

**Exploring the Impact of Sustainable Logistics Service Quality on
Relationship Quality in Logistics Service Providers**

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Abstract

The role of sustainability practices around the world in supply chain made it a very critical point to measure not only the entities' performance but also the sustainability practices in supply chain overall. This study takes Logistics Service Providers (LSPs) as the field of study in Egypt. The main aim of this study is to propose a new Sustainable Logistics Service Quality (SLSQ) framework through reviewing Sustainable Service Quality (SSQ), Egyptian laws related to Sustainability and Logistics Service Quality (LSQ) for enhancing Customer Satisfaction (CS) and Relationship Quality (RQ) in Egypt.

This research starts with the literature review to derive out the research questions. Four research questions were presented in order to state the research gap. This research integrates the concept of SSQ and LSQ as one process to be evaluated from the customer perspective as called SLSQ. After that, it measures the effect of SLSQ on LSP's customer satisfaction and relationship quality.

To collect the research data, a mixed method approach has been used in this research, starting from the semi-structured interviews in phase one (part one) to validate the SSQ elements. In phase one (part two), the SLSQ elements have been generated and validated through evaluation tools. Finally, in phase two, the questionnaire is designed and distributed to the target sample.

The results show that SLSQ would have a significant positive effect on customer satisfaction. The findings show that customers satisfied with SLSQ will partially support the relationship between an LSP and its customers. Moreover, the findings show that CS fully mediates the relation between SLSQ and RQ.

SLSQ elements focused mainly on sustainable transport, time, product condition, training programmes and collaboration. These aspects are the ones that Egyptian LSPs should consider when they present services, and the Egyptian government should consider these aspects as a power to make a sustainable development in LSP field.

Kurzfassung

Die Rolle weltweiter Nachhaltigkeitspraktiken in der Lieferkette hat es zu einem kritischen Punkt gemacht, nicht nur die Leistung von Unternehmen, sondern auch Nachhaltigkeitspraktiken in der Lieferkette im Allgemeinen zu messen. Diese Studie nimmt Logistikdienstleister als Studiengebiet in Ägypten.

Das Hauptziel dieser Studie ist es, einen neuen Rahmen für die Qualität nachhaltiger Logistikdienstleistungen vorzuschlagen, indem die Qualität nachhaltiger Dienstleistungen sowie die ägyptischen Gesetze in Bezug auf Nachhaltigkeit und Qualität von Logistikdienstleistungen überprüft werden, um die Kundenzufriedenheit und die Beziehungsqualität in Ägypten zu verbessern.

Diese Forschung beginnt mit einer Überprüfung der Literatur, um Forschungsfragen zu erheben. Es wurden vier Forschungsfragen gestellt, um die Forschungslücke zu identifizieren. Diese Studie integriert das Konzept der nachhaltigen Servicequalität und Logistikqualität als einen Prozess, der aus Kundensicht als nachhaltige Logistikqualität bewertet wird.

Anschließend werden die Auswirkungen einer nachhaltigen Logistikdienstleistungsqualität auf die Kundenzufriedenheit und die Qualität der Beziehung zwischen Logistikdienstleistern gemessen. Um Forschungsdaten zu sammeln, wurde in dieser Forschung ein gemischter Ansatz verwendet, beginnend mit halbstrukturierten Interviews in Phase 1 (Teil 1), um die Elemente einer nachhaltigen Servicequalität zu validieren.

In der ersten Phase 1 (Teil 2) wurden nachhaltige Logistikqualitätskomponenten festgelegt und durch Bewertungsinstrumente validiert. Schließlich wurde in der zweiten Phase der Fragebogen entworfen und an die Zielstichprobe verteilt.

Die Ergebnisse zeigen, dass sich die Qualität nachhaltiger Logistikdienstleistungen erheblich positiv auf die Kundenzufriedenheit auswirken wird. Auch die Ergebnisse zeigen, dass Kunden, die mit der Qualität einer nachhaltigen Logistik zufrieden sind, die Beziehung zwischen Logistikdienstleistern und ihren Kunden teilweise unterstützen. Darüber hinaus zeigen die Ergebnisse, dass die Kundenzufriedenheit der vollständige Vermittler der Beziehung zwischen nachhaltiger Logistikdienstleistungsqualität und Beziehungsqualität ist.

Die Elemente einer nachhaltigen Logistikqualität konzentrierten sich hauptsächlich auf Programme für nachhaltigen Transport, Zeit, Produktzustand, Schulung und Zusammenarbeit. Dies sind die Aspekte, die ägyptische Logistikdienstleister bei der Erbringung ihrer Dienstleistungen berücksichtigen müssen.

Die ägyptische Regierung muss diese Aspekte als eine Kraft für eine nachhaltige Entwicklung im Bereich der Logistikdienstleister betrachten.

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List of Abbreviations	
SDGs	Sustainable Development Goals
NGOs	non-government organizations
WCED	World Commission on Environment and Development
SCM	Supply Chain Management
SQ	Service Quality
LSQ	Logistics Service Quality
CS	Customer Satisfaction
RQ	Relationship Quality
MCS	Marketing Customer Service
PDS	physical distribution service
DLA	Defence Logistics Agency
B2B	Business to Business
B2C	Business to Customer
LSP	Logistics Service Provider
GDP	Gross Domestic Product
S-D	Service-Dominant
SSSCM	Sustainable Service Supply Chain Management
GSCM	Green Supply Chain Management
SSCM	Sustainable Supply Chain Management
TBL	Triple Bottom Line
MRP	Material Requirement Planning development
DRP	Distribution Requirements Planning development
LIS	Logistics Information System
EDI	Electronic Data Interchange
VANS	Value Added Networks
CPSC	Consumer Product Safety Commission
EMS	Environmental Management system
ISO	International Organization for Standardization
EPA	Environmental Protection Agency
GSQ	Green Service Quality
CSR	Cooperate Social Responsibility
ILO	International Labour Organization
USAID	United States Agency for International Development
JICA	Japan International Cooperation Agency
WB	World bank
GDP	Gross Domestic Product
TI	Transport Intelligence
AEMLI	Agility Emerging Markets Logistics Index
EBRD	European Bank for Reconstruction and Development
GHG	Greenhouse Gas
LPI	Logistics Performance Index
JICA	Japan International Cooperation Agency
SWS	Single Window System
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Program
LECB	Low Emission Capacity Building
PRNs	Packaging Recovery Notes
PERNs	Packaging Export Recovery Notes
EEAA	Egyptian Environmental Affairs Agency
EFA	Exploratory Factor Analysis
SEM	Structural Equation Modelling
CFA	Confirmatory Factor Analysis
AVE	Average Variance Extracted
KMO	Kaiser Meyer-Olkin
PCA	Principle Component Analysis
SPSS	Statistical Package for Social Sciences
FL	Factor Loading

Chapter one

1. Introduction

It became an important practice to measure the organizational performance with an evaluation that does not only cover the financial and management perspective, but it also covers the organization's sustainability performance, as there are a number of sustainable issues that begin to emerge regarding the global supply chain. For logistics providers, they need to consider the sustainability factors as well as the financial and management performance. Therefore, this study aims to propose a new sustainable logistics service quality (SLSQ) framework in order to enhance customer satisfaction (CS) and relationship quality (RQ) in business to business (B2B) in logistics service provider (LSP) field in Egypt.

The concept of sustainability has been widely discussed in different areas, including management, technology and supply chain, as it is considered one of the main concerns for many industries and a major challenge for their logistics management activities (Zhu, Sarkis, & Lai, 2008). With the emerging of the concept of globalization that forced the companies to re-shape their business strategies to make development in environmental and business operations level and develop a new products design with taking into account the sustainability factors. Moreover, the international trade among countries started to increase in both directions in the form of imports and exports in developing countries, especially Asia and Africa.

Due to the increase in international and local trade, the demand on the logistics activities started to increase too. Therefore, companies started to take serious steps and critical policies when they choose the logistics service providers, as efficient logistics service is considered a competitive advantage for companies by decreasing the overall cost and enhancing the quality of products or services presented by the companies (Cavusgil, Deligonul, & Zhang, 2004). Khan and Burnes (2007) stated that logistics management is a key component of organizational effectiveness and success.

Although increasing the role of logistics activities has a positive side, it still has a negative side that would affect the environmental side. The World Economic Forum stated that logistics emits around 5.5% of the global GHG emissions, and they mentioned that around 4.95% is derived from freight transport and 0.55% from logistics facilities (Bischoff et al., 2009).

Therefore, companies aim to present a better logistics service to their customers, as the power of these services comes from the quality that is presented to the service receiver. Thun and Hoenig, (2011) stated that innovations, globalizations and customer needs have pushed the organizations to work hard to develop a sustainable quality of products and services on the practical level, whereas, theoretically, researchers have the same perspective about recognizing, adopting and realizing changes in their business model according to new sustainable trends, technologies and customer requirements to remain successful in their businesses. A high-

quality service would build a customer relationship with them, which supports the companies to establish and maintain a sustainable competitive advantage in the market place to achieve customer satisfaction and loyalty (Khompatraporn & Somboonwiwat, 2017).

Consequently, the role of logistics service providers starts to appear more and more as it is the party that carries out the companies' activities in order to let companies focus on their core business. Hertz and Alfredsson (2003) defined the logistics service providers as the party that is responsible for the company's logistics services and activities by managing, controlling and delivering those activities to the other companies. The criteria of selecting service provider became too complicated for companies because of implementing the international standardizations and applying new concepts of sustainability.

Logistics service providers are being demanded to deliver more sustainability with a high quality of logistics services, so, logistics service quality (LSQ) and sustainable service quality (SSQ) that are presented from logistics providers are being the main criteria of selecting the best logistics providers. The researcher tackles on reviewing all the processes of LSQ and SSQ and integrating them in one variable called SLSQ. This SLSQ variable is responsible for measuring all service quality processes from the moment the customer requests the order until after receiving it. How would these processes affect customer satisfaction and the relationship between LSP and its customers?

That topic has been discussed from different perspectives; in the United Kingdom (UK), Jaafar (2006) explained the role of logistics service quality in achieving the customer relationship. In 2014, (Chaisurayakarn, Grant, & Talas) investigated the effect of green service quality and logistics service quality on Logistics Performance Indicators (LPI). While in the USA, Mentzer and Williams (2001), the authors who have invented the LSQ theory, investigated the role of logistics service quality on customer satisfaction. This research aims to propose a sustainable logistics service quality (SLSQ) framework for enhancing logistics service providers' customer satisfaction and the relationship quality between LSP and its customers. Generating the SLSQ elements will be through reviewing the sustainable service quality and logistics service quality elements. These elements would be chosen based on the nature of this research and based on the nature of Egyptian culture. Therefore, the next section will explain the current situation of logistics service providers in general and in Egypt in particular.

The efficiency and effectiveness for logistics operations have a huge effect not only on the company's profit but also on the customers' acceptance of the quality of the service that they receive; moreover, efficient logistics activities lead companies to have a competitive advantage, which ensures a faster response to the customer (Somuyuwa Adebambo, Odepidan Omolola, & Dosunmu Victor). As a result, companies start to take another path to focus on their core business and leave some activities to the specialists who are called logistics service providers (Carbone & Stone, 2005). Logistics outsourcing appeared as an important topic in the mid-1980s, after cancelling the regulations of freight transportation industries (Bask, Juga, & Laine,

2001) and (R. C. Lieb, 1992). Based on Elmuti (2003) by using outsourcing, companies have 9% cost saving and 15% increasing in quality. X. Zhang, Han, Liu, Liu, and Leng (2015) stated that the new development has raised the role of LSP that achieved cost reduction and delivery in time by outsourcing logistics services with LSPs.

Somuyuwa Adebambo, Odepidan Omolola, and Dosunmu Victor (2016) illustrated that using outsourcing leads to enhancing the role of logistics activities that lead to vital improvements for the firms. In the last few decades, logistics service providers' markets started to thrive. According to T. A. Foster and Armstrong (2005), the total revenue of logistics outsourcing reached 333 billion \$. X. Zhang et al. (2015) explained that Logistics service Provider (LSP) is the main entity that connects all the parties in a supply chain, starting from the supplier's suppliers till the customer's customers; moreover, it guarantees the flow of information within a supply chain.

In recent years, the term "sustainability; appeared in most parts of the supply chain (suppliers, manufacturers, retailers); those parts are implemented and obliged to take a serious step to achieve the environmental sustainability goals (Cooke, 2008); however, K. J. Lieb and Lieb (2010) stated that a small number of research studies have been done in the field of LSP and illustrated that many LSP companies started to take serious steps to adapt the sustainability programs and other have fear to apply it. However, when companies in Egypt apply sustainability, some side effects start to appear in LSPs and its activities.

Agriculture in Egypt is not anymore the main reason for economy growth. Industries, whether products or services, have huge positive contributions to the country's economy. Today, "Egypt is widely regarded as the major political and cultural centre of the Arab and Middle East regions. It is the fourth-largest economy in the Arab world" (New Zealand for Trade and Enterprise 2017). According to W. B. Group (2016), Egyptian economy doubled (to 4.2 %) after four years of depression, however, the challenge still exists because of the foreign exchange problem.

Logistics service providers are one of the main parties that contribute to the service industry all over the world, which means it contributes to GDP in many different areas like integrated operation, warehousing and transportation services that could be done to satisfy customers' needs.

LSP has a vital contribution to the Egyptian economy (Sindi & Roe, 2017). Shemberg (2009) has presented a full overview of Egypt's logistics sector. It calculates the market investment for logistics sector; around 7.5 billion in 2014 with the future vision for increasing the number of potential investors, which encourages and leads to private sector development, economic progress and social interaction. Despite the role of logistics activities and domestic and international transportation, there is still a huge problem related to Greenhouse gases (GHG) and other emissions.

According to the Central Agency for Public Mobilization and Statistics (CAPMAS) statement, the biggest single source of carbon dioxide emissions in Egypt is the electricity sector, which is a large consumer of petroleum products, accounting for 43.3 % of total Carbon dioxide (CO₂) emissions during 2016/2017. The other major contributors are the transport sector, with 18.5%; the industrial sector, with 15.4%. Figure 1-4 clarifies the percentage of CO₂ emissions from transportation.

Egypt showed its strategy for sustainable development, “Egypt’s Vision 2030”. The expected Egyptian strategy is unmatched in scope and importance on the national level. It extends beyond the three dimensions of sustainable development: economic, social and environmental dimensions and makes a formation of the main principles that will guide Egypt to achieve its development goals in all sectors.

According to Ministry of planning (2017), most of the sustainability practices that will be adopted from LSP companies will come from the Egyptian laws. It is a new tool and dimensions that make them offer competitive prices, high quality, customized products, convenience, flexibility and responsiveness; in addition, most companies were giving attention to sustainability issues during the economic crises and requested the LSP companies to comply with the sustainable business and sustainable development to receive a better service.

Based on the background discussed above the research problem can be abstracted in the following part. The transportation system in logistics industry in Egypt contributes to greenhouse's emissions by approximately 26%. The problem is not only related to the environmental side but it also has negative effects on the social side in terms of global warming that affects micro and macro levels. Moreover, the awareness of sustainability would affect the activities of each member in the supply chain as we will find that multi-national companies focus on sustainability aspects.

However, there is a lack of awareness of sustainability in small and medium enterprises (SMEs); therefore, the researcher worked into operationalizing the Egyptian laws and regulations into measurable scales that would push companies to apply these kinds of practices to their companies and design a report with the best practices that would be compatible with the nature of business. SMEs have a fear to apply sustainability practices, so this study could be a guide for them and an evidence that applying these practices would enhance their performance.

Academically, there is scarcity in the literature of the studies that use SLSQ variable in the LSP context. Therefore, this study proposes a new SLSQ framework explaining how sustainable service quality and logistics service quality affect logistics providers’ customer satisfaction and relationship quality. Based on the previous problem and after reviewing the literature review,

The gap has been found through reviewing the main variables of the study (SSQ, LSQ, LSP, CS, and RQ); we found this gap based on comparing the existing literature that measures the impact of SLSQ on RQ in Egypt.

The research problem and gap will be solved and filled through the main aim of study which is proposing a new sustainable logistics service quality framework that would enhance the logistics service provider's customer satisfaction and relationship quality. The research sample was from Egypt and the reasons that the researcher selected Egypt to apply their study are:

- 1- Egypt's location makes it one of the vital countries in Africa, which makes it a connector between Asia and Europe. Moreover, the great role of Egypt in enhancing Africa's economy and achieving collaborations between the African countries.
- 2- According of numbers and statistical data (see chapter 4), Egypt is one of the developing countries that has a great performance in logistics and has a strategic plan for achieving a better logistics service and to achieve better sustainability development.

Based on the problem that we have discussed above and after reviewing the literate and the previous studies, this research tries to answer the following questions:

- ✓ **RQ1:** What are the LSP's SSQ elements?
- ✓ **RQ2:** What are the LSP's LSQ elements?
- ✓ **RQ3:** What are the LSP's SLSQ elements?
- ✓ **RQ4:** What is the impact of sustainable logistics service quality on customer satisfaction level and relationship quality?

These questions have been designed in order to fill the gap in literature and to find the best solution for the research problem. So, research objectives have been formatted.

- ✓ To explore the elements of sustainable service quality elements.
- ✓ To explain the elements of logistics service quality.
- ✓ To formulate the SLSQ framework.
- ✓ To measure the effect of SLSQ on LSPs' customers' level of satisfaction and relationship quality.

Answering the research questions and achieving research objective will be through methodology. This research uses two main methodological and theoretical frameworks for the elements scale development developed by different authors (see chapter 6).

This empirical study is divided into two main phases; the first phase is divided into 2 parts; the first part has used a qualitative approach that includes making semi-structure interviews with 9 of the leading LSPs and LSP's customers in Egypt in order to validate SSQ elements to answer first and second research questions. Moreover, an interview with 3 law specialists has been conducted to validate the Egyptian law that is related to social and environmental elements. In the second part, the researcher has derived out the SLSQ elements and validated them through specific techniques; see section 7.4.2.

After that, a pilot study has been done to choose the most suitable constructs to the variables. In the second phase and based on phase one, the questionnaire will be prepared and designed to be distributed for LSPs' customers in Egypt to validate the research framework as a quantitative approach.

The first contribution of research is adding knowledge of the relationship between sustainability and logistics service quality and to enhance customer's' satisfaction and relationship quality. Moreover, the second contribution is that the research will provide LSPs with the map that should follow to present a better sustainable practice that would enhance their performance.

Besides, collecting the key empirical findings from the research and proposing a set of SLSQ variable and reporting tools that can be used by LSPs to improve their performance and their customer satisfaction. The third contribution is to operationalize the Egyptian laws and regulations into measurable scales to be able to measure sustainability development in Egyptian organizations. Finally, it will also provide the Egyptian government with the sustainability practices that should be used by LSPs in the Egyptian culture and to break the fear in the LSPs to take initiatives to apply these practices.

This chapter could be concluded as follows, it displayed the LSP industry and highlighted the existing role of LSPs in Egypt and their contribution toward the GDP. It also presented the research problem, gap, objectives, questions, methodology; finally, it showed the contribution of the study.

Chapter Two

2. Supply Chain Management, Service Quality, and Relationship Quality

2.1 Introduction

This chapter introduces the background of the main research, concepts and the current knowledge of this area before identifying the gap of this research. It starts with explaining the theories and definitions of supply chain management (SCM) and explains the logistics as a part of it. After that, it presents the concept of service quality (SQ) and how this concept goes through logistics service quality (LSQ). Next, it gives an introduction to customer satisfaction (CS), and finally it explains the term "relationship quality" (RQ).

2.2 Supply Chain Management

Organizations are challenged on many serious levels: international competition, customers' requirements, new rivals, reduction of the product life cycles, and reduction of response times. However, competition is based on capabilities, or "complex group of skills and accumulated knowledge, operated through organizational processes" (Day, 1994, p.38). The position of effective supply chain management (SCM) has become more and more valuable in recent years; the role of SCM in business has led to creating and developing a strategic competitive advantage through close customer relationship, increased satisfaction and improved business profitability (Mentzer, Flint, & Hult, 2001). Organizations have understood that effective and efficient management of supply chains is essential for current and future progression (Olhager, Persson, Parborg, & Linkoping, 2002). These reasons inspire firms to use SCM as a guide for their industries because the basic objective of supply chain management is to enhance the performance of the chain to add as much value for cutting costs and to satisfy customers; on the other hand, it aims to link all supply chain entities together for cooperation as a way to maximize productivity and deliver the most benefits to all (Finch, 2006).

✓ Supply chain management framework

Mentzer et al. (2001) proposed a supply chain as a "set of three or more parties directly involved in the upstream and downstream flow of products, services, finances, and information from the source to the customer" with a strong focus on management of flows while Fleischmann (2002) divided the supply chain into four main phases and explained their purpose: "Procurement involves the operations of providing the raw material and resources necessary for production. Production is the next process in the chain in which the raw materials are converted into intermediary to finished products. Then, distribution includes the logistics to move the products either to companies for further processing the product or to distribution centres, and finally to points of sales".

The goal of the supply chain is to gain profit and reduce cost at the same time. This means an integration among all members in the supply chain is required. SCM may require that all firms in the supply chain share sensitive and proprietary information about customers, actual demand, point-of-sale transactions, and corporate strategic plans. Figure 2-1 indicates the key elements of supply chain management and clears the significant integration that must take place across several different organizations in the supply chain. This means a balance between customer service level and low costs. In practice, these are hard to be achieved (Croxtton, Garcia-Dastugue, Lambert, & Rogers, 2001).

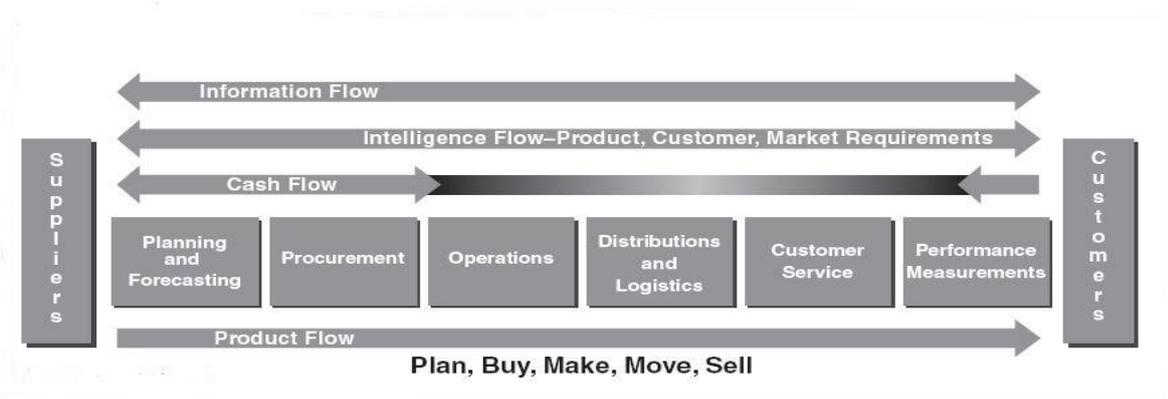


Figure 2- 1: The key elements of supply chain management
Source: (Manrodt, Holcomb, & Thompson, 1997)

✓ Definition of Supply Chain Management

The appearance of the term "supply chain" was in 1982, and it was used to describe the logistics management within the organizations through three main phases: functional management, internal management and external integration (C. J. Langley, 1986; Langley Jr & Holcomb, 1992). A lot of definitions presented in literature explained the main elements and issues correlated to supply chain processes and operations, starting from Scott and Westbrook (1991) who defined SCM as a chain linking each element of the manufacturing and supply process from raw materials to the consumers, including many organizational operations. They emphasized the vital role of coordination and explained the usual functions of supply chains. Ganeshan (1995) illustrated an important idea that is connected to cooperation, and they defined SCM as operations that assist in a lot of tasks, such as procurement of materials, transformation to produce products or services to the end user via distribution network by the corporation between the intermediates. This definition presented the importance of coordination among the members in a supply chain. Moreover, Swaminathan, Smith, and Sadeh (1998) stated that supply chain is a network of autonomous or semi-autonomous business entities that are responsible for procurement, manufacturing, and distribution activities to produce one or more type of products. Christopher (1999) defined the supply chain as the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in order to deliver products and services in the hands of the ultimate customer. This definition clarified the coordination and also collaboration within supply chain

members whether downstream or upstream and also illustrated the value added to the final customer. With the beginning of the millennium, the authors started to focus on the integration among supply chain members. Croxton et al. (2001) extended the scope of SCM to “the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders”. They focused on integration among all entities in the supply chain; furthermore, Mentzer et al. (2001) defined SCM as the systemic, strategic coordination of business elements and the strategies across these elements within particular firms and across businesses within the supply chain, for the purposes of developing the long-term performance of the individual organization and for supply chain overall. They cleared the role of relationship among all supply chain members, which leads to an overall integration. Chan and Lee (2005) defined SCM as the efficient management of the end-to-end process of designing, development, anticipating and sourcing through complex supplier networks, manufacturing, and distributing products from raw material to the final customer, and the final disposal of the product by the customer. They mentioned the point of forecasting as the main function in a supply chain. J. G. Kim, Chatfield, Harrison, and Hayya (2006) noticed the huge development from 1995 to 2006 and defined SCM as a network of facilities that procure raw materials, transform them into intermediate goods and then final products, and deliver the products to customers through a distribution system. According to the Council of Supply Chain Management Professionals (CSCMP) (2009) “Supply chain management includes the planning and organization of all activities involved in sourcing and procurement, exchange, and all logistics management activities”. After a period of time, the role of supply chain management as a terminology started to be developed to the term Sustainable Supply Chain Management (SSCM) – which will be discussed later in chapter 3 - and replaced it as a new trend worldwide.

Reviewing the definition above, we could say that supply chain is considered the main umbrella of companies that helps them to cooperate, collaborate and integrate in order to achieve each entity's goals and to satisfy their customers. But actually, a supply chain could not have a better performance without logistics management, as logistics are gears that make supply chain work effectively and efficiently. Therefore, the next section will point out what logistics are and their main activities.

✓ Logistics

In the 1950s and 60s, the military was the only organization that used logistics; it was concerned with the supply of troops with food, weapons, ammunitions and extra parts, as well as the transport of troops themselves. In civil life, logistics are the main activities that help firms produce and distribute physical goods, and it is considered a main tool to decide how and when raw materials, semi-finished and finished goods should be needed, distributed, moved and stored (Ghiani, Laporte, & Musmanno, 2004). The competitiveness advantages are developed by recognizing the role of logistics; unique logistics have become a powerful source of competitive differentiation within marketing offerings of world-class firms. (Seuring & Müller, 2008) stated that logistics as a part from supply chain and explained that logistics is a network includes raw materials, suppliers, manufacturing, warehouses, distribution centres, wholesalers, and retail that all work together in processes to produce finished or semi-finished products that flow among facilities to reach to customers as it is clear in (Figure 2-2).

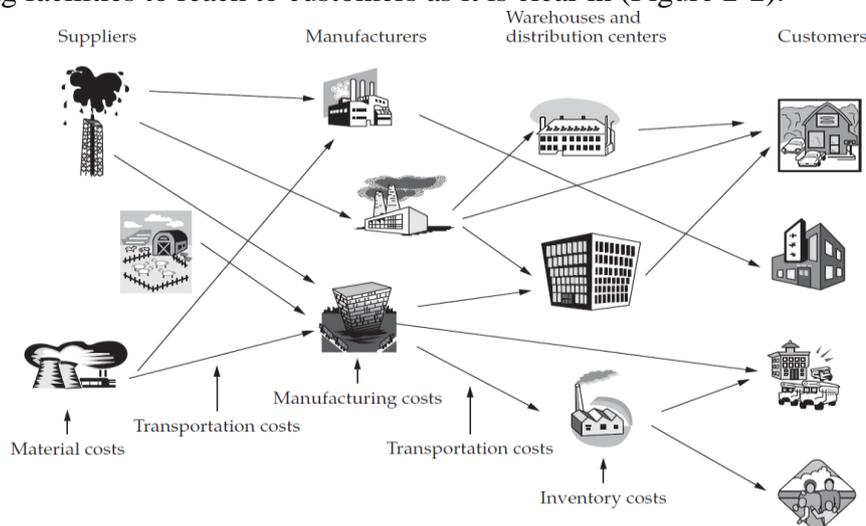


Figure 2- 2: The Logistics Network
Source: (Seuring & Müller, 2008)

✓ Logistics Activities

Grant, Trautrim, and Wong (2017) mentioned the main functions and sub- functions of logistics; the main functions include transportation management, inventory management, order fulfilment, and customer service, and the sub-functions include network designing, warehousing, supply/demand planning, materials handling and management of LSP sourcing and procurement, packaging, assembly, production planning and scheduling. Through these activities, the definitions will explain the role of each activity for achieving the overall logistics processes.

✓ Definitions of Logistics

The researchers started to focus on logistics from the moment that logistics was created; they mentioned a lot of definitions that include different aspects and functions starting from Rosenfield, Shapiro, and Bohn (1985) who defined logistics as those activities that relate to

receiving the right product or service in the right quantity, in the right quality, in the right place, at the right time, delivering to the right customer, and doing this at the right cost (7R). They clarified the main seven rights of logistics, but actually the definition was not including the main activity network of logistics; in contrast, the Council of Logistics Management (1991) gave little attention to the logistics activities; it defined logistics as “a part of the supply chain process that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers’ requirements”. Another main point here that is related to forecasting was stated by Samuelsson and Tilanus (1997), and they defined logistics as “the process of forecasting customer requirements and desires; owning the capital, materials, people, technologies, and information necessary to satisfy their requirements and desires; optimizing the goods- or service-producing network to carry out customer requests and utilizing the network to fulfil customer requests in the right time”. A similar definition by Lumsden, Dallari, and Ruggeri (1999) “Logistics systems encompass operative responsibilities, which include administration, operation and purchase and constructive duties as well as detailed design”; moreover, Handfield and Nichols (2002) defined logistics as a chain of handling and moving goods and materials from point of order to point of consumption to achieve customer satisfaction and attain a competitive advantage. According to (Waters, 2003; p.5), logistics is a complete process of materials and products moving into, through, and out of firms' inbound logistics and covers the progress of materials received from suppliers. Therefore, we can give an overview of the whole process starting from materials management that describes the movement of materials and components within a firm. Then, physical distribution refers to the movement of goods outward from the end of the assembly line to the customer. Finally, supply-chain management is somewhat larger than logistics, and it links logistics more directly with the users’ total communications network and with the firm’s engineering staff.

Supply chain and logistics are the backbone of any company; they could be the face of the company's image and reputation. The organisation's success means that the organization is working in a suitable investment environment that will be reflected on the overall investment weather; therefore, the economy will have a share from that success, such as importing and exporting, services, and manufacturing; as a result, the benefits will touch the community by reducing the unemployment ratio and interaction with the company’s’ activities. The community is our customers that need to be treated in a suitable way; however, the excellence in dealing with customers comes from the way that you present the services, so the next section will explain the concept of service quality, what the relationship between logistics and service quality is and how it comes to be logistics service quality; moreover, it will explain the concept of customer satisfaction as an outcome from logistics service quality.

2.3 Service Quality

The role of service quality cannot be denied in all industries and sectors like banks and hotels, (Oyetunji, Baguri, & Otis, 2014), education and health (Samanhya, Arhin-Larbi, Adusei, & Donbesuur, 2014); therefore, it has a vital and great impact on business performance, reducing costs, customer satisfaction, customer loyalty, profitability and achieving successful business (Gurău, 2003). Albrecht and Zemke (1985) illustrated that service quality plays an important role in setting a vision for firms' competitive strategies and identified systems and strategies for managing service. It has been discussed intensively in many previous studies, pointing out new concepts of empirical studies (Silvestro & Cross, 2000), (K. Newman, 2001), (Sureshchandar, Rajendran, & Anantharaman, 2002), (Gurău, 2003), (Oyetunji et al., 2014), (Samanhya et al., 2014). Each service that companies present is a new experience for the company. (Ananthanarayanan Parasuraman, Zeithaml, & Berry, 1988, p.12) stated that "service quality" is a general tool to measure perceived service quality that clears the degree of difference between consumers' perceptions and expectations. As a result, service quality is defined as customers' perception of how well a service meets or exceeds their expectations. The services that are presented in the best way are the firm's backbone in the market share; this quality will be reflected on the performance that gives significant benefits to incomes, cost savings, and market share (Fornell, Johnson, Anderson, Cha, & Bryant, 1996).

2.3.1 Service Quality Dimensions

Researchers generally adopt two perspectives to measure the services: the "Nordic perspective" and the "American perspective" (Brady & Robertson, 2001). The "Nordic perspective" was proposed by Gronroos (1984), and the "American perspective" was proposed by Anantharanthan Parasuraman, Zeithaml, and Berry (1985). The "Nordic perspective" was the first concept that has been used to measure the services in literature; however, the "American perspective" was the model that answered many questions that are placed by the researchers: "What is the best way to determine the quality of service?" and "What is the best way to measure it?"; therefore, Anantharanthan Parasuraman et al. (1985) created 22 elements as a service quality scale to measure the service quality; after that, Ananthanarayanan Parasuraman et al. (1988) defined the service quality model as "SERVQUAL" that is illustrated in figure 2-3 and comprised the service quality measurement scales with 22 elements into 5 main dimensions as shown in Table 2-1, and the definitions of the five dimensions are as follows:

- 1) Reliability is the ability to achieve the promised service in a reliable and correct way.
- 2) Assurance is the trust and the confidence toward the customers in dealing with the organization. This reflects the employees' experience, understanding and their ability to transfer the confidence to customers themselves.

- 3) Tangibles are the physical indication of the service; for instance, the appearance of the physical facilities, tools and equipment used to provide the service; the look of employees and the link tools between the customer and the company.
- 4) Empathy is the individualized care that a company provides to the customers.
- 5) Responsiveness refers to the intentions of employees to help customers and to deliver the services in time

Table 2- 1: Service Quality Dimensions

Dimension	Refers to	Specific criteria that customers use
RELIABILITY Delivering on Promises	one's ability to perform the promised service dependably and accurately	<ul style="list-style-type: none"> • Timeliness • Consistency/Regularity • Accuracy
ASSURANCE Inspiring trust and confidence	The knowledge and courtesy of staff; their ability to inspire trust and confidence	<ul style="list-style-type: none"> • Staff competence • Respect for stakeholders • Credibility • Probity and confidentiality • Safety and security
TANGIBLES Representing the service physically	The physical representations or images of your service	<ul style="list-style-type: none"> • Physical facilities • Equipment • Technology • Employees • Communication materials
EMPATHY Treating customers as individuals	The caring individualized attention you provide your stakeholders	<ul style="list-style-type: none"> • Access to (staff, services, information) • Communication (clear, appropriate, timely) • Understanding the stakeholder • Individualized attention
RESPONSIVENESS Being willing to help customers	Providing prompt service	<ul style="list-style-type: none"> • Willingness to help • Prompt attention to requests, questions • Problem resolution • Complaint handling • Flexibility

Source: Ananthanarayanan Parasuraman et al. (1988)

2.3.2 Service Quality Model

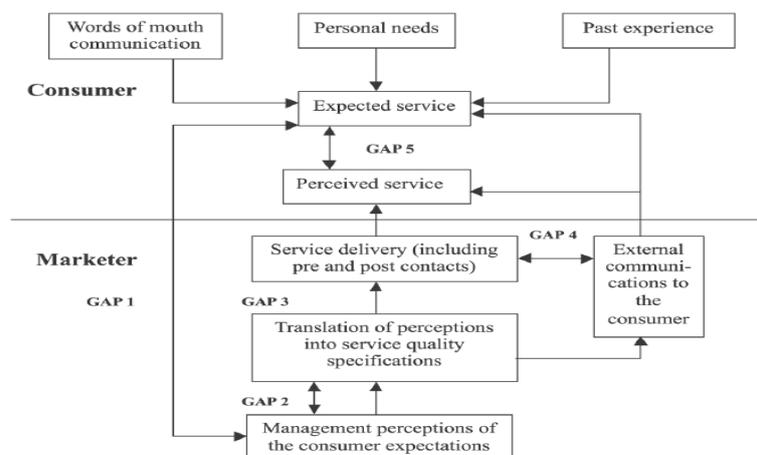


Figure 2- 3: Service quality models and the Gaps of this model

Source: (Anantharanthan Parasuraman et al., 1985)

Anantharanthan Parasuraman et al. (1985) developed a service quality model based on gap analysis. The gaps are stated below:

1. **Gap 1:** Difference between consumers’ expectations and management’s perceptions of those expectations, i.e. not knowing what consumers expect.
2. **Gap 2:** Difference between management’s perceptions of consumer’s expectations and service quality specifications, i.e. improper service-quality standards.
3. **Gap 3:** Difference between service quality specifications and service actually delivered i.e. the service performance gap.
4. **Gap 4:** Difference between service delivery and the communication with consumers about service delivery, i.e. whether promises match delivery.
5. **Gap 5:** Difference between consumer’s expectation and perceived service. This gap depends on the size and direction of the four gaps associated with the delivery of service quality on the marketer’s side.

Gronroos (1984) stated three main components in order to understand the customer perception and the way that service influences customer’s decisions; moreover, achieving customer satisfaction comes when the company management perceives service quality. The three components are technical quality, functional quality, and image. (Gronroos, 1984, p.39) defined technical quality as “what the consumer receives as a result of interactions with a service firm” and mentioned that employees' technical skills, employees' knowledge, technical solutions, technology systems and machine quality as its five attributes; furthermore, he defined functional quality as “the way in which the technical quality is transferred”. The functional service quality dimension of seven attributes consists of behaviour, attitude, accessibility, appearance, customer contact, internal relationships and service mindedness as its seven attributes. He concluded that the technical and functional quality of service built up the corporate reputation of the company as figure 2-4 clarifies the technical and functional quality aspects from the perceived service quality.

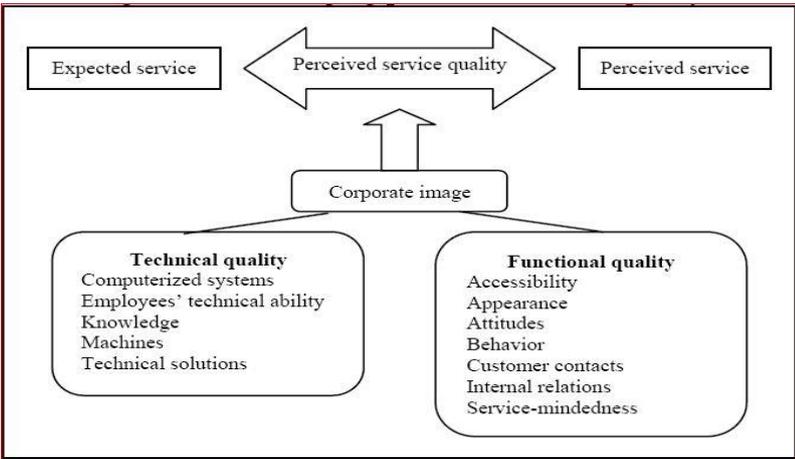


Figure 2- 4: Managing perceived service quality
 Source: (Gronroos, 1984)

Most of the researchers start to use both logistics and service quality as an integrated terminology, so the next section will explain how logistics would go through service quality.

2.4 Logistics Service Quality

According to Cronin Jr and Taylor (1992), service quality factors have a big role that cannot be ignored in developing the services' level; however, the weakness in service quality measurement factors will have an effect on the company's performance and its customer satisfaction. Therefore, Bienstock, Mentzer, and Bird (1997) developed a suitable and reliable scale for measuring the quality of physical distribution service quality; they were the first to start an integration of the logistics and marketing service quality research. Moreover, Bienstock et al. (1997) examined the marketing service quality measurement literature, particularly the development of logistic service scale and following actions aimed at the application of these logistic service dimensions in industrial service contexts. Mentzer, Flint, and Kent (1999) extended the use of the service quality concept into the logistics service quality aimed to find out factors that are considered important to customers in their logistics service quality evaluations. They developed a logistics service quality scale that attempts to measure customer perceptions in 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). Bienstock et al. (1997) defined the quality in logistics service as consisting of two complementary elements: marketing customer service (MCS) and physical distribution service (PDS). The idea of logistics service quality (LSQ) has been studied from two different approaches: subjective and objective quality. The first one is related to adapting the service to specific characteristics determined by service providers; this approach sees the service as a physical object that could be evaluated and observed (Garvin, 1984). The second approach proposed that quality is based on customers' evaluation and perspective; both approaches are related to functional quality that a customer gets "from his/her assessment on how he/she receives an outcome of the production process, which is perceived in a very subjective way"; for technical quality, it "is obtained from the customer's evaluation of the technical outcome of the process. Hence, it can be measured in a rather objective manner" (Jaafar, 2006; p 31.). Mentzer et al. (1999) Mentzer, Flint, Kent (MFK) developed and validated their LSQ scale using a single large logistics service provider firm in the United States, namely the Defence Logistics Agency (DLA), which provides logistics services to internal customers. Mentzer et al. (2001) concluded that logistics service quality is filling the demand of customers who receive logistics service. Stank, Goldsby, and Vickery (1999) illustrated that LSQ is an important tool that makes a company achieve success by increasing the company's operation flexibility and improving the level of presented services that leads to have a competitive advantage to be unique in the market. Moreover, Jaafar (2006) applied the same model to study the effects of technical and functional quality dimensions of LSQ on customer satisfaction and the effects of relationship quality dimensions on customer loyalty in third party relationships' context. There are many researchers who applied logistics service quality model in different sectors and fields as clear in table (2-2).

Table 2- 2 :Summary of selected literature on service quality dimensions in logistics

Year	Authors	No. of dimensions	Details	Comment
1976	Lalonde and Zinszer	3	An activity to satisfy customers' needs; performance measures to ensure customer satisfaction	Those components focus on provider firms rather than customers
1980	Donabedian	2	Structure; process; outcome	Structure refers to the technical characteristics, process relates to the functional characteristics of logistics service, and outcome refers to the result of their interaction.
1982	Gronroos	2	Technical quality; functional quality	Technical quality refers to the service outcomes, and functional quality refers to the process of service delivery
1989	Mentzer, Gomes and Krapfel	3	Availability; timeliness; quality	These are basically the service outcomes
1989	Mentzer, Gomes and Krapfel	2	Marketing customer service (MCS); physical distribution service (PDS)	These two elements are second-order constructs and complementary to each other; PDS comprises availability, timeliness, and quality in that quality refers to the condition of delivered products; MCS consists of price, product quality, sales support, and warranty
1989	Rinehart, Cooper and Wagenheim	2	Marketing customer service (MCS); physical distribution service (PDS)	Same as above; PDS consists of availability, timeliness and quality
1991	Lehtine and Lehtine	2	Process; result	Same as above
1991	Collier	2	Internal or operation-oriented service quality, external or marketing-oriented service quality	Almost the same as that of Mentzer, Gomes and Krapfel (1989)
1995	Novack, et al,	3	Same as that of Lalonde and Zinszer Same as that of Lalonde and Zinszer (1976);	It extends further by incorporating internal and external customers
1997	Mentzer, et al	2	Physical distribution service; customer service	Same as that of Mentzer, Flint and Kent
1997	(Bienstock et al., 1997)		PDSQ	PDSQ is a second-order construct composed of timeliness, availability and condition
1998	Maltz and Maltz	2	Objective; perceptual measures	Objective represents hard variables of service quality related to delivery reliability; perceptual measures relate to information, familiarity and responsiveness of sales personnel
1999	Mentzer, Flint and Kent		Personnel contact quality; order release quantities; information quality; ordering procedures; order accuracy; order condition; order quality; order discrepancy handling; timeliness	This model is proposed as first-order dimensions of a second order LSQ. It is recognized as the most distinguished to date. However, the validation of this model went untested in the context of 3 PL service.
2000	McDougall and Levesque	2	Technical ability; perceived value	This model is simplified based on the dimensions proposed by Lehtine and Lehtine (1991)

2001	Brady, et al	2	Same as above	Same as above
2001	(Mentzer et al., 2001)	9	Same as that of Mentzer, Flint and Kent	Same as that of Mentzer, Flint and Kent
2001	Gronroos	2	Technical service characteristics; functional characteristics	Similar to those propose by Mentzer, Ruthner and Matsuno
2006	Davis	2	Operational LSQ, relational LSQ	Operational LSQ means perceptions of logistics activities performed by service providers that contribute to consistent quality productivity and efficiency; relational LSQ is defined as perceptions of logistics activities that bring the firm closer to its customers in order to understand customers' needs and expectations and have the ability to provide quality services to meet them in an efficient manner.
2007	Rafiq and Jaafar	9	Same as that of Mentzer, Flint and Kent	The two elements of information quality construct consisting of availability and adequacy of information show limitations. This construct is modified, using the information quality measure instead. The second two-element construct is ordering procedures, referring to the efficiency and effectiveness of the order placement procedures; four new elements (measuring simplicity, flexibility of the ordering procedures, time, and effort taken) are added to the original ones.
2007	Feng, et al	6	Timeliness quality, personnel contact quality, order quality, order discrepancy handling, order condition, and convenience	These dimensions are dedicated for online shopping in logistics, and they represent Chinese characteristics.
2008	Jian and Zhenpeng	6	Personnel's quality; information quality, order the course; intact intensity of the goods, the error is dealt with, timeliness	These dimensions focus on customers' appraisal on suppliers' service
2011	Gil-Saura et al	3	Personnel quality, information quality and order quality.	Analysing the influence of the use of logistics service quality on supplier's results in terms of commitment and loyalty towards the main supplier from the point of view of the customer, and at testing the moderating role of Information Technology on these relationships.
2012	Yin Ho et al,	4	Timeliness, condition/accuracy of order, quality of information, and availability/quality of personnel.	The most significant variables in achieving satisfaction among customers in the courier service industry are the condition/accuracy of order, the availability/quality of personnel that were not indicated as factors influencing customer satisfaction for the courier service providers.
2013	Bouzaabia et al,	2	Operational LSQ, relational LSQ	Romanians and Tunisians; In the Romanian sample, "the relational LSQ" was the most important predictor of both satisfaction and loyalty, followed by "the operational LSQ". In the Tunisian sample, "the relational LSQ" was the most important predictor of satisfaction, followed by "the operational LSQ". We remark that the most important predictor of loyalty in the Tunisian sample was "the operational LSQ" followed by "the relational LSQ".

2013	Thai	5	Personnel contact, information quality, timeliness, customer focus quality, and order fulfilment quality	Customer focus quality is the logistics service quality factor that was most agreed upon by respondents, followed by order fulfilment quality, corporate image, and timeliness, while information quality is the least agreed upon factor
2014	Bernd Philipp and David B. Grant	9	Personnel contact quality; order release quantities; information quality; ordering procedures; order accuracy; order condition; order quality; order discrepancy handling; timeliness	They created 42 questions to measure the logistics service quality to the end customer. An empirical study will be undertaken to validate and purify these variables across three European contexts of France, UK and Germany
2015	Hussein et al,	9	Personnel contact quality; order release quantities; information quality; ordering procedures; order accuracy; order condition; order quality; order discrepancy handling; timeliness	The findings show that personnel quality contact and timeliness are the most two variables that have a direct effect on retailer satisfaction
2015	Chaisurayakarn,		Personnel contact quality; order release quantities; information quality; ordering procedures; order accuracy; order condition; order quality; order discrepancy handling; timeliness	This study used Green service quality and logistics service quality to measure its effect on logistics performance indicators. The findings indicate that LSQ has a positive and significant effect on Thai government's logistics performance index TLPI, and that effect is more pronounced when GSQ measures are included
2016	Abdul Khabir Rahmat and Nasrudin Faisol.	3	Timeliness, Delivery Condition and Accuracy	The findings showed that in achieving customer satisfaction in Malaysia's context, operational technical ability within the logistics service quality (LSQ), such as timeliness and service condition, is a basic element contributing to satisfaction subject to influence of cultural values

Source: Thai (2013) till (Jian and Zhenpeng 2008) and the rest has been done by the author.

Logistics Service quality and customer satisfaction are related concepts and complementary definitions, the logistics service quality performance is a main marketing component that enhances customer satisfaction (Mentzer et al., 2001). In the logistics literature, many researchers have illustrated the significance of logistics service performance as a main point to achieve customer satisfaction (Bienstock et al., 1997; Dadzie, Chelariu, & Winston, 2005); therefore, most of the researchers followed this approach and path in their research. Mentzer et al. (2001) stated that satisfaction is the outcome of logistics service quality model; furthermore, logistics service quality and customer satisfaction are significant in the current business environment, and they are the main reasons to build a long term relationship with customers (Caceres & Paparoidamis, 2007). In academic literature, customer satisfaction has been explained and explored from many different perspectives; therefore, the next section will explain the definitions of customer satisfaction and its role within the organization.

2.5 Customer Satisfaction

The role of customer service started to be recognized over 50 years ago Kyj (1987) since logistics were known as physical distribution channels (Kent and Flint, 1997). However, the research concentration on customer satisfaction and service quality has only progressively developed in the early 1970s (Bienstock et al., 1997; Mentzer et al., 1999). Nowadays, customer satisfaction is an important concept in modern marketing. Higher customer satisfaction leads to a better financial performance by lowering customer switching; achieving loyalty and word of mouth and improving company reputation. Based on these facts, customer satisfaction took a big range of attention in academic field, and it became nowadays the main interest in all businesses.

Chaisurayakarn et al. (2014) figured out that customer satisfaction and service quality are the future keys of research in the logistics field; therefore, most of the researches started to focus on customer satisfaction explanations, not from the suppliers' perspective but the customers' viewpoint, (Dadzie et al. (2005); Mentzer et al. (2001)). Customer service started to be the centre of research after realizing that the customer is a stakeholder of an organization who provides payment, so the interest of the customer not just ends to the service that he/she receives but also the organization does a huge effort to reach customer satisfaction and loyalty.

✓ Customer Satisfaction Definitions

Customer satisfaction is becoming a strong tool and the backbone for companies with the rising effect on their economic success; moreover, it plays an important role on increasing the market share (Aydinli & Demir, 2015). Customer satisfaction is a tool of evaluation of perceived quality related to expected quality (Moorman, Deshpande, & Zaltman, 1993). Giese and Cote (2000); p.1 agreed that there is no determined definition of customer satisfaction, but after they had done their studies, they defined it as “customer satisfaction is identified by a response (cognitive or affective)

that pertains to a particular focus (i.e. a purchase experience and/or the associated product) and occurs at a certain time (i.e. post-purchase, post-consumption)". (Oliver, 1980, p.461) defined customer satisfaction as "the customers' post-purchase comparison between pre-purchase expectation and performance received"; moreover, (Tse & Wilton, 1988, p.204) developed a new definition for customer satisfaction, and they defined it as "emotional reaction to a specific product/service experience, and these emotional reactions come from disconfirmation of a consumer's perceived performance of product or service and his or her expectations of performance". This definition goes into the emotional reaction to achieve customer satisfaction. According to (Schiffman & Kanuk, 2004, p.14), customer satisfaction is defined as "the individual's perception of the performance of the products or services in relation to his or her expectations" an offer. (R. I. McKinnon, 2007, p.52) defined customer satisfaction as "the perceived value acquired by a consumer in purchasing a particular product, as well as the satisfaction level with service during the trading process"; table (2-3) clarifies the definition of satisfaction. After reviewing the literature of customer satisfaction, it is clear that these definitions contain many different points related to satisfaction, but all the authors agreed on three main points related to the definitions (Giese & Cote, 2000):

1. Customer satisfaction is a response (emotional or cognitive).
2. The response pertains to a particular focus (expectations, product, consumption experience, etc.)
3. The response occurs at a particular time (after consumption, after choice, based on accumulated experience, etc).

Table 2- 3: Definitions of customer satisfaction

Reference	Definition
Oliver (1980)	Customer satisfaction is an outcome of a purchase/usage experience that would appear to be an important variable in the chain of purchase experience, linking product selection with other post purchase phenomena including favourable word-of-mouth and customer loyalty.
Westbrook and Reilly (1983)	Customer satisfaction is an emotional response to the experiences provided by, associated with particular products or services purchased, retail outlets, or even molar patterns of behaviour such as shopping and buyer behaviour, as well as the overall market place.
Tse and Wilton (1988)	Customer satisfaction is the consumer's response to the evaluation of the perceived discrepancy between prior expectations (or some other norms of performance) and the actual performance of the product/service as perceived after its consumption.
Anderson and Sullivan (1993)	Customer Satisfaction can be broadly characterized as a post-purchase evaluation of product quality given pre-purchase expectations.
Cacioppo (2000)	Customer satisfaction is the state of mind that customers have about a company when their expectations have been met or exceeded over the lifetime of the product or service.

Giese and Cote (2000)	Customer satisfaction is identified by a response (cognitive or affective) that pertains to a particular focus (i.e., a purchase experience and/or the associated product) and occurs at a certain time (i.e., post-purchase, post-consumption).
Hansemark and Albinsson (2004)	Customer satisfaction is an overall customer attitude towards a service provider, or an emotional reaction to the difference between what customers anticipate and what they receive, regarding the fulfilment of some need, goal or desire.
Schiffman and Kanuk (2004)	Customer satisfaction is defined as the individual's perception of the performance of the products or services in relation to his or her expectations.
Hill and Alexander (2006)	Customer satisfaction is a measure of how your organization's product performs in relation to a set of customer requirements.
Karunakaran (2008)	Customer satisfaction is the extent to which a product's perceived performance matches buyer's expectations. If the product's performance falls short of expectations, the customer is dissatisfied; if it matches with expectations, the customer is satisfied. If it exceeds expectations, the customer is highly satisfied or delighted.
(Chen, Chen, & Hsieh, 2007, p.52)	Customer satisfaction is "the perceived value acquired by a consumer in purchasing a particular product, as well as the satisfaction level with service during the trading process".
Zeithaml and Bitner (2016)	Customer satisfaction is customer's evaluation of product or service in terms of whether that product or service has met their needs and expectations. Failure to meet needs and expectation results in dissatisfaction with product or service.

Source: (Saroja & Diwan, 2017)

S. W. Brown and Swartz (1989) stated that satisfaction occurs when outcome meets or exceeds the client's anticipated outcome and actual outcome. Customers make satisfied or dissatisfied judgments by assessing the exchange relationship with the service providers. If the process of settling conflicts or problems is not appropriate, customers are likely to be dissatisfied in the logistics service quality process.

Banar and Ekergil (2010) explained that customer satisfaction is not a part of the functional or technical quality that is presented to the customer, but it is the consequences, because when the customer receives the service many times, the degree and the level of satisfaction are different from one process to another, and this proves the researchers' perspective when they defined satisfaction. Satisfaction is reaching customer expectations, so these expectations could be fulfilled after studying the main major needs of markets (Yee, Lee, Yeung, & Cheng, 2013).

There are a number of studies that had been done in the customer satisfaction area; most of the researchers take customer satisfaction as the outcome of their models. The following section will explain a few of these studies that focused on customer satisfaction and the results of these studies. Athanassopoulos, Gounaris, and Stathakopoulos (2001) examined the effect of customer satisfaction on customers' behavioural responses. The results support the notion of direct effects of customer satisfaction on three main variables: "decision to stay with the existing service

provider, engagement in word-of-mouth communications, and intentions to switch service providers”. (Mentzer et al., 2001) investigated whether different groups of customers of a particular organization with multiple market segments might place varying degrees of importance on LSQ components and stated that satisfaction is the outcome of the model; Mentzer's study determined the degree of importance of each LSQ component in the four customer segments of a large logistics organization in a third party organization. Jaafar (2006) tested LSQ across industrial sectors in the UK and measured the impact of LSQ on relationship quality in the business field. Jaafar's study investigated the effects of relationships among logistics service quality, customer satisfaction and relationship quality. Appiah-Gyimah, Agyapong, and Boohene (2011) examined the role of the service quality variables in enhancing customer satisfaction. Multiple regression analysis was used to find the impact service quality has on customer satisfaction. The result showed that service quality has a direct impact on responsiveness, and empathy has a significant impact on customer satisfaction. El Saghier and Nathan (2013) studied the factors affecting customer satisfaction on service quality. Measuring the determinants of service quality is done by factor analysis. The findings highlighted that customer satisfaction has an important influence on reliability, empathy, assurance and responsiveness but not on tangibles. Hussein, Hassan, and Hamid (2015) measured the impact of LSQ model on customer satisfaction “as a moderator variable” and relationship quality in business to business (B2B) field in retailer industry. The result showed that personnel quality contact and timeliness are the two variables that have a direct effect on customer satisfaction. B2B customer satisfaction differs from end user satisfaction due to the difference in nature in services provided (Patterson, Johnson, & Spreng, 1996).

✓ **Business to Business (B2B) Satisfaction**

There is no doubt that (B2B) satisfaction is totally different when we are talking about end user satisfaction; however, some researchers highlighted that B2B marketing is theoretically similar to B2C marketing (Coviello & Brodie, 2001) while others emphasised that the complexity of B2B marketing makes it dissimilar from consumer marketing. (Patterson et al., 1996, p.5) defined B2B markets as “often technically complex and sophisticated”, creating a more complicated market for customer to evaluate due to the intangible nature of the services.

Coviello and Brodie (2001) highlighted a very critical point that is related to customer satisfaction in B2B and B2C; they stated that B2C could be one transaction between the two parties while those serving industrial customers were more relational and long-term minded in their marketing approach; moreover, Ganesan (1994) explained that the long term relationships are more beneficial for the organizations to enhance customer satisfaction and increase the financial profits, and he stated that the difference between the end user and the industrial customer satisfaction is the number of decision makers. End-user satisfaction depends only on the people who are involved

in buying a product. On the other hand, the industrial customer satisfaction depends on the satisfaction of the purchasing process overall.

Based on the above review and based on customer satisfaction definitions and the difference between end user customer and business customer, this study seeks to use customer satisfaction as an outcome of SLSQ variable in order to measure the level of customer satisfaction of logistics service providers based on logistics service quality and sustainable service quality (Sustainable logistics service quality framework) and also figure out the impact of SLSQ's customer satisfaction on the quality of the relationship between Logistics Service Providers (LSP) and their customers.

2.6 Relationship Quality

This term is used to explain to what extent the relationship is strong. It was developed from a customer's view to evaluate the relationship between customer and a salesman (Crosby, Evans, & Cowles, 1990). Crosby et al. (1990), p. 70 stated that high relationship quality means "the customer is able to rely on the salesperson's integrity and has confidence in the salesperson's future performance because the level of past performance was consistently satisfactory". Moreover, Hennig-Thurau and Klee (1997), p 751 stated that RQ is "the degree of appropriateness of a relationship to fulfil the needs of the customer associated with that relationship". On the industrial level, Holmlund (2001) stated a definition based on current definition in service quality literature, and he mentioned that RQ is "the joint cognitive evaluation of business interactions by significant individuals in both firms in the dyad. The evaluation encompasses a comparison with potential alternative interactions of a similar kind, which represents comparison standards". The term of RQ could be taken from buyer's perspective or seller's perspective, and we could say that the term RQ "emerges from the root of service quality" (Jaafar, 2006; p.54). Relationship quality can be described as the marketing activities that have the ability to give an advantage to the partners over time through creating, developing, and maintaining committed, interactive, and profitable exchanges (Harker, 1999). Some researchers call it Relationship Marketing (RM).

