

THE UNIVERSITY OF HULL

Exploring Green and Logistics Service Quality of Thai Logistics Service Providers

being a Thesis submitted for the Degree of Doctor of Philosophy

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by

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Abstract

The emergence of environmental or green issues in global supply chains has made it an essential practice to measure the performance of organisations of not only from their financial and management perspectives but also their environmental performance, particularly logistics service providers (LSPs) as service providers. There has been little work done during last two decades linking the three topics of green service quality (GSQ), logistics service quality (LSQ), and the Thai government's logistics performance index (TLPI) for the logistics sector. The objective of this thesis was to investigate issues pertaining to GSQ and LSQ, and their impact on the TLPI for logistics providers in Thailand.

Based on an extensive literature review, three research questions were proposed for this thesis to address gaps in the body of knowledge. GSQ is a new area of theory development and few research studies have focussed on the on the integration of both green and logistics service quality. The study used a rigorous three-phase methodological framework originally developed for the marketing discipline for item and scale development and applied more recently to logistics research.

A mixed method approach used semi-structured interviews in Phase One, in conjunction with the literature, to generate and develop variables of GSQ and LSQ. These variables were tested in a Phase Two empirical study of Thai LSPs and their customers using a questionnaire survey. Finally, in Phase Three structured interviews were conducted to verify and validate the overall results.

The findings indicate that LSQ has a positive and significant effect on TLPI, and that effect is more pronounced when GSQ measures are included. Such measures indirectly affect TLPI through LSQ. The findings also propose a final set of twenty-eight GSQ and LSQ variables of importance to LSP performance as perceived by Thai LSPs and their customers, and are related generally to green safety, regulations and collaboration; time and services; order service quality; and order procedures competencies. In light of this study, Thai LSPs should consider introducing GSQ as part of their business and the Thai government might include GSQ measures as part of its TLPI.

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List of Abbreviations

ADB	Asian Development Bank
AEC	ASEAN Economic Community
ANOVA	One-way analysis of variance
ASV	Average Shared Variance
AVE	Average Variance Extracted
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
BOI	Thailand Office of Board of Investment
BOL	Bureau of Logistics
BOT	Bank of Thailand
CFA	Confirmatory Factor Analysis
CFP	Carbon Footprint
CR	Composite Reliability
EFA	Exploratory Factor Analysis
EIA	Environmental Impact Assessment
EMS	Environmental Management Systems
EU	European Union
FDI	Foreign Direct Investment
GCI	Global Competitiveness Index
GCW	Green Cost and In-process Waste
GDP	Gross Domestic Production
GHG	Greenhouse Gas
GLSQ	Green Logistics Service Quality
GMS	Greater Mekong Subregion
GMS CEP-BCI	GMS Core Environmental Programme and Biodiversity Conservation Corridors

GSQ	Green Service Quality
GSRC	Green Safety, Regulations and Collaboration
GTTM	Green Technology and Transport Management
HIA	Health Impact Assessment
IMF	International Monetary Fund
IQ	Information Quality
LSPs	Logistics Service Providers
LSQ	Logistics Service Quality
MNCs	Multinational Corporations
MOI	Thailand Ministry of Industry
NESDB	Office of the National Economic and Social Development Board
NESD plan	National Economic and Social Development Plan
OECD	Organisation for Economic Co-operation and Development
ONEP	Office of National Resources and Environmental Policy and Planning
OP	Order Procedures
OSQ	Order Service Quality
PCA	Principle Component Analysis
PRC	People's Republic of China
REDD	Reducing Emissions from Deforestation and Forest Degradation
SEA	Strategic Environmental Assessment
SEM	Structural Equation Modelling
SIA	Social Impact Assessment
SMEs	Small and Medium Enterprises
TBL	Triple Bottom Line
TLPI	Thai government's Logistics Performance Index
TQM	Total Quality Management
TRF	Thailand Research Fund
TS	Time and Services
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific

UNIDO	United Nations Industrial Development Organisation
WEEE	Waste from Electrical and Electronic Equipment
WEF	World Economic Forum
WSSD	United Nations World Summit on Sustainable Development
WTO	World Trade Organisation
YoY	Year on Year

1. Introduction

1.1. Research Background

This thesis aims to investigate 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. With a number of green issues beginning to emerge in regards to the global supply chain, it has become an essential practice to measure the performance of organisations with evaluations covering not only the financial and management perspectives, but also their environmental performance. As service providers, logistics service providers (LSPs) need to consider environmental performance equally as important as financial and management performance, even if they are proactive partners or providing the appropriate services to meet their customers' requirements.

Over the last two decades, globalisation has emerged as a major force, shaping business strategies, leading companies to develop products designed for a global market and to source components globally. External trade growth has taken place in both directions in the form of imports and exports, and is significantly high for the newly industrialising countries such as Singapore, Malaysia, Thailand, and Indonesia. Due to the increase in external trade there has also been a surge in demand for logistics services. Efficient logistics management is considered a powerful source of competitive differentiation since it is not only a source of cost savings, but also an opportunity to enhance the quality of products or services offered by the firm (Mentzer et al., 2004). Effective and efficient logistics services can enhance a firm's competitive advantage. Therefore, logistics management can be considered as a key component of organisational effectiveness and success (Khan and Burnes, 2007).

Thailand, as one of the leading newly industrialising countries in Asia, connects to other regions such as the European Union (EU), the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), the People's Republic of China (PRC), and the Greater Mekong Subregion (GMS) via transportation connectivity, especially road transportation networks, as seen in Figure 1-1 (Thailand Ministry of Commerce, 2009). The GMS is comprised of the Kingdom of Cambodia, the Yunnan and Guangxi Provinces of the Peoples' Republic of China, the Lao Peoples' Democratic Republic, the Republic of the Union of Myanmar, Thailand, and Vietnam. Moreover, the GMS Economic Corridor, is comprised of the North-South Economic Corridor, the East-West Economic Corridor and the Southern Economic Corridor, and this also helps Thailand to act as a gateway to the region (Asian Development Bank, 2011). One advantage of this connectivity network will be to help Thailand increase the value and volume of its international trade in goods and services. Moreover, the

achievement of the goal to form the ASEAN Economic Community (AEC) by 2015 will also expand the movement of goods and services in this region, which might be of benefit to Thailand.



Figure 1-1: GMS Economics Corridors

Source: Thailand Ministry of Commerce (2009)

The increase in the movement of goods and services in this region will not only benefit Thailand but also the externalities concerning sustainability, such as pollution from the increase in industrial estates, CO₂ emissions, and the inefficient use of resources. The Office of the National Economic and Social Development Board, NESDB (2012), as an organisation responsible for formulating development strategies at the national level, has announced that 10 main provinces in Thailand are to become 'special industrial estates and export zones to promote investment'. This measure could increase foreign direct investment (FDI) and also increase the economy's growth rate. However, the growth in trade and services will of course

cause the logistics industry to become a mediate player in the supply chain, and certainly one of the main culprits of releasing high levels of carbon emissions into the supply chain.

According to the statistics on CO₂ emissions by sector type in Thailand, the sector guilty of releasing the most CO₂ emissions is the power generation sector, whereas the transportation sector has seen a slight decrease between 2005 and 2010, as shown in Figure 1-2. By contrast, the industry sector has experienced an increase in CO₂ emissions since 1998. This figure is of significant importance to the concept of green service quality. Though CO₂ emissions in the transport sector are decreasing, the sector is still the second biggest releaser of CO₂ emissions in Thailand, and therefore requires attention, highlighted by the awareness of environmental aspects which have become more important in recent years (Roa and Holt, 2005).

