


## Article

# Developing a Sustainable Logistics Service Quality Scale for Logistics Service Providers in Egypt

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**Abstract:** The role of sustainability has made it a vital point to measure companies' financial performances and sustainability practices along the overall supply chain. Logistics service providers (LSPs) are among the supply chain actors that need to consider sustainability practices to present a better sustainable service. Therefore, we studied LSPs in Egypt, as Egypt has set sustainability goals in the logistics sector to be achieved by 2030. This research proposes a new sustainable logistics service quality (SLSQ) scale through reviewing the literature on sustainable service quality (SSQ) and logistics service quality (LSQ). While additional semi-structured interviews were conducted with LSP companies in Egypt to formulate the SLSQ scale for this specific region, the Q-sorting technique was used to confirm SLSQ measurements. Hence, we present a scale to evaluate Egypt's overall LSPs' service quality. Our research thereby contributes to the theory by proposing a new framework that measures the SLSQ in LSP companies in emerging countries and to the practice by tying the framework to accompany Egyptian law. The results are discussed against previous literature and concluded by showing limitations and potential future research avenues.

**Keywords:** sustainable logistics service quality (SLSQ); sustainable service quality (SSQ); logistics service quality (LSQ); logistics service providers (LSPs)



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## 1. Introduction

It has become a critical practice to measure organizational performance with an evaluation scheme covering the financial and management perspectives and the organization's sustainability performance. Sustainability thereby can be defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [1], p. 43. There are sustainable issues regarding global supply chains in emerging countries and industrialized countries alike, but the latter have been studied more intensely in the past [2,3]. These issues have been postulated by the United Nations (UN) and formulated into 17 Sustainability Development Goals (SDGs) to be achieved by 2030. Based on the UN SDGs, Egypt developed eight sustainable goals, which are: (1) improving the quality of life and standard of living of Egyptian citizens, (2) justice, (3) social inclusion and engagement, (4) competitive and diversified economy, (5) knowledge, (6) innovation and scientific research, (7) integrated and sustainable eco-systems, and (8) governance of state and community institutions, Egyptian peace and security, and strengthening of Egyptian leadership to be achieved by 2030 (<https://mped.gov.eg/EgyptVision?lang=en>, accessed on 1 February 2021). Regarding these goals, particularly goals 4 and 7, Egypt intends to show significant logistics performance development according to current statistical data. Therefore, it becomes essential for logistics service providers (LSPs) to implement sustainable business practices in Egypt.

While LSPs are generally required to deliver more sustainability with a high quality of logistics services [4], logistics service quality (LSQ) and sustainable service quality (SSQ) presented by logistics providers are the main criteria for selecting the best logistics providers [5,6]. Mentzer et al. [7] extended the service quality concept in LSQ, aiming to determine the necessary factors for customers in their LSQ evaluations. The authors developed an LSQ scale that attempts to measure customer perceptions in the logistics sector by identifying nine dimensions (information quality, ordering procedures, order release quantities, timeliness, order accuracy, order quality, order condition, order discrepancy handling, and personnel contact quality). To build on Mentzer et al.'s [7] work in the Egyptian context, this study applied a qualitative approach that included semi-structured interviews with nine leading LSPs and their customers in Egypt to validate essential SSQ elements. Moreover, interviews with three law specialists were conducted to validate the Egyptian law related to the social and environmental sustainability dimension.

So far, the topic has been discussed from different perspectives, particularly from an industrialized country perspective. In the United Kingdom (UK), for instance, Jaafar [8] built a model based on Mentzer et al. [7]. Their LSQ scale measured the impact of LSQ on relationship quality and set customer loyalty. Their results showed that LSPs significantly impact relationship quality and customer loyalty. In the U.S., Mentzer and Williams [9] investigated the role of LSQ in customer satisfaction. They determined the degree of importance of each LSQ component in four customer segments of a large logistics organization. Their findings showed that LSPs have a positive influence on customer satisfaction. However, the mechanisms of applying sustainability practices in the emerging country context, such as in Egypt, remain scarce [10,11]. Moreover, there is a distinct silence in the area of sustainable logistics service quality (SLSQ) as a new variable in the literature for evaluating the overall LSPs' processes in implementing sustainability. Therefore, this study proposes a new SLSQ scale to determine sustainability practices in the Egyptian market and assess the overall service processes, starting from the moment customers place an order until they receive the services. Accordingly, the following research questions guided our study:

- 1: What are an LSP's critical LSQ and SSQ elements for the Egyptian market?
- 2: How should the SLSQ scale measurements be defined?

To answer the proposed questions, the literature concerning sustainable logistics management as well as SSQ and LSQ elements was reviewed in Sections 2 and 3. The elements for the literature review in Section 3 were selected based on the nature of the study and the nature of Egyptian culture and law. In Section 4, the explored elements from the literature were integrated into the proposed SLSQ scale. The SLSQ variables measure all service quality processes from when the customer requests an order until after receiving it. To evaluate the proposed scale, additional semi-structured interviews were conducted with LSPs in Egypt to provide a calibration for this specific region. Further, in Section 4, the Q-sorting technique results are shown to confirm the SLSQ measurements empirically. In Sections 5 and 6, the validated SLSQ items are presented and discussed against the previous literature, showing limitations and potential research avenues.