From LSP point of view, Grönroos (1990) gave a fully described establishing, maintaining and enhancing customer relationships from the service provider's perspective :

- Establishing a relationship involves giving promises;
- Maintaining a relationship is based on fulfilment of promises; and finally,
- Enhancing a relationship means that a new set of promises are given with the fulfilment of earlier promises as a prerequisite.

Since Morgan and Hunt (1994) proposed the well-supported commitment-trust RM model, many studies used this framework in their studies: (Ashnai et al., 2009; Bejou, Wray, & Ingram, 1996; De Wulf, Odekerken-Schröder, & Iacobucci, 2001; Dorsch, Swanson, & Kelley, 1998; Hennig-

Thurau & Klee, 1997; Ivens & Pardo, 2007; Lages, Lancaster, & Lages, 2005; Liu, Guo, & Lee, 2011; Palmatier, 2008; Pepur, Mihanović, & Pepur, 2013; Song, Su, Liu, & Wang, 2012; Storbacka, Strandvik, & Grönroos, 1994; Vesel & Zabkar, 2010; Walsh, Iza, Janson, Law, & Kong, 2010; Walter, Müller, Helfert, & Ritter, 2003); they discussed and measured the concept of relationship quality in different research contexts. The definition of relationship quality construct is different from one research to another based on the nature of the research; however, these authors have the same view that the concept of relationship quality is a higher-order construct consisting of several distinct dimensions, and it has related components or dimensions. Athanasopoulou (2009) reviewed all the literature on relationship quality from 1987 to 2007 and found that three main dimensions have been used in many studies and have been validated in different contexts: trust, commitment and satisfaction. However, some studies replaced satisfaction with dependence and stated that dependence, commitment, and trust are all important to improve relationship quality (Kwon & Suh, 2004; Sirdeshmukh, Singh, & Sabol, 2002; Spekman & Carraway, 2006). Therefore, this study will use dependence, commitment, and trust as the constructs of RQ as a moderator variable between sustainable logistics service quality (SLSQ) and customer satisfaction (CS) in order to examine the impact of SLSQ on RQ and CS. The next section will explain the main three constructs of RQ (dependence, commitment, and trust) in the context of LSP.

Dependence, trust, and commitment are time-dependent constructs; they grow and become bigger over time, especially when both parties have a long-term relationship. The power of this relationship would lead to anticipated improvements in the supply chain channel and increase the competitive advantage (Claycomb & Frankwick, 2010).

Dwyer, Schurr, and Oh (1987) highlighted the relationship as a process that grows over time, and classified five levels of relationship life cycle: (awareness exploration, expansion, commitment and dissolution). The life cycle starts with understanding that the first party is ready to deal with serious situations (awareness), then followed by looking for the most appropriate relationship exchange partner (exploration) in this phase; the expected exchange partners have to consider all aspects related to the nature of transaction, whether advantages or burdens before entering the third phase. In the third phase (expansion), trust starts to appear as the benefits gained from the relationship and interdependence increase. If a high level of input is provided, both partners believe that the future exchange is going to be effective; commitment will then be established.

2.6.1 Dependence

Dependence can be defined as to what extent the partner can rely on the relationship to satisfy important goals (Rusbult & Van Lange, 1996). Dependence in the logistics services context could be considered as the relationship between the LSPs and customers, as the degree to which

customers need to keep relationships with their LSPs to achieve the wanted performance (Sukresna, Hamilton, & Tee, 2016). Dependency exists in B2B when the dependent company receives very essential benefits and advantages from the relationship or cannot find another LSP that can present the same services. Dependence has become crucial from the moment that companies realized the role of logistics outsourcing due to the lack of advanced logistics techniques and skilled personnel; firms are relying more on logistics services provided by LSPs.

2.6.2 Trust

Generating trust has been mostly related to the development of interest in relationship quality in general and particularly in the context of B2B markets (Blois, 1999). The significant role of trust between firms in B2B is managed and used. Many academics used trust as a main construct to remain and develop a successful B2B relationship in the market. Setiawan and Achyar (2013) stated that trust between B2B enhances the customer's economic performance. The firms need to feel safe and confidential when they are dealing with LSPs as trust is an important factor to make a successful relationship (Anantharathan Parasuraman et al., 1985). Berry (1995). p 238 stated that trust is the backbone of building a unique relationship in the market. Trust in relationships is thinking that a party's word is dependable and that a party will achieve its requirement and commitment in an exchange (Mohr & Spekman, 1994). Trust not only depend on the advantage of the partner; it is a proof that the partner will not use the weakness of the other (Barney & Hansen, 1994). Trust is a vital aspect in reducing opportunism (Cavusgil et al., 2004; Chung & Jin, 2011). Trust can be defined as the willingness to rely on an exchange partner in whom one has confidence (Moorman et al., 1993). From LSP's field, trust is defined as to what extend the company is confident about its partner in the reliability and competence (Singh & Teng, 2016). Zaheer and Zaheer (2006) emphasized trustee characteristics and defined trust as: "the expectation that an actor:

- Can be relied on to fulfil obligations,
- Will dealing in a predictable way, and
- Will act and negotiate fairly when the possibility of opportunism is present.

2.6.3 Commitment

Commitment is considered an important construct of relationship quality because it represents a long-term orientation toward supply chain parties (Doney & Cannon, 1997). Moreover, it has a great contribution in keeping customer retention. According to Dwyer et al. (1987), p.19, commitment is defined as "an implicit or explicit pledge of relational continuity between exchange

partners". Commitment in the LSP field is defined as to what extent the company is willing to use its resources to work with its partner in the supply chain (Dubey, Altay, & Blome, 2019).

(Morgan and Hunt (1994)) mentioned that commitment and trust are the main elements in order to develop a long-term and successful relationship. They stated that "commitment and trust are key" because they make marketers

- "work on preserving relationship investments by cooperating with exchange partners,
- resist attractive short-term alternatives in favour of the expected long-term benefits of staying with existing partners, and
- view potentially high-risk actions as being prudent because of the belief that their partner will not act opportunistically."

Therefore, this study will use relationship quality (dependence, commitment, and trust), the framework outcome of the study, to measure the impact of SLSQ on customer satisfaction and RQ in the field of logistics service providers.

In conclusion, this chapter introduced a background of supply chain management, and then presented the definitions of supply chain. After that it presented logistics as a part of supply chain management and also highlighted the definitions of logistics. Moreover, it highlighted the main idea of service quality and service quality theory and model; in addition, it explained how service quality would be integrated into logistics. Moreover, it explained the term of customer satisfaction and the difference between end user satisfaction and business customer satisfaction. Finally, it illustrated the term of relationship quality and explained the three dimensions of relationship quality. The next chapter will go through literature of the concepts that have been discussed in this chapter. It will link between them and provide a complete literature review of the main topics to identify the gap of research.

Chapter Three

3. Sustainability Practices and Logistics Service Providers

3.1 Introduction

Understanding the nature of sustainability, its role within organizations and how it affects the companies' financial and market share performance leads us to go in depth with this terminology; moreover, logistics is one of the main sectors that sustainability can create a value added to each activity in it, as mentioned in chapter two in the explanation of logistics, supply chain management, service quality and customer satisfaction. This chapter starts with explaining the terminology of sustainability, exploring the origin of this word, it explains how the term of sustainability goes through businesses. moreover, it highlights the role of services within the organizations and how they are developed to sustainable services; moreover, this chapter illustrates the development of sustainable business to sustainable supply chain management. In the second part of this chapter, the role of logistics service providers (LSP) all over the world is defined, and the main activities of LSP are explained. In addition, this chapter illustrates how sustainability creates added value to LSP and LSP's customers, and finally it explains the three main sustainability dimensions in logistics and the main elements of each dimension.

3.2 Sustainability

"The ability to maintain some entity, outcome, or process over time." is the general definition of sustainability according to W. Jenkins (2008). The role of sustainability starts to be shown since Malthus (1872) was concerned about how Britain's apparently unstoppable rise in population could be sustained from a limited amount of land. As a result, the consumption of energy increases with a limited quantity of coal. Moreover, people start to face a lot of challenges, especially the damage related to social, economic, and environmental resources, which are connected to each other. Furthermore, these challenges could be solved by a new integrated system of thinking to take an action that creates a future where human society and nature can live with common advantage and where the suffering caused by natural resource abuse is finished (Gibson, 2010).

The idea of sustainability came to public care after a 1972 report, "Limits to Growth" issued by the international think tank Club of Rome that mentioned five major trends of global concern: accelerating industrialization, increasing population growth, widespread malnutrition, reduction of non-renewable resources, and a deteriorating environment (Dabelko & Conca, 2019; Meadows & Meadows, 1972), and they stated that if the current growth trends in world population, industrialization, pollution, food production, and resource reduction continue unaffected, the

resources of the earth will disappear, and the result will be a rather sudden and uncontrollable decline in both population and industrial capacity.

Meadows and Meadows (1972) explained a very critical point according to the model they had used in their report. They stated that the population increased from 1.6 billion in 1900 to 3.5 billion in 1970. Even though the birth rate decreased slowly, the death rate fell more quickly, especially after 1940, and the rate of population growth increased. Industrial output, food and services per capita increased exponentially. The resources declined dramatically thereafter, as population and industrial output continued to rise.

“Limits to Growth” draws the attention of the world to the huge disaster that could happen due to the negative usage of the resources; therefore, the term of sustainability alleviates the common impact of the environmental degradation done by the activities of people and the dangers to human systems presented by global environmental problems. The idea of sustainability gives us a very critical question ‘Can human activity successfully maintain itself and its goals without exhausting the resources on which it depends?’ (W. Jenkins, 2008).

In 1980, the World Conservation Strategy developed by the International Union for Conservation of Nature, in collaboration with the U.N. Environment Programme and World Wildlife Foundation, worked to make sustainability a standard of international action. Then, the term “sustainable development” was realized globally through the 1987 report of the World Commission on Environment and Development (WCED) called the “Brundtland Report”. This report emphasized two very important issues:

1. The world is suffering from poverty, and improvement is needed to satisfy the basic needs of people with using many different strategies.
2. Developed countries should find advanced strategies to stop the resources' exhaustion and environmental degradation.

Those two issues are related to each other; that means the change in one will directly affect the other (Gibson, 2002)

1- Definitions of Sustainability Development

The most famous definitions of sustainable development mentioned hereinbefore:

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987; p.43)

There has been an apparently limitless range of definitions shaped since Brundtland, and there will no doubt be many more in the future. Most researchers start to follow the same approach when

they are defining the term "sustainability". According to Shrivastava and Hart (1992), sustainability refers to a value and trust to keep the natural environment. Through this definition, the researchers put more concentration on the environmental terminology and gave both an enhancement and preservation of the natural environment, but, actually, they neglected future generations. Furthermore, according to (Dyllick & Hockerts, 2002, p.131), sustainability is the characteristics, the social development and the new light in nation's life, a more comfortable world where future generations find the best reservation for the natural environment and cultural accomplishments. This definition took a positive side and definitely cleared the role of communities to create a better future to the next generations. Similar to the definition of sustainable development in the Brundtland report, Hart and Milstein (2003) defined sustainability as the anticipation of the successful social and environmental performance of the present generation without including the ability of future generations to meet their social and environmental needs. Another definition of sustainability that many economists would accept is the "development does not decrease the capacity to provide non-declining per capita utility for infinity" (Neumayer, 2003; p.7). On the other hand, Heintz (2004) presented a new perspective of sustainability and mentioned that sustainability is a concept that describes a healthy, dynamic condition of the earth systems and the stability in production in contrast with human social and economic systems without preconception to the environmental elements . Shaker (2015), p.304, illustrated a very simple definition of sustainable development and stated that "it is a process of meeting human development goals while sustaining the ability of natural systems to continue to provide the natural resources and ecosystem services upon which the economy and society depend". In the years following the Brundtland Commission's report, it was very hard to reach a standard definition, while a lot of different groups and academics allow a range of assembly under the sustainable development umbrella, going in depth on the industrial level and know what sustainable development really means. One significant study—by the Board on Sustainable Development of the U.S. National Academy of Sciences—sought to bring some arranged points to both the comprehensive literature supporters and the analysts requiring to sustain and develop the relationship between (the same) (Robert, Parris, & Leiserowitz, 2005).

The three main categories (nature, life support systems, and community) have been mentioned under the title "what is to be sustained" and the subcategories for each. In the same way, "what should be developed" has three main distinct ideas, namely people, economy, and society (Robert et al., 2005). We could say that triple bottom line has collected all these elements in one basket.

2- Sustainable Business

By the end of 1990, businesses have begun to take into consideration the environmental issues in each department in the company's and firm's structure (Welford, 2016), despite the appearance of International Organization for Standardization (ISO) in 1994 that implements the organizations to set environmental management systems; this system includes rules for environmental policies, practices, objectives, and targets, but it was stated that (ISO) became a weak tool with the huge challenges and pressures that demand to protect not just the environment but also the social and economic aspects. Studer, Welford, and Hills (2006) illustrated that companies should use the environmental management systems with the additional main points of sustainability to figure out the new way to do the business. Evans and Sawyer (2010) clarified that firms still have the main goal to achieve the profit plan, but the change in economic, social and environmental perspective led them to make the profitability as a late prior target. White and Lee (2009) also confirmed that companies took into account the term of sustainability, and they became more interested in the environmental issues. Organizations increasingly tend to integrate sustainability into their business strategies to explore opportunities for creating competitive advantage and achieve sustainable business (Bielak, Bonini, & Oppenheim, 2007). A lot of researchers defined sustainable business from different perspectives. Dyllick and Hockerts (2002) called it 'cooperate sustainability', defining it as "meeting the needs of a firm's direct and indirect stakeholders without compromising its ability to meet the needs of future stakeholders as well. The researchers focused on satisfying the needs of the stockholders and neglected the future generations' interests" ; on the other hand, Labuschagne, Brent, and Van Erck (2005) concentrated on satisfying the current and the future needs. They defined business sustainability as "adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources needed in the future". E. Group (2008) stated that sustainable business is doing a business operation without having a negative impact on the environment. This definition prioritizes the environment and neglects both the social and the economical sides. In contrast, (Landrum & Edwards, 2009, p.4) defined a sustainable business as "one that operates in the interest of all current and future stakeholders in a manner that ensures the long-term health and survival of the business and its associated economic, social, and environmental systems". There are a lot of definitions for sustainable businesses, and most of them met the main points, such as (environmental protection, social responsibility, economical aspects, and the future generations). The question here is what are the steps that companies should take to achieve a sustainable business? The next section will answer this question.

The degree to which companies affect society, the global economy and the natural environment cannot be ignored. However, Kernel (2005) illustrated some steps that could help companies to

take initiatives to suitability. Therefore, starting from the first steps are reducing environmental damages and using the resources the best usage toward sustainability in businesses, which would reflect on the organizational performance. The second steps are mainly focused on setting a rule for managing the environmental practices and improving environmentally protection processes; the last steps integrate the company's business to include social and ethical features to be integrated in the community. Benn, Dunphy, and Griffiths (2006) explained some main steps related to the applicability of sustainability in business; however, Benn et al. (2006) stated that "the sustaining corporation" is the last step toward sustainability achievement; and this phase has not been reached by any company till this time. Moreover, many firms try as much as they can to concentrate their efforts to achieve the main dimensions of sustainability. Furthermore, companies within this context are required to carry out their activities in ways that are much more responsible for the environment and society (Evans & Sawyer, 2010). Vos (2007) and Biggemann, Williams, and Kro (2014) suggested that sustainability perspectives should include common elements related to the economic, social, and environmental aspects of the market place. Sustainability in business can be divided into two sections products and services. Based on this research, sustainable services will be discussed. So, the next section will discuss the term "sustainable service".

3.6 Sustainable Service

First, will identify the term service in general as it is a key of defining sustainable services. Since the nineteenth century, the world market has evolved and commodity markets has changed in the way of manufacturing, producing and consuming intangible products (service). Generally, the service sector – one of the main sectors in economy – starts to grow up and possess a huge market share in order to satisfy markets' needs; it plays an important role to build sustained competitive advantages. It also gets a huge attention because it increases effectiveness and contribution to Gross Domestic Product (GDP) by 75% in most countries, providing jobs, inputs and public services for the economy (Sengupta, 2008), The service sector has continued to grow and create new opportunities for developed and developing countries by creating new employment internationally over the past 20 years; it makes more than 80% of jobs in the U.S. and nearly 70% in Europe; moreover, it represents 76% of the activities in the USA while in Europe statistics indicate around 65% (Lee, Ribeiro, Olson, & Roig, 2007). In spite of the vital role of services in our world, it carries comprehensive and interdisciplinary complexities.

Service is defined as "a transformation of values and methods by the service provider into a product (i.e. service) requested by the customer" (A. W. Brown, Delbaere, Eeles, Johnston, & Weaver, 2005, p.727); service can be started by a customer whose needs are to be supplied from the service provider, or a service provider who offers a specific service to the customer, or a value that is created as a result of cooperation between them.

In other words, there are at least two interacting parties: the service provider who is responsible for presenting the service by applying competences, and the service receiver who is “the customer who integrates the firm’s competences with other resources in a given context”. The interaction between both entities is called a service system (Reis, Amorim, & Melão, 2015). Service system is defined as “a configuration of resources (people, technology, organizations and information) that co-creates value, including individuals, businesses, government agencies and nations (Reis et al., 2015).

Service philosophy is creating values to the customers through using resources in the best way; moreover, the continuing growth of the service sector as an essential part of our lives and the variation of its products forced us to adopt a new way of thinking and attitude toward services (Wolfson et al., 2010); however, the appearance of sustainability and its role in making a decision process led to introduce a new approach called “Sustainable Service” (Wolfson, Tavor, Mark, Schermann, & Krcmar, 2010).

Since the immersion of sustainable service, most companies started to take serious and critical actions towards applying this concept. Moreover, Wolfson, Tavor, and Mark (2012), Wolfson, Tavor, and Mark (2013a) have set rules for the implementation of sustainable service, and they stated that each service should be integrated with its economic, social and environmental aspects through taking into account the future consequences and the negative effects that may appear; in addition, this approach has a base tenet based on the reasonable use of natural resources and working with environmental awareness.

Sustainable service simplifies the service concept as “shared and dynamic problem-solving” that generates value in several scopes and dimensions taking into consideration the possibilities of long-term effects. Besides, the strong relationships among consumers, service providers and suppliers are considered one of the main life cycle-oriented perspectives that are needed in order to achieve sustainable services development, while concentrating on adding environmental and social aspects to economic aspects (Galbraith, 2002, p.194). The huge growth in service sector leads us to rethink about the challenges and barriers that could face that essential part of our lives. It gives us a new perspective of thinking, which leads us to figure out and understand the nature of the service as a part of the large system that corporates and collaborates with agriculture and manufacturing processes, with reducing the possible long-term effect. Moreover, services should be integrated and reflected on economic, social and environmental dimensions; these requirements forced us to adopt a new approach towards the service sustainability context (Wolfson, Tavor, & Mark, 2013b).

Wolfson et al. (2010) stated that the basics of sustainable service for making a service more sustainable and its main strategies are still under development. Therefore, they started to create a new approach to define the relationship between sustainability and services and to build the fundamentals of this model as explained in the “S3 Sustainability as Service Science” Model (Figure 3-1). The model includes two main phases, starting with a “Sustainable Decisions” made for the service. The decision will be taken based on service resources, including natural resources, technologies, information and knowledge. Choosing the most sustainable scenarios as step 2 among the alternatives based on the evaluation of integrated services, manufacturing and agricultural processes. However, the main challenge in applying that approach is moving toward “triple bottom line” with eco-efficient products and processes with taking into consideration the financial performance, the service’s ecological and social performance (Savitz, 2013).

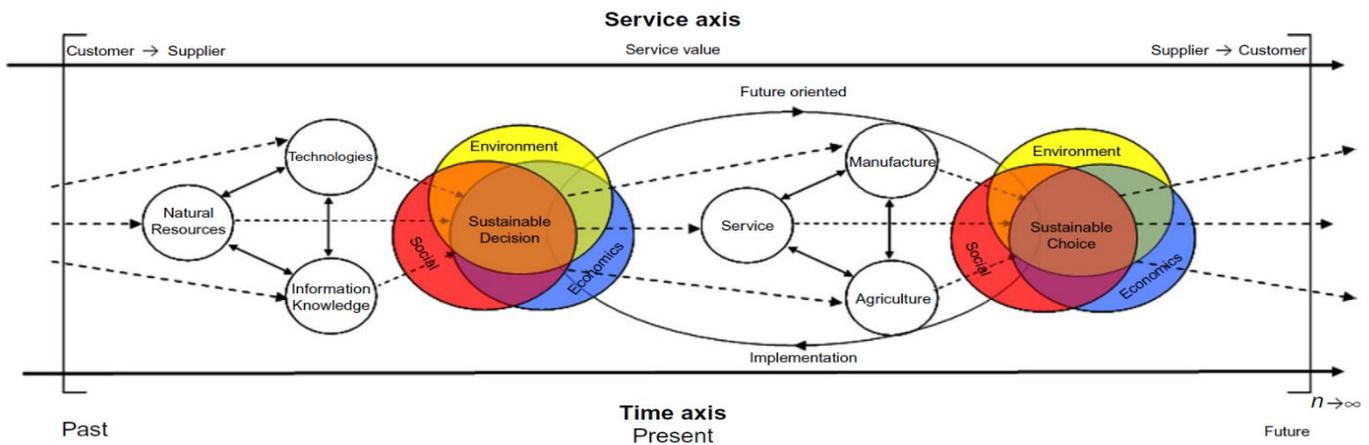


Figure 3- 1: S3-sustainability as service science model
 Source: Wolfson et al. (2010)

Sustainability as explained before is the ability to take actions and adapt with the present situations while taking into account the requirements and needs of the next generations, that actions are done between suppliers and customers and should also be done from the customer to the next generation, so sustainable service can be defined as the service that is satisfying customer needs and requirements without having a negative effect on the environment or the social side for a long

time, known as a super service. See Figure (3-2) (Wolfson, Tavor, Mark, Schermann, & Krcmar, 2011).

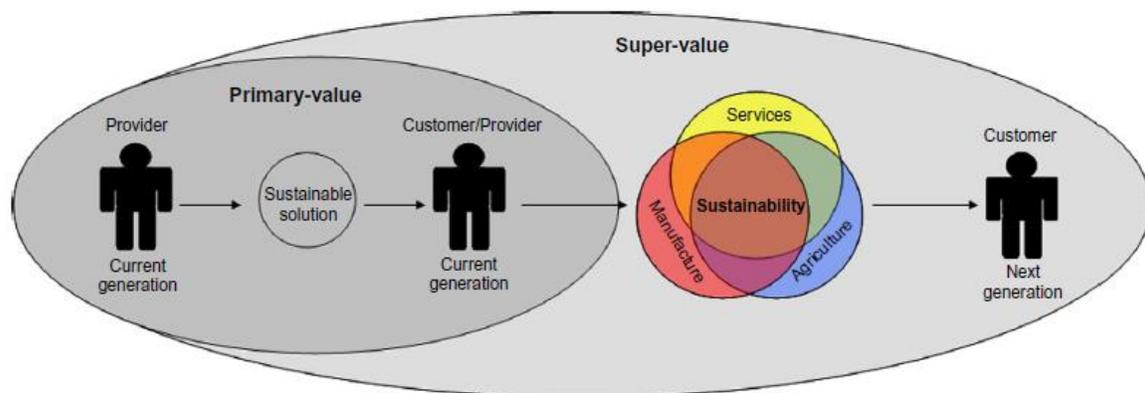


Figure 3- 2: Sustainable service
 Source: Wolfson *et al.* (2011)

As we explained above in sustainable service model, there are some factors that should be taken into account to be applied, such as current natural resources, knowledge and information and technologies. All of them should be considered while taking future sustainable decisions that will be included in any service, manufacturing or agricultural action (Wolfson *et al.*, 2013b).

3.8 Sustainable Service Quality

It is hard to know if your company meets customers' expectations or not and whether they are satisfied with your services and products or not. According to Garvin (1984), the definition of quality can take major approaches:

- ✓ Transcendent – Quality is synonymous with “innate excellence”.
- ✓ Product based - Quality is viewed as a precise and measurable variable.
- ✓ User based – Quality is associated with customers' personal view of quality and satisfaction.
- ✓ Manufacturing based – Quality is identified as “conformance to requirements”.
- ✓ Value based –in terms of costs and prices.

The term of quality could be viewed from many perspectives; marketers look from two sides: the products itself and the user of these products; in contrast, the engineers look from the manufacturing side. By using all perspectives here, the company sees quality as a product to design to the market. Overall, when the product is produced and distributed to the markets and create a satisfied customer and trusted intentions toward it, that means quality. Quality has three main types that are discussed in literature: product quality (Aspinwall, 2001), process quality (Antony, Agus, & Hajinoor, 2012) and services quality (Parasuraman *et. al.*, 1985,1988; Parasuraman, 1998, 2004, 2010; Gronroos, 1978, 1982, 1984, 1998, 2001), which is discussed in details in chapter two.

Service quality has been discussed several times in the literature. Seth, Deshmukh, and Vrat (2005) reviewed 19 service quality models that have been published in literature for 20 years and also identified linkages between them. Sustainability concept started to flourish when companies' performance decreased as a result of poor service quality. Therefore, logistics service providers needed to develop service quality in terms of sustainability. Seth et al. (2005) proposed a sustainable e-service quality model in the banking industry. They stated that sustainable e-service quality is the ability to present a better service with sustainable high quality for reaching customer satisfaction and loyalty. Moreover, they discussed the sustainability concept from e-service perspective, whereas Salleh (2016) stated that there are many factors that could have an effect on service quality, one of which is sustainability. He presented a model named SUSSERV that has been developed based on literature reviews and related studies to measure perceived sustainable service quality of water and sewage services. In addition, Gupta, Singh, and Suri (2018) used assets, processes and performance capabilities of logistics service providers as indicators to understand and evaluate the effective sustainable service quality management. They attempted to find the vital components required by logistic service providers to present a better sustainable service quality.

The service quality should be unique in design, development, management, and implementation when it comes to be sustained; furthermore, it should be cooperated with environmental, social, and economic elements; our focus in this research will be on logistics service providers (LSP), which is the main gear in supply chain. Focusing on sustainable service supply chain management (SSSCM) has grabbed the attention to optimize the whole service supply chain's economy, environment, and social performance. The next part will explain sustainable supply chain and sustainable logistics in LSP.

3.9 Sustainable Supply Chain Management

The integration of environmental interest and organizational performance has begun to attract the attention over the recent decades. Climate change, the overconsumption of natural resources and environmental deterioration were the main drivers behind the international efforts to maintain sustainable supply chains; in addition, efficiency and effectiveness are considered the main two issues for the entities in supply chain. Consequently, world organizations called for protecting the environment all over the world. Environmental problems related to waste and emissions come from supply chain activities; moreover, reduction and deterioration of the natural resources and the environmental high pressure have enforced organizations to recognise, realise and manage their supply chain to make it environmentally friendly (Barve & Muduli, 2011). The organizations took

serious steps towards greening their supply chains, which led to green supply chain management (GSCM) concept.

GSCM is a developed level of supply chain management; in the 1990s, the competition increased with increasing the awareness of green practices, which led the companies to operate their supply chains in an ethically and a socially responsible way (Diabat & Govindan, 2011). In 2010, a huge attention has been given to GSCM, practically and academically (Luthra, Garg, & Haleem, 2014). According to the changes in environmental requirements and how they could affect their supply chain operations, companies developed environmental management strategies and long term plans to deal with this development (Beamon, 1999). (Hu & Hsu, 2010, p.587) defined GSCM as the management of raw materials, parts /components and processes from suppliers to companies and then to distributors to end users and in reverse processes too, with improvements to environmental impacts through life cycle stages.

Green supply chain management (GSCM) is considered to be an environmental innovation that uses the integrated environmental thinking into supply chain management. “GSCM aims to eliminate wastes including hazardous chemicals, emissions and energy and solid wastes along the supply chain, such as product design, material resourcing and selection, manufacturing process, delivery of final product and end-of-life management of the product”(Chin, Tat, & Sulaiman, 2015; p.1).

With the new era of GSCM, companies have to address their responsibilities for new issues like human rights, safety of the workers and the society as a whole for enhancing the quality of life; therefore, they started to take serious steps toward applying a new concept to serve not only the environmental part but the social and economic parts. The idea of integrating these three factors is to develop a concept of Sustainable Supply Chain Management (SSCM).

The term sustainability- which refers to the integration between social, environmental, and economic responsibilities- has started to appear in the literature of business approach, such as management and operations, in (1997). (New), in his book, linking between sustainability and supply chain claimed that ethical, political and economic implications should be considered by the supply chain management in an industrial society; furthermore, Gladwin, Kennelly, and Krause (1995) and Starik and Rands (1995) have stated that the measurement of supply chain performance should include the impact of entities activities on ecological and social systems.

Linton, Klassen, and Jayaraman (2007) studied in depth the relationship between sustainability and supply chain management; they mentioned the main requirements to be sustained in each department in a supply chain; moreover, they declared the roots of sustainability in both physical and social sciences and also recognized the influence and link between the activities within the

natural environment and their comprehensive impact on current and future quality of life “based on advances in a variety of different areas of the natural sciences”; in addition, they stated that social sciences are very important to set main rules and to give a clear explanation towards sustainability (Figure 3-3).

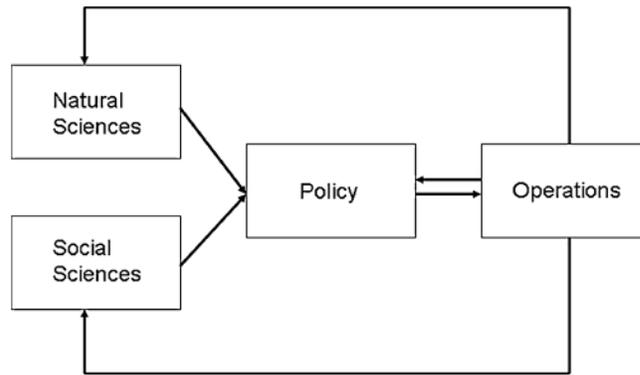


Figure 3- 3: Relationship between different disciplines in consideration of sustainable supply chains
 Source: (Linton et al., 2007)

Most researchers and academics have done similar studies that link between sustainability and supply chain management from management and economic perspective (Carter & Rogers, 2008). Lately, the research on supply chain has shifted to sustainable supply chain management based on triple bottom line (TBL). Seuring and Müller (2008) noticed that there is a variety of understanding sustainability in supply chain management, and they also mentioned “the triple bottom line approach wherever best performance to be achieved in the environmental, economic and social factors. Carter and Rogers (2008) highlighted specific points not clearly explained in sustainability literature and definitions, which are risk management, transparency, strategy and culture; each of these areas needs to be explained in relation to sustainability.

A number of definitions of sustainable supply chain management (SSCM) have been widely discussed in the literature. Starting with (Carter & Rogers, 2008; p.368), they defined (SSCM) based on sustainability literature review and supply chain definitions and defined SSCM as “the strategic, transparent integration and achievement of an organization’s social, environmental, and economic goals in the systemic coordination of keys between business organization processes for improving the long-term economic performance of the individual company and its supply chains”. They mentioned that the definition of SSCM is originally based on the triple bottom line and the four supporting facets of sustainability is conceptualized and shown in Figure 3-4.

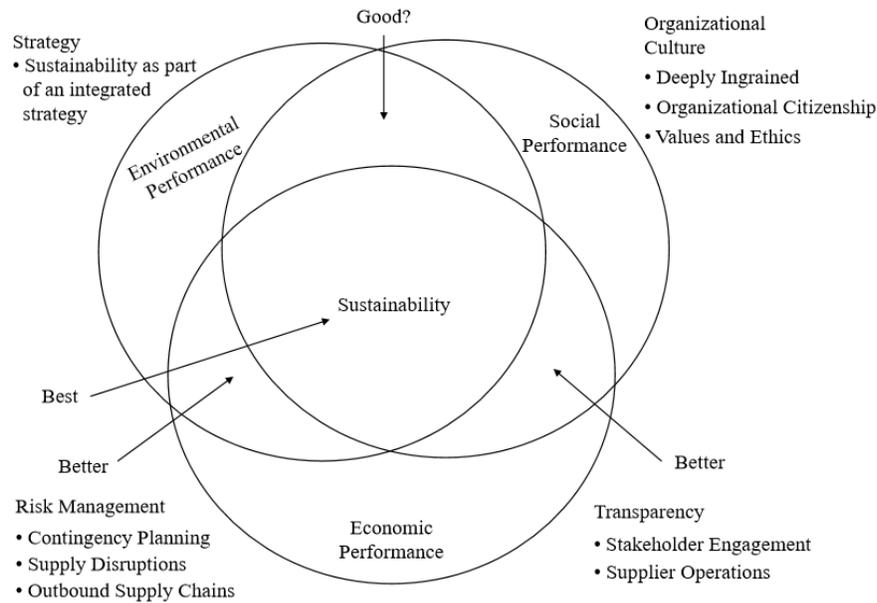


Figure 3- 4: Sustainable supply chain management
 Source: Craig et al., (2008)

A similar definition is proposed by (Seuring & Müller, 2008, p.1700), where SSCM is defined as “the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account, which are derived from customer and stakeholder requirements. In sustainable supply chains, environmental and social criteria need to be fulfilled by the members to remain within the supply chain, while it is expected that competitiveness would be maintained through meeting customer needs and related economic criteria”. (Pagell & Wu, 2009; p.58) stated that “ To be truly sustainable, a supply chain would at worst do no net harm to natural or social systems while still produce a profit over an extended period of time; a truly sustainable supply chain could, customers willing, continue to do business forever”, and they also gave a perfect definition for triple bottom line as a tool to measure sustainable supply chain management; they defined it as “a measure of supply chain performance that addresses not just profits but also supply chain impacts on social and environmental systems; a measure of the chain’s impact on people, profits and the planet”.

Ramudhin, Chaabane, and Paquet (2010) worked on this definition and suggested a framework that integrates all three dimensions of sustainability: economic, social and environmental. As seen in Figure 3-5, they started with the environmental dimension that urged business companies not to exceed greenhouse gases (GHGs) emission standards; on the other hand, economics dimension is concentrated on minimizing the total logistics cost in the whole supply chain activities; finally, the social dimension is included as to decrease noise, traffic jam, and stress and improve customer and consumer life quality around the supply chain.

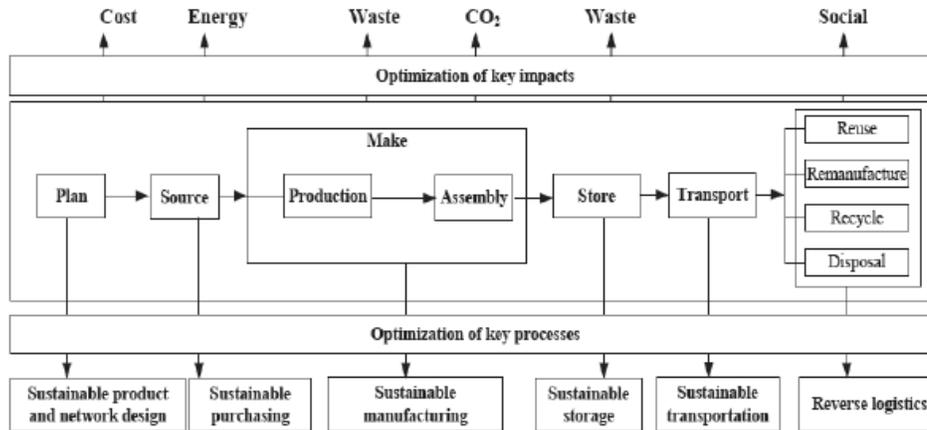


Figure 3- 5: Sustainable Supply Chain Management framework
Source: (Ramudhin, et al, 2010)

(Hassini, Surti, & Searcy, 2012; p.70) explored a new definition that concentrated on social and environmental dimensions; they stated that SSCM is “the management of supply chain operations, resources, information and funds in order to maximize the supply chain profitability while at the same time minimize the environmental impacts and maximize the social well-being”. However, (Ahi & Searcy, 2013; p.39) mentioned an inclusive definition for SSCM,; they defined it as “The creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, competitiveness, and resilience of the organization over the short- and long-term”. Those definitions extremely clarified the idea of sustainable supply chain management, but this research will be more specified in the area of supply chain services and logistics service quality.

A number of studies have been done in the area of TBL and supply chain management; however, Lu, Geng, Liu, Cote, and Yu (2017) have displayed a valuable table that includes the most recent

studies in this area, Table 3-1 clarify most of these studies concentrated on manufacturing industries that are marked M in the table more than services industries that marked S.

Triple bottom line and sustainable supply chain management are related to the manufacturing and service supply chains; TBL has been frequently used in the manufacturing supply chain, which gives a helpful guidance for building a sustainable service supply chain management framework; therefore, the next section will explain the Sustainable Service Supply Chain Management (SSSCM) concept and derive the main dimensions of sustainable logistics service quality as the main framework of this study.

Table 3- 1: Sustainable supply chain management based on TB.

Authors	Year	Type	Journal Title	Research Field	Main Conclusion
Hussain, Khan, and Al-Aomar	2015	Quantitative	Renewable and Sustainable Energy Reviews	S	Use sustainable view to build and design their network for managers, from providers to customers.
Cassini, Surti, and Searcy	2012	Qualitative	International Journal of Production Economics	M/S	Presentations of a sustainable supply chain unique concept.
Wu and Pagell	2011	Qualitative	Journal of Operations Management	M	In the uncertain case, how organization make supply chain decisions when balancing short-term gains and long-term environmental sustainability. The article found that business managers when making environmental factors decisions will consider the short-term benefits.
Winkler	2011	Quantitative and Qualitative	CIRP Journal of Manufacturing Science and Technology	M	Proposed the concept of a sustainable supply chain network closed-loop manufacturing system, as well as four steps for success.
Chaabane, Ramudhin, and Paquet	2010	Quantitative and Qualitative	International Journal of Production Economics	M	This paper uses a framework based on mixed integer linear programming to consider the sustainable supply chain life cycle assessment. An effective carbon management strategy can help decision makers achieve a cost-effective sustainability goal.
Gupta, and Omkar	2011	Qualitative	IIMB Management Review	M	A general framework is proposed, showing that the existing studies focuses on four broad aspects: 1 Strategic considerations 2 Functional level decisions 3 Laws and regulations 4 Integral models and decision support tools.
Securing and Muller	2008	Qualitative	Journal of clean production	M/S	This paper discusses the barriers to supply chain sustainability from the perspective of sustainable external factors in the service supply chain, and provides a conceptual framework to illustrate how to manage the supplier's risk and performance.
Peano, Tecco and Dansero	2015	Quantitative and Qualitative	Sustainability	S	A conceptual framework for sustainable assessment of small fresh agricultural supply chains has been proposed and validated with ten small fresh agricultural products systems. It was confirmed that the conceptual framework could be used for sustainable prediction of fresh agricultural product supply chain.
Brandenburg and Rebs	2015	Quantitative and Qualitative	Annals of Operations Research	M/S	There are vacancies in SCM models regarding pressure and motivation, as well as risk and supplier management.
Tseng and Divinagracia	2015	Quantitative and Qualitative	Industrial Management and Data Systems	M	The first consideration in the sustainable environment should be the stakeholder indicators, followed by green design, cooperative sustainability, environmental management strategy design, cost-saving supplier motivation and market share.
Ageron, Spalanzani, and Gunasekaran	2011	Qualitative	International Journal of Production Economics	M/S	A conceptual framework for a sustainable supply chain is constructed and verified with examples (in the French region).
Beske, Land, and Seuring	2013	Qualitative	International Journal of Production Economics	M/S	Applications of SSCM help companies continue to control their entire supply chain, and provide competitive advantage.
Aminia, Carol and Bienstockb	2014	Qualitative and Quantitative	Journal of Operations Management	M	Based on literature review, this paper has drawn a conclusion on the sustainable behavior and framework of the tangible business, discovered the potential synergies between sustainability and innovation.
Chardine-Baumann and Botta-Genoulaz	2014	Quantitative	Computers and Industrial Engineering	M	This paper has considered all three aspects of sustainability (total cost, GHG emissions and lead time), and proposed an optimal framework for multi-objective scenarios to optimize the sustainable supply chain.
Brandenburg and Rebs	2015	Qualitative	Annals of Operations Research	M/S	This paper summed up quantitative research on sustainable supply chains and found vacancies for future research.

Source: Lu et al. (2017)

3.10 Sustainable Service Supply Chain Management (SSSCM)

The focus on services in operations management aspects started in the 1990s when some journals dealt with the topic in serious research studies (A. V. Roth & Menor, 2003); moreover, the focus on service supply chain has optimized the entire service in supply chain activities and enhanced the business performance. (Ellram, Tate, & Billington, 2004; p.18) have defined service supply chain as “a new supply chain, including information management, process management, competency management, service performance and treasury management, that occurs in professional services, from the upper stream supplier to the downstream customer”; that definition explained the main characteristics of supply chain services from suppliers’ suppliers to customer’s customer. (Baltacioglu, Ada, Kaplan, Yurt And, & Cem Kaplan, 2007; p.117) (Baltacioglu et al., 2007) presented a definition of service supply chain and stated that it is a network of suppliers, service providers, consumers, and other supporting units that perform the functions of transactions of resources required to produce services; transformation of these resources into supporting and core services; and the delivery of these services to customers”; this definition has neglected the characteristics side and concentrated more on the processes of services supply chain.

Wang, Wallace, Shen, and Choi (2015) have extended the perspective of service supply chain and stated that service could include products too and presented two new definitions: Service Only Supply Chains (SOSCs) and the Product Service Supply Chains (PSSCs). They defined that in (PSSCs) service and physical products are together whereas SOSCs are only service, and physical products have no role. Both definitions are aiming to create a perfect atmosphere to consumers by giving service providers multiple options; however, service supply chain creation leads to deliver a strategic and competitive advantage to service providers. The vision is still not clear to many practitioners for applicability.

Ellram, Tate, and Billington (2007) identified seven theoretical processes of service supply chains, which include information flow, capacity and skills management, demand management, customer relationship management, supplier relationship management, service delivery management and cash flow; those processes are considered the backbone of services supply chain operation; moreover, business companies are struggling to apply those dimensions to achieve customer satisfaction, improve the performance and optimize profits.

Some problems have arisen such as labour intensity, intangibility and inseparability; a lot of pressure on services providers from many different sides (governments, environment, social) made the academics and scholars think of the integration between services and sustainability dimensions, TPL within the frame of supply chain management (SSSCM) to beat that shown gap in services.

Adopting sustainability in a service supply chain will provide business companies with competitive advantages. (Halldórsson, Kovács, Wolf, & Seuring, 2010; p.85)“Environmental aspects have entered the class of order qualifiers in services”. According to Ouyang et al. (2016), the intangibility of services makes the integration between sustainability and service supply chain difficult; however, TBL gives a strong direction for service supply chain to control it.

A number of studies have been done in the field of SSSCM, see Table 4-1. However, Hussain, Khan, and Al-Aomar (2016) have presented a new framework of sustainable service supply chain that has been developed to consist of four dimensions, see Figure 3-6. Sustainable development often cares about dimensions – environmental, social and economic issues. There is related literature that proved these dimensions of supply chain sustainability (Crum, Poist, Carter, & Easton, 2011; Gold, Seuring, & Beske, 2010; Mollenkopf, Stolze, Tate, & Ueltschy, 2010; Sarkis, Zhu, & Lai, 2011; Srivastava, 2007).



Figure 3- 6: Framework of sustainable service supply chain management
 Source: Hussain et al., (2016)

Environment Management, Social Responsibility, Health, Safety and Risk Management, and Customer Management were suggested by Hussain et al. (2016) to apply them on their study as a framework of SSSCM. Reviewing the SSCM and SSSCM is the first part of our research to find the research gap as the research aim is to propose a SLSQ variable to enhance customer satisfaction and relationship quality in the field of LSP. Therefore, the next part will give in details the practices of sustainability in the LSP to give a complete picture of the topic of the literature review and state the gap of the study.

3.11 Logistics Service Providers

✓ Identifying Logistics Service Providers

During the past several years, many studies have appeared in sustainable supply chain management that have concentrated on manufacturers, retailers, and suppliers to achieve sustainability goals (Cooke, 2008). Nevertheless, very little attention has been given to the activity of logistics services providers – some researchers call it third party logistics- in sustainability content (J. V. Murphy, 2008). The challenges that supply chain faces - like coordination of supplies in input and output, storage of goods, inventory management, distribution of finished and semi-finished products by different types of transportations globally, and from another side, new customer demands for lead time reductions, increasing market coverage and customer orientation as well as the high competition level among companies in different industries- have forced the organizations and stockholders to find the best way to run their businesses, especially when internal problems exist such as delays, errors, miscommunications and human faults (Plunkett, 2009).

Companies that are specialized in transportation and storage have appeared to reduce the huge pressures on businesses companies; these companies started to integrate with new entities to do their activities in order to optimize the process of logistics and transportation costs and to focus on the main activities, so many organizations outsourced part of their logistics activities to companies of logistics services providers (LSP).

The evolution of appearance of LSP has shifted executing operations activities toward a more complex supply chain (Esposito & Passaro, 1997); that evolution drew the attention to do more efforts to improve customer supplier relationships and increase the variety of services offered, especially that related to value-added and the high technological services that are measured as points of uniqueness (Evangelista, McKinnon, & Sweeney, 2013). (Hertz & Alfredsson, 2003; p.140) have clearly defined LSP as “an external provider who manages, controls and delivers logistics activities on behalf of a shipper”, According to Wilson (2005), an LSP is “A firm which provides multiple logistics services for use by customers. Preferably, these services are integrated, or "bundled" together by the provider. These firms facilitate the movement of parts and materials from suppliers to manufacturers, and finished products from manufacturers to distributors and retailers. Among the services which they provide are transportation, warehousing, cross-docking, inventory management, packaging, and freight forwarding”. (Rosa, Jedliński, & Chrachol-Barczyk, 2017; p.16) stated that LSP is to satisfy business customers and people of logistics service needs through logistics activities. As explained in the definitions, the core work of LSP is to do sub-activities to other business companies and to add value to overall supply chain; Figure 3-7

shows the role played by LSP in Supply chain, so the next part will explain the main services that LSP present in supply chain.

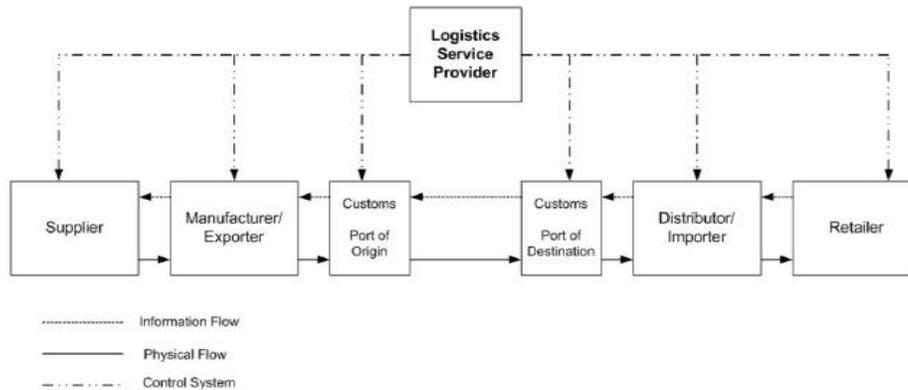


Figure 3- 7: Role of LSP in Supply chain
Source: Grant and Banomyong (2010)

✓ **Logistics Service Providers Categories**

Papadopoulou and Macbeth (1998) tried to plan the progress based on the services offered by Logistics Service Providers (LSPs) over the past 40-50 years. Since there is no clear cut classification stating the evolution of LSP, Papadopoulou and Macbeth (1998) illustrated 5 main categorizes for logistics service providers:

- Single services: providing only haulage or transportation or warehousing services.
- Separated services: providing either hauling or warehousing services.
- Integrated services: providing a combined haulage or warehousing services.
- Combined services: providing extra services on top of the equipment warehousing, transportation functions such as trade administration and planning services.
- Complex combined services: providing a network of different services, such as planning, equipment handling, yard management, warehousing administration and information and transportation functions.

✓ **Logistics Service Providers Classifications**

The classification of logistics service providers has taken different shapes. Existing literature shows that there are many classifications of LSPs (Saglietto, 2013; p.106). Lai (2004) presented a classification of LSPs based on their operating service capability. As Placzek (2012) stated, LSPs could be unique based on the way that they solve problems, present better customer services and

the degree of collaboration among supply chain entities. The classification of LSPs is presented as follows:

- 1- 1PL: a company that sends goods or products from one location to another. It might be run a distribution centre. Picking operations could be done through it (Hübner, Kuhn, & Sternbeck, 2013).
- 2- 2PL: an asset-based carrier (owns assets such as vehicles or planes to transport products) that is related to physical distribution of goods (Ciemcioch, 2018). Carriers, freight forwarders and warehousing services providers are the most representative members of this type (Kersten, 2008).
- 3- 3PL: “A firm that provides multiple logistics services for use by customers. Preferably, these services are integrated, or "bundled" together, by the provider” (CSCMP, 2014). This type of logistics provider has more complicated and customized operations and services. It has the ability to adapt with all customer’s needs and requirements (Lukassen & Wallenburg, 2010). There are four types of 3PL that have been indicated, i.e.: standard providers, service developers, customer adapters and customer developers (Hertz & Alfredsson, 2003). A 3PL may or may not own its assets, such as trucks and warehouses. Most 3PLs present a package of integrated supply chain services as follows: Transportation, Warehousing, Cross-docking, Inventory management, Packaging, Freight forwarding (Ciemcioch, 2018).
- 4- 4PL: this type of providers is called supply chain solution provider (Bijman, Omta, Trienekens, Wijnands, & Wubben, 2006). The main role of 4PL is to offer more strategic vision and management over the company's supply chain. It organizes the movement of goods, manages 3PL services and provides logistics management visions and consultants.
- 5- 5PL: this is the party that is responsible for the innovation of logistics solutions in a supply chain. “5PL is an information provider serving customers in virtual” (Kempny, 2012; p.123). Ciemcioch (2018) stated that 5pl presents an intelligent solution and adds value to supply chains from the beginning to the end like block chain, robotics, automation, Bluetooth beacons, the realization of full-scale operation of e-procurement and Radio Frequency Identification (RFID) devices. Moreover, it could be the part that deals and negotiates with other parties in a supply chain in order to get the best rate or best solutions for the company.
- 6- 7PL: the last type of LSP; it is the type of integration between 3PL domain with the concept of 4PL. It could be an integration between the physical services experts (3PL) and consultancy and IT (4PL)

Gruchmann, Melkonyan, and Krumme (2018) discussed the transformation of LSPs from normal businesses to integrated sustainable practices. They proposed the potential development that could be done in the LSP field through reviewing all types of LSPs. Moreover, they have mentioned the variations that occurred in business challenges in the past from “subcontracting (1PL) and globalization (2PL) towards e-commerce and omni-channel growth (3PL to 5PL). Solutions for these challenges have also been strongly driven by transformations in the past, starting from the planning of locations and vehicle routing (1PL) towards advanced Information and Communication Technology (ICT) (2PL), cross-docking (3PL), and advanced pooling (4PL to 5PL).” They integrated all these types, added new concepts in the field of LSP and defined Lead Sustainability Service Providers (6PL). They proposed that LSPs would rather directly involve consumers into their business strategies by creating a 6PL business model, which helps in overcoming actual obstacles such as the readiness to pay for logistics services or enhancing social and societal performance. In this respect, sharing current infrastructure and constructing different transportation systems are potential practices in order to achieve supply chain and reverse logistics integration. Nevertheless, LSPs face a main challenge to enforce these sustainable practices due to reliance on other supply chain members and relentless competition. Consequently, LSPs would benefit from possible approaches that focus on anti-competitive and performance enhancement purposes. In this regard, recent digital technologies and consumer empowerment are considered important factors to aim for repetition and mimicry strategies.

In today’s competition, businesses companies are looking for the best methods to increase customer satisfaction and achieve targeted profits; hence, LSPs have become vital to outsource such types of activities that provide an extensive range of advantages (Matt, 2015), which are as follows:

- The use of resources in an efficient way: LSPs can support companies to save time and cost and make the business efficient in all manners. LSPs reduce the cost of investment in warehouse space, transportation and skilled manpower to execute the logistics process.
- Expertise: the latest developments in logistics, technology and other related factors are known for LSPs. They have the knowledge of the best applications in business, whether in services or industries which is valuable for the customers.
- Flexibility and scalability: with the use of LSPs, companies become more flexible as they present a lot of solutions related to transportations and other industries.
- Continuous improvement: Logistics service providers are highly flexible with fluctuations. LSPs have skills to make changes in each condition in supply chains so that customer requirements can be satisfied as soon as possible in an efficient and an effective way.

- Use of latest technology: for the processes that are complicated in supply chain networks, LSPs offer the latest software and technology. Therefore, users do not have to invest in the latest developments.
- Improving growth rate: LSPs give you a chance to grow your market worldwide. Therefore, business can be extended with a minimal cost, which directly affects the growth rate of business.
- Safety and Risk: A knowledgeable LSP ensures security by avoiding making huge mistakes in decision making and guarantees a higher return on investments.
- Customer satisfaction: advanced technology, skilled employers and several assets in LSPs guarantee that all customers' requirements will be fulfilled.

C. a. J. Langley (2017) showed a huge reduction to overall logistics cost from 75% of those who use logistics services and 93% of LSPs. In addition, improving customer service levels came through using LSPs as 86% and 98% of LSPs stated. Moreover, using LSPs offers a new and innovative ways to improve logistics effectiveness from 73% of customer perspective. (C. a. J. Langley, 2017; p.4) “The LSP sector continues to increase globally, in terms of both revenue and coverage, and LSPs are refining and expanding their core competencies to improve and grow their offerings. New demands from consumers and shippers will drive the industry to continue to evolve”.

✓ **Type of Services Provided by Logistics Services Providers**

There have been several definitions regarding the LSP activities and the other supply chain parties (Gammelgaard, van Hoek, & Stefansson, 2006). However, Sink and Langley Jr (1997) stated that there is no specific definition for LSP that could cover all kinds of industrial activities; moreover, most of them agreed that LSPs are doing at least two activities. Berglund, Laarhoven, Sharman, and Wandel (1999) mentioned that LSPs are facing a huge challenge is that they are required to present services to their customer that add value to customers' firms more than the value that the business customer could gain.

There are many types of classified activities that LSP could provide, starting with Engelsleben (1999) that have invented a conceptual approach that splits the LSP activities in two main categories. The first one is related to all the services that are related to the physical flow of goods that LSPs present to their customers, , and the second one includes services that are not directly related to the physical flow of goods; moreover, these two categories are divided in subcategories that are presented in table 3.2. The table includes the basic LSPs' activities in each category.

Table 3- 2: Classification of LSP activities

Activities related directly to the physical goods flow		Activities not directly related to the physical goods flow	
Logistical core processes	Associated "value added" services	Management support and tools	Financial services
<ul style="list-style-type: none"> • Transportation • shipping, • forwarding, • brokering, • (de)consolidation, • contract delivery • Warehousing: • storage, handling, • commissioning, • packaging, plating • tracking and tracing, • routing, • scheduling 	<ul style="list-style-type: none"> • Assembly • quality control • merchandising • receiving/ order entry • fulfilment, • return goods handling, • kitting, • marking/labelling, • project-related 	<ul style="list-style-type: none"> • Logistics project • controlling, • anticipative logistics • consulting, • location analysis, layout design • (MRP) Material Requirement Planning development • (DRP) Distribution Requirements Planning development • (LIS) Logistics Information System development • Electronic Data Interchange (EDI)/ Value Added Networks (VANS) 	<ul style="list-style-type: none"> • Factoring, • invoicing/freight bill • payment audit • insurance services

Source: (Sink, Langley & Gibson, 1996, p. 41)

C. a. J. Langley (2017) clarified that companies continue to outsource a wide variety of logistics activities, and he mentioned the most and the least frequent outsourced activities. The most frequently outsourced activities are domestic transportation (86%), warehousing (66%), international transportation (60%), freight forwarding (44%) and customs brokerage (42%); however, the less frequently outsourced activities continue to be those that are more strategic, customer facing and IT intensive. Examples include supply chain consultancy services (19%), IT services (17%), fleet management (15%), service parts logistics (12%), lead logistics provider/4PL services (10%) and customer service (9%). Table 3-3 illustrates the specific logistics service provided by LSPs and the most used activities.

Table 3- 3: Logistics services provided by LSP and the most used activities.

Outsourced Logistics Services	Percentages of 3PL Users	Outsourced Logistics Services	Percentages of 3PL Users
Domestic transportation	86%	Order management and fulfillment	24%
Warehousing	66%	Reverse logistics (defective, repair, return)	23%
International transportation	60%	Product labeling, packaging, assembly, kitting	22%
Freight forwarding	44%	Supply chain consultancy services provided by 3PLs	19%
Customs brokerage	42%	Information technology (IT) services	17%
Transportation management and planning	36%	Fleet management	15%
Cross-docking	34%	Service parts logistics	12%
Freight bill auditing and payment	32%	Lead logistics provider/4PL services	10%
Inventory management	24%	Customer service	9%

Source: C. a. J. Langley (2017)

3.12 Sustainable Logistics and Logistics Service Providers

The service sectors are usually expected to have a little effect on the environment. The companies set a serious strategy to reduce the huge impact on the environments, which may use resources and generate more pollutants, while the service companies are not like the manufacturing ones. However, the logistics operations always lead to negative effects on the environment like “air pollutants, hazardous waste disposal, solid waste disposal, fuel consumption, and other effects”(Halldórsson et al., 2010; K. J. Lieb & Lieb, 2010). Although LSPs offer a wide range of services, transportation has by far the largest environmental impact compared to all other logistics activities and therefore it is the largest source of hazards on logistics network (Abukhader & Jönson, 2004; Aronsson & Brodin, 2006; K. J. Lieb & Lieb, 2010; Wu & Dunn, 1995).

The evaluation of the LSP is an important step for a manufacturer who is looking for a suitable LSP as a business partner; moreover, transportation and logistics services are increasingly outsourced to large international LSPs; accordingly, demand for advanced logistics services grows LSPs are being requested to offer more sustainable services; however, it seems that many companies do not recognise how to integrate transportation and logistics services into sustainability context, but the international requirements cannot be ignored.

For a long time, there has been a belief that the service sector has a minor influence on sustainability (Rossi, Wright, & Anderson, 2013), but the large number of services and the huge number of activities made supply chain more complex and in need of other parties to handle these services; moreover, companies start to believe in outsourcing their activities due to the impact of logistics service providers on environmental, economic and social practices (Rossi et al., 2013). Golinelli, Pastore, Gatti, Massaroni, and Vagnani (2011) have divided the negative externalities attributable to logistics services to economic, environmental and social “human”. With the growing of the service sector and the increasingly ongoing practices of outsourcing of logistics services, LSPs are requested to be responsible to take initiatives to apply sustainable practices as well in their businesses. Facanha and Horvath (2005) stated that outsourcing has a great probability to apply sustainability factors in supply chain while LSPs concentrate on the best usage of resources and achieving operation's efficiency.