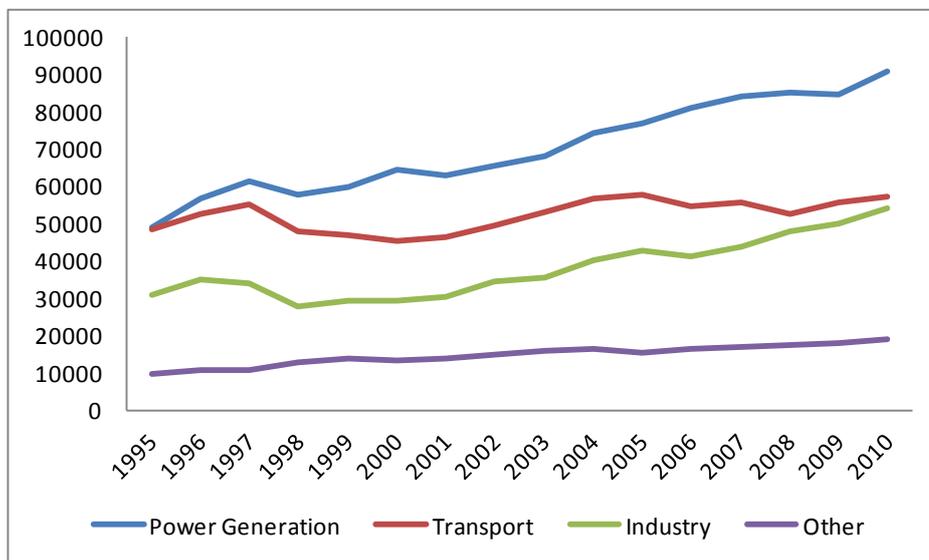


Figure 1-2: CO₂ Emissions by Sectors in Thailand, Year 1995-2010

Source: Thailand's Energy Policy and Planning Office (2011)

Moreover, under one of the AEC commitments, AEC countries including Thailand were required to work towards keeping the proportion of foreign shareholders from ASEAN countries in the logistics sector to at least 70% in 2013 (Thailand Ministry of Foreign Affairs' Department of Trade Negotiation, 2012). This covers eleven activities, such as maritime cargo handling services, freight transport agency services, courier services, etc. The quality of service provided by LSP companies seems to be important when helping Thai LSPs to compete with foreign LSP companies. However, a cost leadership strategy does not seem enough to gain a competitive advantage over foreign rivals. The environmental aspect offered by logistics service providers (LSPs) is also seen as an important differentiation strategy for intermodal transportation and freight transportation (Jensen, 2007; Lamngård, 2007).

Looking at the connection of transportation modes between Thailand and other countries, in Figure 1-1, and the percentage of freight moved in Thailand in 2010 as shown in Figure 1-3, it appears that road transportation is quite important for LSPs to improve their efficiency and effectiveness in supporting the GMS community relative to AEC integration in 2015. Climate change has important implications for both the development of real sectors in the GMS and the incidental effects on ecosystem services. However, there is little research on the interaction between green service quality and the quality of LSP service, even though there is some research concerning green issues in the LSP industry (Isaksson and Hüge-Brodin, 2013; Lieb and Lieb, 2010; Martinsen and Björklund, 2012; Perotti et al., 2012; Wolf and Seuring, 2010).

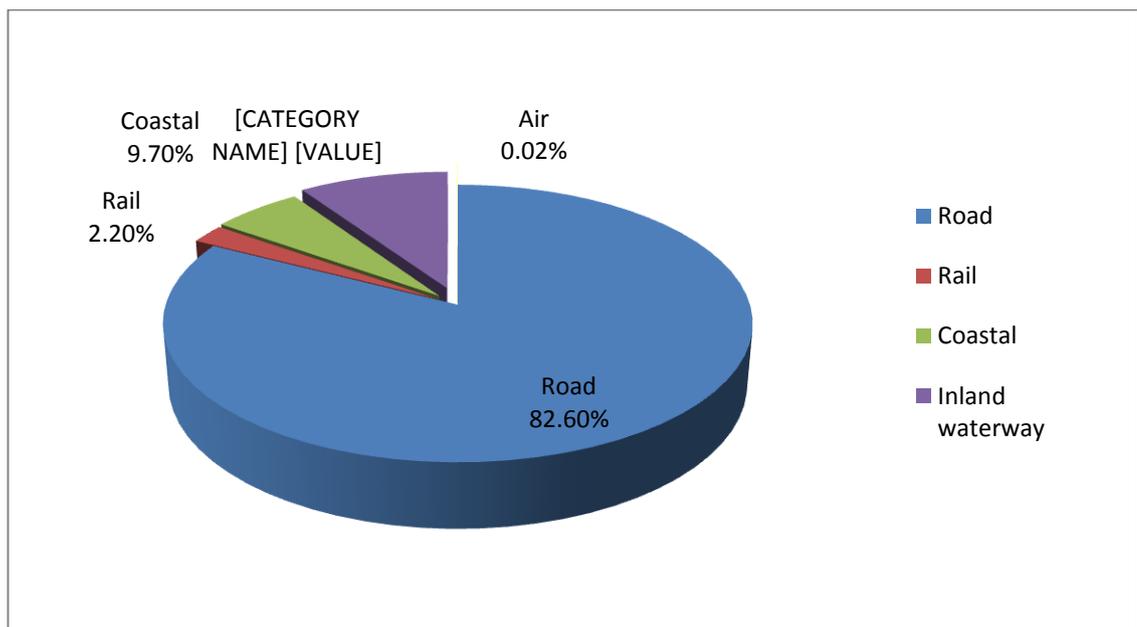


Figure 1-3: Percentage of Freight Moved in Thailand Segmented by Mode of Transportation, 2010.
Source: NESDB (2011).

1.2. Research Context

The aim of this thesis is to investigate the extent to which the Thai government's logistics performance index (TLPI) for the logistics sector is dependent upon its logistics service quality (LSQ) and green service quality (GSQ). The researcher has selected LSPs and their customers in Thailand as a study sample for this thesis. Thai LSPs have been selected for two primary reasons, as follows:

- 1) Thailand connects to other regions as well as those within other Asian countries, such as the EU and BIMSTEC, via transportation connectivity, especially road transportation networks known as GMS economics corridors

- 2) Thailand is one of the leading developing countries in Asia and plays an important role in the Asian economy

The highest percentage of freight is moved throughout Thailand by road, making it the second-highest emitter of CO₂ in Thailand. This is one of the main causes of the greenhouse effect. As a result, investigating the effect of green issues on the service quality and LSP performance seems to be an emerging issue in Thailand and the Asian economy.

The aim of this research is to investigate what green service quality and logistics service quality is, including the effect of GSQ-LSQ on the TLPI for logistics providers in Thailand. The industrial supply chain and the interaction of the logistics service providers' network in Figure 1-4 represents the interaction of LSPs among the focal firms, suppliers, and customers. However, this research will focus only the interaction of LSPs among the focal firms, which are in five important industries in Thailand, and their customers.

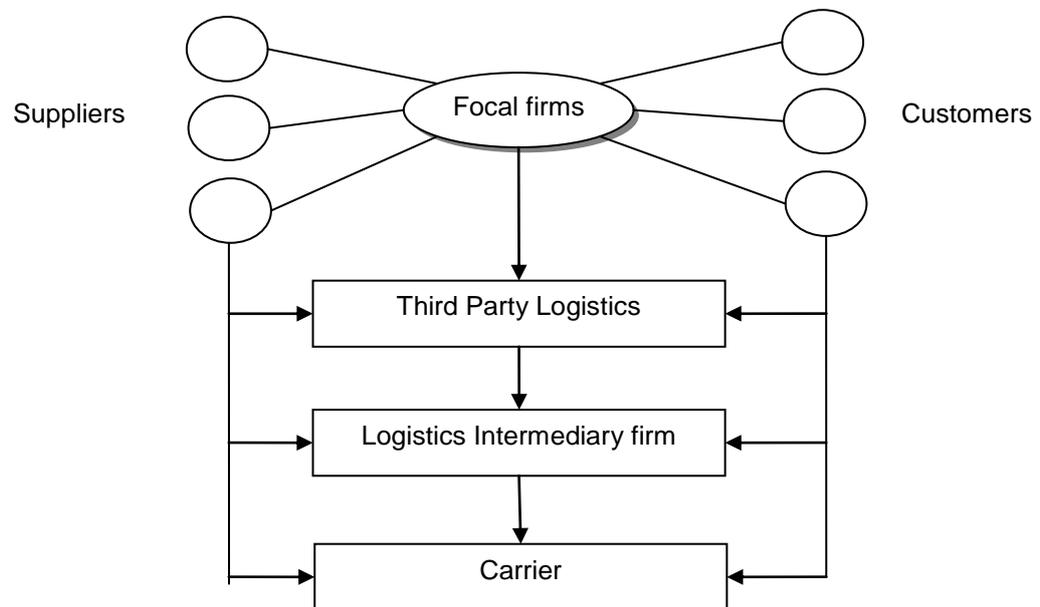


Figure 1-4: 'Typical' Industrial Supply Chains

Source: Cui and Hertz (2011; pp. 1006)