## 2. Literature Review

In the past, many companies have ignored the importance of investments in sustainability practices, particularly during the economic crisis between 2008 and 2009. However, a survey conducted right after the crisis indicated that companies are making a considerable effort toward sustainability to achieve cost-effectiveness and maintain new customers [12]. Lieb and Lieb [12] found many reasons to adopt sustainability initiatives within LSP companies, particularly seeking to meet their customers' requirements and customer pressure to apply sustainability, which increases and improves the company's reputation and also attracts new customers who are interested in sustainable perspectives, as well as to survive within the fierce competition. Sustainability is generally considered a leading factor in building a long-term relationship; this kind of relationship would achieve all

entities' targets and induce long-term profitability. Barile et al. [13] mentioned that a company's survival in market competition depends on the relationships and interactions it can manage. Moreover, Cozzolino et al. [14] stated that sustainability should be added to a company's corporate strategy to meet the stakeholders' expectations and consider the long-term impact on the community and related economic and environmental factors.

### 2.1. Environmental Sustainability in Logistics Research in the Past 20 Years

Several studies have already indicated the critical role of environmental initiatives adopted by logistics service industry companies in the following aspects [15]. First, environmental issues are becoming increasingly fundamental due to the increasing demand for goods' mobility. Second, environmental sustainability is becoming a critical selection criterion for firms operating in the logistics service industry. Third, in the logistics service industry, environmental sustainability is becoming a crucial success factor in cost reduction. Nonetheless, the most common criteria to measure LSPs are still "cost, relationship, services, quality, information/equipment system, flexibility, and timeliness" [16]. Studies related to integrating economic factors and sustainability in logistics services are being conducted. While customers are now requesting sustainable operations from companies, including LSPs, the motivation to apply sustainable operations at LSPs is feeble and needs more effort to be supported [17].

At the beginning of the millennium, Rondinelli and Berry [18] claimed that LSP companies should adopt strategies based on environmental management and provide a conceptual framework for understanding the interactions among multimodal transportation and their impact on the environment. In addition, Murphy and Poist [19] explained how reverse logistics and packaging impact environmental factors. Ang-Olson and Schroeer [20] illustrated measures that could improve road transport companies' environmental performance. Their findings showed the potential reductions in greenhouse gas emissions in the U.S. that would result from more sustainable adoptions. A study done in Hong Kong by Wong and Fryxell [21] was among the first to examine the stakeholders' effect on environmental management practices in fleet management. Lin and Ho [22] analyzed "explicitness and accumulation of green practices, organizational encouragement, quality of human resources, environmental uncertainty and governmental support" as the six main factors that will affect the intention to adopt sustainability innovations for LSPs. Jumadi and Zailani [23] highlighted the green practices of LSPs and how customers affected them; moreover, they illustrated that those customer relationships positively influence the adoption of green activities in the logistics service sector in Malaysia. Beškovnik and Jakomin [24] identified long-term contracts as an essential driver for implementing green measures by logistics companies in Southeast Europe. Halldórsson et al. [25] investigated whether companies set specific criteria related to environmental issues for selecting their suppliers when sourcing LSP services. The results of their study indicated that while LSPs are showing an increasing interest in environmental issues, a lot of the main factors for the companies, like price, quality, and timely delivery, are still at the forefront. Nonetheless, the study also clarified that LSPs are taking serious steps to develop cooperative partnerships on environmental issues. Table 1 provides a summary of research that has accelerated over the past 10 years.

Analyzing the selected papers, we found a scarcity of the literature that synergizes the concept of sustainability in logistics and supply chain services, especially in the LSP field. Moreover, there is a distinct silence in the area of LSQ and sustainability, as well as the evaluation of services after applying sustainability practices. According to organizational imprinting theory, balancing sustainability practices within companies' global supply chains would help them better understand their markets and better interact with their customers and suppliers and achieve better strategic goals [40]. Therefore, this study proposes a new framework that measures the SLSQ in LSPs in Egypt by reviewing LSQ and SSQ in the following sections.