Sustainability is considered the main factor of power to build a long term relationship; this kind of relationship would achieve all entities' targets and lead to a long term profitability. Barile, Saviano, Iandolo, and Calabrese (2014) mentioned that the company that survives in market competition depends on relationships and interactions that it can manage. Moreover, Cozzolino, Wankowicz, Massaroni, and Kleinaltenkamp (2015) stated that sustainability should be added to the company's corporate strategy to meet the expectations of the stakeholders and take into consideration the long term impact on the community, economic and environmental factors.

Many companies have ignored the importance of investments in sustainability practices during the economic crisis between “2008-2009”. However, a survey that has been done in these years indicated that companies are doing a double effort towards sustainability to achieve the cost effectiveness and maintain new customers; moreover, LSP organizations have a huge effect on supply chain operations; K. J. Lieb and Lieb (2010) have found many reasons to adapt LSPs Initiative within the companies; the companies' desire to be on the right track and how they could do so in a best way; furthermore, seeking to meet the customer's requirements and customer pressure to apply sustainability which leads to increase and improve the company's reputation and also attract new customers that are interested in sustainable perspectives and finally to survive within the huge fierce competition.

3.12.1 Sustainability Challenges for LSP

LSP have faced a lot of challenges to adapt sustainability concept, especially for those who have a short-term contract, because these kinds of investments need to build a long term relationship between parties (Quintens, 2017). According to the survey that has been done by K. J. Lieb and Lieb (2010), it illustrated five main weighted challenges that companies should go through in order to achieve sustainability practices. The findings of this study are as follows: the most important challenge is balancing sustainability efforts with customer expectations for low-priced LSP services, and then comes identifying appropriate environmental benchmarks/targets; the third one is establishing sustainability priorities within the company, and the fourth challenge is generating accurate company information related to current sustainability practices, and finally developing an organizational sensitivity to sustainability issues. Some researchers go through sustainability initiatives that LSPs should adapt to be sustainable (Martinsen & Björklund, 2012). These initiatives will be explained in the next section.

4.9.1.1 Sustainable Transport Initiatives

In recent years, LSP industries have achieved an important development in transportation and other related services. Apart from their benefits, they have also created some negative influences like traffic, noise, accidents, environmental degradation (damage to eco system, air pollution, climate change). Deakin (2001) defined sustainable transportation as achieving the mobility needs while being proactive and supporting the human and eco-system health, making an economic development and achieving social justice for now and for the future generations. The role of transportation in affecting the environment is clear; it has a huge effect on the environment by releasing hazardous and harmful substances like carbon dioxide and other greenhouse gas emissions (Halldórsson et al., 2010). Contrary to this case, a few laws and regulations have been released.

Conversely, the fuel price is increasing, which leads to an increase in transportation cost, so cost cutting initiatives are required. Consequently, sustainability approaches have been adopted in the field of transportation. Sustainable transport initiatives have been explored by (Martinsen & Björklund, 2012; p.566). They stated twelve factors that have been discussed in many different positions, whether discussions from the empirical study or the literature review Table 3-4 gives a brief overview of these initiatives.

Table 3- 4: Sustainable Transport Initiatives

Sustainability initiative	Examples
Alternative fuels	Use of bio fuels, use of renewable energy sources, limitation on fossil fuels or their usage base on environmental class specific fuel consumption.
Vehicle technologies	Replacing old fleets, modern and efficient vehicles, regular maintenance
Modal choice	Selection of transport mode that gives sustainable benefits (air, sea, rail transport or intermodal transport), load optimization
Driving behaviour	Driver training for consistent performance
Logistics system design	Use of direct transport, improvements in distribution network, decreasing average length of haul, route planning - Transport management system (TMS)
Transport management	Well planned routes; high fill-rates.
Choice of partners	Asking for support of customers to achieve your own environmental targets, selection of environmental transport provider.
Environmental management system (EMS)	ISO14001, EMS certification
Emissions and energy data	CO2 reports; energy consumption from external transportation

Source: Adapted from Elkington (1998) and Martinsen and Bjorklund (2012).

1- Alternative fuels

The environmental impact comes from transportation as the most emitting sector by consuming oil and national gas (A. McKinnon, 2010). According to Grant and Banomyong (2010), protecting the environment and reducing CO2 might come from the efficient use of transport, and there are a lot of studies that have been done in this field to investigate the ways to reduce transportation emissions (Aronsson & Brodin, 2006; A. McKinnon, 2010; A. McKinnon, Ge, & Leuchars, 2003; R. I. McKinnon, 2007). A study has been done to demonstrate if applying sustainability practices like mode of transport and vehicle utilization can reduce the transport emission (A. McKinnon et al., 2003). Browne, Rizet, and Allen (2014) stated that vehicle size and the fuel source are correlated to the energy use of trucks. One of the fewest CO2 emissions produced is diesel engine compared with petrol engine. These kinds of engines became the challenge for trucks' operations

with the increase in trucks to 95% in 2011. Although the huge benefits that diesel engine provides to the trucks' operations, it is not an effective way for cost saving, and it is also a major modification in trucks.

According to (Grant & Banomyong, 2010; A. Shaw, Burch, Kristensen, Robinson, & Dale, 2014), using alternative fuels in LSP companies leads to enhance the corporate image and affects customer satisfaction. Using an alternative fuel is not an easy decision; most probably the transportation cost is reduced on the short term, but it needs to be tested on the long term too.

2- Vehicle technologies

Vehicle fuel efficiency is the main concern for LSPs; a number of researchers have investigated the improvements to the ratio of vehicle fuel efficiency among the logistics service providers (Tacken, Rodrigues, & Mason, 2014). Wu and Dunn (1995) stated that design transport networks, operation of transport vehicles and disposal of transportation vehicles and parts are the main three aspects of transport that cause an impact on the environment. The companies start to take serious steps and initiatives in transportation industry to reduce the carbon emissions in order to create “long-term market opportunities in new high-margin, low-emission products and technologies”, use less energy for cost saving and achieve improvement of carbon management in resources and capabilities (Browne et al., 2014; Grant et al., 2017; A. McKinnon, 2010; Renukappa, Egbu, Akintoye, & Suresh, 2013).

✓ Maintenance

Logistics service providers in developing countries have been noticed that they are using old fleets because of a limited investment budget, especially for small to medium-sized providers. Buying a new fleet will be costly for them; the old fleet that they are using is less efficient and emits more hazard gases. Furthermore, little attention has been given to the maintenance processes (Macbeth, 2017). According to Macbeth (2017), maintenance must be scheduled for to minimize environmental impact by using vehicles effectively and efficiently, by regularly inspecting the vehicles and replacing the damaged parts that grantee a longer life and safety of the vehicle.

✓ Modernize fleet

Many LSPs are starting to improve their fleet and upgrade their current fleet with the latest equipment and design in order to have high efficiency and low carbon emissions. New fleets have greater load carrying capacity, low running costs, safety and security of goods and driver (Retail industry leaders association, 2017).

3- Modal choice

The main point in modal choice is how to choose a perfect mode of transport for decreasing the freight transport of environmental impact with low cost and low impact on society. Using a specific mode of transport depends in the first place on the type of products that will be transported and the value of these products; for instance, electronics are high value products, so they need to be transported by air or road freight. On the contrary, heavy low element products are appropriate to be delivered by water or rail transport (Grant et al., 2017). Six aspects have been mentioned in (McGinnis, 1990; p.14)'s study that have an influence on choosing the mode of transport: "freight rates, reliability, transit time, loss/damage/claims processing/tracing, shipper market considerations, and carrier considerations". This research found that freight rates were less important than service factors. Because of the competitiveness and the speed in businesses, companies seek to offer better services more than their competitors for their customers (Ernst, Kamrad, & Ord, 2007; Forslund & Jonsson, 2007; Martinsen & Björklund, 2012).

4- Driving behaviour

The top management has a huge role in enhancing the attitude and the behaviour of the employees and stakeholders (Renukappa et al., 2013), and it gives advice and the required tools in order to reduce the carbon emissions. Some researchers stated that training the drivers leads to reducing trucks' fuel consumptions. Tacke et al. (2014) presented a different style for driver training to be applied according to the size of the company, with different programs for each type of company.

5- Logistics system design

Reducing the average handling factor within the distribution network and improving the main roads and axes to optimize the best and most suitable transportation paths are considered important factors in designing the logistics system (Forslund & Jonsson, 2007; A. McKinnon, 2010; Tacke et al., 2014). Moreover, using less handling, shorter movements, more direct routes, and better space utilization in distribution networks are an environmental practice that companies are responsible to apply (Wu & Dunn, 1995).

6- Transport management

Transportation is considered a source of environmental hazard in logistics system (Wu & Dunn, 1995). According to Tacke et al. (2014), the use of vehicles can decrease CO₂ emissions meaningfully for road freight transport. Companies should take a serious step to minimize the transportations' emissions in order to achieve environmentally friendly logistics system (Pazirandeh & Jafari, 2013). Achieving efficient transport does not only depend on reducing CO₂ emissions but also affects the delivery service quality to the customers (Forslund & Jonsson, 2007).

7- Choice of partners

Choosing partners' factors depends on the partner that will cooperate with you to achieve your environmental goals. Moreover, choosing environmentally friendly transport providers in order to accomplish environmental collaboration goals between companies can also have an effect on the service quality. Seventeen factors have been suggested by Grzybowska, Awasthi, and Hussain (2014) in order to determine the criteria of the partner to be chosen: information sharing, coordination, trust, willingness to collaborate, communication, common business goals, responsibility sharing, planning of supply chain activities, flexibility, benefit sharing, joint decision-making, organizational culture, organizational compatibility, resources sharing (integration), top management support, technological readiness, and training.

8- Environmental management system

An environmental management system (EMS) is an approach that stated the environmental structure. The most recognized Ems framework is ISO 14001, which helps companies to mitigate the impact of their activities on the environment (Ann, Zailani, & Wahid, 2006). It is considered as a tool that companies try to achieve in order to gain a competitive advantage and compete with other competitors.

9- Emissions and energy data

Many companies have taken CO₂ reporting into consideration in their strategic decision-making process. This report is used for supply chains as a guideline in order to reduce carbon footprints. These reports include operational business data and other internal engineering terms that are integrated with carbon emissions. These tools are providing information about the environmental performance, which helps LSP to make an optimization for transport planning for reducing carbon footprints. These initiatives have been used in many different articles and research studies. Table 4-5 demonstrates many articles with different usage of transport initiatives in different cases and situations.

4.9.1.2 Sustainable warehousing

Warehouses were only used to store the materials and wastes, but nowadays warehouses play a crucial role in the supply chain. They are considered the link and connection among supply chain parties. Companies started to use LSPs to make an optimization in using warehouses and achieve an economical space utilization.

Warehouses do not only offer storage roles but they also support the material flow processes through cross-docking, consolidation, etc. Along the full range of distribution, warehousing offers value-adding activities, such as sub-assembly, sequencing, and re-packaging. These services

indicate that warehouses are the main contributor of economic activities that create a negative impact on the global environment. Moreover, they became a large and important influence on the society and the environment. These types of functions and activities create a complex and challenging atmosphere for warehouse sustainable development (Centobelli, Cerchione, & Esposito, 2017). Sustainability in warehouses could be discussed from many different aspects (warehouse designing, management and maintenance). Perotti, Zorzini, Cagno, and Micheli (2012) stated that sustainability initiatives can be categorized based on warehouse design, warehouse management and handling of goods. These initiatives are listed in Table 4-5.

Table 3- 5: Sustainable Service Quality Elements

Study	Fuels	Vehicle technologies	Modal choice	Behaviour aspects	Logistics system design	Transport management	Choice of partners	EMS	Emissions data	Social impact	Economic impact	Limiting the speed
Wu and Dunn (1995)	x		X	x	X	x	x		x		x	
McIntyre et al. (1998)					X	x			x		x	
Beamon (1999)						x			x		x	
Van Hoek (1999)						x			x		x	
Rao (2002)						x		x	x		x	
Murphy and Poist (2003)	x					x			x	x		
Hervani et al. (2005)						x		x	x			
Rao and Holt (2005)						x		x	x		x	
Aronsson and Hüge-Brodin (2006)	x		X	x	X	x			x			
Lieb and Lieb (2010)	x	X	X	x		x	x		x	x	x	x
Shaw et al. (2010)						x		x	x	x	x	
Lau (2011)		X	X		X	x						
Martinsen and Björklund (2012)	x	X	X	x	X	x	x	x	x	x	x	
Perotti et al. (2012)	x	X	X		X	x	x	x	x		x	
Isaksson and Hüge-Brodin (2013)		X	X	x		x	x		x	x	x	
Stamenkov and Dika (2015)				x				x		x	x	x
Chaisurayakarn 2014	x	X	X	x	X	x	x	x	x			
(Gupta et al 2018)					X	x		x		x	x	
Σ 18	7	6	8	7	8	17	6	9	15	7	13	2

Source: Adapted from Martinsen and Björklund (2012), created by author from Stamenkov and Dika (2015)

1- Warehousing Design

One of the main strategic plans that service providers take into consideration is warehouse design. This long-term decision needs to be considered as it is one of the main sustainability influencers, table 3-6 shows the sustainability initiatives in warehousing. Warehouse site selection has a significant effect on the sustainability dimension too. Most of the warehouses are located in populated areas where they make problems to the society and nature because of the processes and loud noises, pollution from waste disposals and emissions. A sustainable warehouse location gives an optimum transportation distance in order to optimize carbon emissions.

The construction of warehouses and the building materials used also affect the sustainability of warehouses. Service providers started to use new materials in the construction of warehouses like coating and isolation materials outside the warehouse at the roof, which is helpful to decrease heat loss in normal warehouses. Moreover, cold warehouses are protected from the outside heat, and cold air cannot escape from the gates; however, this type of materials protects warehouses from extreme heating (Grant et al., 2017). Thus, these materials keep a suitable temperature in the warehouse and reduce energy consumption. It is necessary to build warehouses by using recycled materials in order to minimize waste and make the environment healthier. Construction materials such as asphalt and concrete can be re-used to make a strong basis for the warehouse, and it is also cost-effective because of the lower purchase price than that of new materials (Perotti et al., 2012).

Table 3- 6: Sustainability initiatives in warehousing

Aspect	Sustainability initiative	Examples
Warehouse design	Location	Environment-friendly facility location
	Construction materials	Recycled concrete, asphalt, and other materials
	Lighting	Skylight installation, clerestory windows, energy efficient lighting
Warehouse management	Education	Training, awareness programs, seminars
	Working condition	Ergonomic working environment according to safety and security of employee
	Alternative energy source	Use of solar or photovoltaic panels or other renewable energy sources
	Waste management system	Waste water recycling plants, water storage system, solid waste management system
Handling of goods	Material handling	Installation of equipment – Automated guided vehicles (AGV) and automated storage and retrieval system (ASRS)
	Warehouse management system (WMS)	Pick-by-light technology, voice technology, RFID, and other automated solutions

Source: (Perotti, et al., 2012, pp. 645-647)

Warehouse operators try to reduce the amount of electricity consumed in warehouses, so they depend on the sun as a great source of energy that will effectively reduce the overall instalment of lighting and lowers the electric consumption in the warehouse (Centobelli et al., 2017). As a result, clerestory windows and skylights are good choices to let natural sunlight in the warehouse (Perotti et al., 2012). Lighting consumes almost two-thirds of electricity in warehouses; in order to reduce this cost, companies started to think of a new tool to reduce this amount consumed, which is an energy-efficient light installation such as replacing traditional lights with LED lighting. This type of lighting is efficient and has five to seven times longer lifetime. Furthermore, automation sensors will enable the lighting when it is needed, which reduces the lighting costs in a warehouse almost by 60%.

2- Warehouse Management

Employees' education is one of the main requirements of efficient management in order to guarantee continuous improvement. The tools of continuous improvement are different like seminars, workshops, and trainings. These kinds of techniques are able to offer several advantages to increase sustainable benefits through creating consciousness of new visions into the existing practice, process, and technology (Weisner & Deuse, 2014). That will improve work quality, reduce human efforts and enhance the environmental advantages.

It is really important for workers and employees to work in good weather conditions when they manually handle the materials, which need and require high physical effort and movement of body like picking, lifting, pulling, etc. The physical stress on a worker's body increases, which affects them on the long run; for instance, order picking processes are physically very stressful and might cause a high cost in operation and customer dissatisfaction, but warehouses with a great range of flexibility will provide safe and secure working conditions in order to make them more sustainable (Weisner & Deuse, 2014).

A warehouses has a huge large space over the roof that can be used for solar panel installation for generating electricity as a renewable energy, which is considered a good option for operating the warehouse with less impact on the environment (Centobelli et al., 2017). Grant et al. (2017) stated that windmills around the warehouse are suitable to provide electric energy to the warehouses, but for the small LSPs, it is a huge investment and it is costly for them; however, they can buy electricity from a provider who produces electricity from renewable energy sources. Grant et al. (2017) stated that warehouses need a huge amount of water, whether for cleaning the warehouse or equipment or for human needs. They suggested that rainwater can be collected from the large space over the roof and can be used in many different ways. Water treatment plants are one of the alternative solutions where huge amounts of water are used. This is the best way to recycle water and can be reused at the site.

Warehouses produce a big amount of solid waste from plastic wastes (bottles, can, plastic bags, covers etc.) that can be sorted with developing solid waste management system and recycled for re-use, or packaging; packing wastes (paper, filling materials, boxes, etc.) can be re-used directly or after a certain amount of processing.

3- Handling of Goods

Using automatic machines for cargo handling and storage is quicker than using a manual process. With the appearance of Automated Guided Vehicles (AGV) and Automatic Storage and Retrieval System (ASRS), which are considered the latest examples of automation of material handling equipment in warehouse, the capacity of warehouses increased to reach maximum utilizations of warehouses' space. The movement of heavy and hazardous goods became much easier as a result of safe and efficient handling that increases the warehouses' productivity. Moreover, the damage rates have decreased due to a good control over managing movement of goods and the decrease in the rate of workers' injuries. Therefore, using this automation equipment reduces humans' mistakes and enhances decreasing handling costs (York, 2017).

Overall warehouse emissions can be reduced and decreased by taking into account many factors like the movement related to operation processes. Most of the movement in the warehouse is done by forklifts, so forklifts would be more sustainable due to many factors like upgrading battery technology, which may increase efficiency. Improved energy storing capacity, faster charging and high efficiency give longer operating times and reduce the number of batteries required; all these factors would make an optimization at transport network in a warehouse and also make the warehouse more sustainable (Grant et al., 2017). Warehouse management system (WMS) uses a wide range of technologies that helps to communicate with a system to collect the exact data for order picking, which reduces extra travel distance and the number of trips, and achieving travel distance optimization leads to save the cost and electric energy. In addition, using Radio Frequency Identification (RFID), voice technology and pick-by-light technology provide an efficient handling.

4.9.1.3 Sustainable packaging

Packaging plays a very vital role in storage, handling and goods transportations; moreover, it is concerned with the effectiveness and efficiency of logistics activities through affecting handling, cost, service, warehouse layout and overall productivity. There are two main functions of packaging: logistics and marketing. Packaging provides the products with all details related to product functions and labels and also provides information using various signs and specifications on the packaging, which supports a worker to handle the goods. Furthermore, it is considered as an attractive and a special tool in order to promote their product in the market (Sonneveld, James, Fitzpatrick, & Lewis, 2005). Occasionally, using an unsuitable packaging method creates a difficulty in handling and maintaining the goods, and it could affect goods'

transportations. Hence, logistics providers try to get a better use of packaging by reducing negative consequences. Therefore, using sustainable packaging provides many benefits that are cost-effective and decreases the damaging effect on the environment. Sustainable packaging helps users to have better handling, decreases the transportation cost and gives better space utilization in the warehouse and transportation because of the light materials (Ma & Moultrie, 2018).

International organizations start to put companies and other logistics firms under pressure in order to comply with the regulations and rules related to sustainable packaging. Research into this area starts to be raised, resulting in numerous packaging sustainability guidelines, theories, strategies and tools. These points have been explained to various stakeholders like ‘designers, engineers, technologists, marketers and environmental managers in the production, transportation and distribution areas of packaging production’ (Ma & Moultrie, 2018; p.2693). Several criteria have been selected for sustainable packaging, which are shown in Figure 3-8. These criteria can be used to identify the opportunities, requirements of actions, current efforts and strategies towards the sustainable packaging.

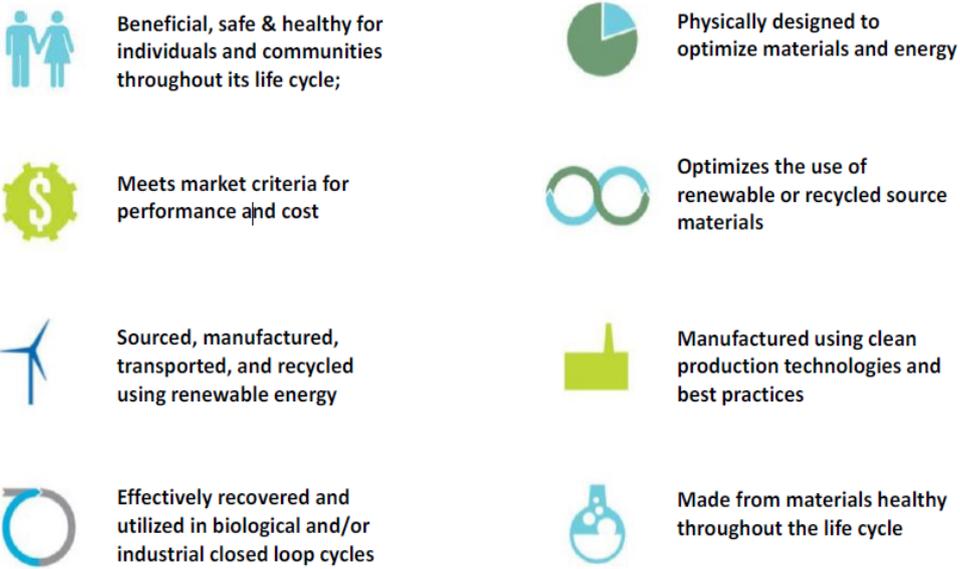


Figure 3- 8: Criteria for sustainable packaging
 Source: (Sustainable Packaging Coalition, 2011, pp. 2-8)

These actions can be implemented through different stages of packaging and explain the sustainable packaging elements. Sustainable packaging could convert to a closed-loop chain, which can make the system economically powerful and give the benefits throughout its lifespan. The main initiatives of sustainable packaging are clarified in the next section.

1- Recycle and reuse of packaging

Enhancing sustainable packaging comes through using recyclable and reusable packaging materials to reduce the waste and consume a less quantity of new resources in order to guarantee

the availability of resources for the future generations' sustainable packaging (Coalition, 2011). Some packaging materials like plastic, wood, paper, etc. are reused directly and some of them are sent for recycling. The disposable and returnable packaging is mainly used in LSP packaging processes. The term "sustainable packaging" starts to take a big range in LSP field. They start to follow the international standards for packaging; for example, disposable packaging is typically sent for recycling after using it, but in case of returnable, they are recycled for multiple usages. In case of damages, they can be either repaired or recycled (Umweltbundesamt, 2014).

2- Eco-friendly packaging design

This is a very critical level where key aspects are identified: the designers are doing a huge effort due to optimize the package material usages. Packaging design starts with selecting the materials that will be used. The selection of these materials will be done based on the required performance and the principle that packaging must not affect the product. Raw materials are selected based on their minimum impact on the environment while being produced and even after their disposal, and for non- renewable resources, LSPs must guarantee that the materials used are readily recyclable (Coalition, 2011).

3- Biodegradable packaging materials

Many packaging materials are impossible to recycle or reutilize due to their material properties that lead to inefficiency and finally create waste. Therefore, using bio-materials is more encouraged to be taken into practice, which will support sustainability by developing the environmental conditions and deliver a new source of packaging materials. This type of packaging supports recycling and reusing the materials with high benefits.

4- Customer Cooperation

The cooperation and collaboration between LSP and supplier or customer play an important role in creating awareness about sustainable packaging. It is considered a top priority for an LSP to care for the customer packaging, as customers also need these types of packaging (Lozano & Vallés, 2007). According to Lozano and Vallés (2007), customer awareness of sustainable packaging will stop them from purchasing products that cause more pollution for the environmental system. Not only the normal customer but also the big industries put into consideration sustainable packaging while they set their strategic plans. LSPs started to apply some criteria and guidelines for packaging materials to be more sustainable; however, the customers or suppliers should be flexible enough to consider these positive changes, which can improve the sustainability awareness, reduce the environmental impact and save costs for both parties.

4.9.1.4 Environment management system (EMS)

(Lozano & Vallés, 2007; p.495) defined EMS as that part of management that is responsible for improving, applying, maintaining, and evaluating the environmental policies through creative and innovated thoughts, planning, different practices, operations, technologies and other tools. EMS is a framework or structured plan that includes processes that are applied on the organizations to reduce the environmental impact and to achieve better operational performance. This system does not only target reducing the negative impact on the environment but it also helps to improve the safety and health of the public as well as employees; moreover, it deals with the non-regulated issues that focus on energy conservation and employee protection (Safoutin, McDonald, & Ellies, 2018).

This system concentrates on the awareness programs of the organization; it inspires organizations to make improvements towards the sustainable development by encouraging them to be environmentally certified. The next section will explain the main components of EMS, which are IOS 14001 and Eco-management and audit scheme (EMAS).

1- ISO 14001 certification

International Organization for Standardization (ISO) has a framework for all companies all over the world to present framework based on Plan-Do-Check-Act methodology, which is considered a four-step management method used in business for the control and continuous improvement of processes and products (Tague, 2005). EMS is developed according to ISO 14001 for improving the environmental performance. This method is represented in Figure 3-9 and divided into five main stages.

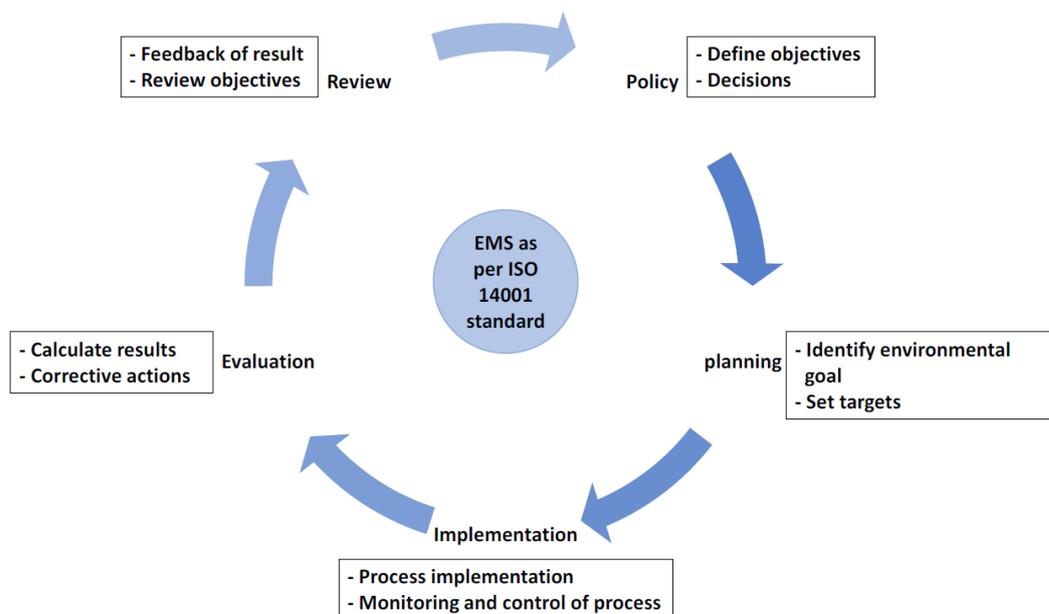


Figure 3- 9: The continuous improvement cycle
Source: EPA- environmental protection agency, 2017

✓ **Policy and commitment**

Establishing the objectives and processes through top management in order to introduce organization's policy and follow it to improve the environmental performance. This policy is the foundation for further future planning. It sets targets and objectives on the basis of the goals of the organization.

✓ **Planning**

Organizational strategic goals are defined based on the environmental aspects of their operations, such as air pollutants or hazardous wastes that can have negative impacts on people or the environment. The organization starts to make a categorization based on which aspect is most important; for example, a company can select several aspects like the working conditions of workers and their safety or the processes for the hazardous wastes. Once significant environmental aspects are categorized, the organization sets the main overall environmental goal. The last part in this phase is setting an action plan in order to achieve the targets. This includes "designating responsibilities, establishing a schedule, and outlining clearly defined steps to meet the targets"(Safoutin et al., 2018).

✓ **Implementation**

Action plans are being implemented using the necessary resources (human efforts, budget, etc.). Employee training and awareness are very significance aspects here because the plan will be implemented through them. There are other steps in this phase like controlling, tracking, documentations and communications for the operations processes.

✓ **Evaluation**

In this stage, the company monitors its operations in order to get the results and compare them with the planned target. If the results do not meet the desired goals, then the company takes corrective actions.

✓ **Review**

In the last stage, the top management checks the results of the evaluations and states whether the environmental policy is consistent or not. Then, the plan is reviewed to improve the effectiveness of the EMS. This stage creates a loop of continuous improvement for a company.

2- Eco-management and Audit Scheme (EMAS)

Eco-management and Audit Scheme (EMAS) is a tool that has been developed by the European Commission. That tool management's mission is evaluating, reporting and improving organization's working conditions while taking care of the environment. It looks like IOS 14001

standards, but little modifications are added to it. EMAS gives information about the environmental performance on the public domain through which a company could achieve a good external and internal transparency. This tool tries to support the sustainable development through legal compliance, active involvement of employees and saving resources and money (Vella, 2017).

✓ **Logistics Service Provider's Best Practices**

Case 1: DHL

DHL is one of the best logistics providers around the world. It has a huge fleet and big staff. It is one of the leading logistics companies that applies sustainability practices in its operation. DHL has launched many of initiatives in order to reduce the pressure on the environment, the following points will briefly explain it:

- 1- “Burn Less” and “Burn Clean” is the principles that DHL has launched in order to choose the truck types and fuel consumption. Moreover, the energy usage within the supply chain network. “Burn Less” reduces the energy and fuel consumption within the logistics operation, whereas “Burn Clean” uses alternative energy resources within the supply chain overall (DHL, 2017).
- 2- DHL has published many approaches like “Waste management”, “Extended Producer Responsibility” and “Lead Environmental Partner”, those approaches refer to the integration between the logistics operations and environment in order to achieve the environmental protection. All these approaches came under the term of “Environmental Solutions” programme (DHL, 2017).
- 3- DHL shared the idea of environmentally friendly operations between German's manufactures and providers, as a result DHL was able to down about 120 deliveries by trucks every week through switching from road trucks and vehicle to ocean freight and trains which are the less polluted mean of transportation.
- 4- Training one of DHL priorities is to provide its employees with all updates of environmental protection and to make them aware of being sustainable for the environment and society.
- 5- DHL has set a strategy for smart packaging that will facilitate greener and more efficient logistics operations across all sectors.

DHL has set a vision as in table 3-7 to show the future initiatives that will be taken by them to reduce the environmental pressures

Table 3- 7: Differences between biofuels and e-fuels

	Sustainability	Availability	Cost effectiveness
 Bio	+	<ul style="list-style-type: none"> If obtained from sustainable raw materials 	<ul style="list-style-type: none"> Already commercially available
	-	<ul style="list-style-type: none"> Questionable if obtained from certain raw materials 	<ul style="list-style-type: none"> Limited availability
 E-fuels	+	<ul style="list-style-type: none"> Production possible on land not used for farming No competition between food and fuel production 	<ul style="list-style-type: none"> Production potential exceeds long-term demand
	-	<ul style="list-style-type: none"> Documented proof required for electricity and carbon from renewable sources 	<ul style="list-style-type: none"> Price reductions possible through optimization of production processes and economies of scale Price of €1 per liter possible in the long term
			<ul style="list-style-type: none"> Price level still exceeds that of conventional fuels Price linked to the availability of raw materials
			<ul style="list-style-type: none"> Price projections for e-diesel and e-kerosene 2030: €1 to €2 per liter 2050: €0.50 per liter
		<ul style="list-style-type: none"> Not commercially available yet First demonstration facilities planned in 2022 First large facilities planned between 2025 and 2030 	<ul style="list-style-type: none"> No market price set to date

Source: (DHL 2019)

Case 2: UPS

¹UPS is one of the LSP that sets 10 sustainability goals to address the environmental impacts, advance industry-leading safety programs, and strengthen the communities where we live and work. The following points give a brief about the practices that UPS applied in its companies:

- 1- Reducing the auto accidents records by 2020 from 9.04 to 8.77 per 100,000 driver hours, representing a 3 percent reduction by 2020. UPS sought to enhance driver training techniques and advancements in vehicle technology. The company has a strategy to mitigate collision systems for select delivery trucks on targeted routes.
- 2- The absolute emission 0.8 percent over 2018 performance, but the total emission remained over. So, UPS started to take serious steps to reduce the overall emission like using renewable energy across the fleet and facilities, using alternative fuels and expanding the fleet of alternative fuel and advanced technology vehicles.
- 3- Reducing GHG intensity through using Transportation Intensity Index (TII), this Index captures the overall efficiency of our global network by measuring GHG emissions associated with transporting packages and freight for our customers in specific year.
- 4- Using a solar panels facility in New Jersey, Connecticut, and Massachusetts, and began procuring renewable electricity for more than 30 UPS facilities in Virginia. In Europa, using renewable electricity in the facilities lead to reducing the emissions reaching to zero.
- 5- By 2025, UPS is targeting to use alternative and renewable fuels to reduce absolute GHG emissions, they purchased 135 million gallons of alternative fuels, which represents 24 percent of the total ground fuel usage. Furthermore, they committed to

¹ <https://sustainability.ups.com/progress-report/goals-and-progress/>

purchase 250 million gallons of renewable natural gas (RNG) over the next several years, to increase the percentage of alternative fuel and advanced technology vehicles.

- 6- UPS has 10,300 alternative fuel and advanced technology vehicles includes all-electric, hybrid electric, hydraulic hybrid, ethanol, compressed natural gas (CNG), liquefied natural gas (LNG), RNG, biodiesel, and propane vehicles. In 2019, UPS purchased 6,000 natural gas-powered vehicles and planned vehicle purchases in the next three years. And they planned to increase number of electric vehicles to 10,000.

3.12.2 Literature Review of Logistics Service Provider and Sustainability

The appearance of sustainability in the literature started when it became a topic of interest to business companies in the last two decades since the European Commission (2001) made a study to link the sustainability to transportations; in addition, A. V. Roth and Menor (2003) stated that there is a relationship between LSP and environmental factors and concluded that distribution of merchandises has a huge influence on supply chain sustainability. LSPs and sustainability have been discussed in many different perspectives in the literature; however, most previous research focuses on the environmental side of sustainability with little attention on social and economic aspects. Most studies of environmental issues have concentrated on manufacturing sectors and gave little attention to service sectors (S. T. Foster, Sampson, & Dunn, 2000; K. J. Lieb & Lieb, 2010; Lin & Ho, 2011; Ostrom et al., 2010; Ramus & Montiel, 2005).

Some research studies indicated the critical role of environmental initiatives adopted by logistics service industry companies related to the following aspects (Lammgård, 2012). Firstly, in the logistics service industry, “environmental issues are becoming increasingly fundamental due to the increasing demand for the mobility of goods”. Secondly, environmental sustainability is becoming an important selection criterion for firms operating in the logistics service industry. Finally, in the logistics service industry, environmental sustainability is becoming a critical success factor in cost reduction.”

According to Aguezzoul (2014), the most common criteria to measure LSPs are “cost, relationship, services, quality, information/equipment system, flexibility and timeliness”. Though, there is scarcity in the literature that is related to integrate these factors and sustainability in logistics services manner. While customers are now requesting sustainable operations from companies including the LSP, the motivation to apply a sustainable operation in LSPs is still very weak and needs more effort to be supported (Evangelista et al., 2013).

The current literature appears not only to include the huge change in LSPs in sustainability but it is also going to develop more and more related advanced terminology (K. J. Lieb & Lieb, 2010). The beginning was at Wu and Dunn (1995) when they gave a wide list of environmental impacts that have to be included in logistics; McIntyre, Smith, Henham, and Pretlove (1998) proposed that the greatest way to improve supply chains' environmental performance is to

involve all the entities in the process. Moreover, Van Hoek (1999) mentioned that LSPs' involvement in the "value-seeking" approach of companies is the highest desire level of green concepts, but he did not give a clear explanation for environmentally friendly transportation. With the beginning of the millennium, Rondinelli and Berry (2000) claimed that LSP companies should adopt strategies based on practical environmental management and provide a conceptual framework for understanding the interactions among multimodal transport activities and their impact on the environment. However, P. R. Murphy and Poist (2000) explained how reverse logistics and packing impact the environmental factors. Ang-Olson and Schroerer (2002) illustrated measures that could improve the environmental performance of road transport companies. The findings showed the potential reductions of greenhouse gas emissions in the USA that would result from their adoption. A study that has been done in Hong Kong by Wong and Fryxell (2004) was the first to examine the effect of stakeholders on the environmental management practices in fleet management. The study showed that stakeholders are significantly influenced by the environmental management practices among fleet managers. Lin and Ho (2008) analysed "explicitness and accumulation of green practices, organizational encouragement, quality of human resources, environmental uncertainty and governmental support" as main six factors that will affect the intention to adopt sustainability innovations for LSP. Jumadi and Zailani (2010) highlighted the green practices of LSPs and how customers affected them; moreover, they illustrated that customer relationships have a positive effect on the adoption of green activities in the logistics service sector in Malaysia. Bešković and Jakomin (2010) identified long-term contracts as an important driver for the implementation of green measures by logistics companies in Southeast Europe. Halldórsson et al. (2010) wondered what if the companies set specific criteria that related to environmental issues for selecting their suppliers when companies are sourcing LSP services; the results of this study indicated that while LSPs are showing an increasing interest in environmental issues, still a lot of main factors for the companies like price, quality and timely delivery are not studied yet, and the study also clarified that LSPs are taking serious steps to develop cooperative partnerships on environmental issues. An important study conducted by K. J. Lieb and Lieb (2010) that was based on two surveys distributed to 40 CEOs of US large LSPs companies in 2008 and 2009. The findings show that there are great intentions to construct environmental sustainability plan; the researchers presented 4 classifications to use sustainability to be applied: the first one is administrative by setting a sustainability plan and goals for each part in the organization and building a committee to audit the sustainability performance, the second one is analytical by evaluating software and developing control systems for the company's service providers by using an "environmental check list" and comparing the carbon footprint from LSP to another through using benchmark company, the third point is transportation that is related to main points like (alternative fuels, purchasing more fuel-efficient vehicles and reducing vehicle mileage operated) and finally they presented another variables, such as (reducing company-printed materials, recycling office supplies, and packaging materials and installing solar panels in

warehouses). Lin and Ho (2011) measured the influencing factors, such as regulatory pressures, governmental support, organizational support and the quality of human resources that have significantly positive influences on driving environmental sustainability practices. They have done their study in China based on a sample of 322 logistics service companies and stated that the adoption of green practices is affected by internal and external factors. Björklund (2011) investigated factors affecting the purchase of green transportation services by using factors analysis. The findings show that the most important dimensions are internal management, image, resources of the firm, customer demands and governmental intervention. Zailani, Amran, and Jumadi (2011) conducted a survey of Malaysian 3PLs to evaluate the significance of green innovation in logistics outsourcing; the results cleared that information technology is the most important tool in decreasing the environmental impact of logistics activities. A similar study by Ho and Lin (2012) investigated the effect of the intentions of applying green factors in the third party in Taiwan. The results showed that the best way to mitigate the environmental impact is using information technology between entities and parties. Martinsen and Björklund (2012) identified the matches and gaps between LSPs' green supply and the shippers' green demand by using gap analysis, the degree of consistency between logistics companies' green services and the demand of shippers for these services; they found an internal gap between LSP perspective about the nature of services and "how they perceived the demand from the shippers". This means that LSPs took the next steps without studying the current situations, and also found an external gap between the LSP offers and the shippers' understanding of the offers, and illustrated that shippers do not know the green service initiative that LSP is taking. Pieters, Glöckner, Omta, and Weijers (2012) surveyed 145 logistics companies to measure the impact of change the strategy of sustainability has on the improvement of physical distribution network in the Dutch market; the results show that "most of the initiatives adopted were focused internally". Perotti et al. (2012) identified eight differences for environmental sustainability: (green supply, distribution strategies and transportation, warehousing and green building, reverse logistics, cooperation with customers, investment recovery, eco-design and packaging and internal management) to measure the relationship between the applying of environmental sustainability and 3PL performance in the Italian market. While Liimatainen, Stenholm, Tapio, and McKinnon (2012) concentrated on a small part of environmental sustainability that is related to energy efficiency practices, they investigated 295 road transport companies in Finland and found that the workers in the carrier companies know about the efficiency practices but they need more resources and knowledge to be completely used. Kudla and Klaas-Wissing (2012) examined how the transporters motivate 3PL and the reaction of 3PL by adopting the sustainability initiatives. The results clarify the differentiation between small and large 3PLs in sustainability efforts. Shippers found that applying the sustainability concept is an early phase for 3PL; in addition, the study shows that 3PLs concentrate on environmental sustainability more than the other two factors of sustainability (social and economic). Lamngård (2012) clarified the role of companies and competitors in adopting intermodal road-rail transport

services for improving environmental performance. Colicchia, Marchet, Melacini, and Perotti (2013) classified the environmental practices into two sides: the first is inside the organization and includes (distribution strategies and transportation execution, warehousing and green building, reverse logistics, packaging management and internal management), and the second is between the organizations' practices and includes (collaboration with customers and other external collaborations). This paper offered new visions in environmental sustainability for logistics and transportation. It also found a lack of “standard methodology for environmental performance measurement”, which prevents companies from sharing the costs and benefits of environmental initiatives. Isaksson and Hüge-Brodin (2013) picked 3PL companies in the Swedish market to measure the effect of green initiatives on the logistics services; the findings showed that the green initiatives affected the logistics services on many different services levels. Large, Kramer, and Hartmann (2013) illustrated how the customers who need the logistics services take into considerations sustainable development. A 750 survey distributed to customer and logistics managers, and the results indicated that the customers look for the valuable services that include ecological and social aspects, but 3PL did not involve the customers in this processes; they claimed that customers have a small impact on 3PL' sustainability initiatives. Liimatainen et al. (2014) made a study wider than the one done in Liimatainen et al. (2012); they used a questionnaire survey to explain the energy efficiency practices of road freight in some Nordic countries (i.e. Finland, Denmark, Norway and Sweden), and they concluded that the energy efficiency actions are almost similar in these countries. Chaisurayakarn et al. (2014) investigated the issues pertaining to 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 researcher did his study in order to fill the gap in the body of knowledge of GSQ, LSQ and LPI. The findings of this study indicated that LSQ has a positive and a significant effect on TLPI, and that effect is more pronounced when GSQ measures are included. García-Arca, Garrido, and Prado-Prado (2017) carried out a study in Spain to clarify the main features connected to Sustainable Packing Logistics. They distributed an electronic questionnaire to 70 participants of toy manufacturers to measure if sustainable Packing Logistics contributes to better sustainable performance; the findings show that sustainable Packing Logistics made a partial improvement in sustainable performance. Campos, Callado, and Piecyk (2018) conducted a study to identify the strategic role of logistics service providers in extending sustainability to the supply chain. They picked 26 international companies to analyse the differences among them with considered benchmarks in sustainable development. The results show that logistics service providers have a big role to transform the supply chain to be sustained, and finally Centobelli et al. (2017) made a systematic literature review and research directions for environmental sustainability in the service industry of transportation and logistics service providers.

Most of the studies mentioned above were concentrating on environmental sustainability from many different perspectives that are related to logistics services providers; however, little

attention was given to social and economic perspectives in services industry in logistics; social sustainability is concerned with the influence the company has on the social systems within the field that it works (Mani et al., 2016). Colantonio (2009) mentioned that social sustainability has no agreement that seems to exist on what criteria and perspectives should be adopted in defining social sustainability, so a lot of research is called for in order to develop of social sustainability in terms of concept and scope.

After reviewing the literature in Chapter (2, 3), the researchers found a scarcity of literature that deals jointly with the concept of sustainability in logistics and supply chain services, especially in LSP field; moreover, there is a distinct silence in the area of logistics service quality and sustainability and evaluation of the services after applying the sustainability practices. Therefore, this study proposes a new framework that measures the sustainable logistics service quality in LSP in Egypt through reviewing logistics service quality and sustainable service quality (see chapter 2 and 3) for enhancing business customers' satisfaction and relationship quality. The next section will indicate the three mains dimensions of sustainability that have been discussed in the literature and the main factors of each dimension.

3.13 Sustainability Dimensions

Sustainability includes features in three dimensions: environment, society, and economy. Carter and Rogers (2008) indicated that using those three dimensions “strategically and contemporarily” leads to a higher economic performance. By analysing the previously conducted literature reviews on sustainability and logistics management, it was obvious that dimensions of sustainability are not defined consistently. The academics and researchers have realized the complexity of sustainability and logistics; that’s why it makes them more focused to find the best methods to give an overall view about sustainability and logistics.

1- Environmental Sustainability

The concept of environment refers to the living and non-living things that exist naturally on Earth, including land, water, plants, animals, etc. The main target for environmental sustainability is reducing the ecological footprint of the supply chain. Labuschagne et al. (2005) also identified many factors related to environmental sustainability. Sloan (2010) has divided the environmental factors into six main classifications. Air was the first one, and he explained it from two different aspects: the domestic one like carbon monoxide emissions and the global one like ozone depletion. The second one was Water, being referred to as “quality and quantity impacts e.g., toxic discharges as well as total usage”. The third one was Land, which mentioned the spaces of land that are used and the impact of that use such as “soil pollution”. The fourth one was Materials, which refers to the amount and the type of materials and how they could impact the environment. The fourth one was Minerals and energy, which refers to “the use of non-renewable mineral and energy resources”. The last one was Systems, which refers to “the values, procedures, and systems — both internal and external — that relate to the environment”. He showed that classification in one table 3-7.

Table 3- 8: Environmental Metrics and Indicators

Category	Examples
Air	Emissions Use of ozone depleting substances
Water	Water used Water reuse- recycling
Land	Soil pollutants released Landfill waste
Materials	Post-consumer recyclable content Hazardous material content Mass of materials used Global warming potential of materials
Mineral and energy	Energy from renewable sources Total energy used
Systems	ISO 14000 certification ‘Energy Star’ product labelling Public reporting of environmental performance Regulatory compliance (EPA) Environmental management system (EMS) in use

Source: Sloan, T. (2010)

Environmental sustainability includes environmental responsibilities and environmentally friendly technologies (Winter & Knemeyer, 2013). A lot of researchers have introduced the environmentally friendly practices, starting with Carter and Rogers (2008) who introduced environmentally friendly practices like using friendly materials in packaging and fuel efficient transportation; moreover, they identified them as efficient and environmentally friendly material sources, low carbon emissions, energy efficient machines. Furthermore, Brandenburg, Govindan, Sarkis, and Seuring (2014) illustrated it as renewable energy sources, water and energy consumption, waste management, and pollution. Ahi and Searcy (2013) mentioned that managers should take into consideration many points while applying sustainability in a supply chain that includes efficient end-of-life product management, product reuse, product recovery, reverse logistics, and closed-loop supply chains. The logistics service providers are also required to apply sustainable development in their supply chain as a part of their customers’ sustainable supply chain in order to make each part in it sustained. Environmental sustainability is related to competitiveness and firm performance (Mitra & Datta, 2014), so many certificates have been released in order to cover the point that is related to sustainability, such as ISO 14001. This kind of certificate has been given to the organization that completes the terms and conditions involved in environmentally friendly practices (Hassini et al., 2012).

Many organizations have implemented technologies and environmental policies into their practices to achieve environmental goals; one of these tools that helped companies to take a serious decision toward environmental process is Environmental Management System (EMS). It refers as we mentioned before to a system that uses information communications to improve environmental and business performance (Florida & Davison, 2001). It can be defined as a part of organization that improves, implements, maintains and evaluates environmental policies over new thoughts and uses a new practice to be planned and implemented via processes,

technology and other resources . According to Lozano and Vallés (2007), EMS has a great effect on supply chain and logistics activities. Darnall, Jolley, and Handfield (2008) stated that applying EMS leads to reduce environmental harms with less effort and shorter time while achieving better operational performance; it also helps to improve safety and health of community as well as employees. EMS creates a report that helps in evaluating and monitoring processes. Many technological used and techniques to improve the quality of the processes and to create effective SSCM activities. EMS has mostly two components: (ISO 14001 standard and Eco-management and Audit Scheme (EMAS). Florida and Davison (2001) overviewed the EMS's benefits by “managing environmental risks, helping organizations in achieving their environmental goals, commitment to environmental improvement, improving business performance, and improved community relations”. In this study, the environmental dimensions will include a lot of aspects that are related to third party logistics activities like (Transportations, Warehouses, Packing, Packaging, reverse logistics.....).

2- Social Sustainability

The terms social responsibilities of business, corporate social responsibilities and social sustainability, have been shown in the social aspects in the literature. The social sustainability dimension is mainly related to the human investment in supply chain. (Hassini et al., 2012; p.71) mentioned that the social dimension can be associated to “social well-being and the way in which the supply chain treats its employees, customers and the community”. The idea of developing and maintaining business practices with taking into considerations social dimension to improve the overall sustainability in reasonable and satisfactory manner to the employees and societies that work in supply chain frame has drawn the attention to business companies. Accordingly, Missimer, Robèrt, and Broman (2017) mentioned that social sustainability has suffered from neglect, and it was not a good operational dimension to be a main factor of planning, maintaining, and innovation companies’ strategies. Colantonio (2009) stated that the term of social sustainability still needs a lot of efforts to have main theoretical constructs, and it is not clear what criteria and perspectives should be adopted in defining social sustainability. Many researchers have suggested a varieties criterion whether quantitative or qualitative (Yusuf et al., 2013). These criteria are different from one sector to another and from one country to another. Sloan (2010) divided the social performance indicators into three categories. The first is workplace, which refers to the internal human resources; the second one is community, which refers to all people outside the supply chain that have an effect on supply chain performance; the third one is systems, which refers to “the internal and external systems, procedures, and values that relate to the social dimension”. Brandenburg et al. (2014) and Gold et al. (2010) presented two different perspectives of social sustainability: the first is treatment of labour force (wages, employment gender ratios, working conditions, investments in human capital and child labour), customers and sourcing practices, whereas the second one evaluates the social impact of these practices on communities. Jung and Ha-Brookshire (2017) has presented the most frequently used criteria in social sustainability in table 3-8.

This research concentrates on the criteria that LSPs should have while they are doing their businesses. LSP service needs to be managed from a social sustainability point of view, which is mainly dependent on both transportations and employees. LSP is looking forward to presenting better service quality and price to its customers while taking into account social sustainability. Companies seek to find best providers for it, whether suppliers or distributors for achieving sustainability goals, while Pagell and Wu (2009) mentioned that the entities that companies are dealing with should have a proof of applying sustainability such as the SA8000 certification. Sloan (2010) presented a perfect definition to social sustainability of the LSP provider and stated that LSP's social sustainability is concerned with the internal and external stakeholders while LSPs do their core business in order to provide welfare, safety, and wellness for them and for the community.

Table 3- 9: Main criteria of social sustainability

Category	Criteria	Definition	Measure
Society Related	Philanthropy	The extent to which the company actively participates in aiding the society through donations and commercial initiatives	The budget percentage set aside for philanthropy
	Investment in local community	The extent to which the company actively participates in aiding the local community	The budget percentage invested in the local community
Employee Related	Employee average duration of stay	The turnover rate indicating the loyalty of employees	The number of years an employee remains in the industry
	Minority	The distribution of minorities	The percentage of minority employees
	Average salary	The extent to which the company actively treats its employees by payment	The average employee salary
Management Policy ¹ Related	Organizational learning/training process and program	The existence, variety, and level of the processes or programs related to the certification and internal/external education	Qualitative measure
	Appraisal/Recognition systems and development	The existence, variety, and level of the system related to employee appraisal and recognition (e.g., peer comparison, multi-dimensional performance measures)	Qualitative measure
	Human rights and participation	The existence and level of the policy related to employee rights and participation (e.g., whistle blowing, unions and incentives)	Qualitative measure
	Occupational health and safety	The existence and level of the policy related to occupational health and safety	Qualitative measure

¹ This indicates a sustainability related policy, a set of ideas or a plan of what to do about social issues in particular situations, as officially agreed upon by a business organization (Glavič & Lukman, 2007)

Source: Jung and Ha-Brookshire (2017)

3- Economic Sustainability

It refers to costs, profitability, revenues and returns on investments earned by the members of supply chain, the economic benefits as well achieved by supply chain members to countries, regions and communities. It is related to gross domestic product, labour productivity and import and export when it is on the macroeconomic level. This dimension not only concentrates on the internal financial statements in a specific company but it also has a lot of factors that may not be easily measured in financial terms. However, Brandenburg et al. (2014) stated that the quantitative nature of economic dimension makes it easy to be measured compared with the

other dimensions. Carter and Rogers (2008) clearly indicated that the economic dimension is an indispensable condition for any environmental and social initiative. The economic factors have been classified into four categories according to (Sloan (2010)): the first one is economic performance, which refers to how the companies are able to run their operations and to improve their market value. The second one is financial health that refers to the effective and efficient way to the financial resources for achieving the “long-term viability” of the business. The third one is market and structure, which refers to the nature of the market that the companies deal with and the main components of supply chain. Finally, the last one is Institutions/Systems, which “refers to the internal and external systems, procedures, and values that relate to the economic dimension”. The economic indicators are shown in table 3-9.

Table 3- 10: Example Economic Indicators

Category	Examples
Economic performance	Order fill lead time Product defect rate Transportation cost per unit Productivity Market value
Financial health	Profitability Cost of goods sold Return on working capital
Market and structure	Degree of vertical integration Depth of supplier pool Breadth of customer Market share
Systems	Regulatory compliance (CPSC) ISO 9000 certification Quality Management System in use

Source:(Sloan, 2010)

There are a lot of categories and elements that have been discussed in the literature related to economic sustainability; some researchers took it as measuring financial performance for a company; other researchers used it as a method to measure decreasing or increasing the overall cost for a company. This research will use economic sustainability to measure the overall cost for customers as a result of applying sustainability concept in LSP operations and services.

Although the significance of the sustainability of services offered by logistics service providers arises in many research studies, there is still much to empirically understand the three dimensions of sustainability from the implementations, procedures, and commitment to the other party in a supply chain network. After reviewing the literature (chapter 2,3), we could conclude that the role of sustainable logistics service quality (SLSQ) is not clear enough, and using sustainable service quality (SSQ) and logistics service quality (LSQ) for enhancing customer satisfaction and relationship quality in logistics service provider (LSP) field is not explained and illustrated in the literature. Moreover, identifying elements of each variable of the study will be based on the Egyptian law related to sustainability (see chapter 4) and literature

review too. Therefore, this study seeks to propose a SLSQ framework in order to enhance business customer satisfaction and relationship quality in LSP field.

In conclusion, this chapter starts with the narrow point, which is services and then goes in depth integrating that term to sustainability. After that, it explained the sustainable supply chain management and sustainable service as it is sustainable service supply chain management; moreover, it takes the main points of the research, which are logistics service quality and sustainability, and illustrates each indicator of these variables and gives an overall view of the literature related to sustainability and LSP. As the study will be applied in Egypt, and after we explained the main research ideas and parts, we need to know the current situation, the market that the research will use to be conducted and the reasons why the research chose this market. Therefore, the next chapter will explain in details all these points.

Chapter 4

4. Logistics and Sustainability in Egypt

4.1 Introduction

In the first section, this chapter presents the main steps that Egypt has taken to adapt sustainability concept, starting from publishing laws to be compatible with the international standards and requirements. It also shows the challenges that faced the Egyptian government while applying sustainability elements. In the second section, it presents the current logistics situation in Egypt; moreover, it gives an overview of the future of logistics in Egypt and the strategic plan for developing the logistics infrastructure. In the last part, it illustrates the role of logistics activities in affecting the sustainability elements and the Egyptian constitutional laws that have been issued according to this development.

4.2 Sustainability in Egypt

In March 2015, Egypt decided to make a dynamic innovation to reach the highest point of transformation in sustainability development: they set short-term goals to be achieved in 2020 and long-term goals to be achieved in 2030 “Egypt’s Vision 2030”. These strategies are capable of making Egypt in a highly ranked position on the national, regional, and global levels. From a global perspective, the government of Egypt has applied a determined plan to develop industry and service, with the goal to raise competitiveness to beat the globalization challenges and place a reasonable position in the global economy. This plan also represents the main steps of extensive development in Egypt, which links the present with the future.

The Ministry of Planning and Monitoring and Administrative Reform is trying to collect and call all the entities like non-governmental organizations (NGOs), the private sector, government officials, academics, experts and development partners to give suggestions and solutions for these steps. The new sustainability goals give more peaceful communities and controllable tools. These goals adopted new perspectives and trends to beat the expected and unexpected challenges efficiently. Therefore, these goals were created to achieve balance between the three main dimensions of sustainability.

1- Egyptian Sustainability Axes

Sustainable Development Strategies are considered to be a basic step in the march of country-wide development in Egypt, which links all organizations, companies, firms, and associations to achieve specific goals that serve the cooperate social responsibility (CSR) and sustainable development. Furthermore, they characterized the path of advantages and use of competitiveness. The main aim of these strategies is to guarantee a convenient and dignified life for the Egyptians by achieving their dreams. The amendment of the Egyptian constitution targets the growth of the economy through applying sustainable development and social

fairness and grantees balance between development and growth with taking into account the environmental demission.

By applying sustainability goals 2015 and 2030 with knowledge and creativity, Egypt will have a highly competitive, stable and balanced economy, and it will also have social justice with stable ecosystems, taking advantage of the human capabilities and resources in order to save quality life for Egyptians. All these aspects give the government hopes to put Egypt in highly-ranked positions among countries in these fields: “economic development indicators, fighting corruption, human development, markets' competitiveness, the quality of life and environmental protection”. However, the Egyptian government and other organizations will face a lot of challenges to apply sustainability goals: creativity and innovation systems that are rare in our society; scarcity of natural resources, such as energy, land and water; the negative effect on the environmental usage and weakness of human resource development “including population, health and education”. Sustainability goals seek to adapt those challenges and find the best solutions to beat them in a way that keeps and does not affect the rights of the next generations.

2- Steps to Build Sustainable Goals

Sustainable goals were built based on an outcome of accurate reviews of research studies and previous strategic visions at both the domestic and international criteria. Those goals that are prepared by political leadership and research studies aim to achieve long-term visions to keep the next generations' rights. The preparing of sustainable strategies created by experts, academics and stakeholders was based on participation planning approach. The international finance and development institutions had also huge support for preparing the main elements and factors of these strategies, such as International Labour Organization (ILO), United States Agency for International Development (USAID), Japan International Cooperation Agency (JICA) and World Bank (WB), starting with 150 workshops and meetings organized in 2014 and 2015, in addition to social suggestions made for the private sector, the civil society and the international organizations.