1.3. Research Problem

As the researcher is a Thai who has worked in the logistics field for over 15 years, she has learnt that running a business cost-effectively is the prime concern of most businesses. Organisations tend to display little interest in social responsibility, particularly in regards to

environmental issues. It is obvious that the majority of environmental and social issues in Thailand originate from the logistics industry, as the transport industry is the second largest emitter of CO₂ (seen in Figure 1-2). However, with limited natural resources and the emerging problem of global warming affecting micro and macro levels, the awareness of green issues then influences the activities of every member of the supply chain. Although customers from the downstream side have an awareness of the green aspect, only the large firms or multinational corporations (MNCs) in Thailand focus on this aspect. The largest local firms, which are mostly small and medium enterprises (SMEs), do not rank the environmental aspect as one of the important factors. There are clear differences in the levels of awareness of the green supply chain among logistics providers in Thailand.

In addition, the researcher has a strong passion for 'service quality'. She is of the opinion that improving the quality of service in the services industry should come from both tangible and intangible factors. Therefore, a lack of knowledge and awareness of green services in Thailand is integrated with the 'service quality' concept in the logistics area. Without the researcher's passion for this matter, a technique for conducting this research may never have come about. Consequently, this study proposes a framework showing how a Thai Logistics Service Provider's overall performance is dependent upon its logistics service quality (LSQ) and green service quality (GSQ).

Three research questions are proposed for this thesis based on the foregoing research background literature. Firstly, what are the LSP's LSQ competencies? Secondly, what are the LSP's GSQ competencies? Finally, how important are GSQ competencies relative to TLPI through LSQ competencies? These three primary research questions are set out in a conceptual model in Chapters Two and Three; and synthesise the extant green logistics service quality (GLSQ) literature, before addressing the key gaps in the body of knowledge in Chapter Four.

1.4. Research Methodology

The three research questions present a new area of research and theory development. The thesis therefore uses theoretical and methodological triangulation to maximise the amount of data collected, in order to explore the research phenomena from different perspectives (Mangan et al., 2004). The thesis uses a three-phase methodological framework for the items and constructs scale development developed by Churchill (1979), Churchill and Iacobucci (2010), and Malhotra et al. (2012) for the marketing discipline and applied more recently to logistics research by Dunn et al. (1994).

This empirical study is comprised of three phases: Phase One was an inductive phase that involved conducting semi-structured interviews with eight leading logistics/supply chain managers and executive officers, to explore the research question, identify current and/or required practices employed in the industry, and generate a battery of variables and constructs. Phase Two was a deductive phase that consisted of a self-completion questionnaire survey of LSPs and LSP customers in Thailand to test and validate the variables and constructs emerging in Phase One. Lastly, Phase Three was a final inductive phase that consisted of conducting a structured interview with fifteen leading logistics/supply chain managers, executive officers, and academic professionals to verify the overall research findings.

In Phase Two, descriptive statistics, including data frequencies, means, standard deviations and cross-tabulations, were performed for the entirety of the data in both studies. In addition, exploratory factor analysis (EFA) was used to examine the data sets from the self-completion questionnaire survey of the LSPs and LSP customers in Thailand, (Phase Two) using principle component analysis (PCA). 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 (Hair et al., 2010; Loehlin, 1998).

Confirmatory factor analysis (CFA) and structural equation modelling (SEM) were used to determine the validity, reliability and relationships amongst the remaining variables and latent constructs. CFA differs from EFA in that it attempts to confirm or test a priori hypotheses about the possible factor structures by fitting variables to them (Hair et al., 2010; Loehlin, 1998). SEM is also a multivariate analysis technique that examines a set of dependence relationships simultaneously, using regression and covariance analysis amongst latent constructs (Hair et al., 2010; Loehlin, 1998).

Phase Three, the final stage of the research design, was an inductive phase that involved carrying out structured interviews with fifteen interviewees to explore the three research questions. It contained six main questions, each of which following the questionnaire survey protocol in Phase Two. The results from Phase Three of this research design confirm the results from Phase Two and complete the methodological triangulation process for this thesis.

1.5. Thesis Structure

This chapter gives an idea of the research background, the research problem and its justification. The thesis is divided into eleven chapters as follows:

Chapters Two and Three – Chapters Two and Three review the literatures used for this study and the nature of customer service and logistics service quality. The interface between logistics and marketing mix variables is presented to show that logistics activities play a similar role as services, and can also lead to an increase in customer satisfaction. Moreover, the role of LSPs in Europe and Asia seems similar, particularly as they are one of the key players in the supply chain in regards to delivering goods/services to the end customers. In line with the increase in the amount of LSPs in Europe and Asia, road transportation CO₂ emissions are the highest when compared with other modes of transport such as rail or air. Green service quality and the logistics performance index are also discussed in Chapter Two as among the keywords of the research, and relate to the issues in the Thailand context such as policies relating to green service quality, business and performance as discussed in Chapter Three. Lastly, other relevant issues to this thesis, such as Eastern-Western business philosophies, small and medium enterprises and large companies, and benchmarking are discussed in the last section.

Chapter Four – Chapter Four examines existing empirical studies in the fields of GSQ, LSQ, and LSPs to identify the key contributions, gaps and disparities in the work conducted in these fields. Chapter Four draws together the findings from the literature and proposes a conceptual model and three research questions for this thesis which address the gaps in the body of knowledge.

Chapter Five – Chapter Five discusses the research objectives, approach and methods undertaken in this thesis. It justifies the philosophy and research methods adopted within the contexts of the logistics and marketing disciplines, and discusses the three-phase methodology for item and construct scale development using frameworks from Churchill (1979), Churchill and Iacobucci (2010), Dunn et al. (1994), and Malhotra et al. (2012). This chapter also describes the three-phase approach found in the framework and outlines details of the three phases that comprise the primary research components of this thesis, including the logistics service provider and the five key industrial sectors in Thailand and research samples, data collection, and analysis tools.

Chapters Six, Seven, Eight, and Nine – Chapter Six, Seven, Eight, and Nine present the results from the three phases of the research, which are a semi-structured interview (inductive), questionnaire survey (deductive), and structured interview validation (inductive), respectively. Starting at Chapter Six, the items and constructs are confirmed by the semi-structured interviews, after which they are developed into the questionnaire survey which is discussed in Chapters Seven and Eight. In these chapters, the results of the self-completion questionnaires which were sent to LSPs and LSP customers' respondents will be discussed. The number of returned questionnaires is 429 from 1754 firms or about 24.46 percent. Non-biased responses and descriptive analysis are presented in Chapter Seven. Moreover, the

EFA, CFA, and the SEM are used to test and confirm the variables and constructs in Chapter Eight. Findings confirm construct validity and reliability of the reconceptualised model in accordance with the entire frameworks of Churchill (1979), Churchill and Iacobucci (2010), Dunn et al. (1994), and Malhotra et al. (2012) in Chapter Nine through the structured interview process. The results are presented in a way which links the three phases of the research together and will be discussed in the next discussion chapter.

Chapter Ten – The purpose of Chapter Ten is to discuss and summarise the key empirical findings from all three phases of research, to answer the research questions and draw conclusions. Chapter Ten pulls together the key findings across all three phases of the research to propose and validate a green logistics service quality model, which can be used as a source of competitive advantage and help to guide future policy decisions.

Chapter Eleven – Chapter eleven is the final chapter and thesis summary. The five main areas of the research are revisited. Firstly, the research objectives and main findings are recapped. The contributions to theory and methodology are explained in the next section. In the following section, the managerial implications for the business' perspective and the policy makers' perspective are discussed in Section Three. Finally, thesis limitations and suggestions for further research are discussed in the last section.