**Table 1.** Selected studies on green logistics management.

| Authors                       | Purpose of the Study  | Findings/Contributions of the Study   |
|-------------------------------|---|---|
| Björklund [26]                | The author investigated factors affecting the purchase of green transportation services using factor analysis.  | The findings showed that the most important dimensions are internal management, image, firm resources, customer demands, and governmental intervention.   |
| Zailani et al. [27]           | The authors surveyed Malaysian third-party logistics service providers (3PLs) to evaluate the significance of green innovation in logistics outsourcing.  | The results showed that information technology is an essential tool for decreasing the logistics activities' environmental impact.  |
| Martinsen and Björklund [28]  | The authors identified the matches and gaps between logistics service providers' (LSPs) green supply and shippers' green demand using gap analysis.   | They found an internal gap between the LSPs' perspective about the nature of services and the perception of the shippers' demand. They also found an external gap in the shippers' understanding, such as they do not know the green service initiative of LSPs.  |
| Perotti et al. [29]           | The authors intended to identify environmental sustainability practices and measure the relationship between environmental sustainability and 3PL performance in the Italian market.  | They found green supply, distribution strategies, transportation, warehousing, green building, reverse logistics, cooperation with customers, investment recovery, eco-design and packaging, and internal management as essential practices.  |
| Liimatainen et al. [30]       | The authors concentrated on a small part of environmental sustainability related to energy efficiency practices. They investigated 295 road transport companies in Finland.   | They found that the carrier companies' workers know about the efficiency practices, but they need more resources and knowledge to use these practices entirely.   |
| Liimatainen et al. [31]       | The authors expanded their study of 2012; they used a survey to explain the energy efficiency practices of road freight in selected Nordic countries.   | They concluded that the energy efficiency actions are almost similar in these countries.  |
| Chaisurayakarn et al. [32]    | The authors investigated green service quality (GSQ), logistics service quality (LSQ), and their impact on the Thai government's logistics performance index (TLPI) for logistics providers in Thailand.  | The study's findings indicated that LSQ significantly affects the TLPI positively, and that effect is more pronounced when GSQ measures are included.   |
| Centobelli et al. [5]         | The authors provided a systematic review of environmental sustainability in the service industry to highlight the main literature gaps.   | The gaps concern "the classification of green initiatives, the impact of green initiatives on LSP performance, the evaluation of sustainability performance, the factors influencing the adoption of environmental sustainability initiatives, the customer perspective in the sustainable supply chain, and the information and communication technologies [are] supporting green initiatives" [5] (p. 454). |
| Radović et al. [33]           | The authors used rough additive ratio assessment in Bosnia and Herzegovina, Libya, and Serbia, building a model with 5 phases for assessing the performance indicators in transportation companies.   | They applied 20 performance indicators. These indicators' importance was simulated through the design of 10 scenarios in a sensitivity analysis. The results showed high correlations.  |
| Dellana and Kros [34]         | The authors explained the nature of ISO 9001 certification and its diffusion in the U.S. concerning the organizational supply chain position, quality maturity, and supplier quality maturity. Questionnaires were distributed to supply chain professionals. | The results showed that ISO-9001-certified firms are more likely to have quality programs of greater maturity and suppliers with greater quality maturity than organizations that are not certified.  |
| Sremac et al. [35]            | The authors evaluated 10 3PLs using the Rough SWARA (Step-Wise Weight Assessment Ratio Analysis) and Rough WASPAS (Weighted Aggregated Sum Product Assessment) models.  | The obtained results demonstrated that the methods provide a good ranking of the logistics provider alternatives.   |
| Tran et al. [36]              | The authors discussed the environmental sustainability strategies for LSPs through a case study with DHL.   | The findings showed that firms need to be environmentally sustained to achieve better performance.  |
| Zimon et al. [37]             | The authors used a survey with LSPs and focal companies to measure the impact of implementing standardized management systems on processes related to competitiveness.  | The findings showed that applying guidelines for standardized management systems will give supply chains more competitive advantage and innovation.   |
| Gupta and Singh [38]          | The authors aimed to understand how LSPs handle their operations for sustainable service quality and proposed an index for measuring service quality.   | The findings showed that LSPs use green practices to optimize resource usage for long-term sustainability, including reusable and recyclable packaging materials, rainwater harvesting, the use of solar panels, and other green innovations.   |
| Jazairy and von Haartman [39] | The authors measured the gap between the buyer and the LSP in green practices in purchasing processes.  | They found that purchasing sometimes depends on the LSP that applies green practices, but not all time.   |

## 2.2. Social and Triple-Bottom-Line Sustainability in Logistics and Supply Chain Research

While the first decade and the first half of the second decade of the new millennium were dominated by studies on environmental sustainability in logistics research, studies on social sustainability and the entire triple-bottom-line (TBL) of sustainability are being increasingly focused on recently. In this line, the customer and supply chain perspectives increasingly complemented the logistics perspective [41]. Table 2 gives an overview of selected papers from the past 10 years to complete the picture on recent research.

**Table 2.** Selected studies on social and triple-bottom-line (TBL) logistics management.

| Authors                         | Purpose of the Study   | Findings/Contributions of the Study  |
|---------------------------------|--|--|
| Large et al. [42]               | The authors illustrated to what extent customers consider sustainable development aspects in their purchasing decisions. Here, 750 respondents were collected from among customers and logistics managers.   | The results indicated that customers look for valuable services that include ecological and social aspects, but 3PLs excluded the customers in these processes; they claimed that customers minimally affect 3PLs' sustainability initiatives. |
| Kayakutlu and Buyukozkan [43]   | The authors created an analytical framework using an analytic network process (ANP) to evaluate the effectiveness of performance factors for 3PLs.   | Their result is that companies consider both strategic planning and transportation operation as the most critical factors.   |
| Pieters et al. [44]             | The authors surveyed 145 logistics companies to measure the impact of change the strategy of sustainability has on improving the physical distribution network in the Dutch market.  | The results showed that most of the sustainable initiatives adopted are focused internally.  |
| Kudla and Klaas-Wissing [45]    | The authors examined how transporters motivate 3PLs and the reaction of 3PLs by adopting sustainability initiatives.   | The results clarified the differences between small and large 3PLs in sustainability efforts. The study also showed that 3PLs concentrate on environmental sustainability more than the social and economic dimensions of sustainability.      |
| García-Arca et al. [46]         | The authors conducted a study in Spain to clarify the main features of sustainable packing logistics. They distributed a questionnaire to 70 participants from toy manufacturers to measure whether sustainable packing logistics contributes to better sustainable performance. | Their findings showed that sustainable packing logistics partially improves sustainable performance.   |
| Campos et al. [47]              | The authors conducted a study to identify the strategic role of LSPs in extending sustainability to the supply chain. They picked 26 international companies to analyze the differences among them with considered benchmarks in sustainable development.                        | The results showed that LSPs play a significant role in transforming the supply chain to be more sustainable.  |
| García-Dastugue and Eroglu [48] | The authors examined the implications of operational performance, service quality, and environmental sustainability in the context of logistics services.  | The results illustrated that environmental sustainability leads to a better future operating performance by enhancing sales growth. Better service quality is positively related to improving sales growth and cost efficiency.                |
| Ozbekler and Ozturkoglu [49]    | The authors aimed to examine the quality level perceived by LSPs in terms of the triple-bottom-line approach and determine the relationship between the single dimensions for sustainable competition.   | They found that cooperative sustainability is vital to match competition and achieve customer needs and demand.  |
| Zimon et al. [50]               | This study presented new theoretical visions that address the supply chain practices for future research and performance measurement, along with the 17 Sustainability Development Goals of the United Nations (UN).   | They identified the link between sustainable supply chain practices and UN goals and designed a model for implementing the UN's Sustainability Development Goals in supply chains.   |
| Chkanikova and Sroufe [51]      | Using a case study approach, this study presented an important vision to researchers, retailers, and supply chains. They measured "retail-driven sustainability certification systems" and their role in improving cooperation and collaboration between supply chain entities.  | The results showed that the certification provides retailers with more brand assurance, achieving stakeholder satisfaction and gaining a competitive advantage.  |