The last version of the strategies that include all types of industrial and civil sectors had a lot of different dimensions to work on; for instance, the economic dimension is considered one of the vital factors that have many different axes, such as the added values to Gross Domestic Product (GDP), employment rate, income, direct and indirect investment, and cutting cost. All sectors have created their own strategies based on the Egyptian laws to be integrated with sustainable development and to be compatible with their own goals.

Performance indicators were built based on the main variables that we have. It was taken into consideration that they can be measurable, can be achieved in terms of the existing resources and conditions and also have a time frame to be accomplished. Furthermore, ensuring the achievement of the strategic goals for each axe, it was taken into account to have a reasonable

relationship between input, output and outcome of measurement indicators and to have a system of monitoring the performance.

3- Challenges for applying sustainability

The challenges that exist in the Egyptian environment are considered the map that is used to build the sustainable strategies' goals. Therefore, the next section will explain briefly the main challenges. One of the main goals of workshops was deriving the main challenges and their relationships with the private sector or the public sector. The classification of challenges has been divided into three main groups: the first one was related to resources (including human, natural and financial resources), which means the availability of the resources to achieve the sustainable goals; after that comes the infrastructure, which means each of the main fundamentals to reach the expected results and finally the legislative environment, which is concerned with the natural relationships between parties and the constitutional law. The strategy also recognized some of the challenges facing the foreign policy and national security, including internal situation like insecurity (terrorism, the problem of traffic, and security of citizens); food security; water security (low per capita, the lack of water necessary to increase the agricultural area); low economic growth and social justice (Nations, 2016).

The main aim of this research is to propose a new sustainable logistics service quality framework that would enhance the logistics service providers' customer satisfaction and enhance the relationship between them through reviewing sustainable service quality and logistics service quality elements in Egypt. As the main field of study is the logistics service providers (LSP), the following part will explain the nature of logistics activities in the Arab Republic of Egypt, its position internationally and Africa and the role of Egypt as a leading country in Africa. We also linked the logistics activities with sustainability practices.

4.3 Logistics in Egypt

Currently, Egypt is implementing a vision for social and economic development. Egypt is presenting huge projects that aim at developing infrastructure, increasing production capacity and satisfying the population needs. Logistics are the main part of this vision by introducing different types of transportation and supporting the road infrastructure. Furthermore, Egypt as one of the major trading countries is capable of creating a wide range of opportunities for the logistics service providers. The government targets making the country as a hub for production and distribution to serve Europe and the Middle East & Africa. Egypt Vision 2030 entitled economic development as a major target, which includes development of the transportation infrastructure and building warehouses to increase the company's investment and to create demand on the logistics projects (Jean-François Arvis et al., 2018).

Ali Al Moselhi, Egypt's Minister of Supply and Internal Trade, stated in that in 2022 Egypt is going to build new logistics zones and warehouses to make progress in internal trade. He

regarded internal trade as promising and profitable tool and is able to attract huge investments to Egypt.

According to Agility (2019), Egypt is one of the emerging markets in logistics. Transport Intelligence (TI), and Agility Emerging Markets Logistics Index (AEMLI) covers 50 emerging markets and highlights the challenges and opportunities facing the developing countries. It is regarded as the source of information for developing countries. AEMLI and TI’s role is to create and give a clear vision on economic, trade, logistics and business environment. It uses an updated index methodology to clarify the emerging market growth indicator. The methodology examines three key areas for logistics market development as follows: see table 4-1 (Agility, 2019):

- Domestic Logistics Opportunities.
- International Logistics Opportunities.
- Business Fundamentals.

AEMLI gathers the information based on a survey that has been distributed by Transport Intelligence organizations to many different positions and titles: respondents from logistics professional industries, logistics providers and shipping companies, and 25% of the respondents were from various other organizations. The total responses were 529 and are used in the research for Agility Emerging Markets Logistics Index Survey.

Table 4- 1: Key measures used in the Agility Emerging Markets Logistics Index 2019

Domestic Logistics – 33%	International Logistics – 33%	Business Fundamentals – 33%
• Domestic logistics markets - Size & growth	• International logistics markets – size & growth	• Regulatory environment
• Economy – size & growth	• Logistics intensive trade – size & growth	• Credit and debt dynamics
• Population – size & growth	• Infrastructure quality and connectedness	• Contract enforcement and anti-corruption frameworks
• Income equality	• Border procedures – time & cost	• Inflation & price stability
• Urbanization		• Cost of crime & violence
• Development of business clusters		• Market accessibility & domestic stability

Source: (Agility, 2019)

Egypt is classified as one of the most attractive countries in logistics market as a result of starting to implement a creative program that aims to push the economy and enhance business environment performance. This program calls to remove the investment barriers and encourage foreign investment. According to Agility (2020), Egypt has jumped 6 positions to reach rank 13; see table (4-2) in domestic logistics opportunities, which is considered to be a huge achievement in the index. On the international level, Egypt made progress and went up for 5 positions to be in the 23rd position as shown in table (4-4). Moreover, that Egypt is one of the countries that have a good potential in Emerging Logistics Markets as in table (4-3) indicates that Egypt has jumped 7 positions to be in the 7th place. The Agility Emerging Markets

Logistics Index 2020 mentions the overall ranking for emerging countries as in table, (4-5) and Egypt comes in the 20th place, making progress by 6 positions.

Table 4- 2: Domestic Logistics Index

Rank	Domestic Logistics Index	Score	YoY Change
1	China	8.87	-
2	India	8.05	-
3	Indonesia	6.33	-
4	UAE	5.57	1
5	Brazil	5.49	-1
6	Saudi Arabia	5.44	3
7	Qatar	5.39	-1
8	Mexico	5.36	-1
9	Malaysia	5.30	1
10	Turkey	5.17	-2
11	Russia	5.17	1
12	Kuwait	5.13	1
13	Egypt	5.09	6
14	Thailand	5.09	6
15	Pakistan	5.09	-4

Source: (Agility, 2020)

Table 4- 3: Emerging Logistics Markets

Rank	Country	YoY Change
1	Syria	-
2	Iran	4
3	Venezuela	1
4	Iraq	-2
5	Libya	-2
6	Ethiopia	-1
7	Egypt	7
8	Argentina	12
9	China	20
10	Pakistan	2

Source: (Agility, 2020)

Table 4- 4: International Logistics Index

Rank	International Logistics Index	Score	YoY Change
1	China	9.75	-
2	India	7.54	-
3	Mexico	6.33	-
4	Vietnam	6.17	-
5	Indonesia	6.03	-
6	Thailand	5.90	1
7	Malaysia	5.83	1
8	Turkey	5.80	-2
9	UAE	5.75	2
10	Russia	5.75	-
11	Brazil	5.72	-2
12	Saudi Arabia	5.53	-
13	Philippines	5.22	1
14	Chile	5.21	-1
15	Peru	5.12	-
16	Colombia	5.11	-
17	South Africa	4.96	1
18	Morocco	4.95	1
19	Oman	4.87	2
20	Qatar	4.85	-
21	Ukraine	4.81	-4
22	Jordan	4.70	-
23	Egypt	4.69	5
24	Kazakhstan	4.68	2
25	Sri Lanka	4.68	-

Source: (Agility, 2020)

Table 4- 5: The Agility Emerging Markets Logistics Index 2020 -Overall Ranking

Ranking	Country	AEMLI20 Overall Index	Domestic Opportunities Index	International Opportunities Index	Business Fundamentals Index	YoY Change
1	China	8.90	8.87	9.75	7.17	-
2	India	7.39	8.05	7.54	5.70	-
3	UAE	6.36	5.57	5.75	9.33	-
4	Indonesia	6.14	6.33	6.03	5.95	-
5	Malaysia	6.07	5.30	5.83	8.23	-
6	Saudi Arabia	6.00	5.44	5.53	8.17	-
7	Qatar	5.69	5.39	4.85	8.11	1
8	Mexico	5.67	5.36	6.33	4.91	-1
9	Thailand	5.59	5.09	5.90	5.97	2
10	Turkey	5.54	5.17	5.80	5.77	-1
11	Vietnam	5.52	4.94	6.17	5.37	-1
12	Chile	5.48	4.86	5.21	7.40	1
13	Russia	5.46	5.17	5.75	5.45	1
14	Oman	5.38	4.98	4.87	7.29	-2
15	Bahrain	5.35	5.01	4.66	7.51	1
16	Brazil	5.24	5.49	5.72	3.68	-1
17	Jordan	5.16	4.91	4.70	6.69	2
18	Morocco	5.15	4.62	4.95	6.69	-1
19	Kuwait	5.09	5.13	4.61	6.06	-1
20	Egypt	5.05	5.09	4.69	5.74	6

Source: (Agility, 2020)

We could say that Egypt is working to develop the economic state and that the government successfully implemented the first wave of macroeconomic and structural reforms that contribute to solve many issues and help to make the economy stable and growing; in addition, the huge projects related to the infrastructure and logistics facilities make Egypt in that position. According to the European Bank for Reconstruction and Development (EBRD), the logistics cost contributes to the finished product cost in developed countries between 8:11 % and in developing countries between 30:40% from the cost of finished goods.

The main logistics activity is transportation, which connects all parties starting from supplying raw materials to factories and distributing finished goods to warehouses and stores (Helmy, ElMokadem, Abd el Bary, & El-Sayeh, 2018). According to Moons, Waeyenbergh, and Pintelon (2019) stated that the good transportation system leads to better logistics efficiency and presents a perfect service quality. Logistics include activities beyond transportation, including warehousing, brokerage, express delivery, and critical infrastructure services. C. a. J. Langley (2017) stated that transportation is the most used activity in the logistics providers and then storage comes in the second place and then come other activities. Therefore, we need to figure out how transportation and storage have a huge contribution to GDP as the most used activities for logistics providers. But we need first to mention the Egyptian GDP; see figure (4-1). Egypt's GDP data were stated at 1,479,496.600 EGP in Sep 2019. This achievement has increased to 1,239,800.000 EGP for June 2019.

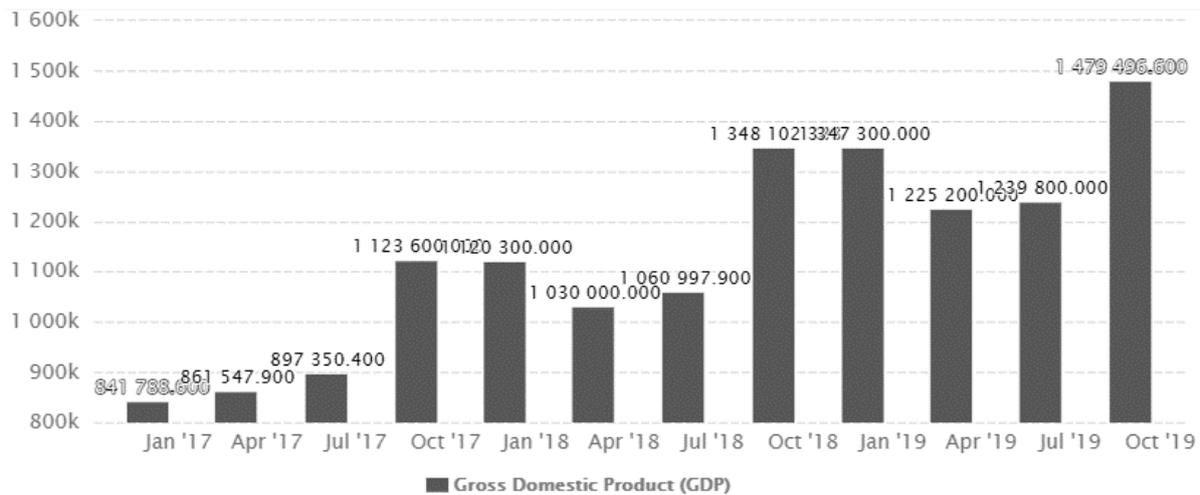


Figure 4- 1: Egypt's Gross Domestic Product (GDP) till 2019
 Source: Ministry of Planning, (2020)

According to the Ministry of Planning (2019), transport and storage data were reported at 76,133.800 EGP in Sept. 2019. This records an increase from the previous number of 65,489.700 EGP in June 2019, and it is considered the highest target that the Egyptian government achieved, shown in figure (4-2).

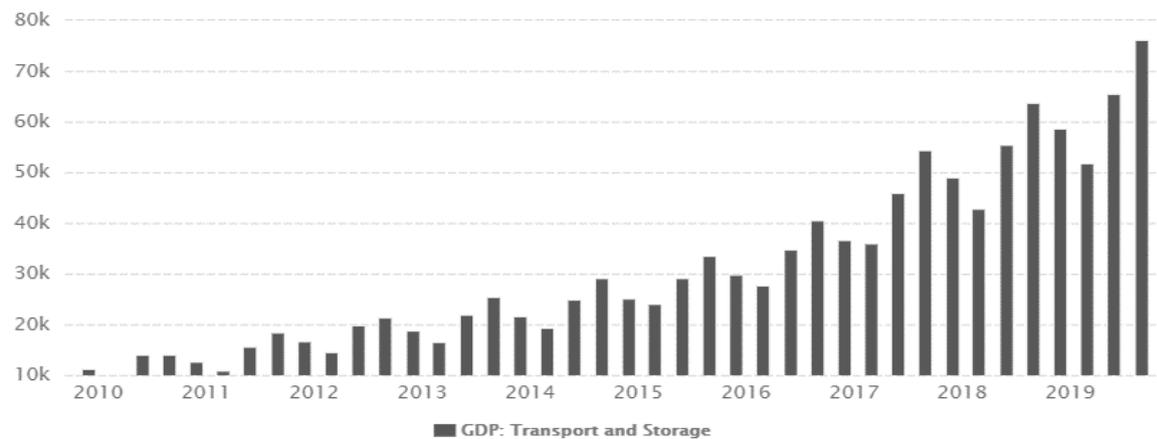


Figure 4- 2: Egypt's GDP from Transport and Storage from Sep 2010 to Jun 2018.
 Source: Ministry of planning, (2019)

The African Development Bank in its report (Climate Change Action Plan 2011-2015) stated that the transport sector's investment represents 24%, which comes after the energy sector that has 32%, with projects focusing on achieving sustainable transport by reducing greenhouse gas GHG Emissions. The quality of transport in Africa is perfect as shown in table (4-6) in 2016; Egypt was in the first rank but in 2017 and 2018 it decreased one rank to be in second place, however globally needs time to be developed (Charles Leyeka Lufumpa, 2018). AIDI also

presented an index related to infrastructure for logistics, communication, transport, electricity and water supply, and Egypt came in the second place, as shown in table (4-7).

Table 4- 6: Egypt Transport Index 2016-2018

Rank	Country	2016	Rank	Country	2017	Rank	Country	2018
1	Egypt	55.38	1	Libya	58.71	1	Libya	58.49
2	Libya	52.84	2	Egypt	55.68	2	Egypt	56.75
3	Seychelles	50.51	3	Seychelles	50.52	3	Seychelles	50.33
4	Mauritius	36.1	4	Mauritius	37.44	4	Mauritius	38.40
5	Cabo Verde	26.59	5	Cabo Verde	26.68	5	Cabo Verde	26.56
6	Botswana	24.46	6	Botswana	22.52	6	Botswana	22.29
7	Algeria	18.21	7	South Africa	22.08	7	South Africa	21.92
8	Namibia	17.72	8	Algeria	17.35	8	Algeria	17.11
9	Comoros	15.58	9	Comoros	17.15	9	Comoros	15.65
10	Sao Tome and Principe	13.94	10	Ghana	16.26	10	Namibia	15.50

Source: The African Infrastructure Development Index 2018.

Table 4- 7: Egypt's Infrastructure Development Index 2016-2018

Rank	Country	2016	Rank	Country	2017	Rank	Country	2018
1	Seychelles	93.927	1	Seychelles	94.109	1	Seychelles	94.324
2	Egypt	85.663	2	Egypt	85.350	2	Egypt	85.847
3	Libya	77.793	3	South Africa	79.635	3	Libya	81.413
4	South Africa	75.515	4	Libya	79.271	4	South Africa	78.527
5	Mauritius	74.076	5	Mauritius	75.493	5	Mauritius	76.787
6	Tunisia	66.262	6	Tunisia	66.974	6	Tunisia	68.982
7	Morocco	62.408	7	Morocco	61.998	7	Morocco	64.884
8	Algeria	53.393	8	Algeria	54.039	8	Algeria	55.793
9	Cabo Verde	49.431	9	Cabo Verde	50.431	9	Cabo Verde	47.955
10	Botswana	35.631	10	Botswana	36.607	10	Botswana	36.793

Source: The African Infrastructure Development Index 2018.

Logistics performance comes based on how firms are efficiently connected in supply chains, domestically and internationally. Logistics progressively play an essential role in international trade, which affects the trade cost by reducing it. Moreover, it also contributes to economic growth and integration (Jean-François Arvis et al., 2018). Egypt is one of the emerging economies that try to make development in logistics performance by modifying and developing new policies to reduce the barriers of international trade and achieve best performance for logistics. The World Bank summarized the logistics performance of countries on six dimensions or indexes: customs, infrastructure, international shipments, logistics quality and competence, tracking and tracing and timeliness (J. Arvis, Mustra, Ojala, Shepherd, & Saslavsky, 2007; J. F. Arvis, Marteau, & Raballand, 2010). The dimensions of LPI were selected based on theoretical and empirical research and logistics professional experts, including the international freight forwarders. The six dimensions are divided into classifications; see figure (4-3).

- ✓ The first area indicates the inputs of supply chain (customs, infrastructure, and services).
- ✓ The second area includes the supply chain performance outcome.

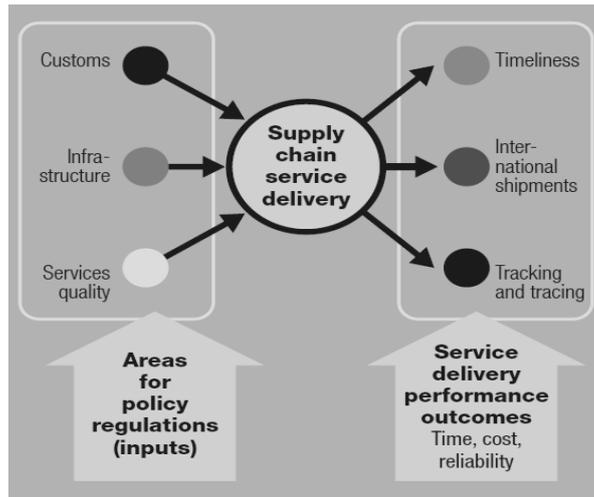


Figure 4- 3: Input and outcome LPI indicators.
 Source: Jean-François Arvis et al. (2018)

“The LPI uses standard statistical techniques to calculate the data into a single indicator. This single indicator can be used to compare countries, regions, and income groups. Because operators on the ground can best assess the vital aspects of logistics performance, the LPI relies on an online survey of logistics professionals from the companies responsible for moving goods around the world: multinational freight forwarders and the main express carriers. Freight forwarders and express carriers are best positioned to assess how countries perform. Their views matter because they directly affect the choice of shipping routes and gateways, thereby influencing the decisions of firms to locate production, choose suppliers, and select target markets. Their participation is thus central to the LPI’s quality and credibility” (Jean-François Arvis, Mustra, Ojala, Shepherd, & Saslavsky, 2014; p.7) The World Bank’s Logistics Performance Index shows that Egypt has significantly improved its logistics performance over the past few years, with the country moving from 42nd in 2014 to 49th in 2016 and showing development in LPI components that lead to significant growth in a country’s trade flows. However, in 2018, the Egyptian rank has decreased to 67th in LPI table 4-8.

Table 4- 8: Egyptian LPI rank from 2007 to 2018

Year	LPI Rank	LPI Score	Customs Rank	Customs Score	Infrastructure Rank	Infrastructure Score	International shipments Rank	International shipments Score	Quality of Logistics Services Rank	Quality of Logistics Services Score	Tracking & tracing Rank	Tracking & tracing Score	Timeliness Rank	Timeliness Score
2007	97	2,37	122	2,08	121	2,00	111	2,33	95	2,38	72	2,62	96	2,85
2010	92	2,61	122	2,11	106	2,22	110	2,56	54	2,87	101	2,56	81	3,31
2012	57	2,98	69	2,6	45	3,07	51	3	50	2,95	66	2,86	64	3,39
2014	62	2,98	57	2,85	60	2,86	77	2,87	58	2,99	43	3,23	99	2,99
2016	49	3,18	65	2,75	50	3,07	45	3,27	43	3,2	54	3,15	48	3,63
2018	67	2,82	77	2,6	58	2,82	73	2,79	63	2,82	89	2,72	74	3,19

Source: World Bank 2018

Jean-Francois Arvis et al. (2016) defined modified six international dimensions of LPI that have been issued in 2016 by the World Bank (customs processes, logistics infrastructure, quality of logistics services, timeliness, tracking and tracing and international shipments). These dimensions are explained in the next section.

1. Customs Processes

J. F. Arvis et al. (2010) stated that the strength of border clearing agencies, processes with all services, and the efficiency of customs and border management clearance are indicators that use the same measurements on the international and domestic level.

2. The Logistics Infrastructure

It is responsible for the main communications for transportations and the information technology between the entities; infrastructure competencies determine constraints or improvements in logistical activities resulting from different connected networks in a country; this factor has also been used on the international and domestic levels (Jean-Francois Arvis et al., 2016).

3. Quality of Logistics Services

It measures the quality and efficiency of the country's logistics providers; this factor is related to the facilities that logistics Service Providers present and also the capabilities to move from one place to another on the international and domestic zones (Jean-Francois Arvis et al., 2016).

4. Timeliness

It means that shipments reach buyers within expected delivery times. Timeliness is the time between order placement and receipt (Jean-Francois Arvis et al., 2016).

5. Tracking and Tracing

It means the ability to monitor the shipments in a specific location and to inform the customer and company about the location of the shipments (Jean-Francois Arvis et al., 2016).

6. International Shipments

They refer to all shipments that are transported from the country of origin to another country (Jean-Francois Arvis et al., 2016).

4.4 Egypt Logistics Development Strategy

Nowadays, Egypt has a social and an economic development vision that enables it to develop the infrastructure, build logistics centres, extend the transport network and increase production capacity. The Ministry of Transport has introduced a long-term vision in order to improve the logistics effectiveness and efficacy (explained next section). Egypt seeks to use the best practices of countries and success stories into the field of logistics and supply chains to achieve the best performance. The Egyptian government has taken into consideration many points

related to sustainable development while they set the logistics and transport strategy (Charles Leyeka Lufumpa, 2018); they focus on:

- Renewable Energy and Energy Efficiency.
- Improving the environment footprint of the energy sector.
- More efficient usage of Egypt's scarce water and land resources.
- Having a less polluting transportation system to protect air quality, especially for urban areas.

Two main studies have been done by the Ministry of Transport with co-ordination with Japan International Cooperation Agency (JICA) in order to take a serious step to apply the logistics vision; the studies are as follow:

- 1- National Transport Plan 2012 – 2027
- 2- Multimodal Transport and logistics system in the Eastern Mediterranean and Egypt's Comprehensive Plan.

The Ministry of Transport has prepared the logistics development plan in Egypt's cities. The logistics development plan includes three main pillars (development of logistics infrastructure - development of the logistic organizational structure - development of customs performance). The main strategic objective of developing transport logistics networks is to make Egypt a global centre for the transport and logistics industry to meet all the requirements of the economic development plans of the countries through (taking advantage of the privileged location of the Arab Republic of Egypt and the efficiency of infrastructure to become a logistics centre globally). Strengthening Egypt's international status based on the strategic location and maximizing the utilization of the Suez Canal whether at local or international connectivity through creating a logistics hub based on the integrated multimodal transport system enable the transport sector to achieve a great impact on the volume of regional and international transport for international trade. Moreover, the Suez Canal also provides a perfect transportation services for individuals and goods with the highest possible efficiency, speed and safety, at the lowest cost and consumption of energy and without damage to the environment (International Federation of Freight Forwarders Association 2019).

1- Port Development

The Ministry of Transport has announced a strategic plan for Egyptian ports, which aims to:

- 1- Increase the capacity of the ports by establishing a number of logistics centres, dry ports and regions to maximize the services provided.
- 2- Establish a new network dedicated to the transport of goods, linking the port production areas and raising the efficiency of river transport.

- 3- Establish a number of river ports close to the logistic areas by upgrading the network of roads in accordance with the expected increases in the movement of goods using the intelligent transport system and electronic collection.
- 4- Develop the customs system to control customs transactions on imports through applying the Single Window System (SWS) at all customs outlets.

The plan includes projects for seaports with a total cost of 71.66 billion Egyptian pounds, divided into the main ports in Egypt: Alexandria Port Authority, 20.3 billion pounds- Damietta Port Authority, 74 billion pounds - Red Sea Port Authority, 13 billion pounds. The Egyptian government also seeks to build dry ports and logistic centres at a cost of LE 15.836 billion and build- in many different areas- many different logistics centres connected with railway projects with a cost of 18 billion Egyptian pounds to serve companies and to increase the trade movement internationally and domestically (International Federation of Freight Forwarders Association 2019).

The Egyptian ministry has divided the logistics in two sections: the first one is Soft-Logistics, which includes the main producers that support the logistics activities, and it has three axes: (Building a Logistics Observatory, Training and Co-ordination and awareness for logistics activities). Soft-Logistics has three main goals as follows:

- Managing the logistics practices by creating an institutional framework.
- Creating a training programs for workers in the logistics field.
- Following the logistics activities through building a logistics observatory system.

The second logistics section is Hard-Logistics, which includes Building of Logistics Centres & Dry Ports, and it has three axes: (cargo, ships, and industry). Hard-Logistics includes five main goals as follows:

- Constructing new logistics centres.
- Developing the Egyptian ports by enhancing the value-added services in ports.
- Constructing distribution centres.
- Building Maritime Fleet.
- Saving the capabilities to support the inter-modality.

2- SWOT analysis

Mohamed (2018) stated that the Ministry of Transport in Egypt has set a strategic plan for transport and logistics sector (figure 4-4), but in order to set this plan, it needed to demonstrate the SWOT analysis for the logistics sector. SWOT analysis assesses the internal strengths and weaknesses, the external opportunities and threats in an organization's environment. 'The internal analysis is used to identify resources, capabilities, core competencies and competitive advantages inherent to the organization. The external analysis identifies market opportunities

and threats by looking at competitors' resources, the industry environment and the general environment' (Sammut-Bonnici & McGee, 2015). Therefore, the following table (4-9) will illustrate the (strengths, weaknesses, opportunities, and threats) for logistics sector in Egypt.

Table 4- 9: SWOT analysis for the logistics sector in Egypt

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"> • Perfect geographical location. • The varieties in logistics activities that can be used in many different sectors. • Maintaining the current infrastructure (road, bridges) and building more. • Increasing knowledge in logistics sector by providing scientific institutes with training and teaching. • More than 15 commercial ports on the Red Sea and the Mediterranean. 	<ul style="list-style-type: none"> • Absence of rules and legislations that organize transport and Logistics. • Overlapping roles among ministries for practicing logistics activities. • Absence of qualified employees in the logistics field. • Using road transport more than any other transport mode, which leads to an insufficient distribution load of transport modes. • Most of the transport fleet is old. • Building a new rail line and renewing the exist. • Increasing the level of competitiveness in ports and airports. • Neglecting the role of Inland water participation in the Logistics System. 	<ul style="list-style-type: none"> • By using Suez Canal Economic Zone (SC Zone), Egypt would be one of the greatest logistics hubs. • Increasing the logistics services demand and growing the value-added services. • Increasing the awareness of logistics activities and logistics knowledge. 	<ul style="list-style-type: none"> • The national legislation is not compatible with the international legislation in the logistics sector. • The economic situation and the legislation procedures are not stable. • Due to the weak performance for local logistics companies, the international companies will possess the logistics market. • Rigid information base of international competitors. • Presence of advanced logistics centres in the neighbouring countries.

Source: (Mohamed, 2018)

Vision

Participating in achieving sustainable development
to develop living standards

Mission

Building a safe, competitive and sustainable transport and logistics system to increase the quality of productivity and decrease its cost, increase the competitiveness of Egyptian exports and decrease the cost of imports.

Goals

- Attracting direct foreign investment by improving the investment climate.
- Increasing the exports.
- Facilitating the flow of imports for production inputs.

Logistics Infrastructure Development Strategy

Dry ports sector and logistics centres	Inland transport sector	Air transport sector	Maritime transport sector
Establishment of a group of dry ports and logistics centres, covering all parts of the Republic and integrated with the multimodal transport axes.	Facilitating existing transport routes and developing means to ensure the redistribution of cargo between different media.	Supporting the role of Egyptian airports to transport goods.	Preparation of central ports.
	Establishment of distribution centres on highways.	Transforming Cairo airport into a pivotal airport and developing cargo villages.	Transforming Egyptian ports into logistics ports.
			Development of the merchant maritime fleet.

Logistics Superstructure Development Strategy

1- Forming a higher logistics council.
2- Establishing logistics performance assessment observatory.
3- Preparing human calibre with standard professional certificate required for practicing the logistics activities.
4- Developing customs performance: simplifying customs producers through the use of single-window system
5- Making legislative amendments to modernize the laws governing transport, introducing new legislations that allow the establishment of dry ports and logistics centres and amending the Ministry of Transport to become the Ministry of Transport and Logistics.

Figure 4- 4: Egyptian strategic plan for logistics sector.
Source: (Mohamed, 2018)

Despite the vital role that transport and logistics sector plays in achieving both economic and social development, transport and logistics sector is still among the most sectors emitting carbon. The World Economic Forum, 2009 stated - as mentioned in chapter one - that logistics accounted for around 5.5% of the global GHG emissions and divided as follows: almost 4.95 % come from transport and 0.55% from the other logistics activities (Bischoff et al., 2009).

The logistics sector is at the centre of a number of Egypt’s most pressing economic, environmental, and health challenges. Egypt is considered one of the 11 fastest growing greenhouse gas (GHG) emission countries in the world. The next section will illustrate the impact of transport and logistics activities on sustainability practices.

Egypt has framed its vision for energy policy, which supports using the natural gas, instead of gasoline for energy conservation and more efficient usage. According to United Nations Framework Convention on Climate Change (2018), the energy sector, including transport, is the primary contributor to GHG emissions in Egypt. Egypt is one of 25 developing countries working with United Nations Development Program (UNDP) through the Low Emission Capacity Building (LECB) Program to identify ways to mitigate climate change causing GHG emissions, while still delivering development benefits to citizens. In addition, running the logistics system in the right way could have a positive effect on the organization’s performance; however, we should take into consideration the aspects that could affect the environment, social and economic dimensions while delivering the logistics services. Therefore, the next section will illustrate the role of logistics services in sustainability dimensions.

4.3 Logistics Emissions in Egypt

✓ **Transportation**

Transport is the fastest growing sector in terms of the consumption of energy and the production of greenhouse gases (GHGs). Among the various sectors, transport accounts for 13.1% of global GHG emissions; moreover, in Egypt it is responsible for approximately 26% of all greenhouse gases (GHG) emissions according to Egypt Second National Communication for the United Nations Framework Convention for Climate Change (UNFCCC) and (El-Dorghamy, Allam, Al-Abyad, & Gasnier, 2015). Figure (4-5) shows the GHGs rate in Egypt from 1990 till 2016 “development in percent (1990 level = 100)”, Excluding LULUCF = Land Use, Land Use Change and Forestry

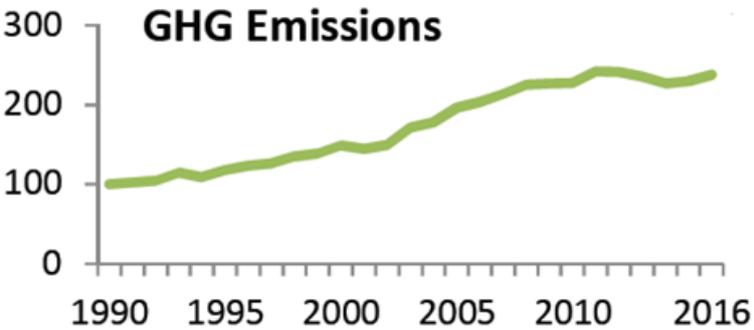


Figure 4- 5: GHGs rate in Egypt from 1990 till 2016
 Source: Climate Change Performance Index, 2019

CO₂ is one of the most hazardous GHG emissions globally. The logistics activities contribute to the CO₂ emissions, especially in transport sector as clear in figure 4-6. In Egypt, the CO₂ emission is represented in figure 4-7. As the transport sector includes numerous unsustainable processes, it is necessary to take this sector into line with sustainability criteria (A. Roth & Kåberger, 2002). The B2B requirements –as the main topic in this research- are too complicated in transport and logistics sectors as they co-operate and integrate together, which needs to have specific characteristics to be compatible with international standards compared with end customer requirements that are too low (González-Benito & González-Benito, 2006). With this integration and collaboration, the quality of their products can hardly be influenced by another party in the supply chain. According to the United Nations (UN), the road sector as the main sector of transport is responsible for 90% of transport energy consumption. The road sector affects the trade movement in Egypt as it transports around 97% of freight movements (Ragab & Fouad, 2009).

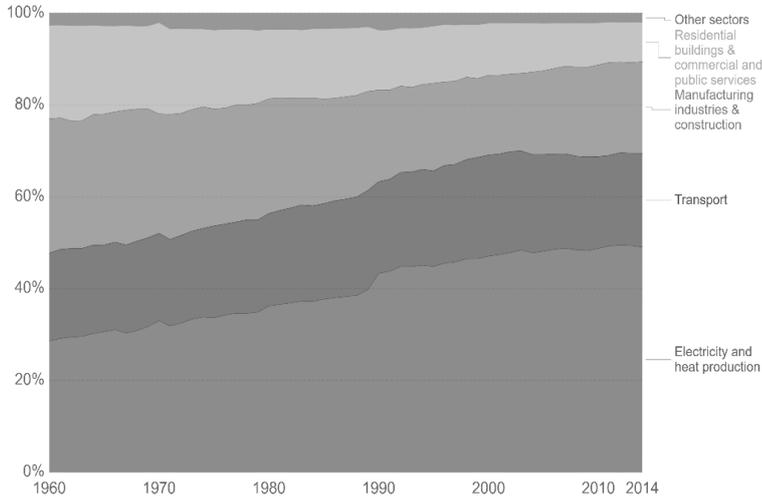


Figure 4- 6: Carbon dioxide (CO₂) emissions by sector.
 Source: International Energy Agency (IEA) via the World Bank

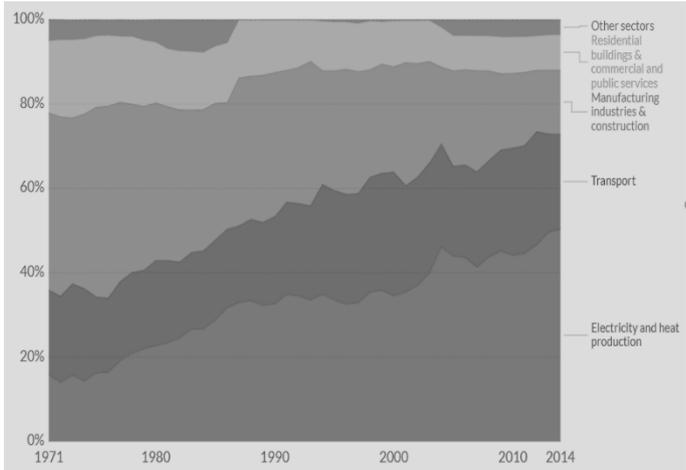


Figure 4- 7: Carbon dioxide emissions by sector in Egypt
 Source: International Energy Agency (IEA) via the World Bank

The United Nations Environment Program (UNEP) mentioned that Egypt adapted the green economy program that could lead to a reduction in CO₂ emissions by 13%. According to Transport in Nationally Determined Contributions (NDCs), Egypt emits 39, 07 Mt CO₂ from transport; however, Löhr, Perera, Hill, Bongardt, and Eichhorst (2017) stated that Egypt has taken a serious action to reduce this amount by (1) Using environmentally friendly forms of transport by using alternative fuel vehicles and planning vehicle routes (2) Improving and expanding the scope of intelligence transport management system and reducing the traffic jam in cities to reduce traffic time (3) Investing in alternative vehicles and fuels such as natural gas, and hybrid and electric trucks (4) Collecting all orders together and switching from transporting goods by using road to rail transport for improving road transport efficiency (5) and using the river as a perfect alternative to ease the domestic trade and connect to the port for international trade.

✓ **The Other Logistics Services**

Warehouse refers to the point where the goods are stored for a specific time. The term "warehousing" is associated with many expressions like martial flows, satisfying customer orders, and value adding services (Baker & Canessa, 2009). With the huge importance of warehouses, it has been and continues to be challenging to achieve sustainability. Transport is the main logistics activity that has a huge negative contribution to the ecological system; in addition, when we consider the sustainability issues or GHGs within supply chains, most of the attention goes to transportations and little attention is given to the warehouse emission in supply chains. Therefore, we cannot neglect the role of warehouses, too. Rüdiger, Schön, and Dobers (2016) stated that "the total energy demand of warehousing can equal around one quarter of the transport emissions". The impact of warehouses comes from many different aspects like land use space, amount of used energy, total emissions produced, consumption of water and "embedded energy contained in building materials".

A. McKinnon (2010) stated that companies have two levels to deal with in warehouses: micro-level, which includes energy, water and land and building materials. This type that comes with the operational level enables companies to deal with it as it is internal, whereas the external macro-level that is connected with the impact of "land use, atmospheric emissions, waste management, traffic and congestion, public transport, visual intrusion and ecology" companies cannot deal with it and affects the environment and society. Companies in Egypt are doing huge efforts to mitigate the pressures on the environmental side by using the energy efficiently and economically, the fossils that provide the equipment and tools in warehouses (Forklift, conveyers...), temperature control whether in cooling or heating, external and internal lighting, and water.

Achieving sustainability is a huge challenge for most of companies in Egypt. Warehouses are one of the main targets that companies try to manage all aspects from energy use, resources,

electricity, water and land. However, there are a lot of chances that firms could use to achieve sustainability by controlling and reviewing lighting and heating and managing ventilation rates and heat loss.

Packing and packaging are required processes to protect all products in transport and storage until they reach consumers. Most customers are suffering from the traditional packaged products and inefficient use of packaging materials, which is considered a point to be discussed. Packaging comes in the third place for GHGs emitting, after transportation and warehouses in logistics activities. This industry drew the companies' attention from two different aspects: low weight of packaging per unit product or the non-use of materials viewed as environmentally harmful. In the UK, companies – according to the regulations- must pay for the recycling of a specific amount of their packaging waste (including wood, aluminium, steel, cardboard and plastic). These processes are done through electronic Packaging Recovery Notes (PRNs) and Packaging Export Recovery Notes (PERNs) to illustrate the amount of packaging that has been recycled (A. McKinnon, 2010).

The emitting of GHGs in packaging includes many different levels, starting from the raw materials that are used to produce the pack, construction of the packaging system, transporting of materials and finished, the product usage level, refurbishment and the end of product life. Ninlawan, Seksan, Tossapol, and Pilada (2010) stated many objectives for packaging to be sustained: economizing packaging, which means making the packaging size smaller than normal; using recyclable materials for packaging; separating the knowledge of recycling and reuse and increasing the awareness; increasing the integration among supply chain members to set rules for packaging; 'encouraging and adopting returnable packaging methods' and finally using system for pallet recycling.

Based on the information mentioned above, Egypt has published a bundle of laws since 1994 (the environmental law), "this law 4/1994, has a greater role with respect to all governmental sectors as a whole. The law has been designated as the highest coordinating body in the field of the environment that will formulate the general policy and prepare the necessary plans for the protection and promotion of the environment. It will also follow-up the implementation of such plans with competent administrative authorities: the Egyptian Environmental Affairs Agency (EEAA). Some provisions of Law 4 were amended by Law 9/2009, and Law 105/2015. From the social side, Egypt has published a bundle of laws related to workers' safety and precautions, and it also supported their training and increased their awareness and knowledge. Moreover, Law 181 specialized in keeping customer privacy and policies. For economic aspects, the researcher will focus on how the environmental and social elements affect the overall cost for logistics service providers' customers. The main elements of sustainable economic will be derived from the literature and will be mentioned in chapter (5).

4.6 Egyptian Laws

The following section will illustrate the Environmental, social laws that are related to the LSPs activities and would have negative effect on the environment.

1- Egyptian Environmental Law 9

Article 1:

This law aims at:

- Protecting the environment, preserving its safety and balance, and preserving its natural systems.
- Reducing pollution in all its forms, and treating any direct or indirect negative damages or effects as an urgent matter resulting from the practice of various activities.
- Protecting natural resources and making optimal use of them for the benefit of present and future generations in order to achieve sustainable development.

Implementing international obligations related to environmental protection and pollution control, as stipulated in regional and international agreements and treaties ratified by the Arab Republic of Egypt.

This law is based on the following principles and foundations:

- Environmental protection and the preservation of natural resources and human health are part of the general policy of economic, social and cultural development.
- The protection of the environment and the preservation of natural resources are considered to be a public interest and a joint responsibility of the official state authorities, civil society organizations, bodies, apparatus and individuals.
- The environmental impact of each project or activity should be evaluated, as a means of planning and prevention in order to combat pollution sources and prevent the degradation of natural resources.
- It is the polluter's responsibility to pay compensation and bear all damages caused by pollution.
- Respecting international and regional covenants related to the environment.

Article 36 (vehicles, trucks and machines):

The use of machines, engines or vehicles that emit exhaust, heavy smoke or noise exceeding limits set by the executive regulations (Appendix 1) of this law shall be prohibited.

Without prejudice to provisions of Traffic Law issued by Law No. 66 for 1973, Police officers of Water Surfaces and Environment, having the capacity of judicial law officers, are legally entitled to stop operation or running of machines, engines, or vehicles as well as withdraw their licenses till causes of violation are removed.

Article 29, 30, 31, 32 (Waste Management)

Article 1 of the General provisions of the Egyptian environmental protection Law No. 4 of the year 1994 defined waste management as collecting, transporting, recycling and disposing of waste. They mentioned many different types of waste as follows:

- Liquid Substances Harmful to the Water Environment: Harmful and hazardous waste provided for in international agreements to which Egypt is bound, the substances listed in the International Convention of 1973/1978.
- Hazardous waste: waste of activities and processes or its ashes that retain the properties of hazardous substances and have no subsequent original or alternative uses, like clinical waste from medical treatments or the waste resulting from the manufacture of any pharmaceutical products, drugs, organic solvents, printing fluid, dyes and painting materials.

Article 29:

It is forbidden to displace hazardous substances and waste without a license from the competent administrative authority. The executive regulations of this law shall determine the procedures and conditions for granting such a license and the authority competent to issue it.

The ministers shall, each in their field of competence, issue in coordination with the Minister of Health and EEAA a table of the hazardous substances and waste referred to in Para one of this article.

Article 30:

Management of hazardous waste shall be subject to the rules and procedures laid down in the executive regulations of this law. The executive regulations shall designate the competent authority, which, after consulting EEAA, will issue the table of hazardous waste to which the provisions of this law shall apply.

Article 31:

It is forbidden to construct any establishment for the treatment of hazardous waste without a license issued by the competent administrative authority after consulting the EEAA. Disposal of hazardous waste shall be in accordance with the conditions and criteria set forth in the executive regulations of this Law. The Minister of Housing shall, after consulting with the Ministries of Health and Industry and the EEAA, designate the disposal sites and determine the conditions of the license to dispose of hazardous waste.

Article 32:

It is forbidden to import hazardous waste or to allow its introduction into or its passage through Egyptian territories. It is forbidden without a permit from the competent authority to allow the passage of ships carrying hazardous waste in territorial seas or in the exclusive maritime economic zone of the Arab Republic of Egypt.

Article 104: Auditing and Inspection

Inspectors of administrative authorities are concerned as well as the inspectors of the EEAA who have the capacity of judicial officers in matters related to the environment shall be held, each in his field of competence, to report to the authority to which they belong any violation of the provisions of this law and the authorities concerned shall then take the necessary legal procedures.

2- Egyptian social law

Law 4/1994 is still an important contributor to the social side, too. this time focusing workers and employees in the entity.

Article 5: (Training)

Apart from article 5 in the environmental law, they mention the below statement:

“Establishing environmental education programs for workers and assisting in their implementation”.

Article 43: (precautions)

The owner of an establishment is held to take all precautions and procedures necessary to prevent the leakage or emission of air pollutants inside the work premises except within the permissible limits as defined by the executive regulations of this Law, whether they result from the nature of the establishment activities or from malfunctioning equipment. He has to provide the necessary protective measures for workers in accordance with the conditions of occupational safety and health, including choosing the appropriate machinery, equipment, material and fuel, taking into account the period of exposure to these pollutants. He must also ensure adequate ventilation and install chimneys and other air purification devices. (Appendix 1)

Law 181 for 2018, article 29

The entity who entered into the contract is obligated to maintain the customer’s information, data and feedback not to circulate or disclose them in contravention of the provisions of this law.

The main aim of this study is to propose a new framework of sustainable logistics service quality for enhancing logistics service providers' customer satisfaction and relationship quality through reviewing sustainable service quality (SSQ) and logistics service quality (LSQ) elements. Consequently, this study is divided into two parts: the first one is related to SSQ

elements; in this step, the researcher reviewed the main Egyptian laws related to environmental and social aspects, as SSQ is the environmental, economic and social issues that are critical to operational service quality, particularly in logistics service provision. Therefore, the researcher will mention the main elements related to SSQ based on the reviewed laws (see chapter 5). The second part will be related LSQ elements; LSQ is a component of service quality that is crucial to operational service quality, particularly in logistics service provision. The elements of LSQ will be derived out based on reviewing the literature in the next chapter. Based on reviewing the SSQ and LSQ elements, SLSQ elements will be designed.

Shortly, this chapter has explained the existing situation that helps to demonstrate the main research problem. It introduced the main axes of sustainability in Egypt and mentioned the steps of building sustainability in Egypt and the main challenges for applying it. Furthermore, it highlighted the logistics situation in Egypt and the future strategic plan for logistics industry. In addition, it linked the sustainability aspects with logistics activities and stated the contribution of logistics activities to sustainability. Finally, it mentioned the Egyptian laws that will be used to measure the study variables through elements that will be mentioned in the next chapter.

Chapter Five

5. Development of Theoretical Framework

5.1 Introduction

Chapters 2 and 3 have presented a wide literature review about sustainability, service quality, logistics service quality, customer satisfaction, and relationship quality in logistics service providers field; moreover, they presented a lot of studies concerning sustainability and logistics: (Björklund & Forslund, 2013; Centobelli et al., 2017; Chaisurayakarn et al., 2014; Gupta et al., 2018; Halldórsson et al., 2010; Isaksson & Hüge-Brodin, 2013; K. J. Lieb & Lieb, 2010; Martinsen & Björklund, 2012; Martinsen & Hüge-Brodin, 2014; D. Shaw & Black, 2010; Tacken et al., 2014), but the studies that are concerned with sustainable logistics service quality are rare. Therefore, this study's main objective is to propose a new sustainable logistics service quality (SLSQ) framework in order to enhance business Customer Satisfaction (CS) and Relationship Quality (RQ) in logistics service provider field in Egypt. The gap has been found through reviewing the main variables of the study (SSQ, LSQ, LSP, CS, and RQ); we found this gap based on comparing the existing literature that measures the impact of SLSQ on RQ in Egypt.

Formatting this framework will be built based on reviewing the Egyptian laws; see chapter 4 and the literature related to sustainable service quality in order to extract the main elements of the first research question:

- ✓ Research question 1: What are the LSP's SSQ elements?

In order to format the main framework of the study, the researcher sought to answer the second research question of the study, which is related to the main elements of LSQ variable through reviewing the literature.

- ✓ Research question 2: What are the LSP's LSQ elements?

Elements of SSQ and LSQ will be explored and designed based on RQ1 and RQ2 and will be validated through interviews with specialists in the field of LSP and its customers; the third research question will be formatted:

- ✓ Research question 3: What are the LSP's SLSQ elements?

After that, the final framework will be designed in order to answer the fourth research question:

- ✓ Research question 4: What is the impact of sustainable logistics service quality on customer satisfaction level and relationship quality?

The theoretical framework has been shaped based on the existing literature explained in the previous chapters in order to answer the main research questions. The next section will explain the main elements of each LSQ and SSQ.

5.2 The Main Elements for SSQ in LSP

Sustainability is considered one of the critical aspects in LSPs performance. Environmental performance as one of sustainability dimensions’ measurement can be a critical aspect in LSPs’ environmental offering (Martinsen & Björklund, 2012). According to Chaisurayakarn et al. (2014), there is a lack of studies in the field of Green Service Quality (GSQ), as explained in chapter three that green service quality is one of the main factors of sustainability. The other sustainability factors should be taken into consideration (social and economic perspectives). Chaisurayakarn et al. (2014) stated that it is rare to find a study that includes the three main dimensions of sustainability and they recommended that firms need to consider these dimensions.

- **Sustainable service quality**

The term is not well-established in the academic literature as it is considered a new context, although the term of environmental sustainability has been discussed widely and known for a long time ago. A lot of studies have been done in the field of LSP related to environmental issues in the logistics area, but most of these studies concentrated on either the LSP’s 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 logistics service quality.

Environmental performance, economic performance and social performance are determined as the three performance measures that have direct relationships to the LSP sustainable initiatives (Gunasekaran & Spalanzani, 2012). They are responsible for the services that LSPs present to their customers. How LSPs could present a sustainable service quality through applying these initiatives was explained in the previous chapters.

Environmental Performance: Environmental performance is highly dependent on the use of efficient and clean sustainable energy sources. Based on the Egyptian laws discussed in chapter 4, the environmental sustainability elements of LSP will be derived out. To measure environmental performance, a lot of elements have been derived from different studies, which are illustrated in the next table (5-1).

Table 5- 1: Measurement elements used to assess environmental sustainability performance.

Variable	Measurement elements	References
Environmental Sustainability	Use of less polluting vehicles	Faruk et al. (2002), González-Benito and González-Benito (2006), Lin and Ho (2008), Jumadi and Zailani (2010), K. J. Lieb and Lieb (2010), and Langella and Zaroni (2011). Based on environmental Egyptian law 9, article 36 (vehicles, trucks and machines) see chapter 4.
	Using routing systems to minimize travel distances	K. J. Lieb and Lieb (2010), and Langella and Zaroni (2011) Based on environmental Egyptian law, article 36 (vehicles, trucks and machines) see chapter 4.

	Using cleaner fuel standards and switching to gas as an alternative to gasoline	Hourneaux et al. (2014), Yusuf et al. (2013), Yang et al. (2011) Based on environmental Egyptian law 9, article 36 (vehicles, trucks and machines) see chapter 4.
	Vehicle maintenance and disposal system	Lin and Ho (2008), Jumadi and Zailani (2010), K. J. Lieb and Lieb (2010). Based on environmental Egyptian law 9, article 36 (vehicles, trucks and machines) see chapter 4.
	Using alternative energy sources (e.g. solar or photovoltaic panels)	Jumadi and Zailani (2010), K. J. Lieb and Lieb (2010), and Langella and Zanoni (2011), P. R. Murphy and Poist (2000), Hervani, Helms, and Sarkis (2005), Rizzo (2006). Based on environmental Egyptian law 9, article 1 (vehicles, trucks and machines) see chapter 4.
	Packaging/shipping materials are reusable	Sonneveld et al. (2005). Based on environmental Egyptian law 9, article 29, 30, 31, 32 (Waste Management) see chapter 4.
	Packaging/shipping materials are recyclable	Sonneveld et al. (2005). Based on environmental Egyptian law 9, article 29, 30, 31, 32 (Waste Management) see chapter 4.
	Packaging/shipping materials are bio-degradable	Sonneveld et al. (2005). Based on environmental Egyptian law 9, article 29, 30, 31, 32 (Waste Management) see chapter 4.
	Performed an environmental or waste audit	Perotti et al. (2012), Ageron, Gunasekaran, and Spalanzani (2012). Based on environmental Egyptian law 9, Article 104 (Auditing and Inspection). see chapter 4.
	Improved compliance with environmental standards	King and Lenox (2001) Based on environmental Egyptian law 9, Article 104 (Auditing and Inspection). see chapter 4.

Source: This Research.

Economic Performance: defined as the financial benefits, decreasing cost and market competitiveness that a company gains after LSP adopting sustainable initiatives. The research will take economic performance from cost side and measure to what extent LSPs contribute to reduce their customer overall costs based on the following elements in table (5-2):

Table 5- 2: Measurement elements used to assess economic sustainability performance.

Variable	Measurement elements	References
Economic Sustainability	Improving company image (i.e. company is seen as a green company)	Smith (2007), Rao and Holt (2005)
	Improving company's position in the marketplace	Smith (2007), Rao and Holt (2005)
	Decreasing of fee for waste treatment	Perotti et al. (2012)
	Decreasing cost of energy consumption	Perotti et al. (2012)
	Decreasing fine of environmental accident	Zhu, Sarkis, and Lai (2007)
	Decreasing your disposal costs	Perotti et al. (2012)

Source: This Research.

Social sustainability: this variable that can be seen as critical and complex for sustainability performance (Hourneaux Jr, da Silva Gabriel, & Gallardo-Vázquez, 2018). Based on the Egyptian laws discussed in chapter 4 and literature review related the social sustainability elements of LSP will be derived out. To measure social performance, a lot of elements have been derived from different studies, which are clarified in the next table (5-3):

Table 5- 3: Measurement elements used to assess economic sustainability performance

Variable	Measurement elements	References
Social Sustainability	Protecting employee health and safety	Hourneaux Jr et al. (2018), Jumadi and Zailani (2010), Wilding, Wagner, Ashby, Leat, and Hudson-Smith (2012). Based on social Egyptian law 4 article 43: (precautions) see chapter 4.
	Creating training programs, awareness programs, seminars for workers.	Hourneaux Jr et al. (2018), Zailani, Jeyaraman, Vengadasan, and Premkumar (2012), Wilding et al. (2012). Based on social Egyptian law 4 article 5 (Training) see chapter 4.

	Considering customer compliance	Hourneaux Jr et al. (2018). Based on customer protection Egyptian law 181 for 2018, article 29. See chapter 4.
	Enhancing customer privacy	Hourneaux Jr et al. (2018). Based on customer protection Egyptian law 181 for 2018, article 29. See chapter 4.
	Ensuring customer satisfaction.	Hourneaux Jr et al. (2018). Based on customer protection Egyptian law 181 for 2018, article 29. See chapter 4.

Source: This Research.

5.3 The Main Elements of LSQ in LSP

Logistics service quality has been studied from different perspectives in LSP's performance. Most researchers have conducted the LSQ studies to figure out the perceptions of LSQ of LSP selection or factors affecting customer satisfaction, see table (6-4). However, this research will examine the effect of SLSQ framework on customer satisfaction and relationship quality. As explained in chapter two, the LSQ has nine dimensions explained below; however, two new dimensions have been added to the main LSQ model by Thai (2013): 'image' and 'social responsibility'. The main nine factors of LSQ in LSP are as follows:

✓ Personnel Contact Quality

It refers to the party that logistics service providers' customers deal with (Mentzer et al., 2001) 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 show a significance of that variable on the image of the company. Most researchers recognized that customers care more about whether customer service personnel are knowledgeable, empathize with their situation and help them resolve their problems; furthermore, it represents the main dimension of sustainability, which is social sustainability, and also that personnel should have knowledge enough for giving advice and tips to decrease the huge pressure on the environmental aspects.

✓ Order Release Quantities

It is related to the concept of product accessibility, which means that suppliers' companies have the flexibility to deliver certain order sizes (Mentzer et al., 2001). Product availability is a perfect indicator of the excellence of logistics. The level of satisfaction will be achieved when the customers have their products in the right quantities. Keebler, Manradt, Durtsche, and Ledyard (1999) stated that failing in delivery leads to decreasing the level of goods or raw materials in warehouses, followed by financial losses that cause customer dissatisfaction. As we see here, that problem could affect the economic sustainability in the field of the company.

✓ **Information Quality**

This dimension explains the way that customers note the information given by suppliers, which is related to the variety of products and their availability (Mentzer et al., 2001). This term is very important because this type of information makes customers able to make decisions. In addition, the role of Information and Communication Technologies (ICTs) is to provide new low-cost and easy-to-use information tools, especially to the firms that operate in the logistics service industry and have intentions to apply environmental sustainability initiatives (Centobelli et al., 2017), (Centobelli et al., 2017) that may be able to support their environmental practices.

✓ **Ordering Procedures**

Ordering procedures are one of the main customer concerns; when they process an order, they get worried about the complicated procedures and expect to have an effective and efficient way to procedures of ordering products /materials on the part of the suppliers or service providers (Mentzer et al., 2001).

✓ **Order Accuracy**

Mentzer et al. (2001) highlighted the three main dimensions of the order (Ordering Quality, Order Accuracy, Order Conditions) and clarified that the three dimensions are different to each other. Order accuracy refers to the ability of the suppliers or service providers to deliver the right element at the required number as ordered, with none of the orders being replaced with other elements (Bienstock et al., 1997).

✓ **Order Condition**

It is 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 logistics service providers, depending on the damage form and its size (Mentzer et al., 2001). The logistics service providers should take into consideration the type of the packing and packing material, and also the handling equipment should be friendly to the environment.

✓ **Order Quality**

This dimension is also related to damage levels of the products ordered from the logistics service providers but this time the manufacturing damage. It measures if the products' specifications provided by the logistics service providers meet the customer expectations (Novack, Langlely Jr, & Rinehart, 1995).

✓ **Order Discrepancy Handling**

The way in which the logistics service providers deal with any problems upon the arrival of orders reflects the order discrepancy-handling dimension. It allows the customer to make a complaint about specific points related to the orders whether not accurate, in poor condition, or with poor quality (Novack et al., 1995), so the ability of logistics service providers to fix and handle this problem in a sustainable and sufficient way is the main target of the providers.

✓ **Timeliness**

The most critical factor that customers always care about is timeliness because they prefer to get the product in the right time as promised. It looks like a deadline that starts from order placement to order receipt (Hult, Hurley, Giunipero, & Nichols Jr, 2000). This dimension could be affected by many reasons, such as (the problems during transportation that may delay the transportation time and back-order time when products ordered are not available in stock.

The following table (5-4) illustrates the main variables of LSQ and also gives an overview of the previous studies that have been done in this field. The author has reviewed 25 articles related to LSQ and stated the main variables of each study. There are 12 different elements or variables of logistics service quality that appear in many different articles, whether as a discussion or an empirical testing. The main nine elements explained above are the most important to the customers according to the literature, and they also got confirmed by the study of Mentzer et al. (2001) and Rafiq and Jaafar (2007) as the constructs of LSQ.