1.6. Thesis Delimitations

The delimitations of this thesis, i.e. boundaries within the researcher's control, are presented in Figure 1-5. The delimitations concern the units and industry of analysis. The units of analysis are the LSPs and LSP customers in five important industrial sectors. This section focuses on the perceptions of LSPs and LSP customers toward LSPs' services, in particular those goods or services delivered by inland freight transportation. This thesis does not investigate the LSP customer's suppliers or the LSP customer's customers. The rationale for this unit of analysis is provided in Chapter Two.

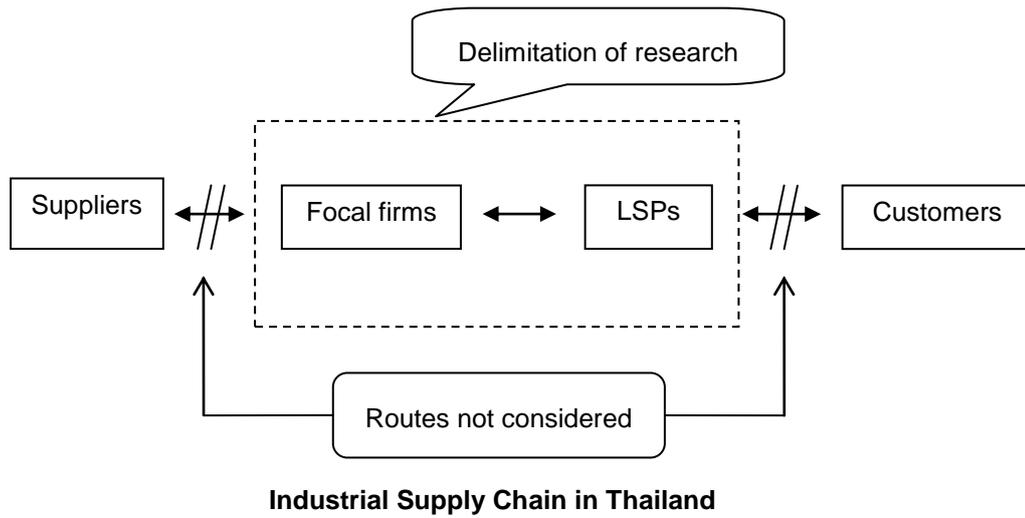


Figure 1-5: Thesis Delimitations

The industries of analysis in the Thailand industrial supply chain are LSPs, food, textile, plastic, automotives and parts, and electronics and parts. This thesis does not consider these five industries' suppliers for the sake of privacy, as their customers may take part in this study together. The rationale for this industry of analysis is provided in Chapter Three.

2. Customer Service and Green Logistics Service Quality

2.1. Introduction

This chapter firstly presents the background literature underpinning the current knowledge in this area before identifying the gaps in the body of knowledge that this research investigates. It begins by explaining the concepts of customer service, including a discussion of SERVQUAL, SERVPERF, and logistics service quality (LSQ) theories. Next, it introduces logistics service providers (LSPs) to discuss how important LSPs are to global trade, freight transport, and goods movement within and/or among the regions/countries.

Examining green service quality is another main issue of this research. This chapter therefore explains the current green service in the logistics market, and environmental performance measurements. Environmental issues, particularly in the logistics market, also have an impact on companies' stakeholder considerations because of the large negative environmental impact involved. Discussion on this impact, therefore, is conducted in the latter stage of this thesis as one main point. It follows up with the logistics performance index (LPI) established by World Bank.

The literature review was conducted in two parts. Firstly, the contents of the three leading management web-based resources, ABI/INFORM Complete, Emerald Management Plus, and Science Direct were examined for articles relating to the following four keyword searches: logistics service quality, logistics service providers, green service quality, and logistics performance index. The keywords were selected by constructing a relevance tree, used to identify other related areas of the literature requiring exploration. Secondly, a keyword search was performed on the web-based resources of the Thailand Research Fund (TRF) and leading universities in Thailand to specifically identify a list of authors and research relating to green and logistics service quality in Thailand. The bibliographies and reference lists from key journals were used to trace new journals relevant to the research area. Lists of key articles or research were discussed in regards to each keyword, starting with LSQ, before discussing LSPs, GSQ, and TLPIs respectively in the following sections.

2.2. Customer Service and Logistics Service Quality (LSQ)

With the rapidly developing world economy and global marketplace, there has been a dramatic increase in the pressure on organisations to find new ways to create and deliver value to

customers through supply chain management. There has been a growing support for the practice of building relationships with the customer as a way of stimulating improvements in profitability, service ability and reduced costs in the supply chain (Niraj et al., 2001). For decades, service quality has been a major area of attraction for practitioners and researchers. Its proven relationship with business performance, lower costs, customer satisfaction, customer loyalty and profitability (Chang and Chen, 1998; Cronin and Taylor, 1992; Newman, 2001) has further motivated both researchers and practitioners to explore this area. The majority of these studies on service quality have focused on service industries or parts of them, with minimum consideration given to the green supply chain as a whole.

2.2.1. Customer Service and Logistics

To understand clearly the relationship between customer service and logistics service quality, customer service needs to be defined, along with the way it relates to logistics. There are many definitions of customer service across organisations, and some organisations define customer service in more than one way. Grant (2012: p. 17) defined customer service as:

...a process which takes place between the buyer, seller, and third party. The process results in a value-added to the product or service exchanged ... The value added is also shared, in that each of the parties to the transaction or contact are better off at the completion of the transaction than it was before the transaction took place. Thus, in a process view: Customer service is a process for providing significant value-added benefits to the supply chain in a cost-effective way.

Organisations often succeed or fail on their provision and levels of customer service. However, achieving outstanding customer service levels is quite challenging due to the required inter-functional coordination, especially between the logistics and marketing functions. Businesses may be unable to meet customer expectations or achieve customer satisfaction if there is no linkage between logistics and marketing customer services (Emerson and Grimm, 1996).

The characteristics of both marketing and logistics customer service are also the requirements to achieve customer satisfaction. Logistics customer service activities “provide place, time, and form utility, by ensuring the product is at the right place, at the time the customer wants it, and in an undamaged condition” (Emerson and Grimm, 1996: p. 29). Similarly, Ruston et al. (2010) stated that the logistics components of customer service can be classified in many ways but the seven ‘rights’ of customer service can be considered as factors that show the main service classification. These seven ‘rights’ of customer service comprise the ‘right’ quantity, cost, product, customer, time, place, and condition.

Grant (2012) addressed that logistics activities would represent a process which achieved the outcome to meet customer needs. Customer service then, is the output of the logistics activities processes. Furthermore, when considering the relationships among logistics mix variables and marketing mix variables, it can be seen that five of ten marketing mix variables are important to logistics activities, and these are: people, processes, places of sale or distribution, power, and planning and control (shown in Figure 2-1). However, looking at the ten logistics mix variables, it appears that they do not include any form of tangible product, much the same as the marketing mix variables. Thus, it can be concluded that logistics activities act as services (Grant, 2012).

To differentiate the products, businesses favour service as an element of the raised product dimension and a part of physical products (Constantinides, 2006). Marketing services then are required to focus on increasing customer satisfaction (Beckwith, 2001 cited in Constantinides, 2006). Due to the co-ordination between marketing mix variables and logistics mix variables, increasing service quality or logistics service quality increases customer satisfaction levels. Despite the fact that improving service quality increases customer satisfaction levels, it also tends to increase the total logistics costs as well. That means companies strive to strike a balance between increasing customer service levels and increasing total logistics costs.