### 3. Sustainable Service Quality and Logistics Service Quality

#### 3.1. Sustainable Service Quality in Logistics

The term SSQ is not widely used in the academic literature, although environmental sustainability has been discussed widely in the extant literature and is known for a long time. Numerous studies have been done in the LSP field related to environmental issues in the logistics area (see Table 1), but most of these studies concentrated on either the LSPs' offering or the LSP performance and its effects on the entire supply chain. There is a distinct silence of focus on sustainability issues in terms of LSQ. To answer the first research question in the light of the previous literature, environmental, economic, and social performances were analyzed. These three performance measures directly relate to LSP sustainable initiatives [49] and determine the services that LSPs present to their customers. Moreover, as the study was applied in Egyptian markets, specific Egyptian law goals related to sustainability aspects are reviewed and mentioned in Tables 3–5.

**Table 3.** Measurement elements used to assess environmental sustainability performance.

| Measurement Elements  | References   |
|---|--|
| Use of less polluting vehicles  | [12,22,23,52,53]<br>Based on Egyptian Environmental Law 9, Article 36 (vehicles, trucks, and machines) |
| Using routing systems to minimize travel distances                              | [12,53]<br>Based on Egyptian Environmental Law 9, Article 36 (vehicles, trucks, and machines)          |
| Using cleaner fuel standards and switching to gas as an alternative to gasoline | [54]<br>Based on Egyptian Environmental Law 9, Article 36 (vehicles, trucks, and machines)             |
| Vehicle maintenance and disposal system   | [12,22,23]<br>Based on Egyptian Environmental Law 9, Article 36 (vehicles, trucks, and machines)       |
| Using alternative energy sources (e.g., solar or photovoltaic panels)           | [12,19,23,53,55]<br>Based on Egyptian Environmental Law 9, Article 1 (vehicles, trucks, and machines)  |
| Reusable packaging/shipping materials   | [56]<br>Based on Egyptian Environmental Law 9, Articles 29, 30, 31, 32 (waste management)              |
| Recyclable packaging/shipping materials   | [56]<br>Based on Egyptian Environmental Law 9, Articles 29, 30, 31, 32 (waste management)              |
| Bio-degradable packaging/shipping materials                                     | [56]<br>Based on Egyptian Environmental Law 9, Articles 29, 30, 31, 32 (waste management)              |
| Environmental or waste audit  | [29,57]<br>Based on Egyptian Environmental Law 9, Article 104 (auditing and inspection).               |
| Improved compliance with environmental standards                                | [58]<br>Based on Egyptian Environmental Law 9, Article 104 (auditing and inspection).                  |

**Table 4.** Measurement elements used to assess economic sustainability performance.

| Measurement Elements   | References |
|--|------------|
| Improving company image (i.e., the company is seen as a green company) | [59,60]    |
| Improving the company's position in the marketplace                    | [59,60]    |
| Decreasing fee for waste treatment                                     | [29]       |
| Decreasing cost of energy consumption                                  | [29]       |
| Decreasing fine for an environmental accident                          | [61]       |
| Decreasing disposal costs  | [29]       |

**Table 5.** Measurement elements used to assess social sustainability performance.

| Measurement Elements   | References   |
|--|--|
| Protecting employee health and safety                                    | [23,54,62]<br>Based on Egyptian Social Law 4, Article 43 (precautions)     |
| Creating training programs, awareness programs, and seminars for workers | [27,62]<br>Based on Egyptian Social Law 4, Article 5 (training)            |
| Considering customer compliance  | [54]<br>Based on Egyptian Customer Protection Law 181 for 2018, Article 29 |
| Enhancing customer privacy   | [54]<br>Based on Egyptian Customer Protection Law 181 for 2018, Article 29 |
| Ensuring customer satisfaction   | [54]<br>Based on Egyptian Customer Protection Law 181 for 2018, Article 29 |

**Environmental performance:** Environmental performance highly depends on efficient, clean, sustainable energy sources. The environmental sustainability elements of LSPs are derived. Many elements have been derived from different studies to measure environmental performance, illustrated in Table 3. Table 3 shows that Egyptian laws have been adapted for more than 20 years. Table 3 also shows that the literature on these statutory alterations is relatively old. Therefore, there is a need to reflect on sustainability issues in the Egyptian market, which the given paper does.