Table 5- 4: Logistics Services Quality Elements

Study	Information Quality	Ordering procedures	Order Releases Quantities	Timeliness	Order Accuracy	Order Quality	Order Condition	Order Discrepancy Handling	Personnel Contact Quality	Action on complaints	Communication about deliveries	Technical, sales and other support
Mentzer et al. (1989)	x	x	x	x	x	X	x	X	x			
Sterling and Lambert (1989)	x	x	x	x	x	X	x	X	x	X		
Pisharodi and Langley (1991)	x	x	x	x	x	X	x	X	x	X		x
Holcomb (1994)	x	x	x	x	x	X	x	X	x		x	
Emerson and Grimm (1996)	x	x	x	x	x	X	x	X	x	X		x
Bienstock et al. (1997)	x	x	x	x	x	X	x	X	x			x
Daugherty et al. (1998)	x	x	x	x	x	X	x	X	x	X	x	
Mentzer et al. (1999)	x	x	x	x	x	X	x	X	x	X		
Mentzer et al. (2001)	x	x	x	x	x	X	x	X	x	X		
Grant (2003)	x	x	x	x	x	X	x	X	x		x	x
Rafele (2004)	x		x	x		X			x		x	
Sahoil et al. (2006)	x	x	x		x	X	x	X				
Hong et al. (2007)	x	x		x	x	X	x	X				
Rafiq and Jaafar (2007)	x	x	x	x	x	X	x	X	x			
Rahman and Laosirihongthrong (2008)		x	x	x	x	X	x	X				
Gil Saura et al. (2008)	x			x		X			x		x	
Kersten and Koch (2010)		x	x	x	x	X	x		x		x	
Tian et al. (2010)	x			x			x	X				
Banomyong and Supatn (2011)	x	x	x	x	x	X	x	X	x	X		x
Cerri (2012)	x	x	x	x	x	X	x	X	x		x	
Bouzaabia et al, (2013)	x	x	x	X	x	x	x	X	x			
Thai (2013)	x			X		x			x			
Philipp and B. Grant (2014)	x	x	x	X	x	x	x	X	x			
Ali, (2015)	x	x	x	X	x	x	x	X	x			
Chaisurayakarn (2014)	x	x	x	X	x	x	x	X	x			
Rahmat and Faisol (2016)				X	x		x					
$\Sigma 25$	22	20	20	24	21	23	22	20	21	7	7	5

Source: Adapted from Grant (2003) and Jaafar (2006), created by author from Sahoil et al. (2006).

5.4 Sustainable Logistics Service Quality

The main aim of this research is to propose a sustainable logistics service quality framework to enhance logistics service providers' customer satisfaction and relationship quality between LSPs and their customers. It started with reviewing the main elements of sustainable service quality based on the Egyptian laws related to sustainability and literature review; moreover, reviewing logistics service quality elements through literature review. This chapter has tried to understand the existing approaches, elements, and theories in the field of LSQ and SSQ by examining the empirical studies related to these variables to build the main study variable, which is sustainable logistics service quality (SLSQ). The definition of this variable will be presented and explained based on reviewing the LSQ and SSQ definition, and we define SLSQ as:

“Sustainable functional and technical processes that are followed by Logistics Service Providers in order to present better services to achieve the satisfaction of stakeholders and build a strong relationship with them”.

SLSQ is considered to be the common cause of LSQ and SSQ, which is called reflective. It means that the causal action flows from SLSQ to LSQ and SSQ. Any changes that could happen to the latent variable (SLSQ) changing pressure, instruction or therapy cause a change in indicator behaviour (SSQ and LSQ) (Edwards & Bagozzi, 2000). Based on phase one of the study, which is reviewing the literature and Egyptian laws, figure (5-1) shows the main framework of the study.

SLSQ Framework

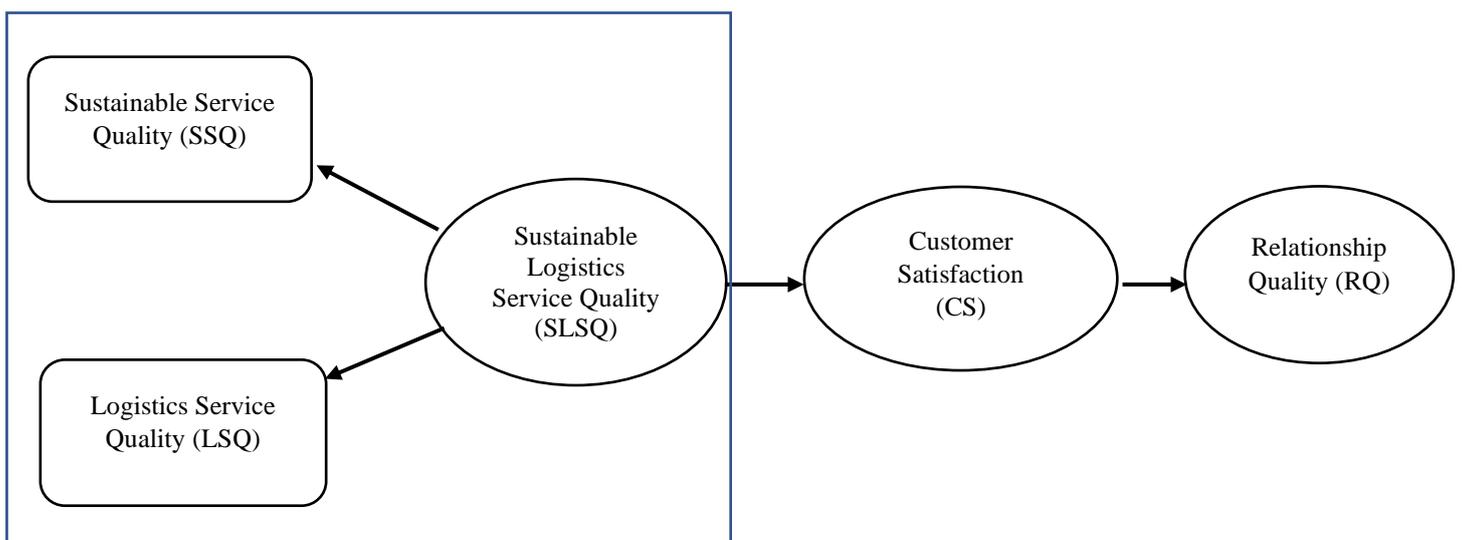


Figure 5- 1: Conceptual framework of SLSQ
Source: This Research

As SLSQ is a new variable, it needs to have new elements to measure it, so the researcher works to find the best elements that are suitable with this variable. Based on reviewing SSQ and LSQ literature, the researcher designed and stated new statements that could represent SLSQ variable; however, they could not be taken as they are. These statements need to be tested and validated by experts, academics and specialities before being used in the main study; table (5-5) shows the SLSQ elements.

Table 5- 5: SLSQ proposed elements

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

Source: This research

These elements that have been designed and reviewed based on reviewing LSQ and SSQ will be validated through specific techniques to be suitable for the nature of the study and for the purpose that they are designed for. The validation steps of these variables will be explained in details in chapter seven.

Briefly, This chapter starts with the research questions of the study and the answer to each question in separate points starting with SSQ elements mentioned in the first section, with the empirical studies and Egyptian laws related to these elements; after that, the main elements of LSQ and the existing empirical studies related to LSQ are mentioned. Finally, the main framework of study, which includes SLSQ that will be explained in details in chapter seven, is proposed. The next chapter will illustrate the methodological approach that has been used in this research, and it explains the tools and techniques used to achieve the research aim.

Chapter Six

6. Research Methodology

6.1 Introduction

This chapter will discuss the methodology used to analyse that model, the reasons for choosing those methods, the advantages and disadvantages of the chosen methods as well as defining the research design and the data collection process. This research explains the tools used to collect the data and measurement scales to measure the effect of sustainability on Logistics Service Quality and Customer satisfaction. At the end of the chapter, there is an overview of the main variables of the model and the conceptual and operational concepts of each.

6.2 Research Phases

This research aims to understand the practitioners' perceptions of SSQ in Egypt and the key role of SSQ in logistics industry and propose new SLSQ variables that would enhance customer satisfaction and relationship quality in Egypt. The research questions aim to find the most suitable elements of study in order to be compatible with the research nature, Egyptian culture, and the new environment. Therefore, phase one of this research is concerned with confirming SLSQ elements and understanding in-depth the full picture of SLSQ elements through semi-structural interviews with researchers and specialists in the field of LSP to make validation for the SLSQ elements and to answer the first three questions of the study: 1- What are the LSP's SSQ elements? 2- What are the LSP's LSQ elements? 3- What are the LSP's SLSQ elements? Phase two of this study will use a questionnaire that will be distributed to the targeted sample. The questionnaire will be designed based on the elements that will be derived out of phase one. All phases will be explained in details in the next sections.

A lot of researchers provide development of framework validation in marketing and logistics (Churchill & Iacobucci, 2010; Churchill Jr, 1979; Dunn, Seaker, & Waller, 1994; N. K. Malhotra, D. Birks, & P. Wills, 2012; Spector, 1992) as they have a respective major of marketing and logistics. Table 6-1 shows the three-phase methodology proposed for frameworks.

As in table (7-1), in phase one the researchers (Churchill & Iacobucci, 2010; Churchill Jr, 1979; Dunn et al., 1994; N. K. Malhotra et al., 2012; Spector, 1992) started with a domain of the research. The domain of this research includes SSQ, LSQ, SLSQ, and CS and relationships between those variables. The explanation and definitions of each domain are provided in chapters two, three, and four. Then, the elements related to the variables are generated and the results from the literature are used to identify the main elements for the study as in table (6-1) in the first phase. In the second phase in part one, a pilot study is used to confirm and verify the main elements of the study; part two is to examine the reliability and validity of the study elements. The last phase is to proceed with the main research.

This research is developed from the original framework of Churchill (1979) in order to provide the consistency and relevance sought in logistics and marketing research. In phase one the main elements of SSQ, LSQ, and SLSQ were developed and confirmed. In phase two, the initial data for testing were collected, and the main elements were confirmed and validated. In the last phase. the study and its final results were validated.

Table 6- 1: Three-phase Methodology for Element and Construct Development Validation

Phase	Churchill (1979) and Churchill and Iacobucci (2010)	Dunn, Seaker and Waller (1994) Regarding Logistics	Spector (1992) Regarding Scales	Malhotra, Birks and Wills (2012) Regarding Marketing
Phase I	Specify domain of construct (literature search)	Define constructs		Develop theory
	Generate sample of elements (Literature search, experience survey, insight stimulating examples, critical incidents, focus groups)	Develop potential elements, check content validity, confirm substantive validity	Design	Generate initial pool of elements: theory, secondary data and qualitative research
Phase II	Collect data	Pilot survey	Pilot test	Select a reduced set of elements based on qualitative judgement, collect data
	Purify measure (coefficient alpha, factor analysis)	Exploratory factor analysis, Element to total correlation	Administration and element analysis	Statistical analysis and develop purified scale
Phase III	Collect data, assess reliability (coefficient alpha, split-half reliability), assess validity	Test theory, confirmatory factor analysis, reliability, convergent validity, discriminant validity (predictive and concurrent), nomological validity	Validate and norm	Evaluate scale reliability, validity and generalizability

Source: Chaisurayakarn, (2015)

6.3 Research Design

The deductive approach is adopted in this study ... “A deductive approach is concerned with developing hypotheses based on existing theory, and then designing a research strategy to test the hypothesis” (Papaioannou & Wilson, 2010, p.510.). The investigation of literature was done carefully to figure out the theories related to our main topic. This research is exploratory in order to explore the SLSQ role in LSP field.

A lot of points have been taken into consideration in designing the research. The best tools to measure the main model and to carry out the research will be determined based on the main problem. Mixed methods approach is the tool that will be used in this research in order to answer the research questions. Creswell (2013) stated that both qualitative and quantitative data are essential for answering research questions as the researcher stated. The next section will illustrate and define these methods.

6.4 Mixed Methods Approach

A qualitative study is the type of study that was developed primarily in social science research. It usually has what, how and why questions, which is required to answer the main questions of the research; the collection of the data in the qualitative method depends on observation, in-depth interviews, document analysis, and focus groups (Yilmaz, 2013, p.315.). Van Maanen (1979); p.9 defined the qualitative method as “an array of interpretative techniques that seek to describe, decode, translate and otherwise come to terms with the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world”. According to Lincoln and Denzin (2000), a qualitative research is "multimethod in its focus involving an interpretative, naturalistic approach to its subject matter. This means that the qualitative researcher studies things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meaning people bring to them."

The quantitative studies answer why and how questions but not the same as the qualitative studies; systematic measurement, experimental and quasi experimental methods, statistical analysis and mathematical models are the main tools of quantitative studies. The information of observed actions of samples is gathered through statistical data collected of the observed actions of the samples (Wittrock & Association, 1986); these data are analysed in numerical forms that would describe the relationship between two variables or more, or they could measure a causal relationship or measure the effect of one variable on another (Gall, Borg, & Gall, 1996). Gall et al. (1996) stated that the main purpose of quantitative research is to find causal relationships between variables. The researchers collect the primary data through questionnaires, or surveys, to test the hypotheses that answer the research questions of the study (Yilmaz, 2013). The observations of the study should be checked from two different sides: objectivity and validity, because of the big sample size involved. One of the most important aspects of quantitative research is that the process of data collection can include both descriptive and analytical findings (D. A. Jenkins & Smith, 1994). Bouma and Atkinson (1995), p.208 demonstrated that some research studies adapt the quantitative approach whereas some others are convinced that adapting qualitative approaches will provide them with better findings, though in specific research studies, both approaches can be adopted.

There are some studies that use both methods (Qualitative and Quantitative); they are called “Mixed Method”. This type of research uses multiple methods, not one research type – either qualitative or quantitative. A mixed method could be used to cover the weakness for each qualitative or quantitative method, and it also leads to cover all gaps that could exist in the case of using only one method. It also shows an accurate inference due to the huge review. Mixed method is defined as “the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches, (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, and inference techniques) for the broad purposes of breadth and depth of understanding and corroboration” (Johnson, Onwuegbuzie, &

Turner, 2007). It is claimed that the strength of a research study could be gained by using mixed methods, which give the researchers more confidence in their research results (Harrison & Reilly, 2011).

As mentioned before, this study is exploratory, which proposes a new SLSQ framework to enhance customer satisfaction and relationship quality and to figure out the new elements of SLSQ variable in the fields of LSP in developing countries like Egypt. This research used the exploratory sequential design (Creswell, 2013), as shown in Figure 6-1.

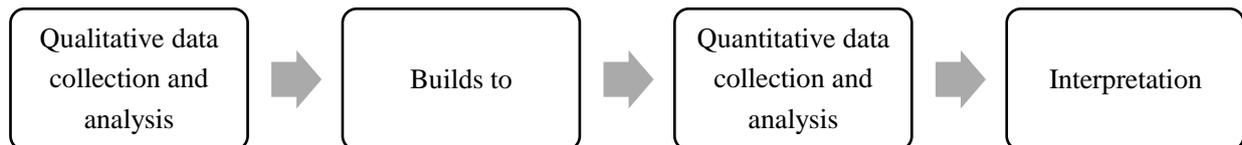


Figure 6- 1: Exploratory Sequential Design
 Source: Adopted from Creswell (2013)

In this study, the qualitative phase is conducted through semi-structured interviews; this is followed by a quantitative phase in which data are collected through an online survey. The survey method is the most frequently used in the research (Gall et al., 1996). It gives an opportunity to the researchers to collect the data from the targeted sample. According to Gall et al. (1996), the survey method is a “constructive research methodology and can be considered to be a systematic data collection tool used in large scale investigations”. Survey tools include questionnaires and the individual interview, which are the main data collection tools in this research. The results of the qualitative phase are helpful in developing a measurement scale (questionnaire) “Measure sustainable logistics service quality”. The second phase (quantitative phase) is important to examine the research hypotheses (that were developed based on the literature and the qualitative study).

6.4.1 Phase one: Qualitative Approach

This phase is divided into two parts: the first part is related to confirming SSQ and LSQ elements through a semi-structured interview; in the second part, the validation of SLSQ elements is through interviews but with different methods that will be mentioned later. The following section will explain what interviews are, the types of interviews and which type the research will adapt.

Interviews are one of the main tools of qualitative research. Interviewing is considered a key factor in research design (Weiss, 1994). Interviews are interactive by talking to people, which makes it one of the most effective methods of gathering and collecting the data; moreover, face to face interviews will provide the research with clear answers and give him a chance to go into more details. Miller and Crabtree (1999) stated that interviews are the most common communication method used among people. However, (Denzin (2001), p.24.) argues that interviews are “...not a method of gathering information, but a vehicle for producing

performance texts and performance ethnographies about self and society”. Nunkoosing (2005) stated that an interview is a text that is originally transformed from talk and brain thinking.

According to Kvale and Brinkmann (2009), p.174, an interview is “a conversation, whose purpose is to gather descriptions of the [life-world] of the interviewees with respect to interpretation of the meanings of the described phenomena”. There are a number of different types of interviews that can be applied in social research. The desirable answers and information help to provide full answers for the research questions. Each type of interviews has its goals and aims. These types shown as follows:

✓ **Structured interview**

The researchers prepare questions before conducting the interview and seek to collect the information from the interviewees. The main feature of this type is that it is planned mostly to set determined direct questions that require immediate answers, with mostly a “yes” or “no” response (Bryman, 2016). Structured interviews are controlled by the interviewer and the space of flexibility and causality of interviewee is less (Stuckey, 2013). It gives the chance to the interviewer to compare among the interviewee’s answers. Nevertheless, this type of interview is poor in data collection because it collects unexplained answers for the questions. In the literature, the researchers demonstrated that this type of interview is appropriate for researchers who know exactly what kind of information they are looking for (Dornyei, 2007). Furthermore Alshenqeeti (2014) argued that this type of interview looks like ‘self-administered’ quantitative questionnaire “in both its form and underlying assumptions”.

✓ **Unstructured interviews**

This form of interview could be theorized as the description interview (Stuckey, 2013). This type of interview is organized discussions that come towards the researcher's interests. In contrast with the structured interview, this type of interview has huge flexibility and space to ask and answer questions for both parties (Gubrium & Holstein, 2001); therefore, the interviewer here would be able to go in depth in topics and give freedom to the interviewees to talk about different issues (Dornyei, 2007). According to Jamshed (2014), there are two types of unstructured interviews: the first one is when the researcher has not prepared questions for the interview, the other one is a focused interview when the researcher has enough background knowledge about the main subject; moreover, this type of interview is suitable for concentrating on specific points and also may finish up with a huge amount of data. It is still one of the important data collection methods.

✓ **Semi-structured interviews**

It is the most common type of interviews for social science to conduct qualitative research studies (Alshenqeeti, 2014). This type is a mix of the two types mentioned above (Stuckey, 2013). This type of interview highlights topics and questions prepared by the researcher as in the structured interview; nevertheless, semi-structured interviews have no strict obligations. Therefore, “it allows depth to be achieved by providing the opportunity on the part of the

interviewer to probe and expand the interviewee's responses” Rubin and Rubin (2011), p.88. Lune and Berg (2016) stated that a checklist is one of the main tools in semi-structured interviews that helps the researchers to cover all relevant areas. However, the interviewee or the subject provides the researcher with the flexibility to add more enhanced questions than the questions mentioned in the checklist. This type of interview can be done whether individually or in groups; the individual interview gives more space to go in more details and has more flexibility while the group interview gives the researchers enough time to explore specific points or issues. The last point here is related to the researchers: they should choose the interviewees from the same field or same interest based on the study questions (DiCicco-Bloom & Crabtree, 2006).

✓ **Focus group interviews**

This type appeared in market research two decades ago (Petty, Thomson, & Stew, 2012). This data collection method uses semi-structured group interviews to collect the data. Dornyei (2007) claims that the role of the researchers and the arrangement of this type are dissimilar compared to the other types, but the main features are similar to those of the above types. The focus group design could be different in method as this type includes usually six to twelve interviewees (Dornyei, 2007). The design of the groups will be based on the criteria of questions, number of focus groups and number of participants per group; moreover, these groups are regularly managed by a group leader (Adhabi & Anozie, 2017). Barbour and Schostak (2005), p.46 defined focus group as “an interviewing technique in which participants are selected because they are a purposive, although not necessarily representative, sampling of a specific population; this group being ‘focused’ on a given topic” (Lewis, 2015).

After explaining the four types of interviews, this research uses semi-structured interviews in order to confirm SSQ and LSQ elements. The reasons why the researcher chose this type of interview are to get information related to the current situation, note the reaction, the way of speaking of the interviewees and interviewees' behaviours (Ghauri et al., 2020). The aim of this phase is to confirm the SSQ and LSQ elements that would be suitable to the Egyptian LSP and logistics industry.

6.4.1.1 Semi-structured Interview Protocol Development

Malhotra and Malhotra (2012) present six processes for interview protocol development. The first stage is to know what kind of information that the researcher needs, which is related to reviewing the LSQ and SSQ elements through literature review and Egyptian laws and confirm them; based on the information that we have, the type of interview will be decided in the second stage. In this stage, the researcher chooses the best interview type to get the expected outcome. In the third stage, the researcher prepares the questions that will be used to get a complete picture of that targeted outcome. In the fourth stage, the researcher uses an appropriate wording technique for each question. In the fifth stage, the researcher arranges the questions to be in a

suitable sequence to get the answers easily. And finally, the researcher identifies the form and layout for the interview; see figure 6-2.

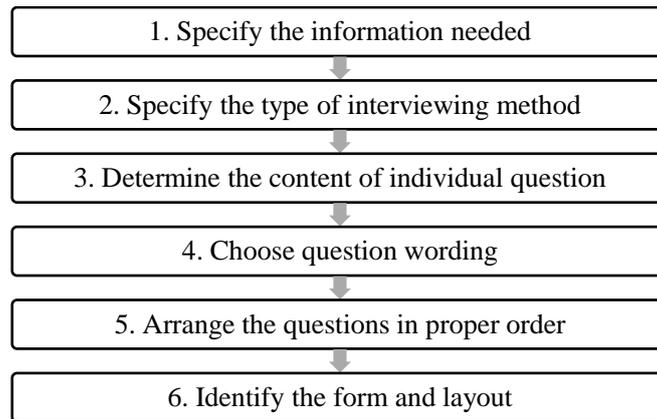


Figure 6- 2: Interviews Protocol Development
 Source: Adapted from Malhotra et al. (2012)

6.4.1.2 Sampling procedures

✓ Definition of the sampling technique

Considering only the main and important data is the core target of sampling techniques that save huge varieties of methods and ways to decrease the amount of data processed instead of using all possible elements (Saunders et al., 2009). Sampling is a group of comparatively smaller number of people selected from a population for examination purposes; they are called participants, and it makes research more accurate and efficient (Alvi, 2016). Sampling is giving the researchers a chance to observe a part rather than the full of community research.

✓ Probability samples

In this technique, each one has a probability to be selected. This method has been known as non-zero probability of selection because everyone in population could be in the sample. These techniques cannot be used for the population that is too general a category found almost everywhere in the world. Table (6-2) mentions the advantages and disadvantages of this method as follows:

Table 6- 2: Advantages and Disadvantages of Probability Samples

Advantages of Probability samples	Disadvantages of Probability samples
1. Decreasing the chance of systematic errors.	1. A lot of efforts are needed.
2. Reducing the methods of sampling biases.	2. It needs much time to be done.
3. Receiving a better representative sample by using it.	3. The cost is too high.
4. Can be generalized to the rest of population.	

Source: Malhotra et al. (2012)

This type of sample has 5 methods as follows: Simple random, Systematic random, Stratified random, Cluster Multistage.

✓ **Non-probability samples**

This technique is the opposite of probability samples. It does not use the random way to select the samples. Every unit of population does not have the chance of equality to be a part of the investigation. The results that come from this method could not be generalized (Showkat & Parveen, 2017). Alvi (2016) mentioned the advantages and disadvantages of this method as follows in table (6-3):

Table 6- 3: Advantages and Disadvantages of Non- Probability Samples

Advantages of Non- Probability samples	Disadvantages of Non- Probability samples
<ol style="list-style-type: none"> 1. It needs less effort than probability sample. 2. It needs less time to be done. 3. It is not expensive. 	<ol style="list-style-type: none"> 1. It could have <i>systematic errors</i> and <i>sampling biases</i>. 2. The sample cannot be representative of the population. 3. Cannot be generalizable to the population.

Source: Malhotra et al. (2012)

This type of sample has 5 methods as follows: Convenient sampling, Judgemental sampling, Quota sampling (proportional and non-proportional), Snowball sampling.

Jaafar (2006) stated that “Future research should also consider using other sampling techniques, such as snowballing technique as to obtain the required sample size and reliable sample of LSP customers from each industrial sector”. Therefore, snowball technique was used with Judgemental sampling as a non-probability sampling method to collect the data of the study. Snowball technique is used when the interested population cannot be very clear for the researcher; it could be identified by the person who has experience or the research characteristics to be included in the study (MacNealy, 1999; p.175). for Judgemental sampling, the researcher has the decision to choose the sample based on his experience in the academics and logistics fields. For snowball technique, collecting data includes a group of people that have the same research specifications which have been asked to the next targeted sample that have the same specifications and characteristics. The most common benefit of snowball sampling is "useful in approaching the type of population that is not readily available or present in a very small quantity”. But “it is subject to sampling biases and systematic errors due to network connection” (Alvi, 2016; p.33), and the samples could include members of difficult groups to deal with (e.g., drug abusers, criminals) (Black, 1999).

Based on the type of sampling explained above and based on the main aim of qualitative phase (part one), snowball sampling and judgemental sampling techniques will be used in order to confirm the LSQ and SSQ elements in the field of LSP in Egypt. The researcher has done these interviews with a list of practitioners, academics and specialists in LSP fields to get valuable information related to the main aim of this phase; the evaluation and selection of the interviewees are done based on the experience of the person and the reputation of the companies in logistics.

✓ Data Collection Methodology

According to Churchill and Iacobucci (2010), phase one has 4 steps: the first step is to prepare an interview guide and an interview protocol. The interview protocol is developed from LSQ and SSQ elements found in the literature and the Egyptian laws. In the second step, the sampling techniques that will be used are snowball and judgment. In the next step, the researcher has done the interview with the respondents, each point is very important in this interview, as the interviewees have high positions in top management and are responsible for the company's strategies. In the third step, the researcher has done the interview and collected the required information that he needed to complete his study. In last step, the researcher prepared the transcript coding and analysis of interviews. The four steps are shown in figure (6-3):

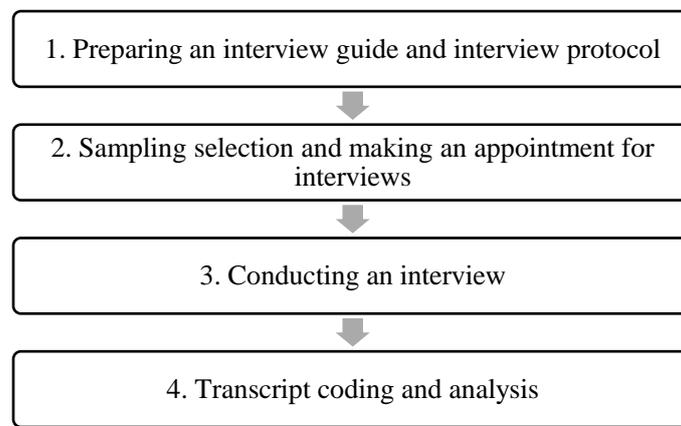


Figure 6- 3: Data Collection Processes in Phase One
 Source: Adapted from Churchill and Iacobucci (2010)

Table 6-4 presents the interviewees from the first phase with the position of the respondents; they are selected based on the experience that they have in the field of logistics in Egypt. The interviews took around 60 to 120 minutes to include all the points the researcher needs.

Table 6- 4: Details of Interviewees from Phase One (part one)

Time	Title	Field
17/12/2017	Corporate Supply Chain Associate Director	LSP
25/01/2018	Warehousing manager	Retailer
07/02/2018	Operation Team Leader	LSP
12/02/2018	Head of Quality Assurance	LSP
26/02/2018	Purchasing specialist	Retailer
15/03/2018	Supply chain manager	LSP
19/03/2018	Supply Chain co-ordination	LSP
03/04/2018	Business Development Manager	LSP
29/04/2018	Warehousing manager	LSP
25/03/2019	Law social specialist	Law
22/04/2019	Law Environmental specialist	Law
13/05/2019	Law Environmental specialist	Law

Source: This Research

The processes of phase one (part one) have been done to confirm the main elements of LSQ and SSQ through an interview with experts in the field of logistics industry in Egypt. The results

of this phase will be clarified in the next chapter in details. These elements will be used in phase one (part two) in order to shape and design the main elements of SLSQ in the next section.

✓ **Phase one (part two)**

In this phase, the researcher aims to write the methodology that will be used to measure the SLSQ elements. SLSQ elements have been generated through the researcher and based on reviewing the SSQ and LSQ elements, but to confirm these elements, a lot of steps should be taken.

- **Validity**

Validity refers to the extent to which the indicator assesses the concept in the way it was invented. Messick (1994) stated that those terms are a social value that have a solid meaning and power of measurement “wherever evaluative judgments and decisions are made” (p.13). As it is a mixed research, the expert could provide the data that the research needs in order to reach its target (I. Newman, Lim, & Pineda, 2013). Therefore, this study will use a group of experts to pre-test the questionnaire elements as a validation level. At this level, the experts are giving the right feedback that would achieve the research goals and make matching opinions (I. Newman et al., 2013). Face validity and content validity are used to validate the questionnaire elements.

- **Q-sorting**

The tool that will be used to test the element validity is Q-sort. As we are in a qualitative phase, the researcher will explain Q-sort as a part of element validation of SLSQ. Q-sorting is a part of construct validity. This tool is used to regroup the elements according to their similarity through an expert (Moore & Benbasat, 1991; Storey, Straub, Stewart, & Welke, 2000). Storey et al. (2000) stated that there are two methods in which this can be done:

- Exploratory: when the people who receive the elements are asked to sort and identify category labels for each group.
- Confirmatory: the elements are already labelled and the people who receive the elements are asked to sort each element under one category.

The second one will be used in this research; the elements have been created and invented based on LSQ and SSQ elements; these elements have been presented in a short Q-sort instrument with a sheet to write down each element with the degree of acceptance of this element under the main variable. This process has been done through an expert like in face validity, in the field of logistics and supply chain. They were asked to indicate which element should be related to the SLSQ variable.

6.4.3 Phase Two: Quantitative Approach

This phase is the main research step that should be considered. This phase has depended on phase one (part one and two) in order to design the questionnaire elements to collect the main

study data. This phase presents the techniques that are used to analyse the research data, presents the procedures of preparing the survey questionnaire and finally presents the validity and reliability tools that are used to validate the survey questionnaires.

The quantitative method is a technique that is related to numerical data in order to analyse, interpret and present these data (Teddle & Tashakkori, 2009). This research uses numerical measurements and statistical analysis in order to address research objectives through empirical assessments. Pilot and main studies are the two stages that have been done as a quantitative phase. The pilot study has been done to measure the reliability and validity of the measurement elements of the study, and it is also used to assess the new elements of SLSQ (see next chapter). The main quantitative study is done to test the conceptual framework hypotheses.

The structured interview and the self-completion questionnaire are the two types of surveys, see figure 6- 4 (Bryman & Bell, 2011): the structured interview has been explained above (see section 6.4.1) while the self-completion questionnaire is presented in this section. Survey self-completion questionnaire is one of the quantitative methods that are responsible for collecting data scientifically from many respondents in a short time (Fellows & Liu, 2008). In this study, an online self-completion and supervised questionnaire are used to get the customer’ responses. The self-completion questionnaire comprises three types: supervised, postal and via internet. Although the internet questionnaire looks like more suitable and cheap comparing with the postal method; however, the postal response rate is higher than the internet method (Ranchhod & Zhou, 2001). Ranchhod and Zhou (2001) stated that low levels of internet knowledge and the lack of experience and knowledge of e-mail using for respondents are the reasons why the postal method has more respondents than the internet method. However, nowadays it is rare to find a person who cannot deal with the internet. Online or web-based surveys are increasing in acceptance as a result of new modern communications technology in research steps (Easterby-Smith, Thorpe, & Jackson, 2012).

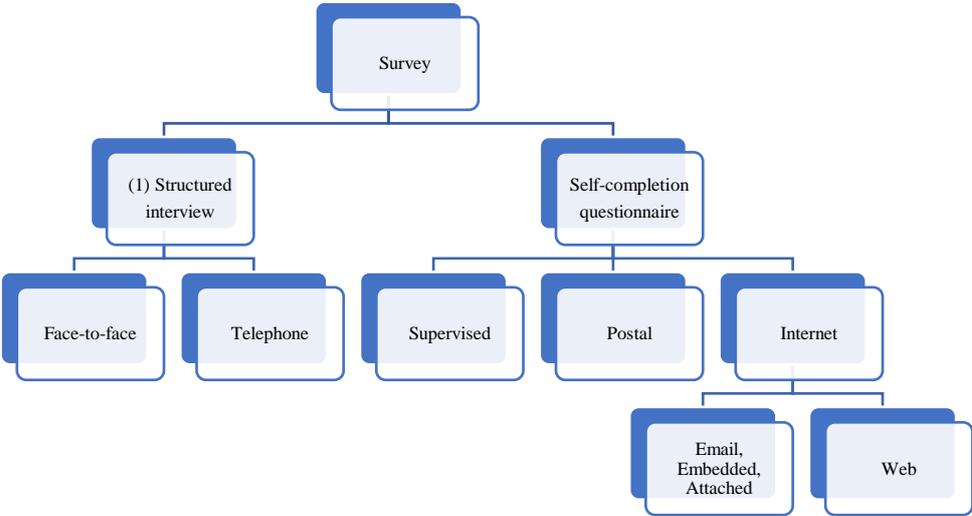


Figure 6- 4: Main Modes of Administration of a Survey
 Source: Bryman and Bell (2011)

✓ **Advantages and Disadvantages of Survey Questionnaires**

There is no doubt that the questionnaire is one of the main sources of collecting data in any research. According to D. A. Jenkins and Smith (1994), most of the quantitative data can be obtained by the questionnaire. Nevertheless, the most vital point here is the designing of the questionnaire; the researchers should take into account three main points related to the questionnaire: being “valid, reliable and unambiguous” (Richards & Schmidt, 2013).

The advantages of the mail questionnaire are that it is lower in cost and faster in distribution and collection (Easterby-Smith et al., 2012). It also has a simple administration and an ease of tabulation and analysis. Moreover, it can cover a very much wider range in geographical area compared to any other tool. In addition, respondents can think about the questions presented with sufficient time to consider the questionnaire. They have the chance to get advice from other people and even to review other references to ensure the high quality of the received information; they answer the questions with no prejudice; as a result, reliability is established by the consistency of the questionnaire’s questions. Nunan and David (1992), J. D. Brown (2001), (Wilkinson) stated some advantages for the questionnaire:

- ✓ It is one of the most effective methods to collect data on a large scale.
- ✓ It can be sent in the same time to a large number of people.
- ✓ Anonymity of respondents makes them share information more easily.
- ✓ When similar questions are managed in the same time for a large number of people, the data acquired are more identical, correct, and standard.
- ✓ It is a time-saving method of collecting data from many respondents.
- ✓ Closed-ended questionnaires can be easily and directly analysed.
- ✓ It is a cost- effective method.

In contrast, the most common problem in questionnaires is the non-response problem, which prevents the researchers from getting the information that they need to do their research and the estimated number of responses decreases. Wilkinson stated that questionnaires have some disadvantages that should be taken into consideration:

- ✓ Sometimes the responses are suspicious and inaccurate.
- ✓ There is usually a low rate of return when sent by post or email.
- ✓ Lack of clarity of some questions may lead to inaccurate and irrelevant responses.
- ✓ Misunderstanding in some questions.
- ✓ Formulation of questions may affect respondents' responses.

As previously mentioned, online or web-based surveys are growing in popularity because of the effect of modern communications technology on the research process. The purpose of surveys is to collect information related to personal facts, opinions, attitudes and past behaviours (Blackmon & Maylor, 2005). Therefore, the researcher used this method to collect the main study data. This method is faster and cheaper than other survey methods; in addition,

some responses go directly to a database for statistical operations (Easterby-Smith et al., 2012). Using this method makes the respondents express their opinions and perspectives without revealing their identity (Cooper & Schindler, 2014).

6.4.3.1 Questionnaire Design

The questionnaire design was developed based on the existing literature of similar studies (Chaisurayakarn et al., 2014; Jaafar, 2006). For questionnaire form, see (Appendix 4). The questionnaire starts with a cover page, which includes a short introduction about the nature of this research and purpose of the research; it also gives a thanks message for the participants. Moreover, it gives a hint to the respondents that the questionnaire will not use any provided information for other purposes but research. The respondents have the freedom not to complete the questionnaire if they do not want to. The time of filling the questionnaire is mentioned, which is around 12 minutes. Starting from the second page, the questionnaire is divided into four sections as follows:

- Section one contains general information about the respondents' general profile.
- Section two contains the use of a 5-point Likert scale (1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree) to determine the degree of agreement or disagreement of the participants on statements representing sustainable logistics service quality variables.
- Section three contains the use of a 5-point Likert scale to determine the degree of agreement or disagreement of the participants on statements representing customer satisfaction variable.
- Section four contains the use of a 5-point Likert scale to determine the degree of agreement or disagreement of the participants on statements related to the relationship quality (dependence, trust, and commitment) variable.

In the end, the researcher gives a short thank you message for the participants' time and effort exerted in answering the questionnaire.

6.4.3.2 Translation and Back translation

As the study is applied in Egypt, the questionnaires have been distributed to the targeted sample in the Arabic language in order to be suitable to the Egyptian culture and nature of the research. Therefore, this study will use the back translation technique that has been used to test the validity of translation and to notice errors in translation in “especially in cross-cultural research” (Douglas & Craig, 2007)

✓ Criteria for a classification of translation techniques

Behling and Law (2000) stated that there are four main criteria for classifying translation techniques that must exist in the translated content as follows:

- 1- Informative.

- 2- Source language transparency: to what extent the content provides useful information to the researcher who understands only one language in order to solve problems with the main language.
- 3- Security: to what extent the content builds chances and opportunities to be similar to the original content.
- 4- Practicality: to what extent the translated language instrument is gained quickly, cheaply, and easily.

✓ **Types of translation techniques**

There are six techniques used to prepare target language versions of existing instruments; those techniques are used to meet four criteria explained above as in table 6-5, in order to make a judgement for the translations. Starting with a simple direct translation, it is a tool that is translated from the main language or the language that is needed to be translated from to the target language by a person who knows both languages, and the quality of translation depends on the person's skills and his or her judgment. It is considered a very cheap quick method, and it has a high score in (Practicality), but the other criteria are low. The next one is modified direct translation, including a group of experts in translation who check the original instrument. The discussion between the translator and the experts leads to modifications and amendments to the target translation (Behling & Law, 2000). The third one is back translation, which has a high score in every criterion. Back translation has been defined by N. Malhotra, D. Birks, and P. Wills (2012) as a tool that is used to translate a questionnaire from the main language into the language that the researcher needs. This version is translated again into the original language by a person who is native in the original language, and this is the tool that the researcher has used in this research because translation/back-translation has a higher score than others. The fourth one is the parallel blind technique, in which a committee of translators, each is fluent in at least two languages, discuss the questionnaire's translations and add or remove “until a consensus is reached” (N. Malhotra et al., 2012).

Table 6- 5: A Classification of Translation Techniques' Degrees

	Informativeness	Source language transparency	Security	Practicality
Simple direct translation	Low	Low	Low	High
Modified direct translation	Medium	Medium	Medium	Low
Translation/back translation	High	High	Medium	Medium
Parallel blind technique	Medium	Medium	High	Medium
Random probe	Medium	Low	Low	High
Simple direct translation	Low	Low	Low	High

Source: Behling and Law (2000: p.18).

Academically, there is a reason that the researcher used this method in this research; Douglas and Craig (2007) made a journal review in *International Marketing Journal* from 1993 to 2005, presenting 45 articles that used a translated questionnaire in their research. They stated that 43

cases from 45 used back translation. Therefore, the researcher used the back-translation technique to validate the questionnaire and to avoid errors. The first step that the researcher has taken is to translate the questionnaire from English to Arabic to give an option to the respondents to select the language they prefer. the second step is that the Arabic version has been translated back to English by three translators who master both English and Arabic to confirm the statements and avoid any errors and mistakes. Table 6-6 shows the three translators who have been selected because of many reasons: 1- They have enough experience in the field of supply chain and logistics, 2- They have perfect language skills because they graduated from English schools. After the questionnaire translation and validation, it will be distributed to the target sample to make initial analysis to the questionnaire and to design the pilot study.

Table 6- 6: Translators Information

Translators	Degree
A PhD holder	PhD in Marketing, University of Lincoln, UK.
A PhD candidate	PhD in Marketing in Logistics, University of Huddersfield, UK.
A PhD candidate	PhD in Logistics, Minho university, Portugal.

Source: This research.

6.5 Data Collection and Data Analysis Steps

This part presents the steps of data collection and data analysis. There are nine points in this phase, adopted from Churchill and Iacobucci (2010):

- 1- Designing the questionnaire form after confirming the LSQ and SSQ elements as phase one (part one), and after confirming SLSQ elements as phase one (part two). Two drafts of the questionnaire have been prepared (translated questionnaire into Arabic).
- 2- The translation of the questionnaire has been done through using back translation technique: the Arabic version of the questionnaire has been given to a “bilingual” person to check the mistakes and to retranslate it into English again. The modification has been added to the first draft version of the questionnaire.
- 3- Pre-test: after the first draft of the questionnaire has been prepared and in order to avoid misunderstanding, the researcher decided to make a pre-test with experts in the field to gain essential feedback and the new idea about the content of the questionnaire. This also allows the researcher to confirm the validity of the questionnaire.
- 4- Pilot study: based on the previous step, the questionnaire was prepared to be answered. The researcher started to distribute it to the targeted samples in order to test the reliability and validity of the elements used in the questionnaire and to receive any comments or modifications from the participants. Table 6-7 clarifies the analysis tools that have been used in this study; 250 questionnaire drafts were distributed and the results will be presented in the next chapter. The researcher used Google forms and self-administered questionnaires in order to design the first version of the questionnaire.
- 5- Based on the modifications that have been done from pilot study, the researcher starts to finalize the final version of the questionnaire. The researcher prepared the final draft to be distributed to the target samples.

- 6- The researcher asks the participations to fill the final draft of the questionnaire by calling them or visiting them. The targeted samples were the logistics service providers' customers.
- 7- Reminder: the researcher tracks the questionnaire path to check who of the respondents handed the questionnaire and who needs a reminder to fill it.
- 8- Coding: after the researcher collects the data from the respondents, he codes the research statements in order to use IBM SPSS Statistics 22 to analyse the data.
- 9- Data analysis: after collecting the questionnaire and coding the questions, statistical analysis such as Exploratory factor analysis (EFA), Confirmatory factor analysis (CFA), and structural equation modelling (SEM) were used to test the hypotheses.

Exploratory factor analysis (EFA) "is a multivariate analysis technique that determines underlying dimensions or factors in a set of correlated variables and is used when underlying factors are not known a priori" (Chaisurayakarn et al., 2014; p.110; Williams et al., 2010). Confirmatory factor analysis (CFA) and structural equation modelling (SEM) were used in order to find the validity, reliability and relationships between the variables of study. CFA is a technique to test hypotheses in order to fit variables to possible factor structures. SEM is a multivariate analysis technique that tests regression and covariance analysis and relationships between latent constructs (J. C. Loehlin, 1987).

Table 6- 7: Analysis technique used in pilot study

Validity Measurements	Reliability Measurement
Average Variance Extracted (AVE)	Cronbach alpha (α)
Factor Loading	
Composite Reliability	

Source: This Research.

- **Reliability and Validity Measurement**

Joppe (2000) defined reliability as, "the extent to which results are consistent over time and of an accurate representation of the total population under study, and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable" (P.1). In other words, we could say that reliability refers to how the measurements are consisted. On the other hand, validity refers to the extent to which the indicator assesses the concept in the way it was invented. Malhotra and Malhotra (2012) stated that there is a classification of reliability and validity as in figure 6-5. The first reliability test is test-retest reliability; the researcher uses this test to measure if the answers of respondents will be changed over time; for example, the correlation as a relationship measures between two variables: when the correlation coefficient is high, it means a high reliability. This test was applied on the same respondents two different times to check if the respondents would give the same answers or not.

The next reliability test is alternative-forms reliability; this test is similar to the test-retest reliability. It aims to assess whether respondents give the same answers. It is used when it requires two equivalent forms of the scale to be constructed (Chaisurayakarn et al., 2014; p.83).

The last one is internal consistency, which evaluates the reliability of set of elements and clarifies which elements will be added together through Cronbach alpha (α) as a coefficient of how elements in the scale come together (Malhotra & Malhotra, 2012). In the pilot study, internal consistency will be adopted to assess the reliability of a set of elements, while test-retest and alternative forms will not be used because the study does not aim to see if a measure is stable over time or two equivalent forms of the scale can be constructed.

For Validity measurement, construct validity will be adopted and applied in this study; it checks the variable theoretical relationship to other variables (Cronbach & Meehl, 1955). To assess the research model the construct validity, convergent validity and discriminant validity are measured.

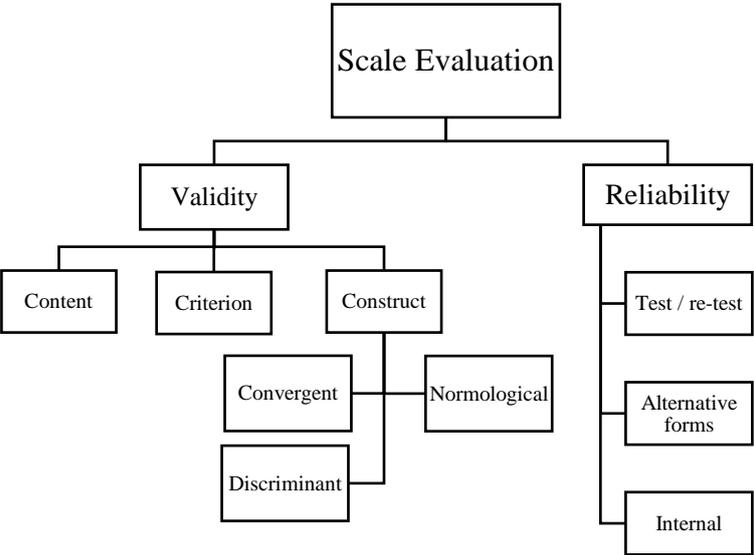


Figure 6- 5: Scale Evaluation
 Source: Malhotra et al. (2012: p. 432)

Malhotra and Malhotra (2012) stated that convergent validity is the extent to which the elements have a positive correlation with other measurements of the same construct. Average Variance Extracted (AVE), factor loading and composite reliability value will be used to measure the convergent validity. AVE is “the mean variance extracted for the element loading on a construct” (Chaisurayakarn et al., 2014; p.85). Fornell and Larcker (1981) stated that average variance extracted for each construct should be higher than 0.50, but 0.4 is moderate and acceptable. Joseph F Hair, Black, Babin, Anderson, and Tatham (2006) confirmed that AVE score of 0.4 or higher is good. A high factor loading would provide a high convergent validity. As mentioned in table 6-8, factor loading of 0.4 was considered to meet the minimal level for interpretation as mentioned by (Joseph F Hair et al., 2006). Discriminant validity measures to

what extent the construct is different from another construct. When the discriminate validity is high, it means that the construct is unique. Hair et al., (2010) stated that when square root of AVE of variables is higher than its correlation with other variables, it means good validity.

Table 6- 8: Guidelines for Identifying Significant Factor Loading Based on Sample Size.

Factor Loading	Sample Size Needed for Significant
0.40	200
0.45	150
0.50	120
0.55	100
0.60	85
0.65	70
0.70	60
0.75	50

Source: Hair et al. (2010: p. 117).

There is a step that has been provided by Hair et al. (2010) to use EFA as shown in Table 6-9 to check whether this technique is suitable for the data under consideration. In this research, there are more than 8 indicators to explain each variable, which is well within the suggested five to ten case per variable indicators. “The next step is to set assumptions in the factor analysis and following that to assess the overall fit, interpret the factors, validate, and use the factor analysis’ results” Chaisurayakarn (2015).

Table 6- 9: Factor Analysis Decision Process

Stage	Detail
Stage 1	Objective of Factor Analysis
Stage 2	Design Factor Analysis
Stage 3	Assumptions in Factor Analysis
Stage 4	Deriving Factors and Assessing Overall Fit
Stage 5	Interpreting the Factors
Stage 6	Validation of Factor Analysis
Stage 7	Additional Uses of Factor Analysis Results

Source: Chaisurayakarn (2015).

Moreover, the Kaiser Meyer-Olkin (KMO) measure of sampling adequacy gives an index from zero to one; the variable is perfectly predicted when the value reaches one. In addition, communality (h^2) is the degree of variance shared with all other variables done in the analysis.

It derived out the variance of the variables that have no error and is shared with other variables (Hair et al., 2010). Principle component analysis (PCA) “is appropriate to use when the objective is to summarize most of the original variance in a minimum or parsimonious number of factors for predictive purposes” (Hair et al., 2010). Therefore, this research has used these three techniques to apply the factor analysis in this research by following the seven-step process presented in Table 6-9.

However, it starts with giving the suitable factor loading to characterize the correlation between the variables and its indicators. Normally, the significance of factor loading comes based on the

sample size as in table 6-7 that shows the guidelines for classifying the factor loading based on sample size.

- **The Components of Research Hypotheses Model**

Based on the literature reviewed in chapters two, three, and four, this section presents the hypothesized model and the development of these hypotheses. It illustrates the impact of hypothesis and explains the related hypotheses of the theoretical framework. The hypotheses are supported by the theoretical and empirical studies. The main model of the study has been shaped after reviewing the studies related to the main topic of the study and related to the study variables (SLSQ, CS, and RQ) as in figure 6-6.

1- Sustainable logistics service quality and customer satisfaction hypotheses

Based on reviewing the literature and reviewing the social and environmental laws, the SLSQ elements have been derived out. The first part was through reviewing the sustainable service quality (SSQ) elements in the literature and the Egyptian laws related to these elements; in addition, the second part was through reviewing the logistics service quality literature review. Interviews were used to validate the variable elements, and the elements have been confirmed. The origin of this concept came originally from Mentzer et al, (2001) which examined whether different groups of customers of a particular organization with multiple market segments might place varying degrees of importance on LSQ components; Mentzer's study determined the degree of importance of each LSQ component in the four customer segments of a large logistics organization in third party organizations. Moreover, Jafaar (2007) tested LSQ across industrial sectors in the UK and measured the impact of LSQ on customer satisfaction. In this study, the researcher validates a new variable called SLSQ. This variable contains SSQ elements and LSQ elements based on current research, the SSQ elements that LSPs use to apply practices related to sustainability; moreover, LSQ is the customer evaluation of the received services. SLSQ is the overall evaluation of LSP process from customer perspective. Therefore, based on reviewing the literature and previous explanation, the first hypothesis has been derived:

H1: Sustainable logistics service quality constructs positively affect customer satisfaction

2- Customer satisfaction and Relationship quality hypotheses

Relationship marketing is concerned with providing superior customer lifetime value, and the main success criterion is to develop long-term customer satisfaction (Kotler, Armstrong, Saunders, & Wong, 1999). Mentzer et al. (2001) suggested that in the future, the concept of LSQ should be developed through other concepts, as this study used it in sustainability to measure customer satisfaction. As satisfaction the outcome of the SLSQ model, so we can call it SLSQ satisfaction thereafter. Many studies used satisfaction as a mediator variable between service quality and behavioural intentions (Brady & Robertson, 2001; Olsen, 2002), but a few used it to measure the relationship quality as Jaafar (2006), p.87 mentioned “constructs are weak or even non-existent”. Even the link between logistics service quality, satisfaction, and

relationship quality does exist, but the empirical studies related to this concept are few in the marketing literature. Therefore, this study will measure the customer satisfaction with SLSQ may have some effects on relationship quality dimensions.

H2: Satisfaction with SLSQ positively affects Relationship quality.

- *H2a: Satisfaction with SLSQ positively increases Dependence of customers on LSPs.*
- *H2b: Satisfaction with SLSQ positively affects Trust.*

3- 7.5.2.3 Dependence and Trust

Customers could reach the trust level when they feel that they can depend on the LSP and when they feel confident about its partnership in reliability and capability that reflects the meaning of trust (Singh & Teng, 2016). The customers of LSPs could get the trust development through intensive interactions between the company and LSP and when the company believes that LSPs will be beneficial for them (Sezen & Yilmaz, 2007). The trust will be stronger when the customers believe that dependence will create this idea. The perceived risks will be reduced while confidence may increase when having a high level of trust (Gao, Sirgy, & Bird, 2005). Therefore, to reduce risk, the dependent company may aim to maintain or increase dependence toward trustable LSP and will not take risky actions to threaten this relationship. Therefore, based on this explanation, we assume the following hypothesis:

H3: Dependence of customers on LSPs positively affects their trust in LSPs.

4- Dependence, Trust, and commitment

Commitment is the consequence of dependence and trust in the LSP field (Gao et al., 2005; Jiang, Wang, & Guan, 2011; Morgan & Hunt, 1994). When the company has a high level of dependence on other companies, the switch cost to other LSPs will be high; therefore, the customers will keep working with the same LSP (Jiang et al., 2011). Therefore, we could say that dependence is positively related to commitment. On the other hand, trust is assumed to affect commitment according to Ganesan and Hess (1997) as it has a contribution to (1) reduce risk, (2) increase the confidence of the customer that short-term problems will be resolved over the long term, and (3) reduce the transaction costs. Most studies in channel relationships show strong empirical evidence for a positive path from trust to commitment (Anderson & Weitz, 1989; Crosby et al., 1990; Dubey et al., 2019; Ganesan & Hess, 1997; Jiang et al., 2011; K. Kim & Frazier, 1997; LEONIDOU & THEODOSIOU, 2002; Moore & Benbasat, 1991; Moorman et al., 1993; Morgan & Hunt, 1994). Based on the above explanation, we assume there is a positive relationship between dependence and customer commitment, and we assume there is a positive relationship between trust and customer commitment.

H4: Dependence on an LSP positively affects customer commitment.

H5: Trust in LSP positively affects customer commitment.

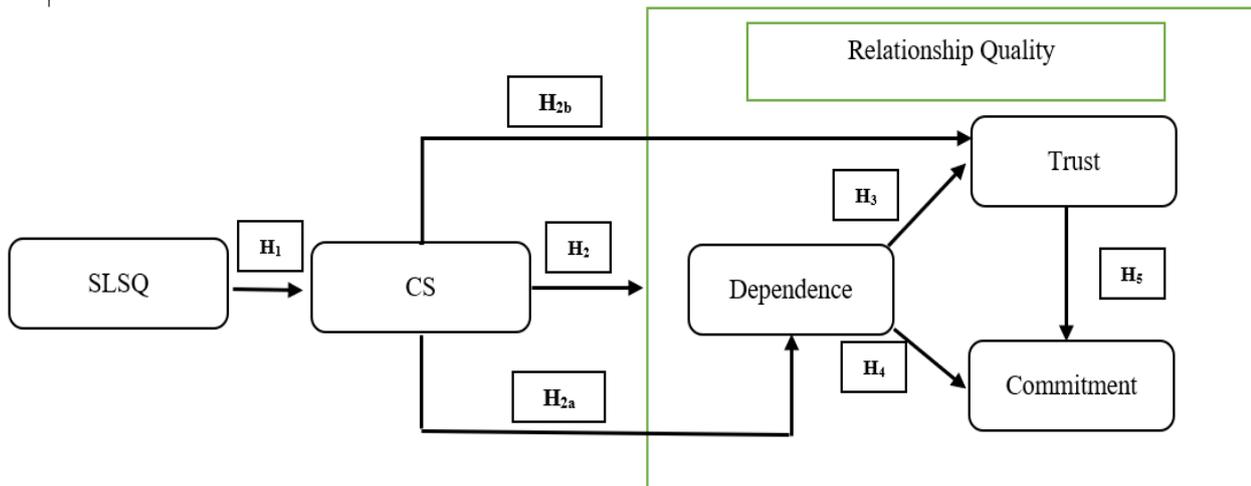


Figure 6- 6: Research Hypothesised model
 Source: This research.

Briefly, this chapter is considered to be the plan of the research. It presents the methods and techniques that will be used in this thesis. It divided the research into two phases, and the first one is divided into two parts. The first part gives an overview of how LSQ and SSQ elements will be validated and tested. The second part presents the techniques that will be used to validate the SLSQ elements. In phase two, the quantitative study is presented and the questionnaire steps and design are illustrated. In the last part of this chapter, the components of research hypotheses model are explained. In the next chapter, the findings of semi-structured interviews will be presented. Moreover, SLSQ scale will be developed.

Chapter Seven

7. Semi-structured Interviews' Findings and Scale Development

7.1 Introduction

The methodology of research has been discussed in the previous chapter; phase one was a semi-structured interview in order to answer the first and second research questions. The findings of those questions will be discussed in this chapter. After that, based on interview findings, the researcher will design the sustainable logistics service quality (SLSQ) scale. The main purpose of this chapter is to present a detailed description of the development and validating procedures of a new measurement scale of SLSQ. It also presents the findings of pilot study as a quantitative phase of this study.

7.2 Interview Procedures

- **Interviewees' Background**

The 12 interviewees are 7 from logistics service providers, 2 from retailers and 3 from law specialists. All the respondents of the interview have a good experience in their fields, each of whom has more than 10 years of experience; the following table 7-1 will give a brief background about them, and also the researcher did not mention their names or their organizations' names as the researcher mentioned that before starting the interview.

The interview for SSQ elements included three main questions; those three questions ask about the SSQ elements, see table 7-2. Three interviews with law specialists included one question related to the laws mentioned in chapter five. The interview has been done based on the respondents' preferred time and place; the interviews were recorded and also written by the researcher.

Table 7- 1: Background information of interviewees.