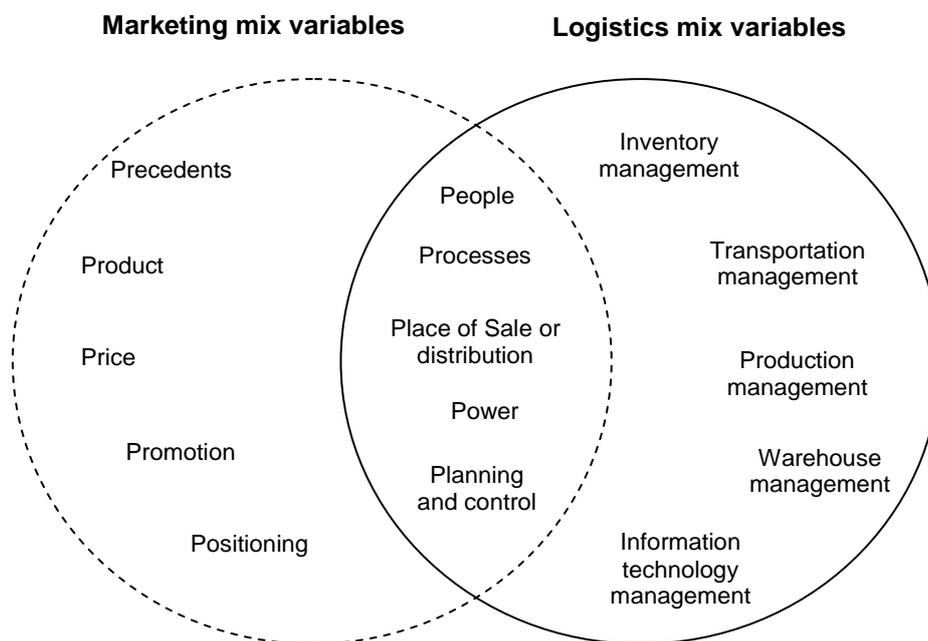


Figure 2-1: Interface between Logistics and Marketing Mix Variables

Source: Grant (2012: p. 22)

2.2.2. Logistics Service Quality

It was mentioned in the previous section that increasing service quality or logistics service quality can increase customer satisfaction levels. Although there are many definitions of service quality, this research uses the definition of service quality provided by Rushton et al. (2010: p. 35) as follows:

Service Quality is a measure of the extent to which the customer is experiencing the level of service that he or she is expecting. Thus, a very simple, yet effective, view of service quality is that it is the match between what the customer expects and what the customer experiences.

Regarding the definition of service quality, the effectiveness of service quality is directly dependent upon a match between customers' expectations and customers' perceptions. Any mismatch between expectations and experiences is called a 'service quality gap' and this affects customer satisfaction. According to Parasuraman et al.'s (1988) service quality model, a service quality gap originates from the comparison of customer expectations and perceptions, such that if perceptions meet or exceed expectations the customer is satisfied. Using this model, firms can not only investigate customer service and service quality, but they also can provide that which customers require, to achieve or increase satisfaction (Grant, 2012 and Rushton et al., 2010).

Figure 2-2 shows the service quality model that presents the positions of a firm and its customers. The expectations and perceptions gap is related to the firm's customer service and service quality activities, and this gap is affected by four other gaps. Firstly, firms have to understand customer expectations of the service; which come from word-of-mouth communication, personal needs, and past experiences. Secondly, those customer expectations must be turned into tangible service specifications. Thirdly, tangible service specifications must be provided by firms. Lastly, communication between firms and their customers must take place.

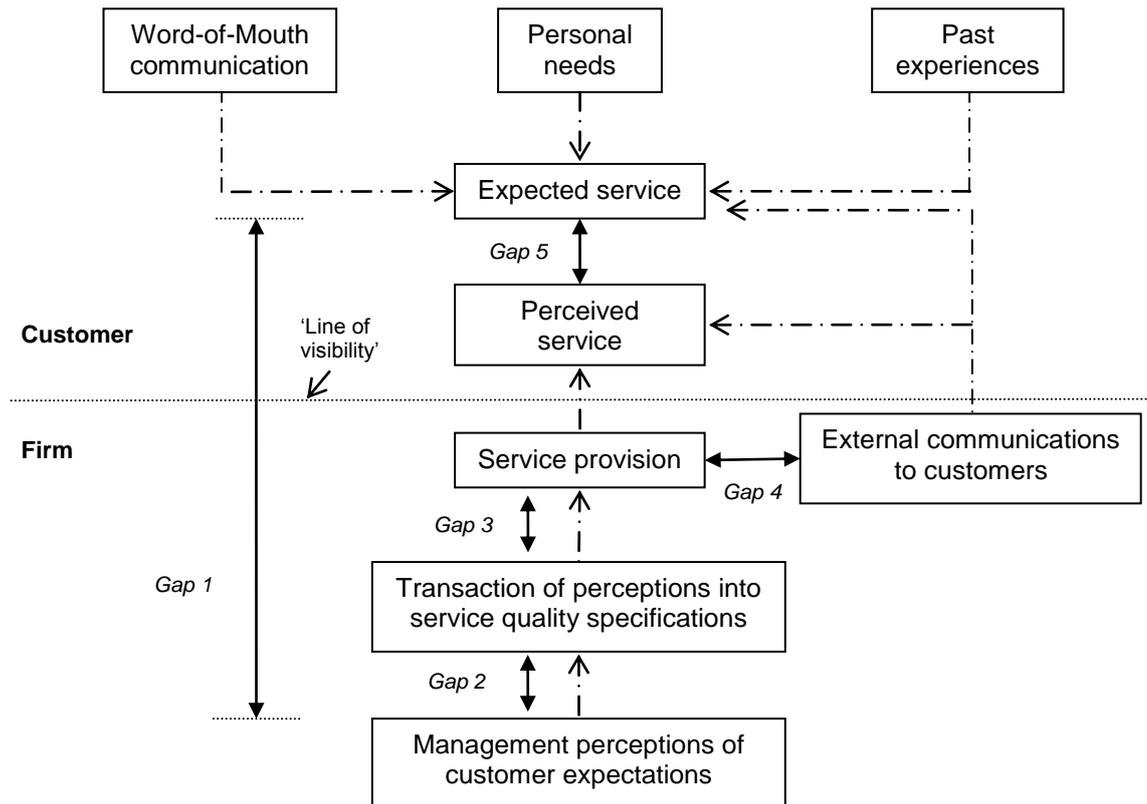


Figure 2-2: Model of Customer Service Quality

Source: Grant (2012: p. 30)

According to the model (Parasuraman et al., 1988), service quality has been categorised into five dimensions: tangible, reliability, responsiveness, assurance, and empathy. The steady rise in the use of SERVQUAL instruments has been arguably attributed to a practical usefulness in diagnostic analysis for improving service quality, especially when it is applied in an international service setting. SERVQUAL is a 22-item instrument that includes variables related to the five dimensions above and was developed based on data gathered from service industries, including credit cards, telephone services, retail banking, stock brokers, and appliance repair and maintenance (Seth et al., 2006).

Conversely, Murphy (1999) stated that performance-based analysis is a more effective approach to measuring quality because of its ability to explain variation in customer satisfaction. Many studies have been conducted on the relative effectiveness of the service performance measurement (SERVPERF) and the SERVQUAL approach (Cronin and Taylor, 1994). However, Brady and Croning (2001) specifically maintain that SERVPERF outperforms SERVQUAL (a gap-based comparison of the expectations and performance perceptions of consumers) in terms of capturing the variance in consumers' overall perceptions of service

quality, and validating the conceptualisation of service quality as an antecedent of consumer satisfaction.

There exists an argument over whether the relative usage of SERVQUAL or SERVPERF is the industry specific or not. Padma et al. (2010) mentioned that customers' expectations associated with the measurement of SERVQUAL are multi-dimensional. It appears difficult to measure expectations in specific industries such as healthcare. To answer the main research question of this study, the SERVPERF concept seems to fit with this study rather than SERVQUAL, in terms of the basis of service quality.

However, there is another theory that focuses on service quality in the logistics activity, referred to as 'logistics service quality (LSQ)'. LSQ has been developed and studied by many researchers over the years, but the most widely recognised research was conducted by Mentzer et al. (1989). They proposed that LSQ consisted not only of the physical distribution aspects of services, but also included other customer service elements. Moreover, the concept developed by Bienstock et al. (1997) explained the characteristics between technical and functional quality (Grönroos, 1984), whereby functional quality refers to the process of service delivery, and technical quality refers to service outcomes (Rafiq and Jaafar, 2007).