**Economic performance:** This is defined as financial benefits, decreasing costs, and increasing market competitiveness that a company gains after adopting LSP sustainable initiatives. The research considers economic performance from the cost side and measures how LSPs reduce costs related to environmental practices. Table 4 shows the measurement elements used to assess economic sustainability performance.

**Social sustainability:** This variable can be seen as critical and complex for measuring the overall sustainability performance [55]. Compared with Egyptian laws, related elements to measure social performance are derived from different studies clarified in Table 5.

### 3.2. Main Elements of LSQ in LSP Companies

Researchers generally adopt two perspectives by applying service quality theory [63]: the Nordic perspective and the American perspective. The Nordic perspective was proposed by Grönroos [64], and the American perspective was proposed by Parasuraman et al. [65]. The Nordic perspective was one of the first concepts to have been used to measure the services in the literature; however, the American perspective was the model that answered many open questions: What is the best way to determine the quality of service? What is the best way to measure it? Therefore, Parasuraman et al. [65] developed 22 elements as a service quality scale to measure service quality and defined the service quality model SERVQUAL, which divides the service quality measurement scales with 22 elements into five primary dimensions:

- Reliability is the ability to achieve the promised service correctly.
- Assurance is the trust and the confidence toward the customers in dealing with the organization. This reflects the employees' experience, understanding, and ability to transfer confidence to customers themselves.
- Tangibles are the physical indication of the service; for instance, the appearance of the physical facilities, tools, and equipment used to provide the service and the link tools between the customer and the company.
- Empathy is the individualized care that a company provides to the customers.
- Responsiveness refers to employees' intentions to help customers deliver the services in time.

SERVQUAL was the basis of LSQ when service quality was introduced to logistics. LSQ has been studied from different perspectives of LSPs' performance. Most researchers

have conducted LSQ studies to determine the perceptions of LSQ in LSP selection or factors affecting customer satisfaction. However, this research highlights the LSQ dimensions to complete the SLSQ variable. After reviewing the literature, the researchers found that the main LSQ has nine dimensions explained below; however, two new dimensions have been added to the primary LSQ model by Thai [66]: image and social responsibility. Nevertheless, this study uses the nine main dimensions of LSQ, as invented in the first place by Mentzer [7], as they the base LSQ theory to formulate the SLSQ variable. The nine main factors of LSQ in LSPs are clarified in Table 6. Our paper's contribution to the international literature is to analyze the main factors of LSQ in LSPs widely known in the literature since the beginning of the sustainability debate in the science, while shedding light on their adaptation by the LSPs in Egypt, which is a unique point of this paper.

**Table 6.** Main elements of LSQ in LSP companies.

| LSQ Dimensions             | Definition  |
|----------------------------|---|
| Personnel contact quality  | It refers to the party that LSPs' customers deal with [7]. The personnel contact quality is the one that receives orders and delivers products; it is also included in fixing the conflict between the buyer and the seller; the studies that used it shows the significance of that variable on the image of the company.  |
| Order release quantities   | It is related to the concept of product accessibility, which means that supplier companies have the flexibility to deliver specific order sizes [7].  |
| Information quality        | This dimension explains how customers note suppliers' information about the variety of products and their availability [7].   |
| Ordering procedures        | Ordering procedures are among the leading customer concerns; when they process an order, they worry about the complicated procedures and expect to have an effective and efficient way of ordering products/materials from the suppliers or service providers [7].  |
| Order accuracy             | Mentzer et al. [7] highlighted the three main dimensions of an order (order quality, order accuracy, and order conditions) and clarified that the three dimensions differ from each other. Order accuracy refers to the suppliers' or service providers' ability to deliver the correct item at the required number as ordered, with none of the orders being replaced with other items [67]. |
| Order condition            | It relates to the damage level in products due to handling throughout the transportation process. Customers have to go through specific procedures to get replacements for the damaged products from the LSPs, depending on the damage form and its size [7].   |
| Order quality              | This dimension is also related to damage levels of the products ordered from LSPs, but this time, it is the manufacturing damage. It measures whether the product specifications provided by LSPs meet customer expectations [68].  |
| Order discrepancy handling | The way in which LSPs deal with any problems upon the arrival of orders reflects the order-discrepancy-handling dimension [68].   |
| Timeliness                 | The most critical factor that customers always care about is timeliness because they prefer to get the product at the right time as promised. It looks like a deadline that starts from order placement to order receipt [69].  |

#### 4. SLSQ Scale Development

##### 4.1. Rating of SSQ Elements Based on Expert Responses

After having derived elements from the literature review and being triangulated with Egyptian law, we evaluated the elements through expert ratings via interviews to shape the new SLSQ variable for the Egyptian context. In sum, 12 interviews were conducted, 7 with LSPs, 2 with retailers, and 3 with law specialists. The expert's positions were a corporate supply chain associate director, two warehousing managers, an operations team leader, a head of quality assurance, a purchasing specialist, a supply chain manager, a supply chain coordinator, a business development manager, and three law specialists. All the interview respondents had over 10 years of experience in their fields. The interviews were conducted based on the respondents' preferred time and place; the interviews were recorded and transcribed by the first author of this study. The interviews for the SSQ



elements included three main questions about the elements and a rating of the elements as having high, medium, or low importance. The first question was related to which of the SSQ elements are important for LSP's service quality. The second question asked about a new element that could be added to these elements related to SSQ. In a third question, the researchers asked the respondents to evaluate which element is the most important, whether to the customer or LSPs, and to check the applicability of these elements in the Egyptian market, in addition to validating these elements for which element is suitable for the Egyptian environment. The primary purpose of interviews with law specialists was to confirm, validate, and check the existence of SSQ elements in the Egyptian law that the researchers extracted from the literature.