Interviewees	Background
Corporate Supply Chain Associate Director (IN1)	He/she works at one of the best LSPs in Egypt; its capabilities are of 26,000m ² Storage area, more than 600 trucks and 2000 employees. His/her main work is to forecast customer demand, handle the information flows from orders, shipments and other related issues and guarantee reaching the products to customer shelves.
Warehousing manager (IN2)	This retailer has been in the Egyptian market for more than 60 years; it has more than 300 branches around Egypt. His/her main responsibilities are receiving, warehousing, and distributing operations through program and through personnel policies and procedures, in addition to setting precautions for warehouse operations by creating and monitoring security procedures and dealing with many suppliers and logistics providers' products and services.
Operation Team Leader (IN3)	He/she works at one of the best LSPs in Egypt. It has 900 employees between workers, drivers, accountants, sales and distribution representatives, supervisors and sales managers. Total storage space is 7200 m ² in 14 stores, and its fleet is of 220 freight vehicles. His/her responsibilities are processing and programming, delivering best service to customers, and maintenance of buildings and equipment.
Head of Quality Assurance (IN4)	He/she works at the same company above. He/she monitors of all the company's activities and test results, detects defects and identifies areas of improvement.
Purchasing specialist (IN5)	He/she works at one of the best international hypermarkets; it has more than 26000 employees around the world. His/her main responsibilities are selecting the potential suppliers; evaluating their offers based on the business standards and the required product specifications; and negotiating.
Supply chain manager (IN6)	He/she works at one of the best LSPs around the world. It has 26000 employees. They offer air, ocean and road freight forwarding; warehousing; distribution; specialized services in project logistics, fairs and events; and chemicals. His/her main responsibilities are managing company's overall supply chain and logistics strategies and operations.
Supply Chain co-ordination (IN7)	He/she works at one of the LSPs in Egypt. It has 700 employees; it presents transportation, warehouse and consultant services. His/her main responsibilities are managing the buying and delivery process of goods or services on behalf of their company.
Business Development Manager (IN8)	He/she works at the same LSP above. His/her main responsibilities are contacting potential customers to establish relationships and meetings And planning to gain new customers and markets.
Warehousing manager (IN9)	He/she works at one of the LSPs in Egypt. It has more than 800 employees; it presents many different services: transportation, storage, packing and packaging. His/her main responsibilities are supervising the receipt, dispatching, storage of goods and reviewing the good specifications and good requirements.
Law specialists (IN10,11,12)	Three interviews have been done in the law field, two of which were with environmental specialists to make sure that the environmental laws are applied and useable by the Egyptian organizations, and the last one was with law specialists in social law for the same purpose.

Source: This research

Table 7- 2: Structure of Semi-structured Interview (Phase One)

Question	Explanation
Q1	The first question is related to which of SSQ elements are important for LSP's service quality, elements that have been generated from literature review as we mentioned before. The respondents were asked about the importance of SSQ in LSPs' service and why they chose this element and why they think it is important to LSP's service quality.
Q2	The interviewees were asked about a new element that could be added to these elements related to SSQ
Q3	The interviewees were asked about evaluating the most important element for LSP's service quality.

Source: This research

- **Interviews' Findings**

Interview is one of the main tools that give enough information about studying a new phenomenon (Sekaran & Bougie, 2016). These interviews have been conducted in order to answer the first research question, which is “What are LSP’s SSQ elements?” and the second research question, which is “What are LSP’s LSQ elements?” related to logistics service quality (LSQ); this question has been answered through reviewing the literature review. The elements of this question are in chapter 5 section 6.3. Those elements of SSQ and LSQ will be used in order to answer the third research question, which is “What are LSP’s SLSQ elements?”. Therefore, in the next section, the research presents a brief summary of the interview results and findings, related to environmental, social and economic elements in table 7-3. At the end, it gives a summary of the validity of environmental and social laws that have been used in this research. The results of these tables will be guidance to the researcher to design and shape the questions of SLSQ as a new variable. These questions will be tested and validated through (Pre-test) techniques later in this chapter to develop the questionnaire survey that will be used in Phase Two.

Table 7- 3: Interview findings' summary.

1- Interview findings (IN1)

Environmental elements for IN1						
Using less polluting vehicles, using cleaner fuel standards and switching to gas as an alternative to gasoline	Using routing systems to minimize travel distances	Vehicle maintenance and disposal system	Using alternative energy sources (e.g. solar or photovoltaic panels)	Packaging/shipping reusable, recyclable, bio-degradable materials	Performed an environmental or waste audit	Improved compliance with environmental standards
Using this kind of vehicles would affect the service quality. It means changing the vehicles' motors and other related tools in order to be environmentally friendly vehicles, and of course it could be affecting the lead time as a change in the nature of these vehicles.	Using routing system is somehow costly to the LSP, but on the other side it will affect the overall delivery time and it is related to service quality.	As a change to the nature of vehicles, it will need a new method of maintenance and repairing. It could be related to service quality, but not that strong.	This is an important point to the LSPs; it will definitely reduce the energy cost, but it is not related to the service quality and would not affect it any way.	This point is strongly related to service quality, using a new material to package the products will save cost for us and for our customer.	As we are a certified company, performing these products is considered our priority; we would like to make a better picture to our customer and apply all environmental practices in our organization.	Complying with the environmental standards is one of our priorities. When the customer selects you to deal with, they consider the environmental side.

Social Elements for IN1			Economic Elements for IN1		
Protecting employee health and safety	Creating training programs, awareness programs, seminars for workers	Considering customer compliance, privacy, satisfaction	Improved company image	Improved company position in the marketplace	Overall cost (cost related to environmental practices)
Our company's priority is to satisfy either the internal customer (employees) or the external customers. The company takes all the precautions in order to protect our employees and worker from any damage, but I see this point is a little bit related to service quality. When we satisfy our employees, our employees will satisfy our customers.	Of course, it has a direct relationship with service quality; our employees are trained well, which means solving our customers' problems and meeting our customer expectations.	Our trained employees will have the ability to deal with any problems with customers and also keep the privacy until we make sure that this problem is solved and our customer is satisfied, and this is related to service quality.	As we implemented a lot of certificates, this will reflect on our customers' image in the market that they are dealing with us.	As the last point, that will give the community a new perspective about our customers.	Applying environmental practices reduced the cost in some sections in our company, so I think it will affect our customers, too.

2- Interview findings (IN2)

Environmental elements for IN2						
Using less polluting vehicles, using cleaner fuel standards and switching to gas as an alternative to gasoline	Using routing systems to minimize travel distances	Vehicle maintenance and disposal system	Using of alternative energy sources (e.g. solar or photovoltaic panels)	Packaging/shipping materials are reusable, recyclable, bio-degradable	Performed an environmental or waste audit	Improved compliance with environmental standards
Using these practices by LSPs would affect the service quality level, but not too much.	Using this system will affect the service quality that we get from LSP. It was clear that using this system makes the products arrive in the right time	This element is related to the service quality that we receive. Our LSP's fleet should be in the right condition to receive the products as we agreed.	Using these practices by LSP will be useful for LSP business more than ours. I think it is not related to service quality.	One of the most important points that affect the service level; we really consider it as a critical point to our business.	This kind of audit makes use comfortable when we are dealing with LSP. I think it is strongly related to service quality.	This point is also important, dealing with LSPs that implement and comply with environmental standards.
Social Elements for IN2			Economic Elements for IN2			
Protecting employee health and safety	Creating training programs, awareness programs, seminars for workers	Considering customer compliance, privacy and satisfaction	Improved company image	Improved company's position in the marketplace	Overall cost (cost related to environmental practices)	
Protecting the LSP's safety and health is an obligatory producer, but in fact it does not affect the service that it presents to us.	This point is totally affecting the service that we get from LSP. The level of knowledge and experience will make our business successful.	What makes our business succeed is that LSPs care about our business and our satisfaction.	Our company's image improved based on our services to customer. I could say that LSP have a big share to improve the company' image.	LSP was one of the reasons that make us able to open new markets, and also the collaboration between us makes us in a perfect place.	Our cost within the last 5 years decreased, and it was clear and obvious	

Interview findings (IN3)

Environmental elements for IN3						
Using less polluting vehicles, using cleaner fuel standards and switching to gas as an alternative to gasoline	Using routing systems to minimize travel distances	Vehicle maintenance and disposal system	Using alternative energy sources (e.g. solar or photovoltaic panels)	Packaging/shipping materials are reusable, recyclable, bio-degradable	Performed an environmental or waste audit	Improved compliance with environmental standards
Change from normal operations to environmentally friendly operation is not an easy mission; this operation is related to service quality from two perspectives: cost and time.	My opinion is that this system will save much time, especially with the crowd that Egypt has. It is related to service quality as saving time, and it could save cost too.	I see that this element is not effective, especially with service quality, but it could have a small effect on it.	This is a new style for LSP; we start to apply these practices partially.	Applying this method of packaging will enhance the service quality that we present to our customers and will give them more advantages.	Performing these practices will enhance our picture in front of our customers and the society.	Each certificate we get makes us in a highly ranking position and gives us an advantage to get more and more customers. Moreover, these environmental standards make our services better and better.

Social Elements for IN3			Economic Elements for IN3		
Protecting employee health and safety	Creating a training programs, awareness programs, seminars for workers	Considering customer compliance, privacy, and satisfaction	Improved company image	Improved company's position in the marketplace	Overall cost (cost related to environmental practices)
we cannot do any process in the company without talking the procedures related to safety to our employees, but I see that point is partially related to the service quality.	Designing training programmes and seminars is highly related to service quality. As LSPs, we have created many different programmes in many different areas in our company.	If we cannot consider our customer compliance and problems, we cannot continue in the markets. It directly affects the service quality.	Implementing environmental and social standards makes us able to improve the other companies' image.	I believe that applying environmental practices will not only enhance our market place but it will also support our customers' market place. I believe that it would affect them.	I believe that as these practices reduced the overall cost for us, it will also reduce the overall cost for our customers.

3- Interview findings (IN4)

Environmental, social, and economic elements for IN4
As we mentioned that interviews 3 and 4 are from same company, the answers were almost the same in all different fields, but the most important factor for service quality was different.

4- Interview findings (IN5)

Environmental elements for IN5						
Using less polluting vehicles, using cleaner fuel standards and switching to gas as an alternative to gasoline	Using routing systems to minimize travel distances	Vehicle maintenance and disposal system	Using alternative energy sources (e.g. solar or photovoltaic panels)	Packaging/shipping materials are reusable, recyclable, bio-degradable	Performed an environmental or waste audit	Improved compliance with environmental standards
I think adapting these strategies by LSPs is a positive side regarding cost, but actually it would have a negative side too as for lead time, so it effects the service quality.	As a retailer, adapting this system by LSPs will save them costs and will save us time. I think it is related directly to service quality	It is related to service quality but not that much. It could have an effect on time delivery.	Using alternative energy sources is a good thing for LSPs; it will save them cost and make them more environmentally friendly, but it affects service quality with a small rate.	The service that we get from LSPs of course got affected from using these packaging materials whether to keep the products in a good condition or keep them good till the final customer gets them.	This point makes us much happier when our LSPs do these processes. It is related to service quality; it affects our business and our image.	The more environmental certificate our LIPs get, the more our credibility increase with them. This point affects service quality.

Social Elements for IN5			Economic Elements for IN5		
Protecting employee health and safety	Creating a training programs, awareness programs, seminars for workers	Considering customer Compliance, privacy, and satisfaction	Improved company image	Improved company's position in the marketplace	Overall cost (cost related to environmental practices)
If you give all the rights to your employees, they will serve you heartily as they said. LSPs' employees can control the service quality level. I think it is an important point.	More knowledgeable workers and employees get better service quality than what we get. It is related to service quality and close to the last point.	If these points do not exist, there is no trust between us and our parties. This is the main point that affects the service quality that LSPs present.	Using these green initiatives from LSPs side makes us in a good position in people's mind.	Changing in LSPs makes us keep up with the changes that happen in our supply chain and make us different compared with other chains.	The overall cost that is related to green initiative has decreased. Using these practices makes us better in different positions.

5- Interview findings (IN6)

Environmental elements for IN6						
Use of less polluting vehicles, Use cleaner fuel standards and switch to gas as an alternative to gasoline	Using routing systems to minimize travel distances	Vehicle maintenance and disposal system	Using of alternative energy sources (e.g. solar or photovoltaic panels)	Packaging/shipping materials are reusable, recyclable, bio-degradable	Performed an environmental or waste audit	Improved compliance with environmental standards
It may be related to the service quality in terms of lead-time and also related to decreasing the cost.	The infrastructure in Egypt has developed in the last three years, and we have many options to use the best way to deliver our products to our customers.	We have a perfect maintenance system to our fleet in order to guarantee the delivery of products to our customers in the right time.	We had the first steps to apply this energy source in our company, but we still need more time to adapt all related practices.	we started to use these packaging materials for 5 years. It saved us a lot of cost and our customers are happy to use them.	We have different types of certificates; the organization that awarded us these certificates must make an audit each 4 years to make sure that we are on the right track.	We are doing our best to comply with the international standards in order to achieve sustainability. Moreover, we are looking for best practices through our R&D team to adapt them in our company.

Social Elements for IN6			Economic Elements for IN6		
Protecting employee health and safety	Creating a training programs, awareness programs, seminars for workers	Considering customer Compliance, privacy, and satisfaction	Improved company image	Improved company's position in the marketplace	Overall cost (cost related to environmental practices)
Our safety procedures are clear in our company; we protect our workers and we take all precautions to keep them safe.	Each three months we have training programmes to our staff to keep them up with international changes.	Customers are the reason we are here; we do our best to solve their problems, share information and present a better service.	Our policy is clear for all, so our image is reflected to our customers and society.	The image that we have reflected to our customers and reflected to the final market, too.	Adapting environmental practices reduced our cost on the long term and also our customers' cost, too.

6- Interview findings (IN7)

Environmental elements for IN7						
Using less polluting vehicles, using cleaner fuel standards and switching to gas as an alternative to gasoline	Using routing systems to minimize travel distances	Vehicle maintenance and disposal system	Using alternative energy sources (e.g. solar or photovoltaic panels)	Packaging/shipping materials are reusable, recyclable, bio-degradable	Performed an environmental or waste audit	Improved compliance with environmental standards
We are talking about time and cost in service quality; we start to change our fleet from gasoline to natural gas.	We train our workers on new routing system to achieve our customer satisfaction and present a better service quality.	As we have a huge fleet, maintenance system should be in a high level of quality. We give disposal stuff to competent authorities to deal with it.	We are using these practices in our company, but I see that they would not affect the service that we present to our customers.	Using these types of materials is really great for us and for our customers. It protects the products while handling and transporting.	That is our main priority; we cannot run our work without checking our environmental performance. This enhances our reputation in the market with our customers.	According to our capabilities, we are trying to adapt the environmental standards that would affect our performance and give benefits to our customers.

Social Elements for IN7			Economic Elements for IN7		
Protecting employee health and safety	Creating training programs, awareness programs and seminars for workers	Considering customer compliance, privacy, and satisfaction	Improved company image	Improved company's position in the marketplace	Overall cost (cost related to environmental practices)
Our company uses all precautions to protect our employees; I see that satisfying our employees will reflect on their performance, which will be reflected on the customers, too.	We are trying to be up to date with all changes that happen in our field, so, we create a training programme for our employees. It will affect directly services that we present to our customers.	As we care for our employees, we must care for our customers' double time. We consider all points, problems, complaints, and orders they ask to deal with in order to gain their satisfaction.	The main purposes of applying these practices are to improve our performance and to have a competitive advantage to make us unique. The company that will deal with us will have a perfect image in the community.	Adapting these practices makes people more interested to deal with us because it gives them a better chance to deal with these new practices and present something new.	As we a profit-seeking company, we try as much as possible to reduce costs through applying these practices. Adapting these practices encourages our customers to go through it and of course will reduce their costs.

7- Interview findings (IN8)

Environmental, social, and economic elements for IN8
As we mentioned that interview 7 and 8 from same company, the answers were almost same in all different fields.

8- Interview findings (IN9)

Environmental elements for IN9						
Using less polluting vehicles, using cleaner fuel standards and switching to gas as an alternative to gasoline	Using routing systems to minimize travel distances	Vehicle maintenance and disposal system	Using alternative energy sources (e.g. solar or photovoltaic panels)	Packaging/shipping reusable, recyclable, bio-degradable materials	Performed an environmental or waste audit	Improved compliance with environmental standards
It has an effect on service quality, but not that big.	It is a matter of time; it will save much time using this system, and it contributes to service quality	Better maintenance leads to better service quality.	I think it is not related to service quality as the last factors.	One of the most related factors to service quality.	It gives us a better position in our customers' mind and improves our performance, too.	Complying with these practices will make us gain more customers and better performance.

Social Elements for IN9			Economic Elements for IN9		
Protecting employee health and safety	Creating training programs, awareness programs, seminars for workers	Considering customer compliance, privacy, and satisfaction	Improved company image	Improved company's position in the marketplace	Overall cost (cost related to environmental practices)
Saving employees with all the precautions that will let them work in a good environment and give a better performance.	Designing training programmes for our employees to make them able to deal with international development and provide them with the knowledge required.	Customer is number 1, so we are trying to fulfil all the requirements that they need.	Delivering the product in the right time and right conditions to customers makes them able to deliver their products to the shelves in the right time, too, so we have a hand to improve company image	As the last point, when customers are satisfied, company position in the market place will be changed.	Using environmentally friendly materials leads to reducing our cost and of course will lead to reduce our customers' cost, too.

Source: This research.

Interview findings (IN10,11,12)

The interview with law specialists is about the following questions:

- 1- Are the following environmental and social laws in the correct manner?
- 2- Are the following environmental and social laws in the right form and wording?
- 3- Do they represent the new practices of environmental and social laws according to the new amendments?
- 4- Would you please add any other laws that could be useful to the nature of this research?

The answers of these questions were clear; they answered me and gave me the right form and manner of writing these laws; moreover, they explained to me the main purpose of each law and gave me an overview of the other related laws in the same field.

We presented the importance of SSQ in the organizations in table 7-4, based on the response of interviewees; they agreed that some elements have a huge importance to the service quality and would affect the overall processes between the LSP and its customers. Then, they gave a little attention to other elements. And other elements have been neglected as they do not affect the service quality level. Table 7-4 illustrates these elements.

Table 7- 4: The most important SSQ elements to the LSP's customers.

Elements	Important	moderate	Not important
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		
Performed 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 fee for waste treatment	x		
Decreasing cost of energy consumption	x		
Decreasing fine of environmental accident	x		
Decreasing disposal costs	x		
Protecting employee health and safety		X	
Creating training programs, awareness programs, seminars for workers.	x		
Considering customer c	x		
Enhancing customer privacy	x		
Ensuring customer satisfaction.	x		

Source: This research.

The researcher starts to design SLSQ elements based on LSQ elements that have been derived out of the literature review and the SSQ elements mentioned in the above part. Therefore, the next section will explain in details the scale development of SLSQ and the steps that have been taken to validate these elements and the procedures that have been taken to design the questionnaire draft.

7.3 SLSQ Scale Development

Phase one (part one) presented the qualitative findings related to SSQ elements, these elements that have been derived out from the Egyptian laws and the literature review. The validation of these elements through interviews is illustrated in the previous part. The second variable that we have is LSQ. The elements of this variable have been derived out from the literature review and explained in chapter 5. All these steps were important to shape the new variable, which is sustainable logistics service quality (SLSQ). The suggested elements of this variable based on the literature review have been presented in chapter 5. The following part will explain in details the development and validation procedures of a new element scale that represents SLSQ in logistics service providers. The elements will be validated and tested through qualitative and quantitative studies; the qualitative study will be done through Q-sort in order to classify which element is important and represent the main variables, and the quantitative study will be done through a pilot study.

7.4 Rationale for Developing a New Scale SLSQ

Chapter 1, 2, and 3 presented a wide literature review about LSQ and SSQ. The researcher understood well the definitions of each variable and how each of these variables affect the performance in the content of LSP. As the first step in developing measures involves specifying the domain of the construct, the researcher will explain what scale should be measured.

Starting from LSQ that has been used in research studies long time ago since (Mentzer et al., 1999) invented it, this concept that has been measured from different perspectives aims to evaluate the overall service quality presented to the customer in the LSP field through these dimensions, namely “information quality, ordering procedure, ordering release quantity, timeliness, order accuracy, order quality, order condition, order discrepancy handling, and personnel contact quality”. Therefore, we can say that logistics service quality is a process that comes after delivering the services to customers in order to evaluate it. However, starting from receiving the order from customers in LSP companies and preparing the orders to deliver to the customers in a sustainable manner is what we call sustainable service quality (SSQ). SSQ is all environmental, social and economic practices that are important operational service quality in LSP field. According to the brief explanation, we could say that SSQ is the level that LSPs use to prepare the order in a sustainable way; in the same context LSQ is the process of evaluating the LSP services. Academically, research studies that discuss the topic related to SSQ were rare, and the research studies that discuss the LSQ linked to sustainability were rare, too; however, Chaisurayakarn et al. (2014) used green service quality and LSQ to measure the

logistics performance indicators in Thailand and it was the only study that used this term linked to LSQ, but using sustainability in service quality and LSQ is rare according to literature review and the researcher's knowledge. Figure 7-1 simply explains the idea of building the variable, but we must say that the relationship between both of LSQ and SSQ to SLSQ is reflective, which means we have other variables that could be representative to SLSQ, which means it is not a reflective relationship.

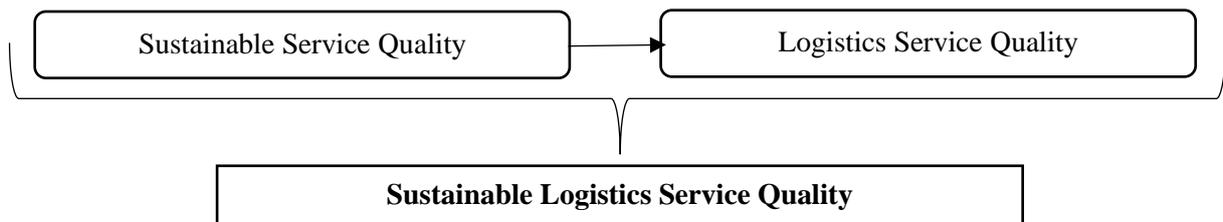


Figure 7- 1: SLSQ theoretical framework
 Source: This research.

7.5 Pre-Test Data analysis

- **Expert Review**

Expert review is an important step in developing scale, and it is very essential for face validity (Hardesty & Bearden, 2004). After the researchers created the elements of SLSQ, they were given to experts in order to revise and review elements and make sure if they express the variable they measure or not. The review of elements was done by four logistics faculty members, two PhD holders in the field of logistics and supply chain and three experts in the field of LSP. The experts were asked to assign each element under SLSQ sub-dimension based on their variable backgrounds and their definition. This technique is called Q-sorting as in the next part.

- ✓ **Q-sorting**

This technique was conducted by nine experts in the field of logistics and supply chain, especially those who have an experience in the LSP field whether academics and practitioners. This test is done in order to ensure that the SLSQ elements fall in the right position. The list of elements has been translated to Arabic to be available upon request in both languages. The calculation of Q-sorting through classifying the frequency of agreed elements from experts. N is the number of experts.

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

When the results of applying this technique are low, this means that this element is not related to the other elements under the main variable (Zaiř & Berteau, 2011). The minimum correct

element classification is 75%, as suggested by Hinkin (1998). 75% is enough to support the elements under the variables. Some studies used 50% as an accepted percentage in order to test validation (Abidin & Afroze, 2018), but they mentioned that it depends on a number of samples; when the number of samples is bigger than 8, it means that 75% is accepted. And when it is less than 8, then 50% will be accepted. This study is conducted with 9 experts in order to make this test. 75% will be the minimum level of accepted elements. The technique results are shown in table 7-5.

Table 7- 5: Results of Q-sorting analysis.

Sustainable Logistics Service Quality Elements	Percent
35. The product becomes better available after using sustainable means of transport by your logistics service provider (LSP)	88.89
36. Product costs decreased after using sustainable means of transport by your LSP	55.56
37. It is uncommon having issues regarding transporting large quantities using sustainable means of transport by your LSP.	66.67
38. It is rare to receive a damaged product as a result of using sustainable means of transport by your LSP.	77.78
39. Using re-route system enhances delivering orders in the right time.	100
40. Trained LSP employees provide your company with a better problem handling.	100
41. Trained LSP employees provide your company with a better problem response.	100
42. Trained LSP employees help in solving your problems in a reasonable time.	88.89
43. Trained LSP employees help you to reduce accident rates.	77.78
44. Your LSP personnel contact employees have enough knowledge and experience.	100
45. Your LSP enhances environmental knowledge sharing with your company.	88.89
46. You achieve a better performance when your LSP considers your complaints.	77.78
47. Collaboration with your LSP improves your sustainable performance practices.	100
48. Your LSP cooperates with your company to achieve environmental goals.	77.78
49. Your LSP cooperates with your company to exchange environmental knowledge.	77.78
50. Adopting your LSP environmental systems (ISO, EMS,.) improves your company's performance.	66.67
51. Your company cooperates with your LSP in the process of sustainable packaging.	88.89
52. Sustainable packaging decreases your company's disposal practices cost.	77.78
53. Sustainable packaging enhances goods stowage.	100
54. It is uncommon to find a damaged product as a result of using sustainable packaging materials.	77.78
55. The sustainable information received from your LSP improves your company's performance.	100
56. The sustainable information received from your LSP decreases the fine of environmental accident.	44.44
57. The sustainable information received from your LSP improved your compliance with environmental standards.	100
58. The sustainable information received from your LSP is always updated.	77.78
59. Adopting sustainability practices from your LSP leads to a reduction in energy consumption cost.	88.89
60. Adopting sustainability practices from your LSP leads to a reduction in disposal practices cost.	77.78
61. It is a rare condition to receive a shipment that encompasses wrong products from your LSP.	77.78
62. Order procedures become more effective due to sustainable systems adopted by LSP.	77.78
63. Order procedures become effortless due to sustainable systems adopted by LSP.	100
64. Order procedures become more efficient due to sustainable systems adopted by LSP.	100
65. products received from LSP are in the right conditions.	100
66. The lead time of the order process becomes shorter.	100
67. The back-order process becomes more efficient.	88.89
68. The back-order process becomes more effective.	88.89

Source: This research.

Based on the results above, twelve elements obtained 100% correct classification (value shown as 100 in the table), seven elements were correctly classified at a rate of 88.89 and eleven

elements were correctly classified at a rate of 77.78. This test shows a high level of correct classification of 34 elements. It proves that all elements are included under the main variable of study.

However, four elements of table 8-2 were below the previously selected minimum 75% correct classification rate; element number 2, related to cost and sustainable transport got 55.56; element number 3, related to large quantities and sustainable transport got 66.67; element number 16, is related to environmental systems (ISO, EMS,..) and the last element, number 22, is related to sustainable information and decreasing environmental cost.

✓ Questionnaire Review

The questionnaire will be designed in the next steps as mentioned in chapter six in the section of data collection and data analysis steps (7.5). Although the researcher designs the questionnaire, the researcher needs to confirm that the questionnaire's main points are clear, the variables and research constructs are understandable. In order to avoid any misinterpretation from the respondents, he engaged a new test in order to make sure that the questionnaire is readable, understandable, answerable and not complicated. The first draft was given to five experts in the field of logistics and supply chain between academics and practitioners. The researcher made this type of test to ensure the face validity and content validity of the questionnaire. The researcher expected to have a feedback and comments from experts, and the changes were made based on their opinions as in table 7-6.

Table 7- 6: Experts' opinions about the questionnaire form.

Focus	Description	Description
Content	Are the questions related to each other and suitable for the research purpose?	<ul style="list-style-type: none"> All the experts agreed that the questions are suitable and appropriate for the nature of research.
Instructions and cover page	Are the instructions clear?	<ul style="list-style-type: none"> The design of the questionnaire is great, but it is better to make separate forms in both languages (Arabic and English) The cover of the questionnaire includes the main points that are important to make clear for the reader (research problem and purpose of this research)
Questions	Are the questions clear and understandable for the reader?	<ul style="list-style-type: none"> They asked me to explain more what SLSQ means and give more explanation about it. All questions were clear, but they suggested to define the new term in the questionnaire. In the Arabic version, they asked me to modify one question based on their review to make it like the English version.
Layout	Is the questionnaire's layout being appropriate?	<ul style="list-style-type: none"> The experts stated that the layout is good, but the section that includes customer satisfaction elements needs to be organized.
Length	Is the time that I suggested suitable to answer the questionnaire?	<ul style="list-style-type: none"> They asked me to modify the time of answering the questionnaire; it would take more than I expected.

Source: This research.

Experts' opinions have been taken into consideration and the changes have been done. After this test, the researcher needs to make a quantitative test to validate the questionnaire. A pilot study will be used in the next section in order to validate the questionnaire and prepare the final draft.

7.6 Pilot study

A pilot study can be defined as a trial study carried out before a research design is finalized to assist in defining the research questions or to test the reliability and validity of the proposed study design². The main mission of this pilot study is to confirm the appropriateness of the questionnaires and to test whether the questionnaire statements were correctly written and understandable by respondents and to check their reliability. This pilot study that is applied on 213 participants from the target sample is measured through the Exploratory Factor Analysis (EFA) and reliability test in order to modify or delete elements or statements.

Based on the results from the face and content validity, the questionnaire was modified. The questionnaire is divided into four sections, and a five-point Likert scale was adapted and used to measure the study variables, with '1' as strongly agree and '5' as strongly disagree. The first section introduces questions about the respondents' profiles like the main title, the current position and how long they have been there, how long they have been working with the other parties, the main sector of their company and finally the contact number, if possible. The second section introduces the sustainable logistics service quality elements, and then the third section shows satisfaction elements; the last section presents relationship quality elements that will be measured by Likert scale as '1' is strongly agree and '5' is strongly disagree.

- **Data Collection**

The researcher has used google forms and self-administrative questionnaires to collect the data for the pilot study. The target number of respondents was 250; the researcher has collected 213 respondents to make a pre-test on the sample in order to delete or modify elements according to the test results. EFA was used to examine the study variables and the internal consistency of SLSQ, CS, and RQ. "Factor analysis is a multivariate analysis technique that determines underlying dimensions or factors in a set of correlated variables" (Chaisurayakarn et al., 2014; p.110; Williams et al., 2010) EFA is used to figure out the elements that are suitable for its variables (J. Loehlin, 1998); moreover, it is used when a researcher needs to know the number of factors affecting the variables and to analyse which elements "go together" (DeCoster, 1998).

- **Data Analysis Results**

Exploratory Factor Analysis (EFA) was applied to test the significant elements related to SLSQ, CS and RQ. The researcher used the principle axis factor extraction (Byrne, 2005). Starting

²(<http://www.cirem.co.uk/definitions.html>)

with SLSQ, elements of SLSQ need to make a factor loading test; the researcher needs to know if the elements will be loaded on too many sub-variables or they will be all under one variables (SLSQ). Therefore, the EFA was used to explain SLSQ elements.

7.6.1 Sustainable Logistics Service Quality Elements

The first analysis for SLSQ that has 30 elements to be measured; table 7-7 shows 30 elements identified and measured under SLSQ.

Table 7- 7: Cronbach's alpha, composite reliability, factor loading, KMO and AVE of the SLSQ elements.

Code	Sustainable Logistics Service Quality Elements	Factor Loading	KMO	AVE	Composite Reliability	Cronbach's Alpha
SLSQ1	The product becomes better available after using sustainable means of transport by your logistics service provider (LSP)	.825	.937	.47	.94	.96
SLSQ2	It is rare to receive a damaged product as a result of using sustainable means of transport by your LSP.	.741				
SLSQ3	Using re-route system enhances delivering orders in the right time.	.755				
SLSQ4	Trained LSP employees provide your company with a better problem handling.	.665				
SLSQ5	Trained LSP employees provide your company with a better problem response.	.733				
SLSQ6	Trained LSP employees help in solving your problems in a reasonable time.	.702				
SLSQ7	Trained LSP employees help you to reduce accident rates.	.705				
SLSQ8	Your LSP personnel contact employees have enough knowledge and experience.	.718				
SLSQ9	Your LSP enhances environmental knowledge sharing with your company.	.705				
SLSQ10	You achieve a better performance when your LSP considers your complaints.	.660				
SLSQ11	Collaboration with your LSP improves your sustainable performance practices.	.680				
SLSQ12	Your LSP cooperates with your company to achieve environmental goals.	.628				
SLSQ13	Your LSP cooperates with your company to exchange environmental knowledge.	.656				
SLSQ14	Your company cooperates with your LSP in the process of sustainable packaging.	.615				
SLSQ15	Sustainable packaging decreases your company's disposal practices cost.	.719				
SLSQ16	Sustainable packaging enhances goods stowage.	.669				
SLSQ17	It is uncommon to find a damaged product as result of using sustainable packaging materials.	.659				
SLSQ18	The sustainable information received from your LSP improves your company's performance.	.764				
SLSQ19	The sustainable information received from your LSP improved your compliance with environmental standards.	.719				
SLSQ20	The sustainable information received from your LSP is always updated.	.695				
SLSQ21	Adopting sustainability practices from your LSP leads to a reduction in energy consumption cost	.716				
SLSQ22	Adopting sustainability practices from your LSP leads to a reduction in disposal practices cost.	.719				
SLSQ23	It is a rare condition to receive a shipment that encompasses wrong products from your LSP.	.716				
SLSQ24	Order procedures become more effective due to sustainable systems adopted by LSP.	.658				
SLSQ25	Order procedures become effortless due to sustainable systems adopted by LSP.	.682				

SLSQ26	Order procedures become more efficient due to sustainable systems adopted by LSP.	.671				
SLSQ27	products received from LSP are in the right conditions.	.634				
SLSQ28	The lead time of the order process becomes shorter.	.689				
SLSQ29	The back-order process becomes more efficient.	.624				
SLSQ30	The back-order process becomes more effective.	.631				
Note: Bartlett's Test of Sphericity: chi-square = 5247.19, df= 435, p < .000.						

Source: This research

The data of the pilot study were analysed by using Statistical Package for Social Sciences (SPSS), starting with factor loading of SLSQ showing that all elements under this variable are exceeded 0.4, which is accepted, and the AVE is good, which has 0.47 score. The Bartlett's Test of Sphericity was significant ($p < .000$) and the Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy was good as it has .937, which is accepted; the Cronbach's alpha values were good with score 0.96, which indicate that elements are reliable in measuring SLSQ. The composite reliability value is measured, too; it is significant it has a score of 0.94, which exceeds 0.5. The factor extraction showed that the SLSQ elements load on the same factor, which means that all elements can clearly measure and explain SLSQ variable.

7.6.2 Customer Satisfaction (CS)

The second construct of CS has four elements to be measured. The following table 7-8 shows the four elements identified and measured under the variable of CS.

Table 7- 8: Cronbach's alpha, composite reliability, factor loading, KMO and AVE of the CS elements.

Code	Customer Satisfaction elements	Factor Loading	KMO	AVE	Composite Reliability	Cronbach's Alpha
CS1	I am delighted with the performance of my LSP	.868	0.806	0.712	0.90	0.86
CS2	The services offered by LSP meet my expectations	.879				
CS3	The service provided to you through LSP is good.	.808				
CS4	Overall, I am satisfied with my LSP.	.818				
Note: Bartlett's Test of Sphericity: chi-square = 405, df = 6, p < .000.						

Source: This research

The analysis of the pilot study showed that all elements of this variable exceeded 0.4, which is accepted; moreover, the AVE has 0.721 score. The Bartlett's Test of Sphericity was significant ($p < .000$), and the Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy was good as it has 0.806, which is accepted; the Cronbach's alpha values were good with a score 0.86, which indicated that the elements are reliable in measuring CS. The composite reliability value is measured too; it is significant as it has a score of 0.90, which exceeds 0.5.

7.6.3 Relationship Quality (RQ)

RQ has three main constructs, which are (Dependence, Trust, and commitment); the researcher will test each sub-variable separately and then will compute the three constructs under RQ to test them. Therefore, next part will test dependence elements.

1- Dependence

The first construct of RQ is dependence; it has four elements to be measured. The following table 7-9 shows the four elements identified and measured under the dependence construct.

Table 7- 9: Cronbach's alpha, composite reliability, factor loading, KMO and AVE of the dependence elements.

Code	Dependence Elements	Factor Loading	KMO	AVE	composite reliability	Cronbach's Alpha
DEP1	It is prohibitively expensive to start dealing with a new LSP rather than the old one.	.820	0.806	0.67	0.89	0.83
DEP2	It is difficult to receive the same services from other LSPs.	.832				
DEP3	The advantages gained from your current LSP are difficult to be substituted.	.840				
DEP4	It will be considered a great loss if you lose this LSP.	.787				

Note: Bartlett's Test of Sphericity: chi-square = 320.82, df= 6, p < .000.

Source: This research

The analysis of the pilot study showed that all elements of this construct exceeded 0.4, which is accepted; moreover, the AVE has 0.67 score. The Bartlett's Test of Sphericity was significant ($p < .000$), and the Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy was good as it has 0.806, which is accepted; the Cronbach's alpha values were good with a score of 0.83, which indicates that all elements are reliable in measuring the dependence construct. The composite reliability value is measured too; it is significant as it has a score of 0.89, which exceeds 0.5.

2- Trust

The second construct is trust; it has five elements to be measured. The following table 7-10 shows the five elements identified and measured under the trust construct.

Table 7- 10: Cronbach's alpha, composite reliability, factor loading, KMO and AVE of the trust elements.

Code	Logistics service Quality elements (ECSQ)	Factor Loading	KMO	AVE	Composite Reliability	Cronbach's Alpha
TRS1	You trust this LSP because it keeps your interests in mind.	.864	0.89	0.71	0.92	0.89
TRS2	Your LSP keeps its promises (i.e., price offers, marketing communications, etc.)	.857				
TRS3	Your LSP has high a level of honesty.	.835				
TRS4	Your LSP will remain very loyal to this relationship.	.846				
TRS5	Your LSP is trustworthy	.820				

Note: Bartlett's Test of Sphericity: chi-square = 597.6, df = 10, p < .000.

Source: This research

The analysis of the pilot study showed that all elements of this construct exceeded 0.4, which is accepted; moreover, the AVE has 0.71 score. The Bartlett's Test of Sphericity was significant ($p < .000$), and the Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy was good as it has a score of 0.89, which is accepted; the Cronbach's alpha values were good with a score of 0.89, which indicates that all elements are reliable in measuring the trust construct. The composite reliability value is measured, too; it is significant as it has a score of 0.92, which exceeds 0.5.

3- Commitment

The third construct is commitment; it has four elements to be measured. The following table 7-11 shows the four elements identified and measured under the commitment construct.

Table 7- 11: Cronbach's alpha, composite reliability, factor loading, KMO and AVE of the commitment elements.

code	Customer Satisfaction elements (CS)	Factor Loading	KMO	AVE	Composite Reliability	Cronbach's Alpha
COM1	You are willing to have a long-term relationship with your LSP.	.864	0.84	0.72	0.92	0.89
COM2	You want to remain a customer of this LSP because you genuinely enjoy your relationship with it.	.882				
COM3	You are willing to invest more in this relationship	.869				
COM4	your positive thoughts towards this LSP is the major driver to continue working with it.	.875				

Note: Bartlett's Test of Sphericity: chi-square = 491.76, df= 6, $p < .000$.

Source: This research

The analysis of the pilot study showed that all elements of this construct exceeded 0.4, which is accepted; moreover, the AVE has 0.72 score. The Bartlett's Test of Sphericity was significant ($p < .000$), and the Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy was good as it has a score of 0.84, which is accepted; the Cronbach's alpha values were good with a score of 0.89, which indicates that all elements are reliable in measuring the commitment construct. The composite reliability value is measured, too; it is significant as it has a score of 0.92, which exceeds 0.5.

✓ Computed RQ variables

The variables of RQ (Dependence, Trust, and commitment) have been tested above; the researcher will compute the three constructs to confirm the validity and reliability for overall RQ elements and to make sure that all elements measure RQ variable. The following table 7-12 supports the idea that the three sub-variables are a reflective construct for RQ variable.

Table 7- 12: Loadings of the elements of RQ variables

	Component
	1
DEP1	.699
DEP2	.778
DEP3	.729
DEP4	.744

TRS1	.828
TRS2	.799
TRS3	.794
TRS4	.801
TRS5	.803
COM1	.802
COM2	.799
COM3	.829
COM4	.814
Extraction Method: Principal Component Analysis.	

Source: This research

The results of EFA support the main idea that the three sub-variables explain the main RQ variable; all elements of this variable exceeded 0.4, which is accepted. The factor extraction showed that RQ elements are loaded on the same factor, which means that all elements can clearly measure and explain RQ variable.

The analysis of the pilot study in table 8-13 shows that AVE has 0.61 score, which is accepted. The Bartlett’s Test of Sphericity was significant ($p < .000$), and the Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy was good as it has a score of 0.96, which is accepted; the Cronbach’s alpha values were good with a score of 0.95, which indicates that all elements are reliable in measuring the commitment construct. The composite reliability value is measured, too; it is significant as it has a score of 0.95, which exceeds 0.5.

Table 7- 13: Cronbach’s alpha, composite reliability, KMO and AVE of the RQ elements.

Relationship Quality Test	Results
AVE	0.61
KMO	0.96
Composite Reliability	0.95
Cronbach’s Alpha	0.95
Note: Bartlett's Test of Sphericity: chi-square = 1932.78, df= 78, $p < .000$.	

Source: This research

The relationship quality has three sub-variables; the accepted discriminant validity comes when the square root of the average variance extracted for each sub- variable is higher than any of the bivariate correlations involving the latent variables in question (Fornell & Larcker, 1981). Table 7-14 shows that the three RQ sub-variables are higher than the bivariate correlations between each of the RQ sub-variables. Therefore, the RQ sale has a high discriminant validity.

Table 7- 14: Discriminant Validity of the RQ

		DEP	Trust	COM	AVE	SQR of (AVE)
DEP	Pearson Correlation	1	.792**	.751**		
	Sig. (2-tailed)		.000	.000	0.67	0.82
	N	213	213	213		
Trust	Pearson Correlation	.792**	1	.835**		
	Sig. (2-tailed)	.000		.000	0.71	0.84

	N	213	213	213		
COM	Pearson Correlation	.751**	.835**	1		
	Sig. (2-tailed)	.000	.000		0.72	0.85
	N	213	213	213		
	AVE	0.67	0.71	0.72		
	SQR of (AVE)	0.82	0.84	0.85		
**. Correlation is significant at the 0.01 level (2-tailed).						

Source: This Research

In conclusion, this chapter answers the first, second, and third research questions through the results from phase one (part one and two) of this research design. Twelve cases' interviews have been conducted in order to validate and confirm the SSQ elements. The interviews' abstracts have been mentioned and illustrated. In the second part and based on phase one, the pilot study was conducted in order to confirm SLSQ elements and to test the reliability and validity of other variables in the study. The next chapter will explain the results of the main study (phase two).

Chapter Eight

8. Data Analysis and Results

8.1 Introduction

This chapter introduces the empirical study for the relationship between sustainable logistics service quality and relationship quality through customer satisfaction. It also introduces the main findings and results after running the data analysis. The data analysis is conducted through applying several steps; the first one is testing the data for their validity and reliability. Validity is tested for convergent and discriminant validity. Reliability is tested using Cronbach's Alpha. The second one is the descriptive analysis that is presented for both the research variables and the respondent profiles. The third one is testing the research hypotheses using inferential analysis, which is conducted using correlation and structural equation modelling. Furthermore, for verifying the hypotheses of the model, the normality testing of the research variables is presented. The analysis conducted is applied using SPSS (Statistical Package for Social Sciences) and AMOS (Analysis of a Moment Structures). These packages are used for analysing the data collected through the questionnaire designed for the purpose of the current research.

This chapter is designed into ten sections; the first section is the current introduction for this chapter. The second section presents the descriptive analysis for the respondents' profile. The third section presents the descriptive analysis for research variables, with the frequencies of different responses for each variable after being constructed. The fourth section discusses the construction of the research variables using the validity and reliability testing of the data under study. The fifth section presents a verification to the normality assumption required for conducting the parametric analysis. The sixth section presents a verification to the multicollinearity assumption required for avoiding redundancy of information in the model. The seventh section presents the exploratory and confirmatory factor analysis for the research variables, including the measurement model conducted for the structural equation modelling. The eighth section introduces testing the research hypotheses using the SEM analysis. The ninth section tests the model by considering the overall Relationship Quality. Finally, a conclusion had been derived in the tenth section as a summary of the main findings of the current research. The outline of chapter eight is clarified in figure 8-1.

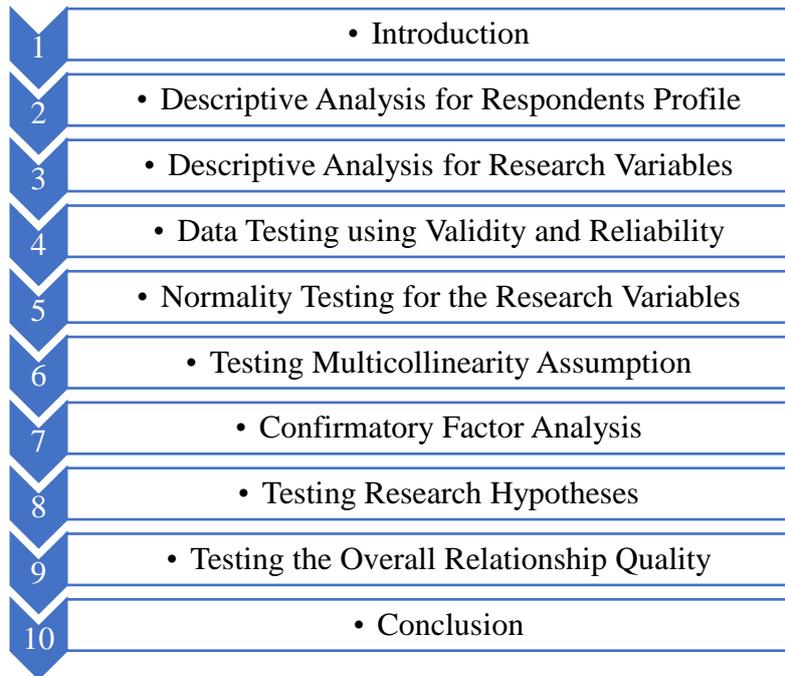


Figure 8- 1: Outline of Chapter Eight
Source: This research.

8.2 Descriptive Analysis

8.2.1 Descriptive Analysis for Respondents Profile

Descriptive statistics is a tool that explains and gives a distinct understanding of the features of certain data set, by giving short summaries of the respondents and how the diversification had been applied to select a representative sample of the population under study. Also, the researcher could be able to identify if there is a gap for improvement in the research variables or not. Data are described here using tables of frequencies that show the number and the percentage of respondents sharing in the questionnaire under each category. Table 8-1 illustrates this by showing the frequencies of the respondent profile regarding his/her job title, years in the current position, years in the company, years working with LSP, industrial section and core work.

Regarding Job Title, it could be observed from Table 8-1 that the number of respondents working as ‘Supervisors’ (n = 131) is the highest compared to other job titles, with a percentage of 31.1%. Considering years in the current position, it could be noticed that respondents being in the current position ‘More than 6 years’ are the most frequently appearing, with 220 respondents and a percentage of 52.3% of the sample under study. Similarly, respondents working in the company for ‘More than 6 years’ are the most frequently appearing respondents, with 289 respondents and a percentage of 68.6%. Likewise, respondents who had been working with LSP ‘More than 6 years’ (n = 240) are higher than other respondents, with a percentage of 57% of the sample under study. In addition, respondents working in ‘Food and Beverages Retailers’ section (n = 208) are higher than other respondents in other companies' industrial sections, with a percentage of 49.4%. Finally, respondents working as ‘Retailer’ are greater than other respondents working in other cores, with a percentage of 58.7% of the sample under study.

Table 8- 1: Respondents Profile

	Frequency	Percent%	Total
Job Title			
Senior Executive	72	17.1	421
Area Manager	21	5.0	
Department Manager	88	20.9	
Supervisor	131	31.1	
Operations	109	25.9	
How many years have you been in your current position?			
Less than 1 year	45	10.7	421
From 1 year to 2 years	35	8.3	
From 3 years to 4 years	50	11.9	
From 5 years to 6 years	71	16.9	
More than 6 years	220	52.3	
How long have you been working in this company?			
Less than 1 year	38	9.0	421
From 1 year to 2 years	10	2.4	
From 3 years to 4 years	46	10.9	
From 5 years to 6 years	38	9.0	
More than 6 years	289	68.6	
How long have you been working with this LSP?			
Less than 1 year	48	11.4	421
From 1 year to 2 years	46	10.9	
From 3 years to 4 years	52	12.4	
From 5 years to 6 years	35	8.3	
More than 6 years	240	57.0	
Company's industrial section			
Food and Beverages Retailers	208	49.4	421
Drug Retailers	16	3.8	
Food Producers and Processes	34	8.1	
Personal Care and Household Products	20	4.8	
Electronic and Electrical Equipment	13	3.1	
Chemical, Oil and Pharmaceutical Products	11	2.6	
Automotive Industry	21	5.0	
Postal	25	5.9	
Utilities	24	5.7	
Health Services	13	3.1	
Maritime Industry	32	7.6	
Other	4	1.0	
Your company core work			
Wholesaler/Distributor	125	29.7	421
Retailer	247	58.7	
Supplier	49	11.6	

Source: This Research.

After presenting the respondents' profiles, the researcher presents the descriptive analysis for the research variables in the following section.

8.2.2 Descriptive Analysis for Research Variables

Similar to the respondents' profiles, the researcher is able to present the frequencies of responses used for representing the research variables. Table 8-2 illustrates the descriptive analysis for the research variables using frequencies, where the value "1" refers to "Strongly

Agree” response, the value “2” refers to “Agree” response, the value “3” refers to “Neutral” response, the value “4” refers to “Disagree” response, and the value “5” refers to “Strongly Disagree” response. The Mean and Standard Deviation for the research variables are represented in Table 8-2 as well. The mean value of SLSQ is found to be 2.2257 with a standard deviation of .77392. The highest frequency of responses for Agree is (n = 244) and then Neutral (n = 88). Also, the mean value of CS is found to be 2.1330 with a standard deviation of .75680.

The highest frequency of responses for Agree is (n = 230) and then Neutral (n = 95). In addition, the mean value of Dependence is found to be 2.2233, with a standard deviation of .72212. The highest frequency of responses for Agree is (n = 276) and then Neutral (n = 80). Moreover, the mean value of Trust is found to be 1.9881, with a standard deviation of .81787. The highest frequency of responses for Agree is (n = 218) and then Strongly Agree (n = 116). Furthermore, the mean value of Commitment is found to be 2.1734, with a standard deviation of .81408. The highest frequency of responses for Agree is (n = 253) and then Strongly Agree (n = 67). Finally, the mean value of Relationship Quality is found to be 2.0119, with a standard deviation of .71538. The highest frequency of responses for Agree is (n = 278) and then Strongly Agree (n = 81).

In general, it could be observed that the mean and the frequencies of most responses are in the agreement zone, as the mean values for the research variables SLSQ, CS, Dependence, Trust, Commitment, and RQ are 2.2257, 2.1330, 2.2233, 1.9881, 2.1734, and 2.0119, respectively. Therefore, it could be claimed that there is a zone for improvement, which might allow respondents to reach higher frequencies for Strongly Agree.

Table 8- 2: Descriptive Analysis for the Research Variables.

Research Variables	N	Mean	Std. Deviation	Frequency				
				1	2	3	4	5
Sustainable Logistics Service Quality	421	2.2257	.77392	57	244	88	32	0
Customer Satisfaction	421	2.1330	.75680	77	230	95	19	0
Dependence	421	2.2233	.72212	40	276	80	21	4
Trust	421	1.9881	.81787	116	218	66	18	3
Commitment	421	2.1734	.81408	67	253	65	33	3
Relationship Quality	421	2.0119	.71538	81	278	38	24	0

Source: This Research.

At the end of this section, the research variables are described and the researcher is ready to analyse the data under study. As a first step in the analysis, the statements are tested for being able to determine to which factor they belong and are able to respond to the research hypotheses. The following section presents data testing using validity and reliability.

8.3 Data Testing Using Validity and Reliability

Validity and reliability are used for data testing to prove that the data collected are good enough for testing the research hypotheses. Validity is described as the degree to which the statements assigned for a certain construct in the questionnaire can measure this construct in a proper way (Sekaran & Bougie, 2016). To measure validity, factor analysis technique is used to compute

the average variance extracted (AVE) and factor loading (FL). AVE is used to measure the average community for each construct. It is claimed that it should be greater than 50% to refer to an adequate validity (Joseph F Hair, Ringle, & Sarstedt, 2012). Also, FL is the size of the loadings of elements on their corresponding variable, which is claimed to be at least 0.40 to refer to an adequate validity (Sekaran and Bougie, 2016). FL analysis for all variables see (appendix 5).

Reliability is described as the consistency of the statements given to measure one construct in the questionnaire designed for this research. Reliability is conducted for each construct using the statements assigned for this construct by computing the Cronbach's alpha value. This value is considered to be the most commonly used test of reliability. The range of Alpha coefficient lies between 0 and 1; the higher the score, the higher the reliability. Cronbach's alpha is claimed to be at least 0.7 to refer to an adequate reliability (Joseph F Hair et al., 2012).

Table 8-3 shows the validity and reliability test of the research variables: SLSQ, Customer Satisfaction, dependence, trust, commitment, and relationship quality. It could be noticed that the data show Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) to be greater than 0.5, which is considered to be good and a significant Bartlett's Sphericity test. The average variance extracted (AVE) is found to be more than 50%. Also, all Cronbach's alpha values are greater than 0.7. The values obtained imply an adequate convergent validity as well as an adequate reliability.

Table 8- 3: Validity and Reliability Test.

Variable	KMO	AVE	Cronbach's Alpha	Element	Factor Loading
Sustainable Logistics Service Quality	0.911	62.151%	0.936	SLSQ1	Deleted
				SLSQ2	0.468
				SLSQ3	0.598
				SLSQ4	0.568
				SLSQ5	0.730
				SLSQ6	0.433
				SLSQ7	0.775
				SLSQ8	0.693
				SLSQ9	0.694
				SLSQ10	0.635
				SLSQ11	0.577
				SLSQ12	Deleted
				SLSQ13	0.666
				SLSQ14	Deleted
				SLSQ15	Deleted
				SLSQ16	Deleted
				SLSQ17	Deleted
				SLSQ18	Deleted
				SLSQ19	Deleted
				SLSQ20	Deleted
				SLSQ21	Deleted
				SLSQ22	Deleted
				SLSQ23	Deleted
				SLSQ24	Deleted
				SLSQ25	Deleted
				SLSQ26	Deleted
				SLSQ27	Deleted

Variable	KMO	AVE	Cronbach's Alpha	Element	Factor Loading
				SLSQ28	Deleted
				SLSQ29	Deleted
				SLSQ30	Deleted
Customer Satisfaction	0.936	67.381%	0.838	CS1	0.670
				CS2	0.717
				CS3	0.634
				CS4	0.674
Dependence	0.774	62.531%	0.800	DEP1	0.643
				DEP2	0.666
				DEP3	0.658
				DEP4	0.534
Trust	0.883	68.409%	0.883	TRS1	0.735
				TRS2	0.738
				TRS3	0.625
				TRS4	0.713
				TRS5	0.609
Commitment	0.810	71.129%	0.863	COM1	0.656
				COM2	0.715
				COM3	0.722
				COM4	0.752
Relationship Quality	0.936	57.533%	0.938	RQ1	0.428
				RQ2	0.558
				RQ3	0.469
				RQ4	0.522
				RQ5	0.667
				RQ6	0.587
				RQ7	0.557
				RQ8	0.652
				RQ9	0.596
				RQ10	0.574
				RQ11	0.575
				RQ12	0.623
				RQ13	0.672

Source: This Research.

In addition, the discriminant validity was applied to the statements by computing the correlation matrix and comparing the square root of AVE of each construct obtained in Table 8-3, with the correlation between such variables and other variables. Table 8-4 shows the discriminant validity of the constructs remaining after the convergent validity and reliability were applied, where it could be observed that all square roots of AVE values for a specific construct are greater than the correlations between such variables and other variables.

Table 8- 4: Discriminant Validity of the Research Variables.

	1.	2.	3.	4.	5.	6.
1. Sustainable Logistics Service Quality	(0.788)					
	.421					
2. Customer Satisfaction	.261**	(0.821)				
	.000	.				
	.421	.421				
3. Dependence	.238**	.514**	(0.791)			
	.000	.000	.			
	.421	.421	.421			
4. Trust	.177**	.458**	.549**	(0.827)		
	.000	.000	.000	.		

	421	421	421	421		
5. Commitment	.098*	.442**	.533**	.549**	(0.843)	
	.044	.000	.000	.000	.	
	421	421	421	421	421	
6. Relationship Quality	.212**	.513**	.657**	.736**	.713**	(0.759)
	.000	.000	.000	.000	.000	.
	421	421	421	421	421	421

Source: This Research.

After data had been tested for validity and reliability, the assumption of normality was verified to be able to identify the relevant tests for testing the research hypotheses. The following section presents the normality testing for the data under study.

8.3.1 Normality Testing for the Research Variables

Normality is one of the assumptions that have to be verified to determine if a data set is normal. If the data are normally distributed, the researcher can use parametric analysis, such as Structural Equation Modelling (SEM). Therefore, it could be claimed that the normality of data should be verified as a preliminary step for inferential analysis as it determines whether the researcher could use parametric or non-parametric tests to respond to the research hypotheses. One of the most common methods to check normality of a data set is the *Kolmogorov-Smirnov test* of normality, which tests the normality assumption of samples greater than 50 observations. It assumes that the data are normally distributed if the P-value is greater than 0.05. It is called the formal test of normality.

Table 8-5 shows the formal testing of normality assumption using Kolmogorov-Smirnov test of normality for the research variables. It could be observed that the research variables are not normally distributed, as the corresponding P-values are all less than 0.05.

Table 8- 5: Formal Testing of Normality

Research Variables	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
Sustainable Logistics Service Quality	.330	421	.000
Customer Satisfaction	.299	421	.000
Dependence	.372	421	.000
Trust	.288	421	.000
Commitment	.344	421	.000
Relationship Quality	.359	421	.000

Source: This Research.

As the formal test shows that the research variables are not exactly normally distributed, an informal test could be used to detect the approximate normality, which is called *Rule of Thumb*. It is called the informal test of normality, which claims that a variable is reasonably close to normal if its skewness and kurtosis values are between -3.0 and +3.0 (Kleinbaum, Kupper, Nizam, & Rosenberg, 2013; Ullman & Bentler, 2001). This rule could be applied only if the sample size is greater than 150.

In this research, the number of observations or the sample under study is 421, which exceeds the number assigned for the rule of thumb to test the normality of the data. Therefore, the rule

of thumb could be used in this research. Table 8-6 shows the informal test of normality, where it could be shown that skewness and kurtosis values of all the research variables under study are all between the ranges of ± 3 . Therefore, all the research variables under study are close to normal.

Table 8- 6: Informal Testing of Normality

Research Variables	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Sustainable Logistics Service Quality	421	.577	.119	.197	.237
Customer Satisfaction	421	.403	.119	.008	.237
Dependence	421	1.046	.119	2.010	.237
Trust	421	.809	.119	.873	.237
Commitment	421	.869	.119	.918	.237
Relationship Quality	421	0.924	.119	1.553	.237

Source: This Research.

8.3.2 Testing Multicollinearity Assumption

This section investigates and verifies one of the important assumptions required to avoid redundancy of information in the model under study, which is the problem of multicollinearity. It occurs when two or more predictors in a model are highly correlated with each other. The perfect multicollinearity is when the correlation between two independent variables is equal to 1 or -1 (Farrar & Glauber, 1967; Neter, Kutner, Nachtsheim, & Wasserman, 1996). This leads to problems with understanding which predictors contribute to the variance explained in criterion, as well as technical issues in calculating a multiple regression model. Therefore, redundant information about the criterion is provided. By testing Variance Inflation Factor (VIF) values, one of the Multicollinearity technique, as shown in Table 8-7, it could be observed that all VIF values of the research variables under study are less than 5, implying that there is no problem of multicollinearity between the research variables under study (Neter et al., 1996).