Mentzer et al. (1989) proposed that the logistics service quality scale should be composed of nine dimensions, including information quality, ordering procedure, ordering release quantity, timeliness, order accuracy, order quality, order condition, order discrepancy handling, and personnel contact quality. In contrast, Rafele (2004) proposed a different logistics service quality model. This research has classified the service quality into three classes, as follows:

- 1) Tangible components composed of assets, personnel and availability
- 2) Ways of fulfilment covers not only reliability and responsiveness dimensions, but also includes flexibility, service care, supply condition, and lead time
- 3) Informative actions refers to the empathy and assurance dimensions, divided into: marketing information and selling conditions; order management; after-sales service; and e-information

Rafiq and Jaafar (2007) proposed LSQ instruments developed by Mentzer et al. (1989) in their cross-sectional survey research of customers' perceptions of services provided by third-party logistics service providers (3PLs) in the UK. They found that five factors, namely information quality, ordering procedure, timeliness; personnel contact quality, and order discrepancy handling, primarily influenced perceptions of LSQ. Conversely, the three factors of order release quantity, order quality, and order accuracy appeared to be less appropriate for outbound logistics (Rafiq and Jaafar, 2007). Within a similar research area, LSQ instruments developed by Grant (2003) and Rafiq and Jaafar (2007) appear to fit with this study.

The quality of logistics service performance is a prime component in helping create customer satisfaction. There are many definitions and descriptions of how logistics creates customer satisfaction, as discussed above. The initial keyword of this research is logistics service quality, which is explained and discussed regarding relevant issues such as models of customer service quality, the definitions of customer service, logistics service quality, and the SERVQUAL or SERVPERF. To make clear the definition of LSQ for this study, LSQ is defined based on the study of Mentzer et al. (2001) as the customer's perception of LSQ which comprises order release quantities; ordering procedures; order accuracy; order condition; order quality; timeliness; personnel contact quality, information quality, and order discrepancy handling.

2.3. Logistics Service Providers (LSPs)

Logistics service providers play an important role in the global supply chain as they deliver goods or services from suppliers to customers. Globalisation has emerged as a major driving force in shaping business strategies, and leading firms, over the last two decades, have been developing products designed to be supplied to a global market, while having to source components globally (Banomyong and Supatn, 2011). External trade growth has taken place in both directions, imports and exports, and is significantly higher for newly industrialising countries such as Singapore, Malaysia, Thailand, and Indonesia. Increasing their external trade also leads to an increase in demand for logistics services as well as an increase in industry competition.

It is seen from Figure 2-3 that the percentage of European Union (EU-28) merchandise exports within the total world merchandise exports has decreased significantly since 2003. It dropped to 32.29 percent of world goods exports in 2013. In comparison, Asian merchandise exports seemed to increase slightly from 2003 to 2008, but increased dramatically from 29.24 percent in 2008 to 33.43 percent of world goods exports in 2013. The key factor leading to the essential role of LSPs in Asia, during the period between 2003 and 2013, is the global financial crisis in 2007-08. The collapse of financial markets was matched by the decline of the real economy and it was mentioned in the world economic outlook of 2009, published by the International Monetary Fund (IMF), that world growth spiralled to its lowest rate since World War II (Gokay, 2009). This crisis started in the United States and spread outwards to the other regions, especially in the EU where it was named 'the Eurozone crisis'. Not only did it affect the United States, but it also led to a global crisis. However, the main areas influenced were the United States and the EU, whereas Asia seemed to be less affected.

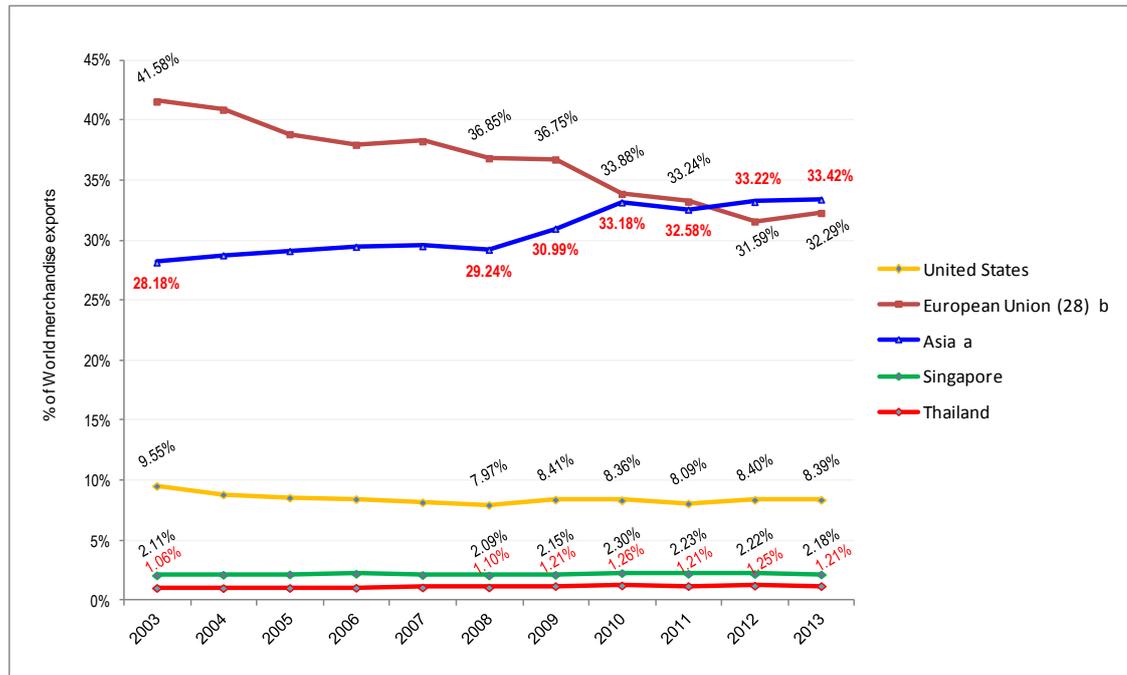


Figure 2-3: Percentage of Total World Merchandise Exports (2003-2013)

Source: World Trade Organisation (2014)

***Note: a is to include significant re-exports and b is prior to 2004, European Union (28) individual country data do not add up to the reported aggregate due to Eurostat's use of different methodologies for Cyprus, Estonia and Lithuania.

After this crisis, the EU situation worsened, rather than that of the US, as the percentage of EU exports continued to drop gradually until it reached 32.29 percent in 2013, whereas the percentage of US exports appeared to rise slightly from 7.97 to 8.39 percent. However, Asia seemed to suffer only minimal effects and was able to resolve any problems more swiftly than the other regions as the growth of merchandise exports in Asia increased and reached 33.42 percent in 2013. It was supported reasonably in the same direction as shown in Table 2-1 and Figures 2-4 to 2-9.

Looking at each economy, starting with the European Union (27 economies), it is shown that the majority of the percent share of gross value added is the service sector, which is 72.6 percent, followed by the industrial sector at 25.7 percent, and lastly the agriculture sector at 1.7 percent in 2011 (European Commission, 2013). It could be said that logistics, transportation or other service activities in the service sector are beginning to play an important role in the EU economy. The total freight transport performance in the EU-27 by transport mode rose from 3,060 billion tonne-kilometres (t-km) in 1995 to 4,173 billion t-m in 2007, then dropped continually to 3,824 billion t-m in 2011, as shown in Figure 2-4.

However, when considering the average annual growth rate of goods transport in EU-27 during time period 1995-2011, there is little change in freight transport by rail and pipeline, whereas there is much change in freight transport by road, inland waterway, sea, and air, as

shown in Figure 2-5. However, freight transport by road and sea are still increasing, which means that these modes of freight transport play a key role in both domestic and international trade through LSP services.

