrastructure are integrally linked. Businesses with infrastructure issues struggle to manage recalled or returned goods, which negatively affects REL's performance (Sirisawat & Kiatcharoenpol, 2016). Therefore, a company should be able to manage returned goods effectively, provided it has a robust infrastructure. Nevertheless, the lack of infrastructure will affect the organisation's capacity to handle these returns, resulting in high costs and losses (Prakash & Barua, 2015). For reverse e-logistics to be successful, infrastructure is required. Without strong infrastructures, businesses won't be able to handle REL procedures effectively, which would seriously jeopardise REL's performance. When implemented properly, organisational structure has a good impact on REL's performance. However, if the company has a poor structure, that will be seen as a roadblock to REL's effective performance (Morgan et al., 2018). The norms, policies, procedures, and culture of collaboration between managers and employees within an organisation affect how well REL performs (Waqas et al., 2018). The effectiveness of REL is directly associated with a strong institutional framework that recognises the fundamental requirements of its employees, activities, and skills (Cannella, Bruccoleri, & Framinan, 2016). A properly designed, understandable, and effective institutional framework will give businesses a competitive edge and make a significant difference in earnings (Prakash & Barua, 2015). Companies should understand that there is no ideal organisational structure. The goals, offerings, and efficiency of each company's supply chain all influence its organisational structure. However, the development and implementation of a successful organisational structure are facilitated by a positive corporate culture.

Quality products should not be exchanged for quantity, as effective quality supervision and control methods can achieve this (Prakash & Barua, 2015). If a company's quality management is weak or nonexistent, the volume of returned goods may affect the availability of these products and, thus, the effectiveness of REL (Waqas et al., 2018). Enhancing product quality through efficient quality control and evaluation systems increases client retention, which in turn increases client satisfaction (Vlachos, 2016). By maintaining product quality through effective management systems that track customer feedback and needs, businesses can add value to their customers (Mahindroo, Samalia & Verma, 2018).

3. Methodology

The purpose of this article was to detect means to enhance the performance of REL systems for B2C e-commerce enterprises. The created research question (RQ) was: how can REL's systems be improved for B2C e-commerce enterprises operating in the Middle East? As such, to explore the study's goals and address its research question, the preceding section of this article presented theoretical background. To identify means to enhance REL's performance, the views of seven professionals in the field of REL were considered using two methods: the Delphi method and the multi-criteria scoring method. The chosen criteria were: a minimum of a master's degree in supply chain or logistics management; at least 10 years of professional experience in logistics or supply chain management; at least 5 years of experience in reverse e-logistics; and holding a top management position within the organisation.

There are two primary rounds in the DELPHI process. Round 1 involves gathering responses from supply chain specialists. Following the determination of the experts' consensus and round 1 result, a second questionnaire is delivered in round 2 to further analyse the selected parameters. In round 1, experts were questioned about the top 15 elements that affect or can enhance the performance of reverse e-logistics. The same experts were then invited to complete a questionnaire with two primary elements in round 2. Part A asks for their view on how important the aforementioned elements are to REL's performance, and Part B assesses the weight of various REL operations on business performance. In round 1 of the DELPHI technique, experts were required to rank the elements they believed had the most influence on REL's performance before responding to the round 2 questionnaire.

The same professionals were then asked to score the factors and their associated criteria using a multiple-criteria approach. The multi-criteria scoring technique was utilised to analyse the specifics of how the identified aspects affecting REL's performance could be enhanced. A scale of 0 to 10 was used, with 0 indicating a low likelihood of an effect and 10 indicating a high probability. The total points attributed to the eight assigned factors must add up to 10. The same holds for criteria scoring, where each component must have a total score of 10 points. Data validation ensures the sum is no greater than 10.

4. Results & Discussions

The experts provided a total of 24 different variables in round 1 of DELPHI. The elements that have been proposed as possibly affecting REL's success in the first round of DELPHI are summarised in Figure 1 below.

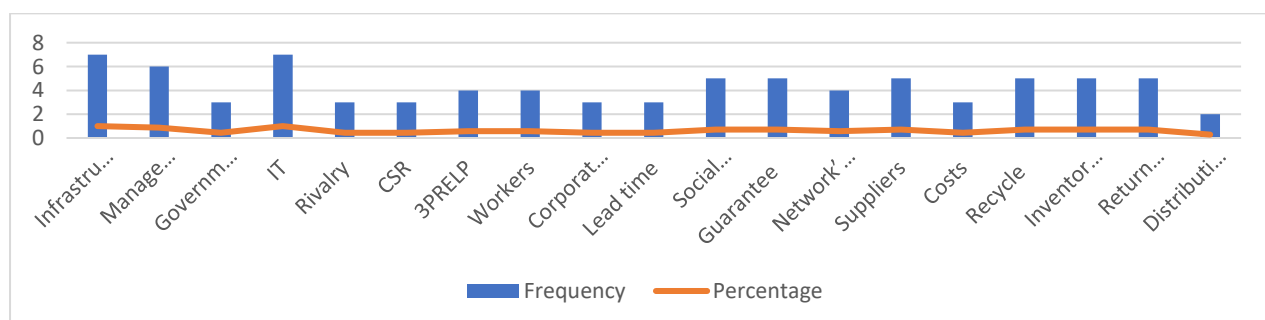


Figure 1. Suggested factors impacting REL's performance in the first round of the Delphi
Source: created by the authors