Table 8- 7: VIF values for the Research Variables

Research Variables	VIF
Sustainable Logistics Service Quality	1.121
Customer Satisfaction	1.699

Source: This Research.

After testing the main assumptions of conducting the model under study, the researcher is now able to start constructing the model. As a prerequisite for conducting the model, the confirmatory factor analysis has to be provided, as shown in the following section.

8.4 Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) is required to know the factor structure of the data set and confirm the factor structure extracted from the literature review to be able to conduct the structural equation modelling (SEM). The program of AMOS 24 was used to apply the Maximum Likelihood (ML) method, which shows the factor loading for each variable and its model fit. The CFA was applied using the covariance method, where some elements were deleted to fix the problem of having some errors, see table 8-3. Figure 8-2 shows the results of

the measurement model, where the model fit of the confirmatory factor analysis was computed. Such model fit indices are represented in the minimum discrepancy, P-value, goodness of fit, adjusted goodness of fit, normed fit index, non-normed fit index, comparative fit index, root mean square residual, root mean square of approximation and PCLOSE.

The minimum discrepancy (CMIN/DF) is computed as the chi-square divided by the degrees of freedom. P-value is defined as the probability of getting as larger discrepancy as occurred with the present sample. Goodness of fit (GFI) and Adjusted Goodness of Fit (AGFI) Indices evaluate the fit of the model versus the number of estimate coefficients or the degrees of freedom needed to achieve that level of fit. The Bentler-Bonett normed fit index (NFI) and the Tucker-Lewis index or Bentler-Bonett non-normed fit index (TLI) assess the incremental fit of the model compared to a null model. The comparative fit index (CFI) is an incremental fit index that is computed by evaluating the covariance matrix. The root mean square residual (RMR) shows the amount by which the sample variances and covariances differ from their estimates obtained under the assumption that the model is correct. The root mean square of approximation (RMSEA) is an informative criterion in covariance structure modelling and measures the amount of error present when attempting to estimate the population (Joseph F Hair et al., 2012). Table 8-8 shows these indicator values in CFA and the recommended values for them. It could be observed that CMIN/DF value was 3.404, P-value was 0.000, GFI was 0.857, AGFI was 0.820, NFI was 0.879, TLI was 0.896, CFI was 0.911, RMR was 0.040 and RMSEA was 0.079. The indices shown mean that the data fit the model quiet well, with the exception of p-value for the model that may be caused by a larger sample size.

Table 8- 8: Fit Indices and Thresholds for Measurement Model of Independent Variables

Measure	Results	Threshold
Chi-square/df	3.404	< 2 excellent; < 3 good; < 5 sometimes permissible
P-value	0.000	> 0.05
GFI	0.857	> 0.80
AGFI	0.820	> 0.80
NFI	0.879	> 0.90
TLI	0.896	> 0.95
CFI	0.911	> 0.95 great; > 0.90 traditional; > 0.80 sometimes permissible
RMR	0.040	< 0.09
RMSEA	0.079	< 0.05 good; 0.05-0.10 moderate; > 0.10 bad
P-Close	0.000	> 0.05

Source: This Research.

Figure 8-2 shows the confirmatory factor analysis after being applied, where the factor loadings are shown on arrows implying good factor loadings for the confirmatory factor analysis.

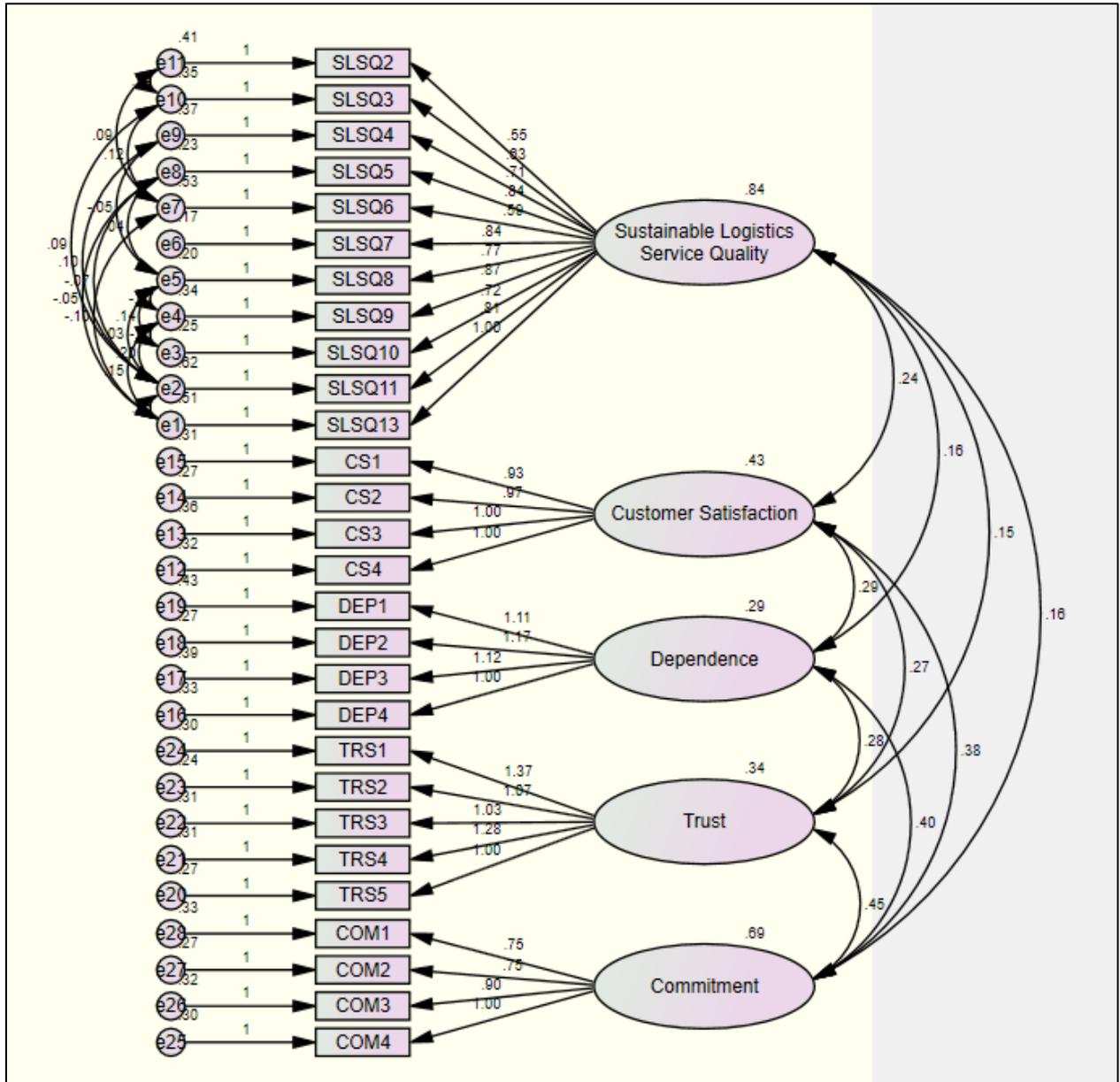


Figure 8- 2: CFA for the Measurement Model
 Source: This Research.

8.4.1 Testing the Research Hypotheses

In this section, the hypotheses under study are tested using the SEM. The following subsections are designed to discuss each research hypothesis. The first one tests the relationship between sustainable logistics service quality and customer satisfaction. The second one tests the relationship between satisfaction with sustainable logistics service quality and relationship quality (Dependence and Trust). The third one tests the relationship between dependence of customers on LSPs and their trust in LSPs. The fourth one tests the relationship between dependence on an LSP and customer commitment. The fifth one tests the relationship between trust in LSPs and customer commitment.

✓ **Testing the relationship between Sustainable Logistics Service Quality and Customer Satisfaction**

This subsection tests the relationship between Sustainable Logistics Service Quality and Customer Satisfaction. Therefore, it tests the first hypothesis:

H1: Sustainable logistics service quality constructs positively affect customer satisfaction

The SEM model conducted in Figure 8-3 reveals the results shown in Table 8-9, where it could be observed that there is a positive significant effect of Sustainable Logistics Service Quality on Customer Satisfaction as the estimate value is 0.320 (which is greater than zero, indicating a positive relationship) and the P-value is 0.000 (which is less than 0.05, indicating a significant relationship). Furthermore, the R Square (Coefficient of determinations) is 0.162, which means that 16.2% of the variation in Customer Satisfaction is explained by the independent variable; Sustainable Logistics Service Quality.

Table 8- 9: SEM Analysis

			Estimate	P	R²
Customer Satisfaction	<---	Sustainable Logistics Service Quality	.320	***	.162

Source: This Research.

Therefore, the first hypothesis testing the relationship between Sustainable Logistics Service Quality and Customer Satisfaction is supported.

✓ **Testing the Relation between Customer Satisfaction and Relationship Quality**

This subsection tests the relationship between Customer Satisfaction and Relationship Quality. Therefore, it tests the second hypothesis:

H2: Satisfaction with sustainable logistics service quality positively affects Relationship Quality.

This hypothesis is tested through two sub hypotheses:

H2a. Satisfaction with sustainable logistics service quality positively increases Dependence of customers on LSPs.

H2b. Satisfaction with sustainable logistics service quality positively affects Trust.

The SEM model conducted in Figure 8-3 reveals the results shown in Table 8-10, where it could be noticed that there is a significant positive effect of Customer Satisfaction on Dependence as the estimate value is 0.799 (Estimate is greater than zero), and the P-value is 0.000 (P-value < 0.05). Furthermore, the R Square is 0.669, which means that 66.9% of the variation of the

Dependence can be explained by the independent variable Customer Satisfaction. On the other hand, there is an insignificant effect of Customer Satisfaction on Trust, as the corresponding P-value is 0.216 (which is greater than 0.05).

Table 8- 10: SEM Analysis.

			Estimate	P	R ²
Dependence	<---	Customer Satisfaction	.799	***	.669
Trust	<---	Customer Satisfaction	-.161	.216	

Source: This Research.

Therefore, the second hypothesis testing the relationship between Customer Satisfaction and Relationship Quality is partially supported. This result is due to the fact that the first sub hypothesis of the second hypothesis testing the relationship between satisfaction with sustainable logistics service quality and dependence of customers on LSPs is supported while the second sub hypothesis of the second hypothesis testing the relationship between satisfaction with sustainable logistics service quality and trust was not supported.

✓ **Testing the relationship between Dependence and Trust**

This subsection tests the relationship between Dependence of customers on LSPs and their trust in LSPs. Therefore, it tests the third hypothesis:

H3: Dependence of customers on LSPs positively affects their Trust in LSPs

The SEM model conducted in Figure 8-3 reveals the results shown in Table 8-11, where it could be noticed that there is a significant effect of dependence on trust as the estimate value is 1.348 (which is greater than zero), and the P-value is 0.000 (P-value < 0.05). Furthermore, the R Square is 0.815, which means that 81.5% of the variation in Trust is explained by the independent variable Dependence.

Table 8- 11: SEM Analysis

			Estimate	P	R ²
Trust	<---	Dependence	1.348	***	0.815

Source: This Research.

Therefore, the third hypothesis testing the relationship between Dependence of customers on LSPs and their trust in LSPs is supported.

✓ **Testing the relationship between Dependence and Customer Commitment**

This subsection tests the relationship between Dependence of customers on LSPs and Customer Commitment. Therefore, it tests the fourth hypothesis:

H4: Dependence on an LSP positively affects Customer Commitment

The SEM model conducted in Figure 8-3 reveals the results shown in Table 8-12, where it could be noticed that there is a significant positive effect of dependence on commitment as the

estimate value is 0.350 (Estimate is greater than zero), and the corresponding P-value is 0.002 (P-value < 0.05).

Table 8- 12: SEM Analysis

			Estimate	P	R²
Commitment	<---	Dependence	.350	.002	.879
Commitment	<---	Trust	.496	***	

Source: This Research.

Therefore, the fourth hypothesis testing the relationship between Dependence of customers on LSPs and Customer Commitment is supported.

✓ **Testing the relationship between Trust and Customer Commitment**

This subsection tests the relationship between Trust of customers in LSPs and Customer Commitment. Therefore, it tests the fifth hypothesis:

H₅: Trust in LSP positively affects Customer Commitment

Table 8-12 shows that there is a significant positive effect of Trust on Commitment, as the estimate value is 0.496 (which is greater than zero), and the corresponding P-value is 0.000 (which is less than 0.05). Furthermore, the R Square is 0.879, which means that 87.9% of the variation in Commitment is explained by the independent variables Dependence and Trust.

Therefore, the fifth hypothesis testing the relationship between Trust of customers in LSPs and Customer Commitment is supported.

At this point, it should be highlighted that the SEM model shown in Figure 8-3 had an acceptable values of model fit indices, where it could be observed that the model fit indices are CMIN/DF = 3.548, GFI = 0.856, CFI = 0.901, AGFI= 0.823, and RMSEA = 0.078. All values mentioned are within their acceptable levels, implying that the model is well fit.

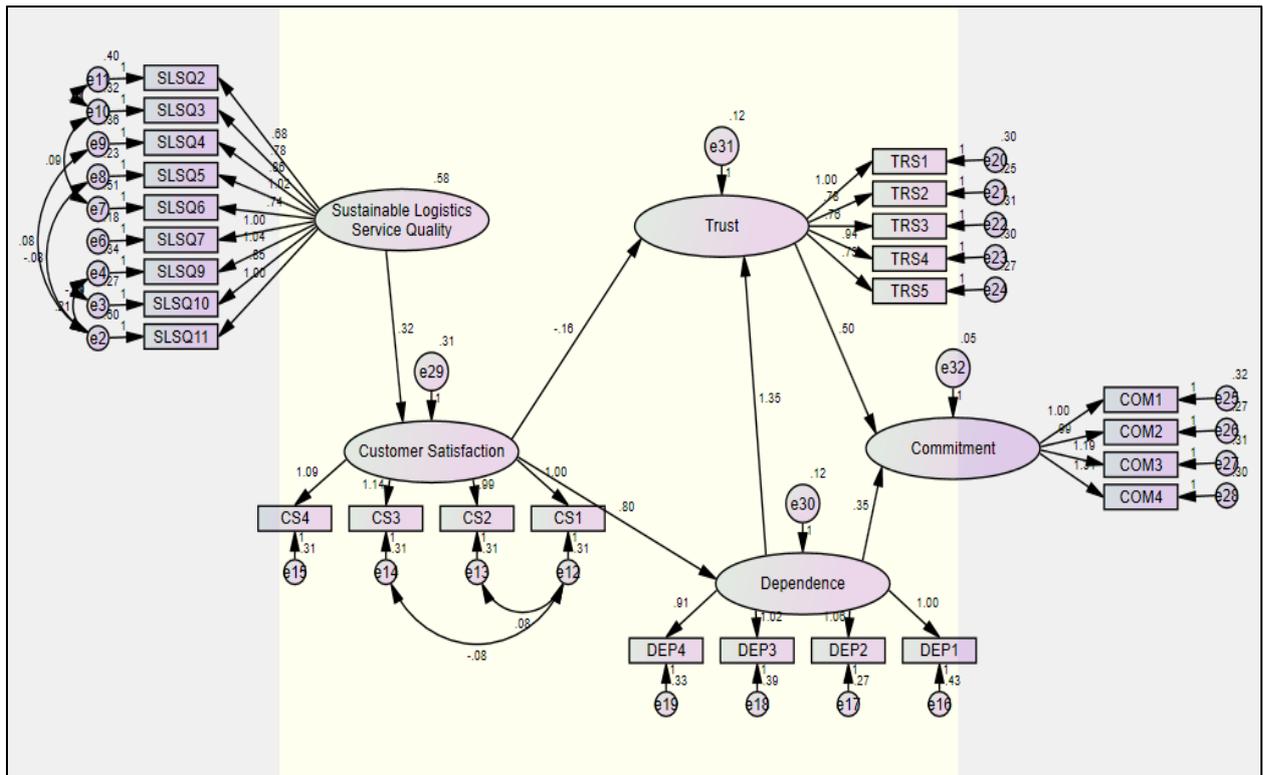


Figure 8- 3: SEM Model for Analysis
 Source: This Research.

8.4.2 Testing the Overall Relationship Quality

This section is designed to test the model considering the overall Relationship Quality. Table 8-13 shows the SEM analysis for the model, as well as the mediation role of Customer Satisfaction between Sustainable Logistics Service Quality and Relationship Quality. It could be noted that there is a significant positive effect of SLSQ on CS as the P-value is less than 0.05, and the Estimate value is 0.284. Likewise, the R Square is 0.165, which means that 16.5% of the variation of the Customer Satisfaction can be explained by the independent variable Sustainable Logistics Service Quality.

Furthermore, it could be observed that there is a significant positive effect of Customer Satisfaction on Relationship Quality as the P-value is less than 0.05, and the Estimate value is 0.675. Moreover, there is an insignificant effect of Sustainable Logistics Service Quality on Relationship Quality as the P-value is more than 0.05, which means that Customer Satisfaction fully mediates the relationship between Sustainable Logistics Service Quality and Relationship Quality.

Table 8- 13: SEM Analysis Mediation role of Customer Satisfaction.

			Estimate	P	R ²
Customer Satisfaction	<---	Sustainable Logistics Service Quality	.284	***	.165
Relationship Quality	<---	Customer Satisfaction	.675	***	.561
Relationship Quality	<---	Sustainable Logistics Service Quality	-.021	.441	

Source: This Research.

It should be highlighted that the model fit indices CMIN/DF = 3.201, GFI = 0.872, CFI = 0.918, AGFI= 0.842, and RMSEA = 0.072 are all within their acceptable levels. The SEM model conducted for the effect of the Mediation role of Customer Satisfaction is illustrated in Figure 8-4.

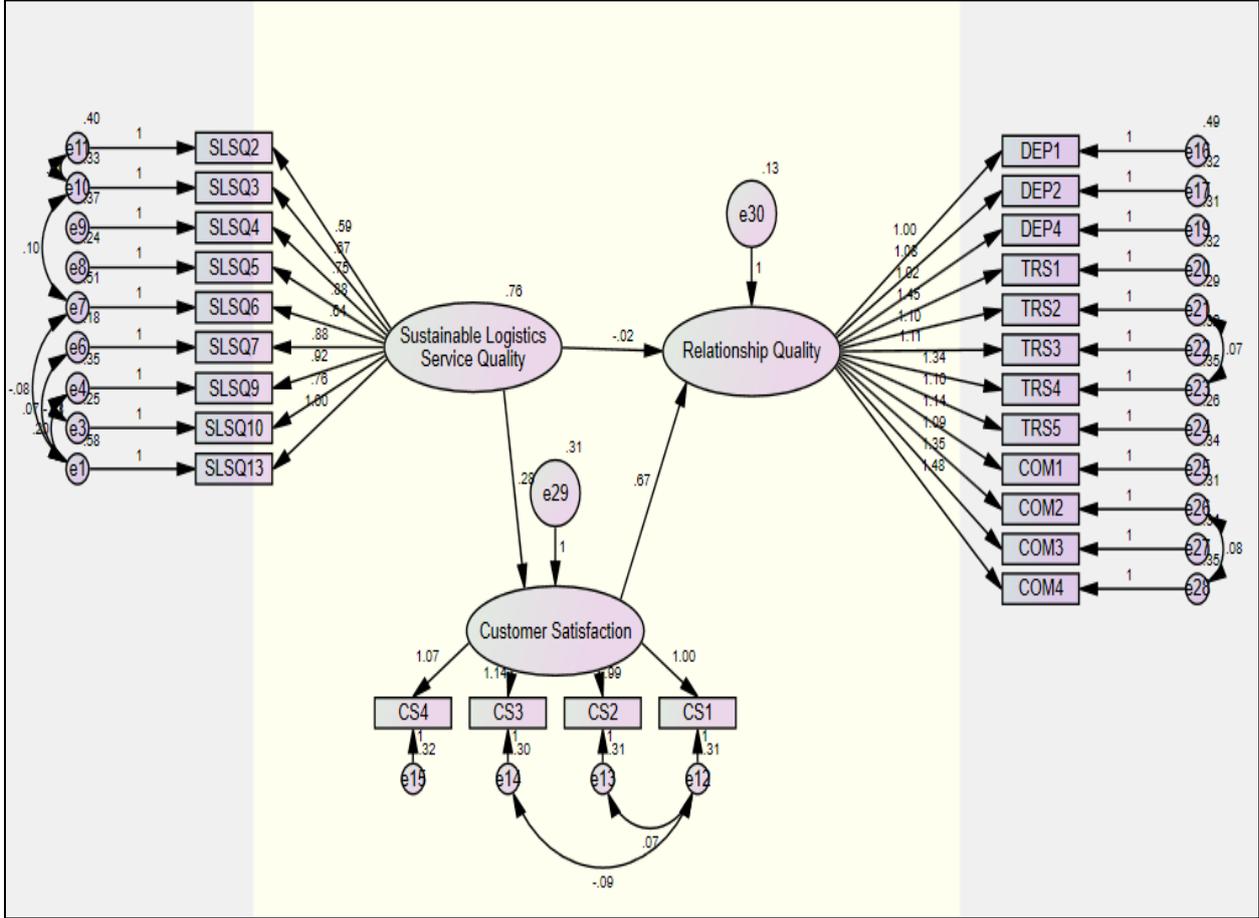


Figure 8- 4: SEM for the Overall Relationship Quality
 Source: This Research.

Briefly, This chapter presents the empirical study to test the research hypotheses by measuring the research variables derived from the literature review through a descriptive, correlation and SEM analysis using SPSS and AMOS. Table 8-14 shows a summary of the conducted analysis and the resulting response for the research hypotheses.

Table 8- 14: Summary of Research Hypotheses.

Description	Results
H1: Sustainable logistics service quality constructs positively affect customer satisfaction.	Fully Supported
H2: Satisfaction with sustainable logistics service quality positively affects Relationship Quality.	Partially Supported
H3: Dependence of customers on LSPs positively affects their trust in LSPs.	Fully Supported
H4: Dependence on an LSP positively affects Customer Commitment.	Fully Supported
H5: Trust in LSP positively affects customer commitment.	Fully Supported

Source: This Research.

Chapter Nine

9. Discussion of Findings

9.1 Introduction

The main goal of this chapter is to summarize the main empirical results of the two phases to derive out the research's main conclusion, recommendation and future limitation. This chapter starts with a discussion of the four researcher questions' answers. It also highlights the role of sustainable logistics service quality in general and in Egypt in particular. And finally, it states the role of each entity in Egypt to enhance and achieve sustainable development.

9.2 Empirical Findings for Research Questions

This research consists of four questions. The research processes have answered these questions.

✓ **RQ1:** What are the LSP's SSQ elements?

The first question was about the main elements applied in LSPs field; these elements are reviewed in the literature worldwide and have been used in many different positions. However, this research reviewed these elements and used the elements that are used by LSP and confirmed that through the Egyptian laws reviewed in chapter 4. Designing these elements was the first step to complete the SLSQ elements in the LSP field. The researcher answered this question through reviewing the literature related to the variable and the Egyptian laws, and the result of this question was that 21 elements were validated and reviewed through interviews with specialists in the LSP field. Table 9-1 shows the answer to the first question.

Table 9- 1: First research question's answers.

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

Source: This research.

The elements have covered many points related to sustainability practices in LSP. Starting from environmental sides that include many aspects like transportation. Most of the respondents accepted the importance of this point which includes the vehicles with all related aspects (fuel, re-routing, maintenance and disposal system), Faruk et al. (2002), González-Benito and González-Benito (2006), Lin and Ho (2008), Jumadi and Zailani (2010), K. J. Lieb and Lieb (2010), and Langella and Zanoni (2011). The second aspect related to packing and packaging materials was supported by Sonneveld et al. (2005), Faruk, Lamming, Cousins, and Bowen (2001), Tsoufas and Pappis (2008), K. J. Lieb and Lieb (2010), Zhu et al. (2008). The third aspect is related to environmental performance standards; in developing countries, most firms care about the quality of products and services presented to the customers. Therefore, they look forward to getting an international certificate such as the ISO 9000 or ISO 14000 to improve their reputation and performance. As for the economic side, the researcher took economic aspects from cost point of view as adopted by Smith (2007), Rao and Holt (2005), (Perotti et al. (2012); Zhu et al. (2007)). All points related to economic aspects got accepted from the respondents. The last point is related to social aspects that consist of two sides: the first one is related to the employee while the second one is related to customer and community. The respondents agreed that all these points are very critical and important whether for the LSP or LSP's customers. For law interviews, they confirmed the articles mentioned in chapter 4. Finally, we could say that the first question is validated and answered from all possible ways.

✓ **RQ2:** What are the LSP's LSQ elements?

LSQ is the model that has been invented by Mentzer et al. (2001) to evaluate the overall service presented to LSP's customers. This term has been used widely from 2001 till this moment, but integrating this term with sustainability aspects is considered a contribution of the research. The elements of LSQ have been derived out of the literature. These elements come originally from the SERVQUAL model that has been created by Anantharathan Parasuraman et al. (1985). The link between LSQ and SERVQUAL has been clarified by Bourlakis, Melewar, Banomyong, and Supatn (2011) when they compared the dimensions of the SERVQUAL model with LSQ dimensions, namely "(information quality, ordering procedures, order release quantities, timeliness, order accuracy, order quality, order condition, order discrepancy handling, and personnel contact quality)" as shown in table 9-2.

Table 9- 2: Logistics Service Quality dimensions in SERVQUAL model.

SERVQUAL	Explanation	Logistics Service Quality Attributes
Reliability	The ability of a service provider to perform the promised service independently and accurately	Order quality Order release quantity Timeliness
Assurance	Knowledge and courtesy of service providers and their ability to convey trust and confidence	Personnel contact quality Order procedure Order accuracy
Tangible	The appearance of physical facilities, equipment, personnel, and communication materials	Information quality Order discrepancy handling
Empathy	Caring and individualised attention that the service provider provides to each customer	-

Responsiveness	The willingness to help customers and provide prompt service	Order condition
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Source: (Banomyong and Supatn 2011)

This research has reviewed all studies related to LSQ, see table 3-2. The answer to this question was used to be integrated with the answer of the first question in order to answer the third research question.

✓ RQ3: What are the LSP's SLSQ elements?

The answer to this question is divided into two parts: the first part was in the first research question's answer; the elements that the researcher collected from this question are the key to answer the third question, but it is not enough. The answer to the second question was also used to answer the third questions. Elements that are collected from RQ1 and RQ2 are integrated to answer the RQ3. These integrations came based on the explanation in the literature review. The researcher designed the elements of SLSQ and validated them through Q-sorting techniques as in section 7.5.1. Table 9-2 shows the accepted and rejected elements of SLSQ.

Table 9- 3: Accepted and rejected elements of SLSQ.

Sustainable Logistics Service Quality Elements	Decision
69. The product becomes better available after using sustainable means of transport by your logistics service provider (LSP)	Accepted
70. Product costs decreased after using sustainable means of transport by your LSP	Rejected
71. It is uncommon having issues regarding transporting large quantities using sustainable means of transport by your LSP.	Rejected
72. It is rare to receive a damaged product as a result of using sustainable means of transport by your LSP.	Accepted
73. Using re-route system enhances delivering orders in the right time.	Accepted
74. Trained LSP employees provide your company with a better problem handling.	Accepted
75. Trained LSP employees provide your company with a better problem response.	Accepted
76. Trained LSP employees help in solving your problems in a reasonable time.	Removed
77. Trained LSP employees help you to reduce accident rates.	Accepted
78. Your LSP personnel contact employees have enough knowledge and experience.	Accepted
79. Your LSP enhances environmental knowledge sharing with your company.	Accepted
80. You achieve a better performance when your LSP considers your complaints.	Accepted
81. Collaboration with your LSP improves your sustainable performance practices.	Accepted
82. Your LSP cooperates with your company to achieve environmental goals.	Accepted
83. Your LSP cooperates with your company to exchange environmental knowledge.	Accepted
84. Adopting your LSP environmental systems (ISO, EMS,) improves your company's performance.	Rejected
85. Your company cooperates with your LSP in the process of sustainable packaging.	Accepted
86. Sustainable packaging decreases your company's disposal practices cost.	Accepted
87. Sustainable packaging enhances goods stowage.	Accepted
88. It is uncommon to find a damaged product as a result of using sustainable packaging materials.	Accepted
89. The sustainable information received from your LSP improves your company's performance.	Accepted
90. The sustainable information received from your LSP decreases the fine of environmental accident.	Rejected
91. The sustainable information received from your LSP improved your compliance with environmental standards.	Accepted
92. The sustainable information received from your LSP is always updated.	Accepted

93. Adopting sustainability practices from your LSP leads to a reduction in energy consumption cost.	Accepted
94. Adopting sustainability practices from your LSP leads to a reduction in disposal practices cost.	Accepted
95. It is a rare condition to receive a shipment that encompasses wrong products from your LSP.	Accepted
96. Order procedures become more effective due to sustainable systems adopted by LSP.	Accepted
97. Order procedures become effortless due to sustainable systems adopted by LSP.	Accepted
98. Order procedures become more efficient due to sustainable systems adopted by LSP.	Accepted
99. Products received from LSP are in the right conditions.	Accepted
100. The lead time of the order process becomes shorter.	Accepted
101. The back-order process becomes more efficient.	Accepted
102. The back-order process becomes more effective.	Accepted

Source: This research.

These variables that have been created included many points: sustainable practices, collaboration and law implementation.

Starting with sustainability aspects, many researchers agreed that sustainability plays a very important role for enhancing performance as it achieves economic growth value while decreasing the firm's environmental deterioration and improving humans' life quality (Elkington, Henriques, & Richardson, 2004; Wichaisri & Sopadang, 2018). The sustainability concept that exists in the SLSQ variables includes not only environmental aspects but also social aspects related to employee's health and safety, community and economic aspects.

From the collaboration side, many activities could be done in order to achieve the collaboration between two parties, such as information sharing, technology and training (Grzybowska et al., 2014). According to Bovel and Martha (2000), increasing the collaboration in supplier–customer relationship would give benefits to both parties and increase the logistics service quality. Gil-Saura, Servera-Francés, and Fuentes-Blasco (2010) stated that there is a positive relationship between increasing collaboration and the logistics value. Carter and Dresner (2001) highlighted that long-term collaboration between parties is important to make a complete sustainable co-partnership, make value for customers and enhance the overall performance.

The last point here is related to law implementation; the reason that the researcher has mentioned this point is that he stated the Egyptian laws related to environmental and social sides. These laws play an essential role as they force firms to apply sustainable practices in their operation processes. Based on our discussion in chapter 4, we mentioned important laws that could be suitable to determine the main points that could be used under this variable in Egypt. Moreover, there are other tools that could be implemented by LSP like Environmental Management Systems (EMS), see chapter 3, section 3.9.1.4.

In phase one part two, statement number 2, which is related to the product cost and its relationship with the suitable means of transport, has been deleted based on q-sorting test. Moreover, statement number 3 was deleted too, which is related to sustainable transporting and

the large quantities required. Those two statements were related to sustainable transport. Statement number 16 has been deleted, which states that adopting environmental systems would affect your performance; this statement is deleted probably because this system in Egyptian companies is not known enough. The last point is that sustainable information would reduce the fine of environmental accidents; this is the only one that is deleted from sustainable information.

Based on phase two, a number of statements have been deleted SLSQ1, SLSQ12, SLSQ14, SLSQ15, SLSQ16, SLSQ17, SLSQ18, SLSQ19, SLSQ20, SLSQ21, SLSQ22, SLSQ23, SLSQ24, SLSQ25, SLSQ26, SLSQ27, SLSQ28, SLSQ29, SLSQ30. These elements have been deleted to reach goodness of model as the SLSQ is a reflective variable. It means that SSQ and LSQ are not only the two variables that format SLSQ variables; there are other factors and elements that could be added in order to format this variable (Joe F Hair, Ringle, & Sarstedt, 2011; Kline, 1998, 2012).

- ✓ RQ4: What is the effect of sustainable logistics service quality on customer satisfaction level and relationship quality?

The answer to this question came when the research data have been analysed in the previous chapter. The answer to this question has been divided into parts: the first part is related to the effect of SLSQ on customer satisfaction. Based on the results in chapter eight, the analysis showed that there is a significant positive effect of SLSQ on Customer Satisfaction. It means that the variation of the customer satisfaction can be explained by the independent variable "sustainable logistics service quality". It means that applying sustainability practices from LSP side will enhance customer satisfaction and make customers much happier with that. The second part is related to relationship quality (RQ). The researcher wants to know if customer satisfaction of LSP with SLSQ would affect the RQ between LSQ and its customers. Based on the results and findings in chapter 8, there is a significant positive effect of customer satisfaction with SLSQ on RQ. It means that satisfaction is the first level that must exist to achieve the next level that is related to RQ dimensions. Moreover, the direct relationship between SLSQ and RQ is fully rejected, which means that customer satisfaction fully mediates the relationship between SLSQ and RQ.

9.3 SLSQ in Egyptian's organizations

The main aim of this study is to propose a framework for small and medium enterprise to explore the role and effect of sustainability practices on their performance and on their customers satisfaction. The findings of this research would be a motivation for those companies to take initiatives to apply these practices. The sustainable logistic service quality is a group of tools that could be used through firms, these tools have explained and illustrated through the research processes. The next part will explain how these practices are used by the logistics service providers through the SLSQ elements (sustainable transportation, sustainable packaging

and packing, sustainable information time, product condition, employees and training programmes)

1. Sustainable Transport

Sustainable transport is one of the main aspects that should be taken into consideration from LSP. It considers the core business of LSP as it possesses approximately 86 % of all LSP activities. Bask et al. (2018) stated that transport sustainability is a potential source of competitive advantage for LPS firms. Based on this research, LSPs in Egypt should follow these steps to achieve sustainability transport:

The first point is alternative fuel, According to (Grant & Banomyong, 2010; Shaw, Burch, Kristensen, Robinson, & Dale, 2014), using alternative fuels in LSP companies leads to enhance the corporate image and affects customer satisfaction. Using these kinds of practices would help the company gain a lot of benefits. Firstly, it would give a very good reputation to the company that uses sustainable transportation. Applying an alternative fuel in the LSPs in Egypt is considered as a point of development that most companies need to change from normal gasoline to environmentally friendly gas, as it is one of the clean energy sources that are not polluting the environment. The use of natural gas in engines reduces the proportions of carbon deposits, and its combustion is an ideal combustion, which reduces the noise from the engine sound during the operation which reduces the audio pollution to the environment. As the cost of fuel and maintenance is 60% less than gasoline. The cost of the conversion from using gasoline to nature resources can be recovered within two years. So, based on these facts and based on the research result, LSPs need to consider the point of converting from using gasoline to natural gas. They also need to take into account their image in front their customers and within the working area. As the result of this research clarified, using these kinds of practices would build a strong relationship with customers.

The second point of LSPs that should be considered in Egypt is routing system, this technique that is used to reduce the total distance of transporting the products. Customers are considering the delivery time as first priority for them and it has a great role affecting their satisfaction, so using this kind of technique would reduce the overall time. This tool is a software that is responsible for choosing the shortest path to deliver the products to customer in order to reduce the overall delivery time. Moreover, using systems to choose a better mode of transport will enhance the service that customers receive, which helps in delivering the product to the customer in the right time and right condition also it reduces the overall transportation cost for both sides. Accordingly, reducing the trip time will decrease CO₂ emissions of transport.

The third point is continuous maintenance, each machine has a time to be repaired and to have maintenance, but in Egypt it is neglected, LSPs continue using the machine and trucks without checking for periodic maintenance, and that would affect the trucks engine and affect the fleet performance. It could also to increase the CO₂ emission and cause delay in delivery time to the

customer which could reflect on customer satisfaction and the relationship quality between them.

2. Sustainable packaging

Packaging is playing an important role in LSPs specially in logistics and marketing. It provides customers with the all information and details about the products and the way that you can use this product. Converting from normal packaging to sustainable packaging may affect the condition of product or the waste from using this product. The interviewees results confirmed that using these sustainability practices related packaging would affect the level of customer satisfaction, moreover it has a good contribution in decreasing the total cost.

So, I recommend all LSPs to take a forward step and to take initiatives to use these packaging and packing materials. Choosing raw materials will be based on minimum level of emission that raw materials are emitting while their production processes, moreover the disposal and re-uses are the two elements that these materials should have.

Through the interviewees, most of LSP and even their customers are preparing to meet all of the requirements to get ISO14001 for improving the environmental performance. But they also focus on how to use these packaging and packing style to deliver a message to the society and community to support specific case like in (Covid-19). Most of companies gave a message through the products labels like (stay home, wash your hand and face...etc). Too many slogans have been used through packaging to deliver message to the people.

3. Sustainable Information

This term refers to the information exchanged between the customers and suppliers, this information could be related to products or forecasting or complains. It could be all information exchanged between LSPs and their customers which might be related to sustainability. This kind of information would decrease the overall cost between the two parties when it is received in the right time.

So, SMEs could start to apply these steps and find out the way that could share information with its customer that would support and enhance their performance. I recommend these firms to use Information and Communication Technologies (ICTs) through designing a software or portal between LSPs and its customers. This tool could be a good start to share all kinds of information. The cost of this software or portal is almost zero because of the advanced communication technologies that the world has. These tools could increase the level of customer satisfaction through knowing the demanded products and it could also build a strong relationship with customers.

4. Training

It is one of the most important points that have a major role for enhancing customer satisfaction and it could have a great role in building a strong relationship with customers. In Egyptian organizations and specially in SMEs, Employees and workers have lack of awareness and knowledge about sustainability. LSPs and LSPs' customers need to take into consideration when they set their strategy plan the training programmes that would have an effect on the long term on the company's performance.

LSPs and LSPs' customers have to identifying training needs which is the first and essential step from which to start the process. Training objectives and target groups are to be identified which helps in good planning for training programs. Training needs determine the difference between current performance and target performance, and it is defined as the set of changes to be made in the individual and related to his information, experiences, performance, behaviour and directions to make it suitable for performing the job duties that was occupied or nominated to be occupied.

Creating these training programmes for the employees and workers would increase the service quality levels, enhance the customer satisfaction, and would build a long-term relationship. These programmes include sustainability practices from environmental sides and explain how organizations apply these practices in order to reduce cost and improve performance. These programmes should include the communication with entities and how to satisfy the requirements of customers. They could also provide the employees with all the information related to the organization and its customers.

5. Collaboration

The phenomenon of globalization, which has acquired many dimensions, is considered one of the most important challenges facing economic institutions in developing countries. Since the world has many crises and risks, and global giant institutions, multinational companies and transcontinental companies that aim to swallow as much of the global market as possible have emerged with their huge competitive capabilities, they pushed the companies and firms in developing countries to take serious steps to find out the partner that could support it with the incomplete part, so the term of collaboration is used to full this gap. The term of collaboration means working practice whereby individuals work together in order to achieve common goals or business benefits or mutual interests. This term that would be used in sustainability which could achieve a better performance whether to the LSPs or for its customers. Working together in order to achieve sustainability goals will build a strong relationship with LSPs customer as we see in the research's result.

We could say that each individual is responsible for applying these practices in the society, and they have to do huge efforts and sacrifices to achieve the aim of the target needed. Adopting these SLSQs in LSPs in Egypt was a new initiative in one sector in Egypt to study if these

elements of SLSQ as new elements would change the nature of businesses and change the main structure of some organizations, but we found that applying these practices which are compatible with the Egyptian laws would affect the customer's satisfaction and improve the relationship quality among organizations.

Customers who receive these services from LSPs would have enough awareness to accept the new changes. Many studies have clarified that customers from different countries and cultural backgrounds have different expectations and react differently to the received services, and they experience different behavioural intentions (J. Zhang, Beatty, & Walsh, 2008). Customers from different countries could have different perspectives about evaluating the services received because of cultural and environmental differences (Ford et al., 2005). Therefore, based on these statements, the Egyptian laws have reviewed in order to guarantee that sustainability practices are applied in the LSP sector.

Finally, SLSQ elements are really important to improve the LSPs' performance and to enhance the customer satisfaction and relationship quality. Considering these elements will improve the sustainability performance and increase the level of logistics service quality. However, applying these practices needs some efforts from the Egyptian community, people, private sector and government.

9.4 The Role of Each Entity to Achieve Sustainable Development in Egypt

To achieve sustainable development in its holistic concept and approach, there must be a political will of the country as well as willingness of societies and individuals to achieve it, for sustainable development is a societal process in which all groups, sectors and groups must contribute in a coordinated manner, and it may not be dependent on a few categories or one resource. Without participation and basic freedoms, it is inconceivable that society accepts adequate adherence to the development goals and their burdens and the sacrifices required in their way, or it envisions its enjoyment of development gains and achievements to the acceptable extent, nor is it conceivable that a state of real equality of opportunity and the possibility of social mobility and the equitable distribution of wealth and income can be imagined. Every segment of society must play its part to achieve sustainable development. The next section gives a brief point about the role that could be done in order to achieve sustainable development in Egypt and to accept the changes that would happen for a better life.

1- The individual's role in sustainable development

Development in its philosophy is a moral concept; it depends on a change in patterns of behaviour so that the individual bears the responsibility for feeling others around him. Sustainable development is centred on the human being and provides him with a better life, and therefore every human being, regardless of his position, is responsible, whether a citizen who takes into account his needs, the needs of his children and neighbours, the environment in which he-she lives, or an employee who performs his duty honestly to achieve the best for all the

beneficiaries of his services or at the level of decision-maker or the policy-maker that it would guarantee a quality of life and the ability to meet the needs of the present and the future. As long as the focus of sustainable development is the individual and his-her needs, the individual is also the basis for building this development.

2- Society Role in Sustainable Development

Society plays a very important role in addressing environmental and sustainable development issues. Society is the primary and central engine in the process of sustainable development through the existence of a society that is aware and understands the rights and duties of all through an integrated society in which equality and social justice are achieved, and at the same time it creates generations that preserve their environment and surroundings. It strives for the next generation to enjoy what they enjoyed in a healthy environment.

3- Privet Sector Role in Sustainable Development

The private sector has emerged as a global actor with an important impact on environmental trends through its decisions on investment and technology. In this regard, governments can play a critical role in creating an enabling environment. Institutional and organizational capacities that allow governments to interact with the private sector should be increased. It is also necessary to increase the commitment of the private sector to generate a new culture that indicates its responsibility towards the environment through the application of the principle of “polluter pays”, indicators of environmental performance, reporting on this performance and a precautionary approach in taking decisions regarding investment and technology. This approach must be linked to the development of less polluting and less rationalizing technologies, to harnessing resources to serve the economy that encompasses the entire life cycle and to efforts to facilitate the transfer of environmentally sound technologies.

4- Government Role in Sustainable Development

The government is the policy-maker and decision-maker and one of the most important parties for achieving sustainable development, so these policies and the plans that follow them should be comprehensive and integrated so that the laws and legislations of an institution or a ministry do not contradict with others (See laws in chapter 4 that are related to sustainability aspects in Egypt).

The central role of the government and its institutions play the supervisory and monitoring role of all aspects of development through qualified cadres aware of sustainable development concepts and their applications within clear and specific programs, each of which is supported by and complementary to the other. It is also the responsibility of the government apparatus as it is to take care of the internal situation for development to be in harmony with global directives to achieve sustainable development through participation in international agreements and covenants that achieve this goal and to reverse this trend on the local situation through the development of a national strategy for sustainable development developed and applied by all

state agencies and its institutions and be the reference for the promotion of sustainable development and its applications on all joints of government work, from the employees to the institution in which they works.

The researcher hopes to make this work one of the main references that the government, state agencies and their institutions and companies could use in designing the strategies in the field of LSPs and to be a new beginning for researchers and academics to go in depth into the field of sustainability in all sectors.

In conclusion, this chapter presented the main empirical results of the research. It started with a discussion of the answers of the research questions and the findings of each question. It also compared the main points of SLSQ and compared these findings to the existing literature. It also highlighted the role of SLSQ in Egypt. Finally, it presented the role of each entity in Egypt to achieve sustainable development.

The next chapter will discuss the main objectives of the study, along with a research summary. It will also present the main contributions of study and the role of this research into the body of knowledge. It will also give tips for future limitations and the main recommendations of study.

Chapter Ten

10. Conclusion and Limitations

10.1 Introduction

This research contains 10 chapters. Chapter one presents an overview of the research and provides a background about the core of topic; it also highlights the research problem, questions, aim, objectives, contribution and structure. The literature review of this research has been divided into two parties, starting from chapter two that explains the concept of supply chain management, logistics, service quality, customer satisfaction and relationship quality. The second part of the literature has been explained by chapter three, which consists of the integration between sustainability and logistics service provider. As the study is applied in Egypt, chapter three highlights the current situation in Egypt from two sides (sustainability and logistics). Chapter five presents the theoretical framework of the study. Chapter six introduces the methodological approaches that have been used in the research and the plan that the researcher followed in order to answer the research questions. Chapter seven presents the research findings in phase one (semi-structure interview findings) and scale development of SLSQ variable. Chapter eight introduces the data analysis, hypotheses test and framework validation. Chapter nine presents a discussion of the research questions and the role of SLSQ in Egypt. Finally, this chapter gives a summary of the research by reviewing the research aim and objectives. It also presents the research contribution in the future research and limitations.

10.2 Research Summary

Egypt is one of the developing countries that have a huge activity on domestic and international levels. The Egyptian government has set 2030 sustainability goals in order to apply sustainability practices in different sectors and levels. This initiative that has started since 2015 could have a negative or positive effect based on the current performance. This research tackles one of the vital sectors to find out how sustainability would reshape the customer perspective about the service received from logistics service providers (LSPs). These modifications in the LSP field moved the curiosity of the researcher to find out the best shape of applying this concept without reducing the service level to the customer. Starting from this point, the researcher worked to propose a new framework in LSP in order to enhance customer satisfaction and relationship quality.

The first objective of this research is

- ✓ To explore the elements of sustainable service quality elements.

The process of applying sustainability is huge; the first objective of the research to find out which sustainability practices could have an effect on the service quality presented to the customer. These practices and elements have been reviewed through the literature review and the Egyptian laws. The validation of these elements has been reviewed through semi-structured

interviews, which have been done with LSPs' managers and LSPs' customers. As the study is applied in Egypt, the researcher made an interview with law specialities in order to validate the elements from the law side and to make sure that the elements are already applied by LSPs. The findings of these interviews, as in chapter seven, presented the elements that the researcher used in this research to complete the overall framework of the study. Based on these processes, see figure (10-1), the researcher was able to shape the first part of sustainable logistics service quality (SLSQ) variable. As mentioned before, this variable consists of two sub-variables. Therefore, the second objective will complete the overall picture of the variable.

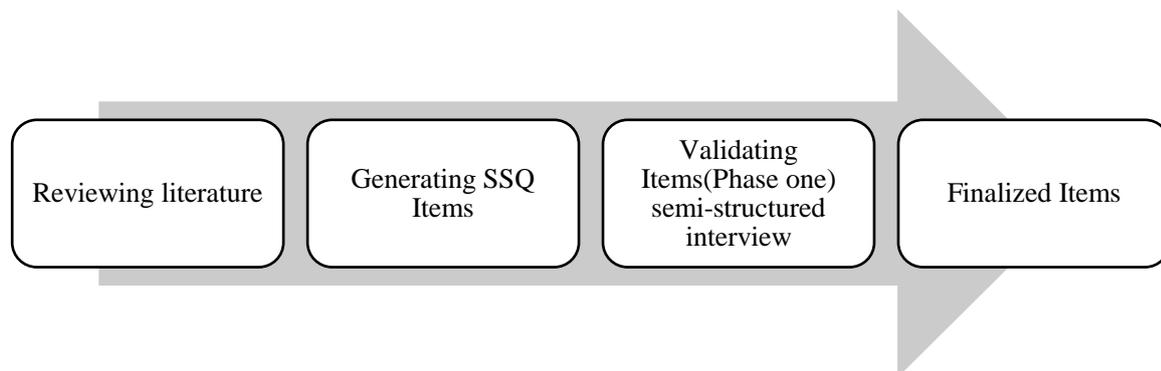


Figure 10- 1: SSQ elements generating processes.
Source: This research.

The second objective of study is

- ✓ To explain the elements of logistics service quality.

Logistics service quality (LSQ) is an important tool for presenting a better logistics service performance (Stock and Lambert, 2001). LSQ has been invented by Mentzer et al. (2001) as a scale for measuring logistic service quality. This tool that the researcher used as the second part of SLSQ variables in order to measure the overall processes from applying sustainability concept in LSP until the service presented to the customers. The researcher viewed that the LSQ can be defined as the components of service quality that is critical to operational service quality in LSP field. From reviewing the literature, the LSQ dimensions were as follows: (personnel contact quality, order release quantities, information quality, ordering procedures, order accuracy, order condition, order quality, timeliness and order discrepancy handling) as in chapter five. The researcher reviewed all studies related to LSQ and identified the main concept of this term. Finally, he presented the main elements that will be a part of SLSQ elements. Figure 11-2 presents the LSQ processes. Therefore, the third objective will have the full picture of the SLSQ variable.



Figure 10- 2: LSQ elements generating process.
Source: This research.

The Third objective of study is

- ✓ To formulate the SLSQ framework.

Phase one of the research was to collect all elements from SSQ and LSQ to formulate the final research variable, which is SLSQ. This variable is defined as “Sustainable functional and technical processes that are taken by logistics service providers to make the service more sustainable to achieve the satisfaction of existing customers and the needs of the next generation”. Elements of this variable has been generated based on reviewing the LSQ and SSQ elements as in chapter five, section 6.4, see figure 11-3: SLSQ Framework process.

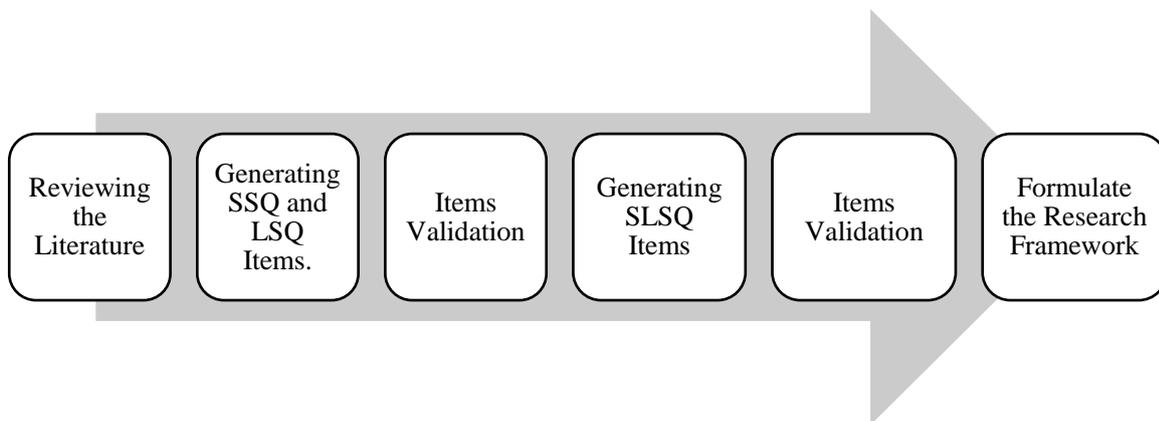


Figure 10- 3: SLSQ Framework process
Source: This research.

Based on the third objective, the fourth objective became ready to be measured. The fourth objective is

- ✓ To measure the effect of SLSQ on LSP’s customers' level of satisfaction and relationship quality.

This objective is the main research objective. It is to measure the effect of SLSQ on customer satisfaction and relationship quality; everything became clear to be measured: the questionnaire form has been designed based on the validation of SLSQ elements. Even the questionnaire has

been validated; see chapter seven, section 7.5.2. The validation of questionnaire is done through a group of experts in the field of supply chain management in order to ensure the face validity and content validity of the questionnaire. The researcher has distributed the questionnaire to the target sample to collect the research data. Data analysis has been done through SPSS AMOS 24. Using customer satisfaction and relationship quality as an outcome of research is based on reviewing the literature from both sides and the huge role that customer satisfaction plays in the marketing and logistics research and the enhancing role of improving the firm's performance. The debate about relationship quality (RQ) was big; some research studies stated that customer satisfaction comes after RQ variable while others stated that satisfaction of customer is done in first place and then the relationship will be built. The second opinion has been adopted in this research.

10.3 Contributions of the Research

The research has many contributions to the academic body of knowledge and the literature regarding the concept of SLSQ as a new variable in literature. Exploring the role of SSQ and LSQ, integrating all elements under SLSQ elements and measuring the effect of these elements on customer satisfaction (CS) and relationship quality (RQ) are considered a new idea. This research fills the gap in the literature through applying these concepts; most researchers dealt with these topics from different perspectives: some of them focused only on sustainability in logistics while some focused-on logistics, and others used both concepts neglecting the evaluation part from customer perspective. According to the researcher's knowledge, using SLSQ, CS, RQ concepts in one research is rare. As the study is applied in Egypt, I can confirm that these kinds of studies are too hard to find as sustainability in logistics is new trend.

✓ Contributions to Theory

This research expanded the applicability of logistic service quality and sustainable service quality through re-testing those variables by using SLSQ framework and adding an important side to the existing literature by considering sustainability in service quality theory. This theory that has been created by Anantharanthan Parasuraman et al. (1985) and developed by Mentzer et al. (2001) to logistics service quality is the main theory that the researcher uses in this study. Developing this theory from service quality to logistics service quality to sustainable logistics service quality is the main target to make the theory updated and realistic simulation according to the international standards.

Many researchers have recognized the role of the relationship quality between the channel members in supply chains. Many researchers also indicate the role of the relationship quality and its impact on business profitability and the link between it and customer satisfaction (Dadzie et al., 2005; Peck, Christopher, Clark, & Payne, 2013). According to the research findings, SLSQ with satisfaction will achieve a good relationship quality with LSP's customers. As a result, that would be reflected on the LSP performance and profitability.

This study will provide and give a theoretical review of the term SLSQ as a new term in the literature. This study also contributes to the body of knowledge by providing links between applying SLSQ, customer satisfaction and relationship quality (dependence, trust, and commitment).

A lot of studies and a wide range of the literature have been done in the area of logistics and sustainability practices, mainly in Europe, the United States and Asia (Björklund & Forslund, 2013; Chaisurayakarn et al., 2014; Halldórsson et al., 2010; Isaksson & Hüge-Brodin, 2013; K. J. Lieb & Lieb, 2010; D. Shaw & Black, 2010; Tacke et al., 2014), but there are a few studies done in Africa. Therefore, the researcher was motivated to work on these kinds of studies, especially in Africa as he wants to create a new framework to be applied in Egypt to improve the overall performance of companies.

✓ **Contributions to Practitioners**

For LSPs, this research proves with evidence that applying sustainability practices would positively affect performance and also enhance the relationship between LSPs and their customers. It could give the managers the initiatives to go more and more through applying these practices. It will provide the practitioners with the right track that could be used to grab the customers' attention and make them unique to other competitors.

Some of the totally owned Egyptian companies have sustainable targets to be achieved, but the fear of applying these kinds of practices would lead to these companies to fail and get kicked out of the Egyptian market, especially with the existence of the international and the big companies that work in the same field. This study would be like a small tool in order to enhance or support the idea of sustainability and let small and medium enterprise take initiatives to apply these practices as applying these practices would increase efficiency, reduce costs, enhance customer satisfaction and increase relationship quality and collaboration between channel members.

SLSQ is the new tool that the research has proposed to enhance customer satisfaction and increase the collaboration between LSPs and their customers. The main points of SLSQ are sustainable transport, training employees and collaboration with customers to achieve sustainability aspects. Those are the three points that SLSQ focuses on, and the company must take serious steps to apply these aspects of SLSQ that comes originally from LSQ and SSQ. Both of those terms come originally from service quality. Service quality has five main dimensions, which are (Reliability, Assurance, Tangible, Empathy, and Responsiveness), see table 9-2. Therefore, using SLSQ aspects would achieve the SQ dimensions with taking into consideration sustainability aspects.

✓ **Contributions to Policy-makers**

Policymakers can take the results of the research forward and consider encouraging stakeholders and companies to adapt these practices through offering training programmes for them and providing them with suitable funds. Policymakers can also support companies by allowing the use of the environmentally friendly materials with low cost in their industries. The researcher provided an agenda that could be used by not only LSP but also companies and firms.

This agenda could be used as a map to guide the stakeholders and advise them that applying these kinds of sustainability practices would affect their performance, especially in developing countries like Egypt. Moreover, their reputation as sustainable companies will give them a unique position in the customer's mind. Studies that concentrate on sustainability in developing countries are rare. Egypt targets to achieve a better sustainability performance in all sectors.

The Egyptian sustainability strategy 2030 calls to apply practices to achieve sustainability goals. The fear of applying new concepts and practices in companies could make them refuse or hesitate to apply these kinds of practices, but this study targets the LSP as a vital sector to prove them that applying these kinds of sustainability practices will enhance their performance, especially those local companies that exist in the Egyptian market.

10.4 Research Limitations and Further Research

1- This study aims to propose a new SLSQ framework to enhance customer satisfaction and relationship quality in LSP field in Egypt. The analysis in the study supported the significance of SLSQ in enhancing customer satisfaction and improve the relationship quality from the data collected in the research, but the first limitation here, taking into consideration the results of specific industries or specific channel members, is that it is impossible to develop a model that is equally applicable across industrial sectors for many reasons:

- ✓ The way the researcher collected the data was influenced by certain industrial sectors; obtaining an equal sample size from each industrial sector was hard as there is no specific record for LSPs' customers.
- ✓ The number of customers would be less than the number of the sample that the researcher needs to apply structure equation modelling techniques.
- ✓ The varieties of logistics services and operations lead LSPs to customize their services that reduce the number of potential populations.

Consequently, the researcher should take into account these factors before going through these points and considering each point separately.

2- The second limitation is that this research uses LSQ and SSQ as the main variables to complete the SLSQ variables and that it also uses customer satisfaction's outcome of this variable and measures the relationship quality dimensions through customer satisfaction.

As mentioned before, the SLSQ dimensions are reflective to it, not formative. This means that there are other dimensions that could be added to SLSQ. Therefore, the dimensions and interrelationships in this study might not be the only dimensions that represent SLSQ; there could be other dimensions and interrelationships that could be taken into consideration in future research.

- 3- The third limitation is that the collected data of study were based on a survey that is applied in different sectors and industries. The nature of this study would be a disadvantage as it is not taking a specific case to discuss or solid problems to solve. Therefore, in future research, I would advise the future researcher to work on a specific case study and use other tools like qualitative studies.
- 4- The fourth limitation is that using a Likert-scale in the survey would be a weakness point because the findings of the research will be based only on the questions that are mentioned in the questionnaire, and any additional information the respondents want to add would be difficult because of the nature of the questionnaire. Therefore, it is considered to be a research limitation, and as the researcher mentioned other tools could be used in future research.
- 5- The fifth limitation is that this study should be applied and replicated in other countries to test the generalisability of the results and the model. This study that is applied on all sectors would be applied on specific sectors taking into account the data collection tools that would be used in the study.
- 6- The sixth limitation is that this study used SLSQ from management perspective and focused on the points that could be added from one perspective only. Therefore, it is considered as a research limitation because the future researchers should use the technical side of SLSQ and use calculations and equations in order to achieve the best performance of LSPs.