Based on the interviewees' responses, we argue that some elements have higher importance for contributing to service quality and significantly affect the overall processes between the LSPs and their customers. Other elements, in contrast, were given little attention and accordingly did not affect the service quality level. The aggregated ratings by the interviewees are shown in Table 7.

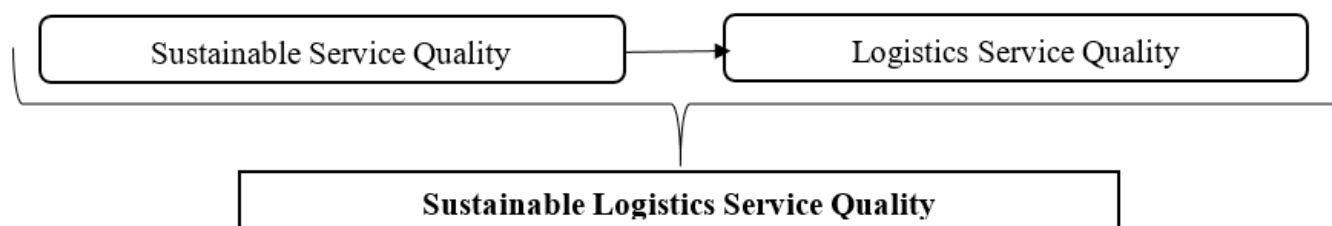
**Table 7.** Rating of SSQ elements based on expert responses.

| Elements  | High Importance | Moderate Importance | Low Importance |
|---|-----------------|---------------------|----------------|
| Using less polluting vehicles   |                 | X                   |                |
| Using routing systems to minimize travel distances                              | X               |                     |                |
| Using cleaner fuel standards and switching to gas as an alternative to gasoline |                 | X                   |                |
| Vehicle maintenance and disposal system   |                 | X                   |                |
| Using alternative energy sources (e.g., solar or photovoltaic panels)           |                 |                     | X              |
| Packaging/shipping reusable materials   | X               |                     |                |
| Packaging/shipping recyclable materials   | X               |                     |                |
| Packaging/shipping bio-degradable materials                                     | X               |                     |                |
| Performing an environmental or waste audit                                      |                 | X                   |                |
| Improved compliance with environmental standards                                | X               |                     |                |
| Improved company image (i.e., company is seen as a green company)               | X               |                     |                |
| Improved company position in the marketplace                                    |                 | X                   |                |
| Decreasing the fee for waste treatment  | X               |                     |                |
| Decreasing the cost of energy consumption                                       | X               |                     |                |
| Decreasing the fine for an environmental accident                               | X               |                     |                |
| Decreasing disposal costs   | X               |                     |                |
| Protecting employee health and safety   |                 | X                   |                |
| Creating training programs, awareness programs, and seminars for workers        | X               |                     |                |
| Considering customer complaints   | X               |                     |                |
| Enhancing customer privacy  | X               |                     |                |

#### 4.2. Development and Validation of the SLSQ Scale

Whereas the SSQ elements defined as environmental, social, and economic practices present opportunities for better service quality in logistics, we now build the SLSQ framework as depicted in Figure 1. Here, we assessed the relationship between the SSQ elements and the economically oriented LSQ elements. In sum, we identified 34 possible elements, together with the nine experts in a workshop to measure SLSQ in Egypt. To do so, the list of elements was translated into Arabic to be available upon request in both languages. In the second part of the workshop, we validated the SLSQ elements through the Q-sorting technique. The calculation of Q-sorting is achieved by classifying the frequency of agreed-upon elements from experts [70]. Equation (1) depicts the calculation formula, while  $N$  is the number of experts.

$$Q - \text{sorting} = \frac{N \text{ accepted items}}{\text{Total number of } N} \times 100 \quad (1)$$



**Figure 1.** Sustainable logistics service quality (SLSQ) theoretical framework.

When the Q-sorting results are low, this element does not belong to the primary variable [70]. The minimum correct item classification is 75%, as suggested by Hinkin [71], which is enough to support the elements under the variables. Some studies used 50% as an acceptable percentage to test validation [72], but they mentioned that it depends on some samples; when the number of samples is more than 8, it means that 75% is acceptable; when it is less than 8, then 50% is acceptable. In our study, 75% is the minimum level of accepted elements. The technique's results are shown in Table 8.