The percentage details by factor: Infrastructure 100%, Management 85.71%; Government policies 42.85%; IT 100%; Rivalry 42.85%; CSR 42.85%; 3PRELP 57.14%; Workers 7.14%; Corporate image 42.85%; Lead time 42.85%; Social network 71.42%; Guarantee 71.42%; Network's capability 57.14%; Suppliers 71.42%; Costs 42.85%; Recycle 71.42%; Inventory management 71.42%; Return policy 71.42%; Distribution channels 28.57%; Transportation costs 42.85%; Internet Connection 71.42%; Client satisfaction 100%; Quality management 57.14%; Organisation structure/environment 57.14%. Elements with less than 51% consensus were disregarded, while relevant ones were grouped into the same category. One factor, for instance, was the guarantee and return policy. The factors were analysed and categorised, and they were then condensed into 10 major ones, which are: Management, IT, infrastructure, external intermediary reverse e-logistics, organisational hierarchy and environment, quality management, inventory management, workers, return policies and guarantees, and customer retention. Low agreement is indicated by answers below 4, medium agreement is indicated by answers between 5 and 6, and high agreement is indicated by answers between 7 and 9, with answers over 7 indicating high agreement. When the value is between 51% and 100%, consensus is attained.

The consensus was calculated using the interquartile range (IQR). The IQR calculates a data series' middle 50 values. The IQR is a measurement of exemptions or the range of values that most commonly occur. IQR is determined by subtracting the first quartile from the third quartile, according to the following formula: $IQR = Q3 - Q1$. When the IQR value is less than or equal to one (IQR 1), it is assumed that there is agreement among the experts' opinions and that the factor in question will have an effect on REL's performance. The relative judgment on the variables affecting REL's performance is summarised in Table 1 along with the IQR measurement.

Table 1. IQR measurement of factors influencing REL's performance

Factor	Mean	IQR	Decision
Management	6.6	1	Not rejected
Workers	6.5	1	Not rejected
IT	7.0	0	Not rejected
3PRELP	4.5	5	Rejected
Inventory Management	4.6	6	Rejected
Return Policy/Guarantee	5.9	5	Rejected
Infrastructure	8.5	1	Not rejected
Institutional structure/culture	7.2	1	Not rejected
Client satisfaction	8.72	1	Not rejected
Quality management	6.5	1	Not rejected

Source: created by authors

The management, personnel, infrastructure, organisational hierarchy/environment, client satisfaction, quality management, and IT all have an IQR of 1, which states they are all acknowledged and taken into consideration for further investigation, as can be seen from the table above. Inventory management had an IQR of 6, external reverse e-logistics and return policy/guarantee had an IQR of 5, both of which indicate that they are disregarded because of an absence of consensus. The mean is computed once the last set of factors has been determined. Table 2 below displays the acknowledged criteria and their relative means.

Table 2. Accepted factors influencing REL's performance and their relative means

Factor	Mean
Client satisfaction	8.72
Infrastructure	8.5
Org. structure/environment	7.2
IT	7.0
Management	6.6
Workers	6.5
Quality management	6.5
Return Policy/Guarantee	5.9
Inventory Management	4.6
3PRELP	4.5

Source: created by the authors

Accordingly, factors that affect reverse e-logistics performance can be ranked according to consensus acceptance and mean calculations as follows: customer satisfaction (mean=8.72) is the most crucial factor to take into account, followed by infrastructure (mean=8.5), organisational structure/culture (mean=7.2), IT (mean=7.0), and management (mean=6.6), whereas workers and quality management are equally important (mean=6.5).

In order to discover and locate the precise solutions in the framework of the research, it was then decided to conduct another multi-criteria scoring questionnaire. How might the factors discovered improve REL's performance? Experts were questioned. Therefore, a third questionnaire was issued to the professionals, asking them to elaborate on how the seven factors were being improved. The eighth component (Return Policy), which was thought to have a major impact on REL's performance in addition to the seven previously mentioned criteria, was also added. First, the experts were asked to rank the significance of each of the 8 factors on REL's performance on a scale of 0 to 10. Experts were given 10 points to score on the proviso that they were spread evenly among the identified factors, meaning that no factor may receive more than 10 total points. Table 4 summarises their results.