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Appendix 1

1- Maximum Limits of Air Pollutions Inside the Work Place

According to the Egyptian executive regulations. Threshold Limits are the concentrations of airborne chemical substances to which workers can be exposed day after day without adverse effects to their health and are divided into three kinds:

1. Threshold Limits – Mean time is the average time of an ordinary working day (8 hours) to which the worker may be exposed for 5 days a week throughout the period of his employment without suffering any damage to his health.
2. Threshold Limits - Limits of exposure for a short period They are the limits to which the workers may be continuously exposed for a short period. The threshold limits for short periods, are the limits of exposure for an average period of 15 minutes and which may not be exceeded under any circumstances during the working period. The period of exposure may not exceed 15 minutes nor be repeated more than four times during the same day. The period between each short exposure and the next must be at least sixty minutes.
3. The ceiling limit which may not be exceeded even for a moment. When absorption through the skin is a factor in increasing exposure, the sign "+ skin" shall be placed before the critical threshold. With respect to dust that merely causes annoyance without having tangible harmful health effects, the threshold limits shall be 10 milligrams/cubic metre for inhalable particles.

Concerning simple asphyxiate gases which have no significant physiological effects, the decisive factor shall be the concentration of oxygen in the atmosphere which may not be less than 18%.

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
Acetaldehyde	100	180	150	270	
Acetic Acid	10	25	15	37	
Acetic Anhydride	5	20			+ SKIN
Acetone	750	1780	1000	2375	
Acetonitrile	40	70	60	105	+ SKIN
Tetrabromide Acetylene	1	15	1.5	20	
Acetyl Salicylic Acid (Aspirin)		5			
Acrolein	0.1	0.25	0.3	0.8	
Acrylamide		0.3		0.6	+ SKIN
Acrylic Acid	10	30			
Acrylonitrile	2				+ SKIN
Alderine		0.25		0.75	+ SKIN
Allyl Alcohol	2	5	4	10	+ SKIN
Allyl Chloride	1	3	2	6	
Aluminium Metal and Oxides	10		20		
Pyro Powders	5				
Soldering Smoke Fumes	5				
Soluble Salts	2				
Alkylates	2				
Aminopyridine	5.5	2	2	4	
Ammonia	25	18	35	27	
Ammonium Chloride (Fume)					
n-Amyl Acetate	100	530	150	800	
sec-Amyl Acetate	125	670	150	800	
Aniline and Similar	2	10	5	20	+ SKIN
Antimony and Its Compounds (Counted as antimony)		0.5			

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
Carbon Tetra Chloride	5	30	20	125	
Carbon Tetra Bromide	0.1	1.4	0.3	4	
Chlordane		0.5		2	+ SKIN
Chlorinated Camphene		0.5		1	+ SKIN
Chlorinated Diphenyl Oxide		0.5		2	
Chlorine	1	3	3	9	
Chlorine Dioxide	0.1	0.3	0.3	0.9	
Chloro Acetaldehyde	1	3			CEILING
Chlorobenzene	75	350			
Chlorodiphenyl (42%)		1		2	
Chlorodiphenyl (45%)		0.5		1	
Chloroform	10	50	50	225	
Di (chloromethyl) Ether	0.001	0.005			
Chloropicrin	10	45			
Chlorpyrifos		0.2		0.6	+ SKIN
Chromium and Its Compounds (Counted on The Basis of Chromium)		0.5			
Hexavalent Chromium Compounds (Counted on The Basis of Chromium)		0.05			
Volatile Coal Tar Products Which Are Soluble In Benzene		0.2			
Cobalt and its Dust and Smokes		0.1			
Copper Smokes		0.2			
Copper Dust and Sprinkles (Counted as Copper)		1		2	
Raw Cotton Fluff		0.2		0.6	

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
ANTU (Alpha Naphtyl Thiourea)		0.3		0.9	
Arsenic and Its Soluble Compounds (Counted as Arsenic)		0.2			
Arsine Gas	0.05	0.2			
Petroleum asphalt Fumes		5		10	
Atrazine		5			
Methyl Azynphos		0.2		0.6	+ SKIN
Barium and Its Soluble Compounds (Counted as Barium)		0.5			
Benzene (Petrol)	10	30	25	75	
Benzyl Chloride	1	5			
Beryllium		0.002			
Diphenyl	0.2	1.5	0.6	4	
Bismuth Telluride	10		20		
Sodium tetra borate (Anhydrous)		1			
Sodium tetra borate (Decahydrate)		5			
Sodium tetra borate (Pentahydrate)		1			
Boron Oxide		10		20	
Boron Tribromide	1	10	3	30	
Boron Trifluoride	1	3			+ CEILING
Bromine	0.1	0.7	0.3	2	
Bromine pentafluoride	0.1	0.7	0.3	2	
Bromoform	0.5	5			

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
Cresoles	5	22			+ SKIN
Cyanide Salts, Counted as Cyanide		5			SKIN
Cyanogen	10	20			
Cyanogen Chloride	0.3	0.6			CEILING
Cyclohexane	300	1050	375	1300	
Cyclopentadiene	75	200	150	400	
Cyclopentane	600	1720	900	2580	
D.D.T		1		3	
Decaborane	0.05	0.3	0.15	0.9	SKIN
Diazinon		0.1		0.3	+ SKIN
Diazomethane	0.2	0.4			
Diborane	0.1	0.1			
Dichloro acetylene	0.1	04			CEILING
o-Dichlorobenzene	50	300			CEILING
para - Dichlorobenzene	75	450	110	675	
1, 2 - Dichloro ethylene	200	790	250	1000	
Dichloroethyl ether	5	30	10	60	+ SKIN
Dichlorvos	0.1	1	0.3	3	+ SKIN
Dichrotofos		0.25			+ SKIN
Dieldrin		0.25		0.75	+ SKIN
Diethanolamine	3	15			
Dimethylaniline	5	25	10	50	+ SKIN
Dinitrobenzene	0.15	1	0.5	3	+ SKIN
Dinitro- O - Cresol		0.2		0.6	+ SKIN
Dinitrotoluene		1.5		5	+ SKIN

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
Butadiene	1000	2200	1250	2750	
Butane	800	1100			
n-Butyl Acetate	150	710	200	150	
sec- Butyl Acetate	200	950	250	1190	
tert-Butyl Acetate	200	950	250	1190	
Butyl Acrylate	10	55			
n-Butyl Alcohol	50	150			+ SKIN
sec- Butyl Alcohol	100	305	150	450	
tert- Butyl Alcohol	100	300	150	450	
Butyl Amines	5	15			+ SKIN
Tetra Butyl Chromate Counted as Chromium Oxide(CrO ₃)		0.1			+ SKIN CEILING
Butyl Lactate	5	25			
Butyl Mercaptan	0.5	1.5			
Cadmium Dusts and Salts (Counted As Cadmium)	0.05		0.2		
Cadmium Smokes	0.05				CEILING
Calcium Carbonate				20	
Calcium Hydroxide		5			
Calcium Oxide		2		10	
Carbaryl		5		10	
Carbofuran		0.1			
Carbon Black		3.5		7	
Carbon Dioxide	5000	9000	15000	27000	
Carbon Disulphide	10	30			+ SKIN
Carbon Monoxide	50	55	400	440	

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
Dioxin	25	90	100	360	+ SKIN
Dipropylene Glycol Methyl Ether	100	600	150	900	+ SKIN
Diquat		0.5		1	
Disulfiram		2		5	
Endosulfan		0.1		0.3	+ SKIN
Endrin		0.1		0.3	+ SKIN
Epichlorohydrin	2	10	5	20	+ SKIN
Ethyl Acetate	400	1400			
Ethanol	1000	1900			
Ethanolamine	3	8	6	15	
Ethylbenzene	100	435	125	545	
Ethyl butyl ketone	50	230	75	345	
Ethyl chloride	1000	2600	1250	3250	
Ethylene diamine	10	25			
Ethylene oxide	10	20			
Ethylene dichloride	10	40	15	60	
Ethylene glycol (particles)		10		20	
Ethylene glycol (Vapour)	50	125			Ceiling
Ethyl mercaptan	0.5	1	2	3	
Ferro vanadium Dust		1		0.3	
fibrous Glass Dust		10			
Fluorides (Counted on The Basis of Fluorine)		2.5			
Fluorine		2	2	4	CEILING
Formaldehyde	2	3			CEILING

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
Formic Acid	5	9			
Gasoline	300	900	500	1500	
Heptachlor		0.5		2	+ SKIN
Heptane	400	1600	500	2000	
Hexachloro Cyclopentadiene	0.01	0.1	0.03	0.3	
Hexachloro-Naphthalene		0.20		0.60	+ SKIN
n-Hexane	50	180	1000	3600	
Hexane Isomers	500	1800	1000	3600	
Hydrogen Bromide	3	10			
Hydrogen Cyanide	10	10			CEILING
Hydrogen Fluoride	3	2.5	6	5	
Hydrogen Sulphide	10	14	14	21	
Iodine	0.1	1			CEILING
Iron Oxide Smokes	3	5		10	
Iron Pentacarbonyl	0.1	0.8	0.2	0.16	
Isobutyl Alcohol	50	150	75	225	
Isopropyl Alcohol	400	980	500	1225	
Lead Dust and Smokes Non Organic (as Lead)		0.15		0.45	
Lead Arsenate		0.15		045	
Lead Chromate		0.05			
Lindane		0.5		0.5	+ SKIN
Liquidified Petroleum Gases	1000	1800	1250	2250	
Magnesium Oxides Smokes		10			
Malathion		10			+ SKIN
Manganese Dusts and Compounds		5			CEILING

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
(as Manganese)					
Manganese Smokes		1		3	
Manganese Tetra Oxide		1			
Mercury (as Mercury)					+ SKIN
Alkyl Compounds		0.01		0.03	
Smokes Of All Other Compounds Except Alkyl		0.05			
Aryl Compounds and Inorganic Compounds		0.1			
Methomyl		2.5			+ SKIN
Methosychlor		10			
Methyl Alcohol	200	260	250	310	+ SKIN
Methyl Bromide	5	20	15	60	
Methyl butyl ketone	5	20			
Methyl chloride	50	105	100	205	
Methyl chloro form	350	1900	450	2450	
Diphenylmethane Diisocyanate (MDI)	0.02	0.2			CEILING
Methylene Chloride	100	360	500	1700	
Methyl Ethyl Ketone	200	590	300	885	
Methyl Hydrazine	0.02	0.35			+ SKIN
Methyl Isocyanate	0.02	0.05			+ SKIN
Methyl Mercaptan	0.5	1			
Methyl Parathion		0.2		0.6	+ SKIN
Mevinphos	0.01	0.1	0.03	0.3	+ SKIN
Monocrotophos					
Naphthalene	10	50	15	75	
Nickel Carbonyl (as Nickel)	0.05	0.53			
Nickel Metal		1			

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
Soluble Compounds (as Nickel)		0.1		0.3	
Nicotine		0.5		1.5	+ SKIN
Nitric Acid	2	5	4	10	
Nitric Oxide	25	30	35	45	
Para Nitroaniline		3			+ SKIN
Nitrobenzene	1	5	2	10	+ SKIN
Nitro Chlorobenzene		1		2	+ SKIN
Nitrogen Dioxide	3	6	5	10	
Nitrogen Trifluoride	10	30	15	45	
Nitroglycerin	0.02	0.2	0.05	0.5	+ SKIN
Nitrotoluene	2	11			+ SKIN
Octachloronaphthalene		0.1		0.3	+ SKIN
Mineral Oil Sprinkles		5		10	
Osmium Tetraoxide (as Osmium)	0.0002	0.002	0.0006	0.006	
Oxalic Acid		1		2	
Oxygen Difluoride	0.05	0.1	0.15	0.3	
Ozone	0.1	0.2	0.3	0.6	
Paraffin Wax Vapours		2		6	
Paraquat (Size of Inhalable Particles)		0.1			
Parathion		0.1		0.3	+ SKIN
Pentachloronaphthalene		0.5		2	
Pentachlorophenol		0.5		1.5	+ SKIN
Ethylene Dichloride	50	325			
Phenol	5	19	10	38	+ SKIN
Phenothiazine		5		10	+ SKIN

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
Para-Phenylene Diamine		0.1			+ SKIN
Phenylhydrazine	5	20	1	45	+ SKIN
Phenyl Mercaptan	0.5	2			
Phosgene	0.1	0.4			
Phosphine	0.3	0.4	1	1	
Phosphoric Acid		1		3	
Yellow Phosphorus		0.1		0.3	
Picric Acid		0.1		0.3	+ SKIN
Platinum Metal		1			
Soluble Platinum Salts (as Platinum)		0.002			
Potassium Hydroxide		2			CEILING
Propionic Acid	10	30	15	45	
Propyl Alcohol	200	500	250	625	+ SKIN
Pyrethrum		5		10	
Pyridine	5	15	10	30	
Rotenone		5		10	
Selenium Salts (as Selenium)		0.2			
Selenium Hexafluoride	0.05	0.2			
Silicon				20	
Silicon Carbide				20	
Silver Metal		0.1			
Soluble Silver Salts		0.01			
Sodium Azide	0.1	0.3			CEILING
Sodium Bisulfite		5			
Sodium Fluoroacetate		0.05		0.15	+ SKIN

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
Sodium Hydroxide		2			CEILING
Sodium Metabisulfite		5			
Söbline	0.1	0.5	0.3	1.5	
Protein Decomposing Enzymes (100% Pure Crystalline Enzyme)		0.00006			CEILING
Sulphur Dioxide	2	5	5	10	
Sulphuric Acid		1			
Sulphur Hexafluoride	1000	6000	1250	7500	
Sulphur Monochloride	1	6	3	18	
Sulphur Pentafluoride	0.025	0.25	0.075	0.75	
2,4,5 - Trichlorophenoxy - Acetic Acid		10		20	
TEPP (Tetra ethyl pyrophosphate)	0.004	0.05	0.01	0.02	+ SKIN
1,1,2,2, Tetrachloroethane	5	35	10	70	+ SKIN
Tetra Ethyl Lead (as Lead)		0.1		0.3	+ SKIN
Tetryl		1.5		3	+ SKIN
Soluble Thallium salts (as Thallium)		0.1			+ SKIN
Thiram		5		10	
Tin & Its Inorganic Compounds (Except Tin Tetra Oxide Counted as Tin)		2		4	
Tin Organic Compounds (as Tin)		0.1		0.2	+ SKIN
Titanium Dioxide				20	
Toluene	100	375	150	560	+ SKIN
Toluene Di-isocyanate	0.02	0.14			CEILING
o-toluidine	2	9			+ SKIN

Substance	Threshold Limits				Remarks
	Mean time		Limits of exposure for a short period		
	Part per million P.P.M	mg/m ³	Part per million P.P.M	mg/m ³	
Trichloroacetic Acid	1	5			
1,2,4, Trichlorobenzene	5	40			
Trichloroethylene	50	270	150	805	
Trichloronaphthalene		5		10	
2,4,6 - Trinitrotoluene		0.5		3	+ SKIN
Trimethylbenzene	25	125	35	170	
Triorthocresyl Phosphate		0.1		0.3	
Natural Uranium & Its soluble & insoluble Compounds (Counted as Uranium)		0.2		0.6	
Inhalable Vanadium Dusts & Smokes (Counted as Vanadium PentaOxide)		0.5			
Vinyl Chloride	5	10			
Warfarin		0.1		0.3	
Soldering Smokes		5			
Solid Timber Dusts		1			
Soft Timber Dusts		5		10	
Xylene	100	435	150	655	+ SKIN
Zinc Chloride Smokes		1		2	
Zinc Oxide Smokes		5		10	
Zirconium Compounds (Counted as Zirconium)		5		10	

2- Maximum permissible noise levels inside places of productive activities

NO.	Type of Place and Activity	Maximum Permissible Noise [level equivalent to decibel (A)]
1	Work place with up to 8-hour shifts and aiming to limit noise hazards on sense of hearing	90
2	Work place where acoustic signals and good audibility are required	80
3	Work rooms for the follow up, measurement and adjustment of high-performance operations	65
4	Work rooms for computers, typewriters or similar equipment	70
5	Work rooms for activities requiring routine mental concentration	60

Maximum permissible period for exposure to noise in the work place (factories and workshops):

* The value given hereafter is indicated on the basis of not affecting the sense of hearing.

- Intensity of noise shall not exceed 90 decibels (A) during a daily 8-hour work shift.

- In case of increasing noise level intensity over 90 dB (A), the period of exposure must be reduced according to the following table:

Noise intensity level decibel (a)	95	100	105	110	115
Period of exposure (one hour)	4	2	1	1/2	1/4

The instantaneous noise intensity level during the working hours shall not exceed 135 decibels.

✓ In case of exposure to different noise intensity levels of over 90 decibels:

For intermittent periods during a shift, the result must not exceed:

$$\left(\frac{A_1}{B_1}\right) + \left(\frac{A_2}{B_2}\right) + \dots \quad \text{over the integer one}$$

whereas:

- A: the period of exposure to a specific level of noise (hour).
- B: the permissible period of exposure at the same noise level (hour)

✓ In case of exposure to intermittent noise emanating from sledgehammers:

Depends on the exposure period (number of impacts during the daily shift) according to noise intensity as per the following table

Noise intensity (Decibel)	Number of permissible impacts during the daily working hours
135	300
130	1000
125	3000
120	10000
115	30000

3- Maximum allowable emissions from vehicles that operate using gasoline fuel

Pollutants	Before the year 2003		From 2003 to 2009		Year 2010 and later	
	Hydrocarbons HC (ppm)	CO%	HC (ppm)	CO%	HC (ppm)	CO%
Maximum allowable Limit	600	4	300	1.5	200	1.2
Measurements should be done at the idle speed from 600 to 900 rpm						

4- Maximum allowable emissions from vehicles that operate using diesel fuel

Manufacturing Year (model) Before the year	Before the year 2003	From 2003 and later
Smoke density factor K (m-1)	2.8	2.65
Opacity %	30	25

Measurements are done in accordance with the ISO-11614 international standard.

- Opacity measured at light flow device 127 mm.

light absorption coefficient, k

coefficient defined by the Beer-Lambert law:

$$k = \frac{-1}{L_A} \times \ln\left(\frac{\tau}{100}\right)$$

or

$$k = \frac{-1}{L_A} \times \ln\left(1 - \frac{N}{100}\right)$$

NOTE 1 To obtain proper comparisons when making opacity measurements, the temperature and pressure prevailing in the measuring zone must be known since they influence the light absorption coefficient k . Reference conditions for these are given in 7.1.

NOTE 2 The term "light absorption coefficient" is in common use and is, therefore, used in this International Standard. However, "light extinction coefficient" would be more accurate terminology. As used, the two terms describe exactly the same parameter.

Symbol	Unit	Description
K	m^{-1}	Light absorption coefficient
L_A	mm	Effective optical path length.
τ	%	Transmittance
N	%	Opacity

Appendix 2

Semi-structured interview (English Version)

Before start the interview please consider the following definition:

Sustainable Service Quality (SSQ): environmental, Social, and Economic initiatives which are critical to present a better service quality, in logistics service providers (LSPs) fields.

From your point of view, which of the following SSQ elements are important for LSP's service quality?

SSQ Elements	Variable
Use of less polluting vehicles	Environmental Sustainability
Using routing systems to minimize travel distances	
Use cleaner fuel standards and switch to gas as an alternative to gasoline	
Vehicle maintenance and disposal system	
Using of alternative energy sources (e.g. solar or photovoltaic panels)	
Packaging/shipping materials are reusable	
Packaging/shipping materials are recyclable	
Packaging/shipping materials are bio-degradable	
Performed an environmental or waste audit	
Improved compliance with environmental standards	
Protecting employee health and safety	Social Sustainability
Creating a training programs, awareness programs, seminars for workers.	
Considering customer Compliance	
Enhancing customer privacy	
Ensuring customer satisfaction.	Economic Sustainability
Improved company image (i.e. company is seen as a green company)	
Improved company's position in the marketplace	
Decrease of fee for waste treatment	
Decrease cost of energy consumption	
Decrease fine of environmental accident	
Decreasing your disposal costs	

- Why did you consider these elements important for LSP's service quality?
- If you suggest any new element that can be added to the list, please mention it?
- From your opinion, what are the most important SSQ elements?

Appendix 3

Q-Sort Test (English Version)

This study seeks to find the elements related to sustainable logistics service quality. As an expert in this field, kindly confirm the following elements under the variable on the left-hand side, or add a new one if you have. If you have any comments or modifications, please do not hesitate to write in the comment cell. Please, read the following definition before you start the test:

Term	Definition
Sustainable Logistics Service Quality	Sustainable functional and technical processes that are taken by logistics service providers in order to present better services to achieve the satisfaction of stakeholders and build a strong relationship with Them.

Sustainable Logistics Service Quality Elements	decision (yes or no)
1. The product becomes better available after using sustainable means of transport by your logistics service provider (LSP)	
2. Product costs decrease after using sustainable means of transport by your LSP	
3. It is uncommon having issues regarding transporting large quantities using sustainable means of transport by your LSP.	
4. It is rare to receive a damaged product as a result of using sustainable means of transport by your LSP.	
5. Using re-route system enhances delivering orders in the right time.	
6. Trained LSP employees provide your company with a better problem handling.	
7. Trained LSP employees provide your company with a better problem response.	
8. Trained LSP employees help in solving your problems in a reasonable time.	
9. Trained LSP employees help you to reduce accident rates.	
10. Your LSP personnel contact employees have enough knowledge and experience.	
11. Your LSP enhances environmental knowledge sharing with your company.	
12. You achieve a better performance when your LSP considers your complaints.	
13. Collaboration with your LSP improves your sustainable performance practices.	
14. Your LSP cooperates with your company to achieve environmental goals.	
15. Your LSP cooperates with your company to exchange environmental knowledge.	
16. Adopting your LSP environmental systems (ISO, EMS, etc.) improves your company's performance.	
17. Your company cooperates with your LSP in the process of sustainable packaging.	
18. Sustainable packaging decreases your company's disposal practices cost.	
19. Sustainable packaging enhances goods' stowage.	
20. It is uncommon to find a damaged product as result of using sustainable packaging materials.	
21. The sustainable information received from your LSP improves your company's performance.	
22. The sustainable information received from your LSP decreases the fine of environmental accidents.	
23. The sustainable information received from your LSP improves your compliance with environmental standards.	
24. The sustainable information received from your LSP is always updated.	
25. Adopting sustainability practices from your LSP leads to a reduction in energy consumption cost.	

26. Adopting sustainability practices from your LSP leads to a reduction in disposal practices cost.	
27. It is a rare condition to receive a shipment that encompasses wrong products from your LSP.	
28. Order procedures become more effective due to sustainable system adopted by LSP.	
29. Order procedures become effortless due to sustainable system adopted by LSP.	
30. Order procedures become more efficient due to sustainable system adopted by LSP.	
31. products received from LSP are in the right conditions.	
32. The lead time of the order process becomes shorter.	
33. The back-order process becomes more efficient.	
34. The back-order process becomes more effective.	

Note

ISO: International Organization for Standardization

EMS: Environmental management systems

Comments or Modifications

Thank you,

اختبار Q-Sort (Arabic Version)

تسعى هذه الدراسة إلى العثور على العناصر المتعلقة بجودة الخدمات اللوجستية المستدامة، وبصفتك أحد الخبراء في هذا المجال، يرجى تأكيد العناصر التالية تحت الإنشاء على الجانب الأيمن، كما يمكنك اقتراح عناصر أخرى بالمتغير محل الدراسة. إذا كان لديك أي تعليقات أو تعديلات، من فضلك لا تتردد في كتابته في المكان المخصص للتعليق في آخر الاختبار.

يرجى قراءة التعريف التالي قبل بدء الاختبار:

المصطلح	التعريف
جودة الخدمات اللوجستية المستدامة	العمليات الوظيفية والفنية المستدامة التي يتم اتخاذها من قبل مقدمي الخدمات اللوجستية لجعل الخدمة أكثر استدامة لتحقيق رضا العملاء الحاليين واحتياجات الجيل القادم.

موافق أو غير موافق	عناصر جودة الخدمات اللوجستية المستدامة
	1. أصبح المنتج متوفر بشكل أفضل بعد استخدام النقل المستدام من قبل مقدمي الخدمات اللوجستية الخاص بكم.
	2. انخفضت تكاليف المنتج بسبب استخدام النقل المستدام من قبل مقدمي الخدمات اللوجستية الخاص بكم.
	3. من النادر وجود مشكلات تتعلق بنقل كميات كبيرة من المنتجات باستخدام النقل المستدام من قبل مقدمي الخدمات اللوجستية الخاص بكم.
	4. نادرًا ما يحدث ضرر للمنتج نتيجة لوسيله النقل المستدامة من قبل مقدمي الخدمات اللوجستية الخاص بكم.
	5. استخدام نظام إعادة التوجيه في النقل ادي الي تسليم الطلبية في الوقت المتفق عليه.
	6. يوفر موظفو مقدمي الخدمات اللوجستية المدربون لشركتكم معالجة أفضل للمشاكل.
	7. يوفر موظفو مقدمي الخدمات اللوجستية المدربون لشركتكم استجابة أفضل للمشاكل.
	8. يساعد موظفو مقدمي الخدمات اللوجستية المدربون في حل مشاكلك في وقت معقول.
	9. يساعدك موظفو مقدمي الخدمات اللوجستية المدربون على تقليل معدلات الحوادث.
	10. لدى موظف الاتصال المباشر من قبل مقدمي الخدمات اللوجستية ما يكفي من المعرفة والخبرة.
	11. يسعي مقدم الخدمة اللوجستية الخاص بكم لتعزيز مشاركة المعرفة البيئية بينه وبين شركتكم.
	12. يمكنك تحقيق أداء أفضل عندما يأخذ مقدمو الخدمات اللوجستية الخاص بكم شكاواكم في الاعتبار.
	13. يؤدي التعاون مع مقدمي الخدمات اللوجستية الخاص بكم إلى تحسين ممارسات الأداء المستدام لديكم.
	14. يتعاون مقدمو الخدمة اللوجستية الخاص بكم مع شركتكم من أجل تحقيق الأهداف البيئية.
	15. يتعاون مقدمو الخدمة اللوجستية الخاص بكم مع شركتكم من أجل زيادة المعرفة البيئية.
	16. تبني مقدمو الخدمة اللوجستية الخاص بكم أنظمة بيئية ساهم في تحسين الأداء الخاص بكم.
	17. تتعاون شركتكم مع مقدمي الخدمات اللوجستية الخاص بكم من أجل التعبئة المستدامة.
	18. تقلل التعبئة المستدامة من تكلفة التخلص من الفاقد لدي شركتكم.
	19. يؤدي التغليف المستدام إلى تخزين البضائع بشكل أفضل.
	20. نادرا العثور على منتج تالف نتيجة استخدام مواد تغليف مستدامة.
	21. حسنت المعلومات المستدامة المستلمة من مقدمي الخدمة اللوجستية الخاص بكم أداء شركتكم.
	22. تقلل المعلومات المستدامة المستلمة من مقدمي الخدمة اللوجستية الخاص بكم من الغرامة الناجمة عن الحوادث البيئية.
	23. حسنت المعلومات المستدامة التي تم تلقيها من مقدمي الخدمة اللوجستية الخاص بكم التزامك بالمعايير البيئية.
	24. المعلومات المستدامة التي يتم تلقيها من مقدمي الخدمة اللوجستية الخاص بكم تكون محدثه.
	25. تبني ممارسات الاستدامة من مقدمي الخدمة اللوجستية الخاص بكم ادي إلى تقليل تكلفة استهلاك الطاقة.
	26. تبني ممارسات الاستدامة من مقدمي الخدمة اللوجستية الخاص بكم ادي إلى تقليل تكلفة الفاقد.
	27. من النادر تلقي شحنة تحتوي على منتجات خاطئة.
	28. إجراءات الطلب فعالة بسبب النظام المستدام لمقدمي الخدمة اللوجستية الخاص بكم.
	29. إجراءات الطلب سهلة بسبب النظام المستدام لمقدمي الخدمات اللوجستية الخاص بكم.
	30. لا تستهلك إجراءات الطلب الكثير من الوقت بسبب النظام المستدام لمقدم الخدمات اللوجستية الخاص بكم.
	31. المنتجات الواردة من مقدمي الخدمة اللوجستية الخاص بكم في حالة جيدة.
	32. الوقت ما بين اصدار امر الشراء واستلامه يكون قصير.
	33. عمليه ارجاع المنتجات أصبحت أكثر كفاءه.
	34. عمليه ارجاع المنتجات أصبحت أكثر فاعليه.

تعليقات أو تعديلات

شكرا لكم

Appendix 4

UNIVERSITÄT
DUISBURG
ESSEN

Research Questionnaire (English Version)

Dear Sir/Madam,

My name is Ahmed Ali, studying at the University of Duisburg - Essen, Germany. Currently, I am writing my Ph.D. thesis under the supervision of Prof. Dr-Ing. Bernd Noche in the department of transport systems and logistics.

The purpose of this research questionnaire is to measure how sustainability practices applied by your Logistics Service Providers (LSPs) affect your overall relationship quality with them. For completion of my thesis, I kindly request you to fill the questionnaire that will not take more than approximately 10-15 minutes.

The data collected from the questionnaire will be used only for academic purposes. The name of companies, respondents and other details will be kept confidential. I will be glad to share with you the findings and summary of this research upon your request.

I would like to thank you in advance for your time, contribution, co-operation and patience. Please, feel free to contact me for any further information.

Yours sincerely,

Ahmed Ali
University of Duisburg – Essen
Email: Ahmed.husseincitl@yahoo.com

Note:

✓ Please consider the following definitions before you answer the questionnaire:

- 1- Sustainable Logistics Service Quality (SLSQ): Sustainable functional and technical processes that are applied by logistics service providers in order to enhance satisfaction of existing customers and satisfy the needs of next generation.
- 2- Relationship quality: “the joint cognitive evaluation of business interactions by key individuals in the dyad, comparatively with potential alternative interactions” Holmlund (2001, p. 15).

Section-1 General information

I would like to know some information about you and your company to be analyzed in the report. Please choose one of your main LSP to answer the next sections.

1. What is your job title?

- Senior Executive
- Country or Area Manager
- Department Manager
- Supervisor
- Operations
- Other: _____

2. How many years have you been in your current position?

- Less than 1 year
- From 1 year to 2 years
- From 3 years to 4 years
- From 5 years to 6 years
- More than 6 years

3. How long have you been working in this company?

- Less than 1 year
- From 1 year to 2 years
- From 3 years to 4 years
- From 5 years to 6 years
- More than 6 years

4. How long have you been working with this 3PL provider?

- Less than 1 year
- From 1 year to 2 years
- From 3 years to 4 years
- From 5 years to 6 years
- More than 6 years

5. Please specify the company's industrial section:

- Food and Beverages

- Drug
- Food Producers and Processes
- Personal Care and Household Products
- Electronic and Electrical Equipment
- Chemical, Oil and Pharmaceutical Products
- Automotive Industry (Goods, Passenger, Components)
- Postal
- Utilities
- Health Services
- Maritime Industry
- Other - (please, specify)

6. Your company core work:

- Wholesaler/Distributor
- Retailer
- Other - (Please, specify)

7. Please provide your contact details. (Email/telephone number) (Optional)

.....

Section-2: Sustainable Logistics Service Quality elements

The following section demonstrates the main elements that measure SLSQ variable.

1. To what extent do you agree that your LSP applies SLSQ elements?

SLSQ Elements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The product becomes better available after using sustainable means of transport by your logistics service provider (LSP)					
2. It is rare to receive a damaged product as a result of using sustainable means of transport by your LSP.					
3. Using re-route system enhances delivering orders in the right time.					
4. Trained LSP employees provide your company with a better problem handling.					
5. Trained LSP employees provide your company with a better problem response.					
6. Trained LSP employees help in solving your problems in a reasonable time.					
7. Trained LSP employees help you to reduce accident rates.					
8. Your LSP personnel contact employees have enough knowledge and experience.					
9. Your LSP enhances environmental knowledge sharing with your company.					

10. You achieve a better performance when your LSP considers your complaints.					
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.					
15. Sustainable packaging decreases your company's disposal practices cost.					
16. Sustainable packaging enhances goods' stowage.					
17. It is uncommon to find a damaged product as a result of using sustainable packaging materials.					
18. The sustainable information received from your LSP improves your company's performance.					
19. The sustainable information received from your LSP improves your compliance with environmental standards.					
20. The sustainable information received from your LSP is always updated.					
21. Adopting sustainability practices from your LSP leads to a reduction in energy consumption cost.					
22. Adopting sustainability practices from your LSP leads to a reduction in disposal practices cost.					
23. It's a rare condition to receive a shipment that encompasses wrong products from your LSP.					
24. Order procedures become more effective due to sustainable system adopted by LSP.					
25. Order procedures become effortless due to sustainable system adopted by LSP.					
26. Order procedures become more efficient due to sustainable system adopted by LSP.					
27. Products received from 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.					

Section-3: Customer Satisfaction Elements.

The following section illustrates the main elements that measure LSP's customer satisfaction variable.

To what extent you are satisfied with the service provided by your LSP?

Satisfaction Elements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1- I am delighted with the performance of my LSP.					
2- The services offered by LSP meet my expectations.					
3- The service provided to you through LSP is good.					
4- Overall, I am satisfied with my LSP.					

Section-4: Relationship Quality elements.

The following section illustrates the main elements that measure relationship quality variable. To what extent do you agree that your relationship quality with LSP is good regarding these aspects (Dependence, Trust, and commitment)?

Dependence Elements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1- It is prohibitively expensive to start dealing with a new LSP rather than the old one.					
2- It is difficult to receive the same services from other LSPs.					
3- The advantages gained from your current LSP are difficult to be substituted.					
4- It will be considered a great loss if you lose this LSP.					

Trust Elements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1- You trust this LSP because it keeps your interests in mind.					
2- Your LSP keeps their promises (i.e., price offers, marketing communications, etc.)					
3- Your LSP has a high level of honesty.					
4- Your LSP will remain very loyal to this relationship.					
5- Your LSP is trustworthy					

Commitment Elements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1- You are willing to have a long-term relationship with your LSP.					
2- You want to remain a customer of this LSP because you genuinely enjoy your relationship with it.					
3- You are willing to invest more in this relationship					
4- Your positive thoughts towards this LSP are the major driver to continue working with it.					

Please if you have any comment, do not hesitate to mention it here:

.....

Thank you for your co-operation

استمارة استقصاء (Arabic Version)

عزيزي المستقضي منه،

يقوم الباحث أحمد علي، ادرس في جامعة دويسبورغ - إيسن بألمانيا. حاليا أقوم بعمل أطروحة دكتوراه تحت إشراف البروفيسور د. بيرند نوخا في قسم نظم النقل واللوجستيات.

الغرض من هذا الاستقصاء البحثي هو قياس مدى تأثير ممارسات الاستدامة التي يطبقها مقدمو الخدمات اللوجستية على جودة علاقتك معهم. لإكمال رسالتي، يرجى التفضل بملء الاستبيان الذي لن يستغرق حوالي من 10-15 دقائق.

سيتم استخدام هذه البيانات التي تم جمعها من هذا الاستقصاء لأغراض أكاديمية فقط. سيتم الاحتفاظ بسرية اسم الشركات والمستجيبين والتفاصيل الأخرى الخاصة بحضراتكم. يسعدني مشاركة نتائج وملخص هذا البحث بناء على طلبك من خلال البريد الإلكتروني المدرج بالأسفل.

أود أن أشكرك مقدّمًا على وقتك ومساهمتك وتعاونك. من فضلك لا تتردد في الاتصال بي للحصول على مزيد من المعلومات.

تفضلوا بقبول فائق الاحترام،

أحمد علي

جامعة دويسبورغ - إيسن

البريد الإلكتروني: Ahmed.husseincitl@yahoo.com

ملحوظة:

يرجى النظر في التعريفات التالية قبل الإجابة على الاستبيان:

- 1- جودة الخدمات اللوجستية المستدامة (SLSQ): العمليات الفنية والتقنية المستدامة التي يتم تطبيقها من قبل مقدمي الخدمات اللوجستية من أجل تعزيز إرضاء العملاء الحاليين وتلبية احتياجات الجيل القادم.
- 2- جودة العلاقة: (RQ) "التقييم المعرفي المشترك للتفاعلات التجارية من قبل الأفراد المتعاونة، مقارنة بالتفاعلات البديلة المحتملة".

القسم الأول: معلومات عامة

أود أن احصل على بعض من المعلومات الخاصة بكم وبشركتكم ليتم تحليلها في التقرير. الرجاء اختيار أحد مقدمي الخدمات اللوجستية الذي تتعامل معهم للإجابة على الأسئلة التالية:

1. ما هو المسمى الوظيفي الخاص بك؟

- مدير تنفيذي
- مدير المنطقة للشركة
- مدير قسم
- مشرف
- مدير العمليات
- أخرى:

2. كم سنة مرت في منصبك الحالي؟

- أقل من سنة
- من سنة إلى سنتين
- من 3 سنوات إلى 4 سنوات
- من 5 سنوات إلى 6 سنوات
- أكثر من 6 سنوات

3. منذ متى وأنت تعمل في هذه الشركة؟

- أقل من سنة
- من سنة إلى سنتين
- من 3 سنوات إلى 4 سنوات
- من 5 سنوات إلى 6 سنوات
- أكثر من 6 سنوات

4. منذ متى وأنت تعمل مع مقدم الخدمات اللوجستية؟

- أقل من سنة
- من سنة إلى سنتين
- من 3 سنوات إلى 4 سنوات
- من 5 سنوات إلى 6 سنوات
- أكثر من 6 سنوات

5. في أي مجال تعمل شركتكم:

- المواد الغذائية والمشروبات
 الأدوية
 منتجي المواد الغذائية
 منتجات العناية الشخصية والمنتجات المنزلية
 المعدات الإلكترونية والكهربائية
 المنتجات الكيماوية والنفطية
 صناعة السيارات (بضائع، ركاب، مكونات)
 الخدمات البريدية
 الخدمات
 الخدمات الصحية
 الصناعة البحرية
 أخرى - (يرجى ذكرها)

6. العمل الأساسي لشركتكم:

- تاجر الجملة / الموزع
 بائع التجزئة
 غير ذلك (يرجى التحديد)

7. يرجى تقديم تفاصيل الاتصال الخاصة بك. (البريد الإلكتروني / رقم الهاتف) (اختياري)

القسم الثاني: بنود جودة الخدمات اللوجستية المستدامة

يوضح القسم التالي العناصر الرئيسية التي تقيس متغير جودة الخدمات اللوجستية المستدامة.

1. إلى أي مدى توافق على أن مقدم الخدمات اللوجستية الخاص بك يطبق بنود جودة الخدمات اللوجستية المستدامة؟

بنود جودة الخدمات اللوجستية المستدامة	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
35. أصبح المنتج متوفر بشكل أفضل بعد استخدام النقل المستدام من قبل مقدمي الخدمات اللوجستية الخاص بكم.					
36. نادرًا ما يحدث ضرر للمنتج نتيجة لوسيله النقل المستدامة من قبل مقدمي الخدمات اللوجستية الخاص بكم.					
37. استخدام نظام إعادة التوجيه في النقل ادي الي تسليم الطلبية في الوقت المتفق عليه.					
38. يوفر موظفو مقدمي الخدمات اللوجستية المدربون لشركتك معالجة أفضل للمشاكل.					
39. يوفر موظفو مقدمي الخدمات اللوجستية المدربون لشركتك استجابة أفضل للمشاكل.					
40. يساعد موظفو مقدمي الخدمات اللوجستية المدربون في حل مشاكلك في وقت معقول.					
41. يساعدك موظفو مقدمي الخدمات اللوجستية المدربون على تقليل معدلات الحوادث.					

					42. لدى موظف الاتصال المباشر من قبل مقدمي الخدمات اللوجستية ما يكفي من المعرفة والخبرة.
					43. يسعى مقدم الخدمة اللوجستية الخاص بكم لتعزيز مشاركة المعرفة البيئية بينه وبين شركتكم.
					44. يمكنك تحقيق أداء أفضل عندما يأخذ مقدمو الخدمات اللوجستية الخاص بكم شكاواكم في الاعتبار.
					45. يؤدي التعاون مع مقدمي الخدمات اللوجستية الخاص بكم إلى تحسين ممارسات الأداء المستدام لديكم.
					46. يتعاون مقدمو الخدمة اللوجستية الخاص بكم مع شركتكم من أجل تحقيق الأهداف البيئية.
					47. يتعاون مقدمو الخدمة اللوجستية الخاص بكم مع شركتكم من أجل زيادة المعرفة البيئية.
					48. تتعاون شركتكم مع مقدمي الخدمات اللوجستية الخاص بكم من أجل التعبئة المستدامة.
					49. تقلل التعبئة المستدامة من تكلفة التخلص من الفاقد لدي شركتكم.
					50. يؤدي التغليف المستدام إلى تخزين البضائع بشكل أفضل.
					51. نادرا العثور على منتج تالف نتيجة استخدام مواد تغليف مستدامة.
					52. حسنت المعلومات المستدامة المستلمة من مقدمي الخدمة اللوجستية الخاص بكم أداء شركتكم.
					53. حسنت المعلومات المستدامة التي تم تلقيها من مقدمي الخدمة اللوجستية الخاص بكم التزامك بالمعايير البيئية.
					54. المعلومات المستدامة التي يتم تلقيها من مقدمي الخدمة اللوجستية الخاص بكم تكون محدثة.
					55. تبني ممارسات الاستدامة من مقدمي الخدمة اللوجستية الخاص بكم ادي إلى تقليل تكلفة استهلاك الطاقة.
					56. تبني ممارسات الاستدامة من مقدمي الخدمة اللوجستية الخاص بكم ادي إلى تقليل تكلفة الفاقد.
					57. من النادر تلقي شحنة تحتوي على منتجات خاطئة.
					58. إجراءات الطلب فعالة بسبب النظام المستدام لمقدمي الخدمة اللوجستية الخاص بكم.
					59. إجراءات الطلب سهلة بسبب النظام المستدام لمقدمي الخدمات اللوجستية الخاص بكم.
					60. لا تستهلك إجراءات الطلب الكثير من الوقت بسبب النظام المستدام لمقدم الخدمات اللوجستية الخاص بكم.
					61. المنتجات الواردة من مقدمي الخدمة اللوجستية الخاص بكم في حالة جيدة.
					62. الوقت ما بين اصدار امر الشراء واستلامه يكون قصير.
					63. عمليه ارجاع المنتجات أصبحت أكثر كفاءة.
					64. عمليه ارجاع المنتجات أصبحت أكثر فاعليه.

القسم الثالث: بنود رضا العملاء.

يوضح القسم التالي العناصر الرئيسية التي تقيس متغير رضا عملاء مقدمي الخدمات اللوجستية. إلى أي مدى أنت راضٍ عن الخدمة التي يقدمها مقدم الخدمات اللوجستية الخاص بك؟

بنود رضا العملاء					
لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	
					1. أنا مسرور بأداء مقدم الخدمات اللوجستية الخاص بي
					2. الخدمات التي تقدمها مقدم الخدمات اللوجستية تليبي توقعاتي

					3. الخدمة المقدمة لك من خلال مقدم الخدمات اللوجستية جيدة.
					4. بشكل عام، أنا راضٍ عن LSP الخاص بي

القسم الرابع: بنود جودة العلاقة.

يوضح القسم التالي العناصر الرئيسية التي تقيس متغير جودة العلاقة. إلى أي مدى توافق على أن جودة علاقتك مع مقدم الخدمات اللوجستية جيدة فيما يتعلق بهذه الجوانب (الاعتمادية والثقة والالتزام)؟

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	بنود الاعتمادية
					1. إن البدء في التعامل مع مقدم خدمات لوجستية جديد يكلف الشركة مصاريف اضافية.
					2. من الصعب الحصول على نفس الخدمات من مقدمي خدمة آخرون.
					3. من الصعب استبدال المزايا المكتسبة من مقدم الخدمات اللوجستية الحالي.
					4. سوف تعتبر خسارة كبيرة إذا فقدت التعامل مع مقدم الخدمة اللوجستية الحالي.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	بنود الثقة
					1. أنت تثق في مقدم الخدمات اللوجستية لأنه يضع اهتماماتك في الاعتبار.
					2. يلتزم مقدم الخدمات اللوجستية الخاص بك بوعده (أي عروض الأسعار، الاتصالات التسويقية، إلخ).
					3. يتمتع مقدم الخدمات اللوجستية الخاص بك بمستوى عال من الصدق.
					4. سيظل مقدم الخدمات اللوجستية الخاص بك مخلصاً جداً لهذه العلاقة.
					5. مقدم الخدمات اللوجستية الخاص بك جدير بالثقة.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	بنود الالتزام
					1. أنت على استعداد لإقامة علاقة طويلة الأجل مع مقدم الخدمات اللوجستية الخاص بك.
					2. تريد أن تظل عميلاً لدى مقدم الخدمات اللوجستية لأنك تستمتع حقاً بعلاقتك معهم.
					3. أنت على استعداد لزيادة الاستثمار مع مقدم الخدمات اللوجستية الخاص بكم.
					4. أفكارك الإيجابية تجاه مقدم الخدمات اللوجستية هي المحرك الرئيسي لمواصلة العمل معه.

من فضلك إذا كان لديك أي تعليق لا تتردد في ذكره هنا:

.....

شكراً لتعاونكم

Appendix 5

SPSS Results

Factor Analysis before deleted elements.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.922
Bartlett's Test of Sphericity	Approx. Chi-Square	10345.316
	df	435
	Sig.	.000

Communalities

	Initial	Extraction
SLSQ1	1.000	.340
SLSQ2	1.000	.404
SLSQ3	1.000	.461
SLSQ4	1.000	.395
SLSQ5	1.000	.547
SLSQ6	1.000	.433
SLSQ7	1.000	.517
SLSQ8	1.000	.492
SLSQ9	1.000	.517
SLSQ10	1.000	.400
SLSQ11	1.000	.433
SLSQ12	1.000	.329
SLSQ13	1.000	.433
SLSQ14	1.000	.376
SLSQ15	1.000	.470
SLSQ16	1.000	.375
SLSQ17	1.000	.455
SLSQ18	1.000	.539
SLSQ19	1.000	.469
SLSQ20	1.000	.373
SLSQ21	1.000	.473
SLSQ22	1.000	.460
SLSQ23	1.000	.443
SLSQ24	1.000	.431
SLSQ25	1.000	.392
SLSQ26	1.000	.383
SLSQ27	1.000	.287

SLSQ28	1.000	.380
SLSQ29	1.000	.268
SLSQ30	1.000	.331

Extraction Method: Principal
Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.607	42.025	42.025	12.607	42.025	42.025
2	3.844	12.813	54.838			
3	2.273	7.576	62.414			
4	1.235	4.116	66.530			
5	.947	3.158	69.688			
6	.859	2.863	72.551			
7	.813	2.711	75.261			
8	.720	2.402	77.663			
9	.675	2.250	79.913			
10	.602	2.008	81.921			
11	.499	1.664	83.585			
12	.474	1.578	85.163			
13	.443	1.478	86.641			
14	.409	1.363	88.004			
15	.398	1.328	89.332			
16	.375	1.250	90.582			
17	.343	1.143	91.724			
18	.286	.954	92.678			
19	.283	.943	93.621			
20	.256	.855	94.476			
21	.239	.796	95.272			
22	.223	.743	96.015			
23	.215	.716	96.731			
24	.199	.665	97.396			
25	.180	.600	97.996			
26	.165	.549	98.546			
27	.131	.436	98.981			
28	.120	.400	99.381			
29	.113	.377	99.758			
30	.072	.242	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix^a

	Component
	1
SLSQ1	.583
SLSQ2	.636
SLSQ3	.679
SLSQ4	.628
SLSQ5	.740
SLSQ6	.658
SLSQ7	.719
SLSQ8	.702
SLSQ9	.719
SLSQ10	.632
SLSQ11	.658
SLSQ12	.573
SLSQ13	.658
SLSQ14	.613
SLSQ15	.686
SLSQ16	.612
SLSQ17	.674
SLSQ18	.734
SLSQ19	.685
SLSQ20	.610
SLSQ21	.688
SLSQ22	.678
SLSQ23	.666
SLSQ24	.656
SLSQ25	.626
SLSQ26	.619
SLSQ27	.536
SLSQ28	.617
SLSQ29	.518
SLSQ30	.575

Extraction Method:

Principal Component

Analysis.

a. 1 components extracted.

Factor Analysis after deleted elements.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.911
Bartlett's Test of Sphericity	Approx. Chi-Square	3875.110
	df	55
	Sig.	.000

Communalities

	Initial	Extraction
SLSQ2	1.000	.468
SLSQ3	1.000	.598
SLSQ4	1.000	.568
SLSQ5	1.000	.730
SLSQ6	1.000	.433
SLSQ7	1.000	.775
SLSQ8	1.000	.693
SLSQ9	1.000	.694
SLSQ10	1.000	.635
SLSQ11	1.000	.577
SLSQ13	1.000	.666

Extraction Method: Principal Component Analysis.

Component Matrix^a

	Component
	1
SLSQ2	.684
SLSQ3	.774
SLSQ4	.754
SLSQ5	.854
SLSQ6	.658
SLSQ7	.880
SLSQ8	.832
SLSQ9	.833
SLSQ10	.797
SLSQ11	.760
SLSQ13	.816

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.837	62.151	62.151	6.837	62.151	62.151
2	1.015	9.231	71.382			
3	.887	8.061	79.442			
4	.526	4.785	84.228			
5	.457	4.158	88.385			
6	.327	2.970	91.355			
7	.266	2.422	93.778			
8	.243	2.209	95.987			
9	.193	1.759	97.746			
10	.150	1.366	99.111			
11	.098	.889	100.000			

Extraction Method: Principal Component Analysis.

Factor Analysis the other variables and reliability measurements

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.768
Bartlett's Test of Sphericity	Approx. Chi-Square	667.849
	df	6
	Sig.	.000

Communalities

	Initial	Extraction
CS1	1.000	.670
CS2	1.000	.717
CS3	1.000	.634
CS4	1.000	.674

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.695	67.381	67.381	2.695	67.381	67.381
2	.554	13.860	81.240			
3	.449	11.222	92.462			
4	.302	7.538	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix^a

	Component
	1
CS1	.818
CS2	.847
CS3	.796
CS4	.821

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Reliability Scale for CS

Reliability Statistics

Cronbach's Alpha	N of Elements
.838	4

Case Processing Summary

		N	%
Cases	Valid	421	100.0
	Excluded ^a	0	.0
	Total	421	100.0

a. Listwise deletion based on all variables in the procedure.

Element-Total Statistics

	Scale Mean if Element Deleted	Scale Variance if Element Deleted	Corrected Element-Total Correlation	Cronbach's Alpha if Element Deleted
CS1	6.10	4.708	.662	.798
CS2	6.00	4.588	.706	.779
CS3	6.10	4.557	.638	.809
CS4	6.00	4.529	.673	.793

Scale Statistics

Mean	Variance	Std. Deviation	N of Elements
8.07	7.750	2.784	4

Element Statistics

	Mean	Std. Deviation	N
CS1	1.96	.823	421
CS2	2.07	.822	421
CS3	1.97	.885	421
CS4	2.06	.864	421

Factor Analysis Dep

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.774
Bartlett's Test of Sphericity	Approx. Chi-Square	509.476
	df	6
	Sig.	.000

Communalities

	Initial	Extraction
DEP1	1.000	.643
DEP2	1.000	.666
DEP3	1.000	.658
DEP4	1.000	.534

Extraction Method: Principal Component Analysis

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.501	62.531	62.531	2.501	62.531	62.531
2	.615	15.384	77.915			
3	.498	12.449	90.364			
4	.385	9.636	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix^a

	Component
	1
DEP1	.802
DEP2	.816
DEP3	.811
DEP4	.731

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Reliability Scale DEP

Case Processing Summary

		N	%
Cases	Valid	421	100.0
	Excluded ^a	0	.0
	Total	421	100.0

Reliability Statistics

Cronbach's Alpha	N of Elements
.800	4

a. Listwise deletion based on all variables in the procedure.

Element Statistics

	Mean	Std. Deviation	N
DEP1	1.92	.884	421
DEP2	2.00	.812	421
DEP3	2.05	.867	421
DEP4	2.06	.785	421

Element-Total Statistics

	Scale Mean if Element Deleted	Scale Variance if Element Deleted	Corrected Element-Total Correlation	Cronbach's Alpha if Element Deleted
DEP1	6.11	4.011	.628	.742
DEP2	6.03	4.204	.646	.733
DEP3	5.98	4.038	.639	.736
DEP4	5.97	4.587	.539	.783

Scale Statistics

Mean	Variance	Std. Deviation	N of Elements
8.03	7.016	2.649	4

Factor Analysis for TRS

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.883
Bartlett's Test of Sphericity	Approx. Chi-Square	1066.617
	df	10
	Sig.	.000

Communalities

	Initial	Extraction
TRS1	1.000	.735
TRS2	1.000	.738
TRS3	1.000	.625
TRS4	1.000	.713
TRS5	1.000	.609

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.420	68.409	68.409	3.420	68.409	68.409
2	.503	10.066	78.475			
3	.422	8.449	86.924			
4	.329	6.585	93.509			
5	.325	6.491	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix^a

	Component
	1
TRS1	.857
TRS2	.859
TRS3	.791
TRS4	.845
TRS5	.781

Extraction Method:
Principal Component
Analysis.

a. 1 components
extracted.

Reliability Scale TRS

Case Processing Summary

		N	%
Cases	Valid	421	100.0
	Excluded ^a	0	.0
	Total	421	100.0

Reliability Statistics

Cronbach's Alpha	N of Elements
.883	5

a. Listwise deletion based on all variables in the procedure.

Element Statistics

	Mean	Std. Deviation	N
TRS1	2.07	.967	421
TRS2	1.99	.797	421
TRS3	2.01	.825	421
TRS4	1.97	.933	421
TRS5	2.00	.784	421

Element-Total Statistics

	Scale Mean if Element Deleted	Scale Variance if Element Deleted	Corrected Element-Total Correlation	Cronbach's Alpha if Element Deleted
TRS1	7.97	7.697	.762	.848
TRS2	8.05	8.524	.765	.848
TRS3	8.03	8.751	.674	.868
TRS4	8.08	7.937	.745	.852
TRS5	8.04	8.993	.662	.870

Scale Statistics

Mean	Variance	Std. Deviation	N of Elements
10.04	12.722	3.567	5

Factor Analysis for COM

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.810
Bartlett's Test of Sphericity	Approx. Chi-Square	784.589
	df	6
	Sig.	.000

Communalities

	Initial	Extraction
COM1	1.000	.656
COM2	1.000	.715
COM3	1.000	.722
COM4	1.000	.752

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.845	71.129	71.129	2.845	71.129	71.129
2	.467	11.682	82.811			
3	.400	9.997	92.809			
4	.288	7.191	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix^a

	Component
	1
COM1	.810
COM2	.846
COM3	.850
COM4	.867

Extraction Method:

Principal Component

Analysis.

a. 1 components

extracted.

Reliability Scale for Com

Case Processing Summary

		N	%
Cases	Valid	421	100.0
	Excluded ^a	0	.0
	Total	421	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Elements
.863	4

Element Statistics

	Mean	Std. Deviation	N
COM1	2.04	.849	421
COM2	1.96	.810	421
COM3	1.99	.932	421
COM4	2.09	.992	421

Element-Total Statistics

	Scale Mean if Element Deleted	Scale Variance if Element Deleted	Corrected Element- Total Correlation	Cronbach's Alpha if Element Deleted
COM1	6.05	5.726	.666	.843
COM2	6.12	5.716	.718	.825
COM3	6.09	5.201	.725	.819
COM4	5.99	4.890	.747	.811

Scale Statistics

Mean	Variance	Std. Deviation	N of Elements
8.08	9.153	3.025	4

Factor Analysis for computed RQ

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.936
Bartlett's Test of Sphericity	Approx. Chi-Square	3431.713
	df	78
	Sig.	.000

Communalities

	Initial	Extraction
DEP1	1.000	.428
DEP2	1.000	.558
DEP3	1.000	.469
DEP4	1.000	.522
TRS1	1.000	.667
TRS2	1.000	.587
TRS3	1.000	.557
TRS4	1.000	.652
TRS5	1.000	.596
COM1	1.000	.574
COM2	1.000	.575
COM3	1.000	.623
COM4	1.000	.672

Extraction Method: Principal
Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.479	57.533	57.533	7.479	57.533	57.533
2	.870	6.693	64.225			
3	.665	5.116	69.341			
4	.627	4.826	74.167			
5	.528	4.063	78.230			
6	.492	3.782	82.013			
7	.418	3.215	85.228			
8	.412	3.170	88.398			
9	.397	3.050	91.448			
10	.355	2.733	94.181			
11	.309	2.379	96.560			
12	.265	2.040	98.600			
13	.182	1.400	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix^a

	Component
	1
DEP1	.655
DEP2	.747
DEP3	.685
DEP4	.723
TRS1	.817
TRS2	.766
TRS3	.746
TRS4	.807
TRS5	.772
COM1	.757
COM2	.758
COM3	.789

.820

COM4

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Reliability Scale for RQ

Case Processing Summary

		N	%
Cases	Valid	421	100.0
	Excluded ^a	0	.0
	Total	421	100.0

Reliability Statistics

Cronbach's Alpha	N of Elements
.938	13

a. Listwise deletion based on all variables in the procedure.

Element Statistics

	Mean	Std. Deviation	N
DEP1	1.92	.884	421
DEP2	2.00	.812	421
DEP3	2.05	.867	421
DEP4	2.06	.785	421
TRS1	2.07	.967	421
TRS2	1.99	.797	421
TRS3	2.01	.825	421
TRS4	1.97	.933	421
TRS5	2.00	.784	421
COM1	2.04	.849	421
COM2	1.96	.810	421
COM3	1.99	.932	421
COM4	2.09	.992	421

Element-Total Statistics

	Scale Mean if Element Deleted	Scale Variance if Element Deleted	Corrected Element-Total Correlation	Cronbach's Alpha if Element Deleted
DEP1	24.24	63.478	.601	.936
DEP2	24.15	63.040	.700	.933
DEP3	24.10	63.225	.634	.935
DEP4	24.10	63.714	.670	.934
TRS1	24.08	60.191	.773	.931
TRS2	24.16	63.028	.716	.933
TRS3	24.15	62.931	.696	.933
TRS4	24.19	60.740	.764	.931
TRS5	24.16	63.094	.724	.933
COM1	24.12	62.483	.710	.933
COM2	24.19	62.943	.710	.933
COM3	24.16	61.023	.744	.932
COM4	24.06	59.836	.775	.931

Scale Statistics

Mean	Variance	Std. Deviation	N of Elements
26.16	72.723	8.528	13

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