**Table 8.** Q-sorting technique output used to assess SLSQ performance.

| Sustainable Logistics Service Quality Elements  | Classification (%) |
|---|--------------------|
| 1. The product becomes better available after using sustainable means of transport by the LSP.                | 88.89              |
| 2. Decreasing product costs after using sustainable means of transport by your LSP is possible.               | 55.56              |
| 3. Transporting large quantities using sustainable means of transport by your LSP is possible.                | 66.67              |
| 4. It is rare to receive a damaged product due to your LSP using sustainable means of transport.              | 77.78              |
| 5. Using a re-route system enhances the orders' delivery at the right time.                                   | 100                |
| 6. Trained LSP employees provide your company with better problem handling.                                   | 100                |
| 7. Trained LSP employees provide your company with a better problem response.                                 | 100                |
| 8. Trained LSP employees help solve your problems in a reasonable time.                                       | 88.89              |
| 9. Trained LSP employees help you to reduce accident rates.   | 77.78              |
| 10. Your LSP personnel contact employee has enough knowledge and experience.                                  | 100                |
| 11. Your LSP enhances environmental knowledge sharing with your company.                                      | 88.89              |
| 12. You achieve better performance when your LSP considers your complaints.                                   | 77.78              |
| 13. Collaboration with your LSP improves your sustainable performance practices.                              | 100                |
| 14. Your LSP cooperates with your company to achieve environmental goals.                                     | 77.78              |
| 15. Your LSP cooperates with your company to exchange environmental knowledge.                                | 77.78              |
| 16. Adopting your LSP's environmental management systems (ISO, etc.) improves your company's performance.     | 66.67              |
| 17. Your company cooperates with your LSP in the process of sustainable packaging.                            | 88.89              |
| 18. Sustainable packaging decreases your company's disposal practices costs.                                  | 77.78              |
| 19. Sustainable packaging enhances goods stowage.   | 100                |
| 20. It is uncommon to find a damaged product using sustainable packaging materials.                           | 77.78              |
| 21. The sustainable information received from your LSP improves your company's performance.                   | 100                |
| 22. The sustainable information received from your LSP decreases the fine for environmental accidents.        | 44.44              |
| 23. The sustainable information received from your LSP improves your compliance with environmental standards. | 100                |
| 24. The sustainable information received from your LSP is constantly updated.                                 | 77.78              |
| 25. Adopting sustainability practices from your LSP leads to reducing energy consumption costs.               | 88.89              |
| 26. Adopting sustainability practices from your LSP leads to reducing disposal practices costs.               | 77.78              |
| 27. It is a rare condition to receive a shipment that encompasses the wrong products from your LSP.           | 77.78              |
| 28. Order procedures become more effective due to sustainable systems adopted by the LSP.                     | 77.78              |
| 29. Order procedures become effortless due to sustainable systems adopted by the LSP.                         | 100                |
| 30. Order procedures become more efficient due to the LSP's sustainable systems.                              | 100                |
| 31. Products received from the LSP are in the right condition.  | 100                |
| 32. The lead time of the order process becomes shorter.   | 100                |
| 33. The back-order process becomes more efficient.  | 88.89              |
| 34. The back-order process becomes more effective.  | 88.89              |

### 5. Sustainable Logistics Service Quality Scale for LSPs in Egypt

Based on the results presented in the previous sections, 12 elements obtained 100% correct classification (values are shown as 100% in Table 8), 7 elements were correctly classified at a rate of 88.89%, and 11 elements were correctly classified at a rate of 77.78%. This test shows a high level of correct classification within the 34 elements. This proves

that most of the elements are included under the study's main SLSQ variable. However, four elements in Table 8 were below the previously selected minimum of the 75% correct classification rate; item number 2, related to cost and sustainable transport, got 55.56%; item number 3, related to large quantities and sustainable transport, got 66.67%; item number 16 is related to environmental systems (ISO, EMS); and the last item, number 22, is related to sustainable information and decreasing environmental costs. Table 9 shows the finally validated items of the developed SLSQ scale for LSPs in Egypt.

**Table 9.** Validated SLSQ items.

| <b>Sustainable Logistics Service Quality Elements</b> |   |
|---|---|
| <b>Sustainable transport elements</b>                 |   |
| 1.  | The product becomes better available after using sustainable means of transport by the LSP.               |
| 2.  | It is rare to receive a damaged product due to your LSP using sustainable means of transport.             |
| 3.  | Using a re-route system enhances the orders' delivery at the right time.                                  |
| <b>Training</b>                                       |   |
| 4.  | Trained LSP employees provide your company with better problem handling.                                  |
| 5.  | Trained LSP employees provide your company with a better problem response.                                |
| 6.  | Trained LSP employees help solve your problems in a reasonable time.                                      |
| 7.  | Trained LSP employees help you to reduce accident rates.  |
| 8.  | Your LSP personnel contact employee has enough knowledge and experience.                                  |
| 9.  | Your LSP enhances environmental knowledge sharing with your company.                                      |
| 10.   | You achieve better performance when your LSP considers your complaints.                                   |
| <b>Collaboration</b>                                  |   |
| 11.   | Collaboration with your LSP improves your sustainable performance practices.                              |
| 12.   | Your LSP cooperates with your company to achieve environmental goals.                                     |
| 13.   | Your LSP cooperates with your company to exchange environmental knowledge.                                |
| 14.   | Your company cooperates with your LSP in the process of sustainable packaging.                            |
| <b>Sustainable packaging</b>                          |   |
| 15.   | Sustainable packaging decreases your company's disposal practices costs.                                  |
| 16.   | Sustainable packaging enhances goods stowage.   |
| 17.   | It is uncommon to find a damaged product using sustainable packaging materials.                           |
| <b>Sustainable information</b>                        |   |
| 18.   | The sustainable information received from your LSP improves your compliance with environmental standards. |
| 19.   | The sustainable information received from your LSP improves your company's performance.                   |
| 20.   | The sustainable information received from your LSP is constantly updated.                                 |
| <b>Other elements</b>                                 |   |
| 21.   | Adopting sustainability practices from your LSP leads to reducing energy consumption costs.               |
| 22.   | Adopting sustainability practices from your LSP leads to reducing disposal practices costs.               |
| 23.   | It is rare to receive a shipment that encompasses the wrong products from your LSP.                       |
| 24.   | Order procedures become more effective due to sustainable systems adopted by the LSP.                     |
| 25.   | Order procedures become effortless due to sustainable systems adopted by the LSP.                         |
| 26.   | Order procedures become more efficient due to the LSP's sustainable systems.                              |
| 27.   | Products received from the LSP are in the right conditions.   |
| 28.   | The lead time of the order process becomes shorter.   |
| 29.   | The back-order process becomes more efficient.  |
| 30.   | The back-order process becomes more effective.  |