Table 4. Experts' scores of factors that affect REL's performance

Factor	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Mean Average
Client Satisfaction	3	2	2	2	3	2	2	2.285714
Workers	0	1	1	1	0	2	0	0.714286
Infrastructure	2	2	2	2	3	2	1	2.00
IT	2	2	1	1	2	2	2	1.714286
Management	1	1	1	2	0	0	1	0.857143
Org. Structure & Culture	2	2	1	2	2	2	2	1.857143
Quality Management	0	0	1	0	0	0	1	0.285714
Return Policy	0	0	1	0	0	0	1	0.285714
Total Points	10	10	10	10	10	10	10	10

Source: created by authors

The experts claim that, in order of importance, the following factors have an effect on REL's performance: client satisfaction (Mean= 2.28), infrastructure (Mean= 2.00), organisational structure and culture (Mean= 1.85), IT (Mean= 1.71), management (Mean= 0.85), employees (Mean= 0.71), quality management (Mean= 0.28), and return policy (Mean= 0.28). Then, experts were required to rate the criteria of factors in order to analyse methods of enhancing the factors. Figure 2 below provides a summary of the conceptual research model that has been chosen.



Figure 2. The conceptual research model

The customer satisfaction factor must be improved before managers can increase the performance of REL's systems. This can be done by doing the following: By monitoring all REL operations, managers must concentrate on the integration of the CRM with REL's systems (returns, recalls, repairs, re-packaging for restock or resale, recycling and disposal, etc.). Following that, management must combine REL's systems with its after-sales service, especially for recycling motives. Finally, managers are responsible for assigning after-sales service for returning defective or incorrect products obtained from REL's operations.

The following actions can be taken to improve employee performance, which is the second thing managers must focus on the following.

First, managers must offer all workers in their supply chain, especially those working with REL's processes, training sessions on REL operations like procurement, production, and returns processing. To help employees get more familiar with REL's systems, directors must concentrate on providing cross-training on a variety of REL activities.

Second, managers must provide employees a sense of social effect by taking their feedback into account while building REL's systems.

Third, managers need to focus on enhancing their infrastructure, which may be done by implementing solar panels or solar thermal technology, which generates heat from sunlight so that REL's operations can go on uninterrupted. To ensure uninterrupted REL operations, managers must think about putting up solar photovoltaic systems that convert sunshine directly into electricity.

Fourth, managers need to work to enhance their Information Technology (IT), which can be done by making it easier to keep in contact with all of their key stakeholders, including KPI providers. Managers must adopt the software "Integration Hub" for electronic data interchange (EDI). Managers should consider implementing RFID (Radio frequency identification) technology, which uses radio waves to read digital data encoded in RFID tags or smart labels. This technology automatically identifies objects, gathers data about them, and inputs that data into computer systems with little to no human involvement.

Fifth, managers need to work on honing their management abilities by connecting REL's activities with those of the entire supply chain and other departments. Managers must have strong leadership and interpersonal skills. Managers can treat suppliers as valued resources by creating supplier offices on their premises.

Sixth, managers need to focus on enhancing the organisational structure and culture. Managers need to consider converting the organisation into an organic one, where the REL communication channels are transformed into low-formality, open channels.

Managers can implement in-process inspection, which involves inspecting work at each process stage and immediately stopping production if even one defective product is found. This action will decrease the number of incidents involving damaged products. To improve the return policy, managers must establish a product recovery that relies on financial motives. This signifies that the business should provide the consumer a discount on a new purchase or just a set amount of money as a reward whenever they return a product for recycling.

Conclusions

Numerous problems must be resolved before B2C e-commerce can be profitable. Reverse e-logistics (REL) is arguably the most challenging aspect of B2C e-commerce. REL has a number of advantages despite the difficulties that it presents. For instance, REL leads to higher earnings, a stronger position in the e-commerce sector, an uptick in consumer satisfaction, a drop in resource utilisation, and improved resource sustainability for businesses. Therefore, identifying ways to improve REL's performance is necessary and was the objective of this study. Two more analyses, the multi-criteria evaluation DELPHI and multi-criteria scoring, were conducted to learn more about how such factors might be improved. The conclusions regarding the variables affecting REL's performance were verified through the DELPHI method. According to experts, there are seven factors that have a significant effect on REL's systems: management, quality management, institutional structure and culture, IT, client satisfaction and service, personnel, infrastructure, and staff. After that, a detailed analysis of how the discovered elements that are positively connected with REL's performance could be improved was conducted using the multi-criteria scoring approach. From a management perspective, B2C e-commerce businesses operating in advanced nations, such as those in the Middle East, which still experience some political conflicts and economic instability, can apply the model and conclusions of this dissertation. A limitation of this

study was that Middle Eastern countries still lack scientific research and results. Therefore, the recommended future research is in Middle Eastern countries, more specifically, in the field of B2C e-commerce and REL's activities.

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