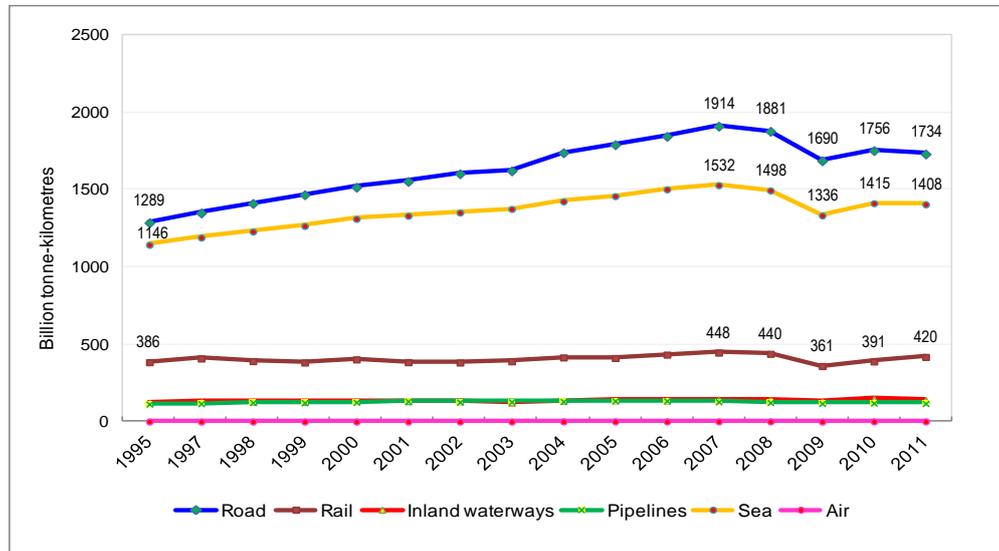


Figure 2-4: EU-27 Freight Transport Growth by Mode 1995-2011

Source: European Commission (2013)

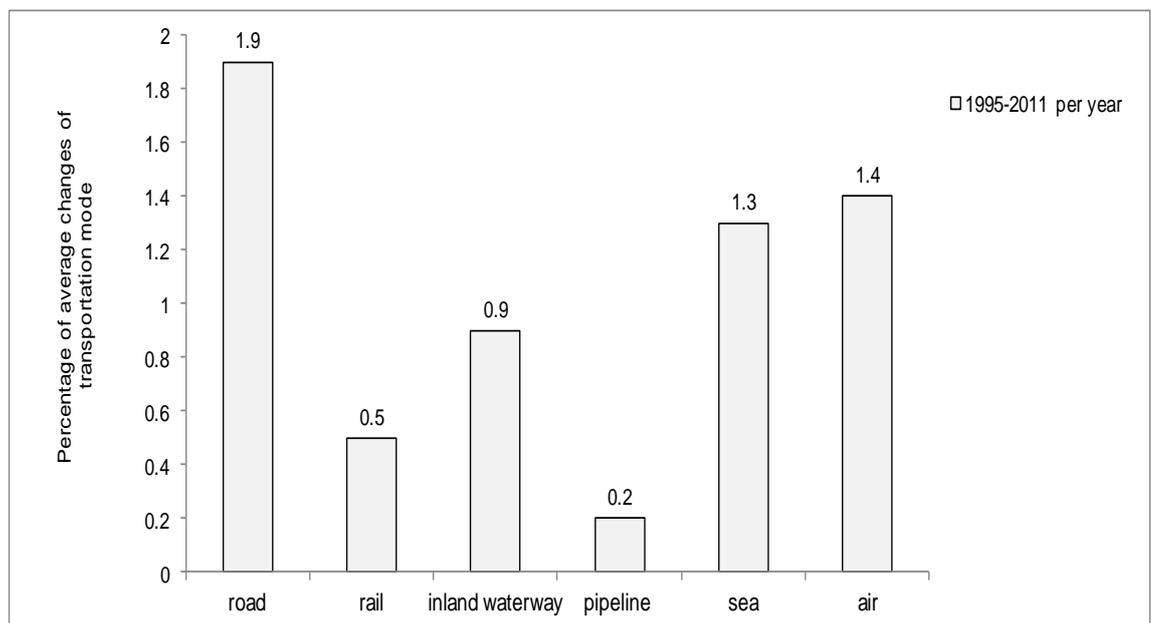


Figure 2-5: Percent of Average Changes of Transportation Mode

Source: European Commission (2013)

On the other side of the world, Asia plays a more important role in the business world than in the past, as shown in Figure 2-3, where it can be seen that the percentage of Asian

merchandise exports has risen rapidly and continually since the financial crisis (2008) in Europe and the US. Additionally, an increase in the number of Asian merchandise exports may affect the level of freight transport by the mode which businesses chose for delivering their goods to their customers. It has been found that developing economies sent over half of their total merchandise exports to other developing economies in 2013: in particular, 35 percent was exported to developing Asia, 6 percent to South and Central America and the Caribbean, 6 percent to the Middle East, and 4 percent to Africa (WTO, 2014). The Asia and Pacific region is defined as those countries and areas of Asia and the Pacific from Mongolia in the north to New Zealand in the south, and from Central Asia and the Islamic Republic of Iran in the west to Kiribati in the east. The region is generally divided into five subregions, namely South Asia, Southeast Asia, Northeast Asia, Central Asia, and the Pacific.

Asia and the Pacific trade transport growth by rail and via ports continues to grow, particularly the trade transport growth by port, as seen in Figures 2-6 and 2-7. These figures are supported and in the line with Figure 2-3 which presents the decrease of the percentage of EU merchandise exports. It is assumed that the Asia and Pacific merchandise exports may play an important role in the global market. However, considering the energy consumption and CO₂ emissions by each mode of transport, it has been found that road transport consumed the highest amount of energy and released the most CO₂ emissions when compared to rail and air transport, as shown in Figures 2-8 and 2-9. Road transport appeared to consume approximately 20 times the level of energy of rail transportation in 2011. Similarly, the CO₂ emissions released by road transport were more than 37 times that of rail transport.

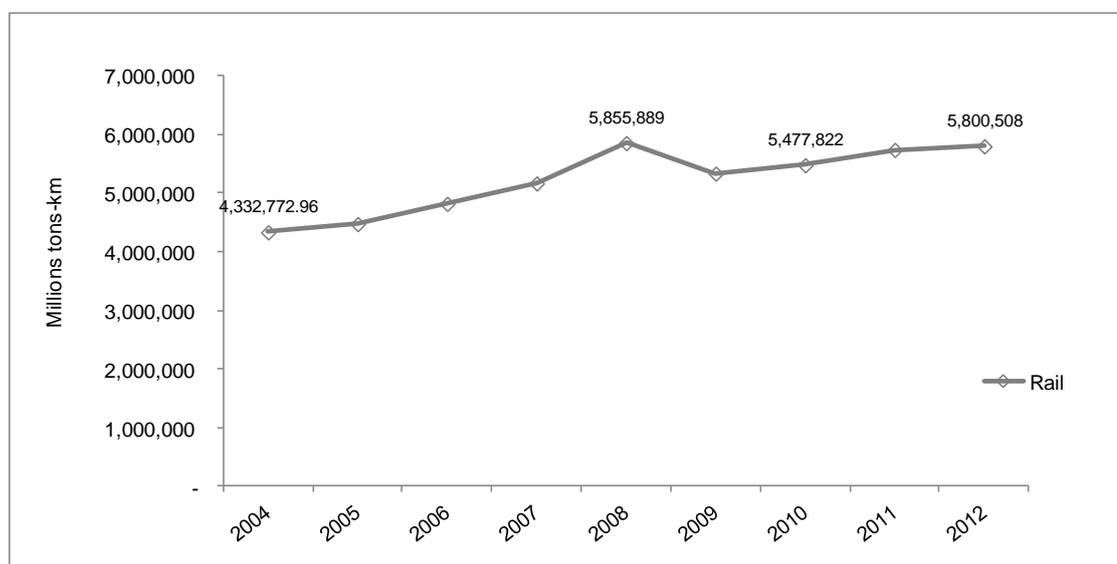


Figure 2-6: Asia and the Pacific Freight Transport by Rail Growth 2004-2012.