## 6. Discussion

Egypt is a developing country with significant economic activity on domestic and international levels [73]. The Egyptian government has set sustainability goals to apply sustainability practices in different sectors and levels, also tackling the logistics industry. This initiative, which was started in 2015, can positively affect the current logistics performance. Therefore, this research tackles one of the vital sectors to determine what sustainability practices should be considered by LSPs. Building on this development, the present research proposed a set of SLSQ variables and developed a scale that LSPs can use to assess and improve their sustainability performance. Furthermore, it aimed to operationalize Egyptian laws and regulations into measurable scales to measure sustainability development in Egyptian organizations. Finally, it provided the Egyptian government with a list of sustainability practices that should be used by LSPs in Egyptian culture and will break the fear in the LSPs to take initiatives to apply these practices. These practices are explained in Tables 7–9 as elements representing the SLSQ scale.

Analyzing the literature concerning the proposed LSQ and SSQ concepts, most researchers have dealt with these topics from different perspectives: some focused only on sustainability in logistics, while others solely focused on logistics, and still others used both concepts, neglecting the evaluation part from the customers' perspective. Exploring a new variable to evaluate logistics providers' overall sustainability processes from the customers' perspective is considered a new perspective by bringing together all constructs from the literature into one scale for the Egyptian market.

As a result, the present research observed five main aspects of sustainable transport: sustainable transport, sustainable packaging, sustainable information, training, and collaboration. The five aspects were extracted from two main dimensions. The first one is LSQ elements extracted from the literature review; SSQ elements were the second variable extracted from the literature review and Egyptian law. These items were validated through semi-structured interviews to reach SLSQ elements. Additional Q-sorting was used to validate the SLSQ items and determine which items are suitable for the Egyptian environment, the country's sustainability goals, and culture. These elements can be a launching point for the LSPs to apply these practices and serve as a map to start applying sustainability practices.

The results expanded LSQ and SSQ's applicability in this vein by re-testing related variables into a combined SLSQ framework. This added an essential side to the existing literature by considering sustainability in service quality theory [63]. We thereby build upon the work by Parasuraman et al. [65] and Mentzer et al. [7]. Developing their work from service quality to logistics service quality to sustainable logistics service quality represents the main theoretical contribution to theory, updated for the Egyptian and developing countries' context and following international standards. Concerning its practical contribution, Egyptian-owned companies have sustainable targets to be achieved, but the fear of failing in the Egyptian market when applying sustainability practices is still present, especially with the existence of international players.

## 7. Conclusions

This study provides a tool set to enhance or support the idea of sustainability and motivates small and medium-size enterprises (SMEs) to apply these practices. Sustainable transport, sustainable packaging, sustainable information, training, and collaboration are the main elements that SMEs in logistics should consider in the Egyptian market. Encouraging LSPs and other companies to apply these practices would decrease the pressure on the environment and then decrease the overall pollution. Moreover, we present a new perspective on the collaboration between supply chain entities. Applying these elements will help develop the way of thinking of the new generations to protect their environment and community. Moreover, it will strive for the next generation to enjoy what they enjoyed in a healthy environment.

While providing valuable insights, the applied research design is not without limitations. While aiming to complete the picture of how Egyptian logistics companies can assess their sustainability performance, the interviews might have been biased by the interviewees' expectations and desires. According to the Egyptian business environment, this research used the SLSQ scale to be applied in the Egyptian market and was particularly designed to be suitable for Egyptian culture. It can be expected that the SLSQ scale can be generalized to developing countries like Tunisia, Morocco, and Saudi Arabia, as the economic situations in these countries are similar and they are classified as lower-middle-income countries [1]. Nonetheless, future research might test the suitability of the SLSQ scale also in these countries, while some modifications of the SLSQ scale are possible to better suit these countries.

Another limitation lies in the sample size, allowing only a theoretical generalization of the findings. Accordingly, future research can build on the specific insights by testing the proposed SLSQ scale with empirical research. Therefore, the study recommends that future researchers take the new scale measurements of SLSQ within specific sectors and different samples, not just in Egypt but also worldwide. Moreover, the SLSQ variable could be considered an independent variable to measure its relationship with and impact on an organization's performance and integration types by conducting surveys and further factor analysis. Generally, SLSQ can be viewed as the fundamental instructor of applying sustainability practices in the LSP sector, especially in developing countries.

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