Source: UNESCAP (2014)

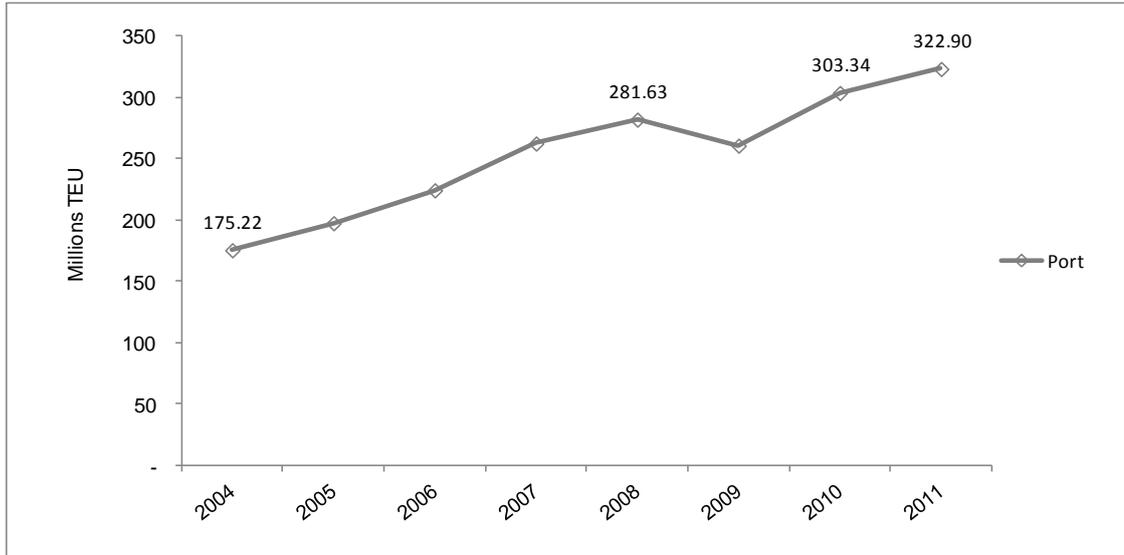


Figure 2-7: Asia and the Pacific Freight Transport by Port Growth 2004-2011

Source: UNESCAP (2014)

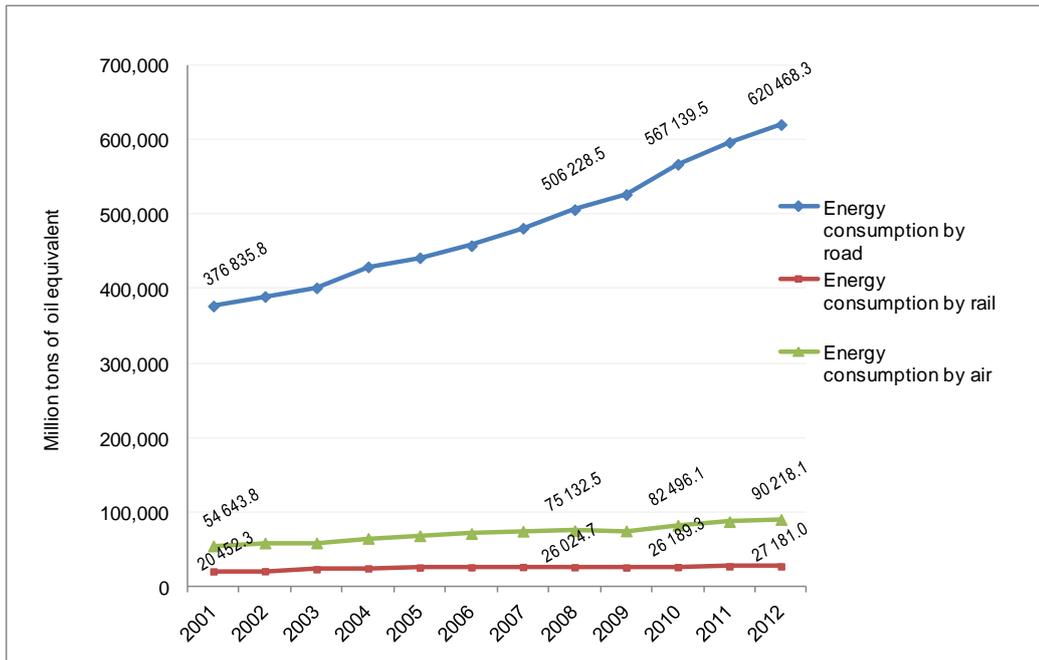


Figure 2-8: Asia and the Pacific Energy Consumption Growth by Transport Mode (2001-2012)

Source: UNESCAP (2014)

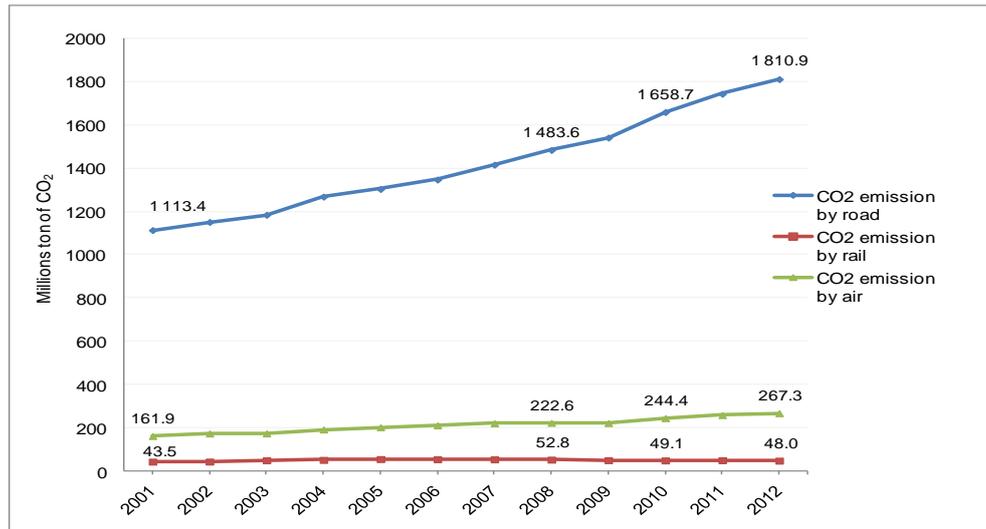


Figure 2-9: Asia and the Pacific CO₂ Emissions by Transport Mode (2001-2012)

Source: UNESCAP (2014)

The relationship between the level of energy consumption and CO₂ emissions of road and rail transport plays a much more important role, and is in line with the growth of trade exports among developing countries through the transport connections between these countries. These connections involve numerous projects supported by UNESCAP, such as Asian highways, Trans-Asian railway networks, dry ports and intermodal transport linkages, and transport logistics (UNESCAP, 2014).

The Trans-Asian railway network comprises 117,500 kilometres of railway lines serving 28 member countries, and the objective of this project is to serve trade within Asia, and also between Asia and Europe (UNESCAP, 2014). Conversely, the Asian Highway network aims to not only enhance efficiency and develop road infrastructure in Asia, but also support the development of Euro-Asia transport linkages and improve connectivity for landlocked countries such as Lao PDR, and Mongolia. It can be seen then, that connecting modes of transport in Asia and the Pacific supports international trade between Asia and Europe or the US. In addition, connecting the routes of transportation may help businesses to reduce lead-times as well as cost and also increase the reliability of services. As a consequence, LSPs will play a key role in the supply chain to deliver goods and services to customers, especially between Asia and Europe.

According to Porter's competitive advantage theory (Porter, 1980), firms' competitive strategies can be categorised in four ways: pure cost leadership, pure differentiation, cost and differentiation, and no competitive advantage. The theory proposes that the two main sources of competitive advantage are cost and differentiation. Shapiro (1984) proposed two generic modes of logistics operations based on Porter's theory, which comprise a full-service mode and a low cost strategy. A full-service mode will provide full logistics services for the market in

which the customers value one-stop and differentiated services, whereas a low cost strategy emphasises price competition in which neither customisation nor rapid delivery is offered (Hong, 2007). That is one of many reasons which support the assertion that LSPs are a key player in the supply chain.

CSCMP (2013: p. 117) defined LSPs as “Any business which provides logistics services includes those businesses typically referred to as 3PL, 4PL, LLP, etc. Services may include provisioning, transport, warehousing, packaging, etc.”. Berglund et al. (1999) cited in Multaharju and Hallikas (2015: p. 107) defined third-party logistics (3PL) as “activities carried out by a logistics service provider on behalf of a shipper and consisting of at least management and execution of transportation and warehousing (if warehousing is part or the process)”. Lieb et al. (1993, p. 37) defined 3PLs as “the use of external companies to perform logistics functions which have traditionally been performed within an organisation”. The functions performed by a third party firm can encompass the entire logistics process or selected activities within it. It cannot be denied that the use of LSPs relates to the outsourcing of businesses in much the same way as a driven model of business competitiveness.

There are some significant benefits of outsourcing logistics services, such as: logistics cost reduction; logistics fixed asset reduction; and order accuracy, as shown in Table 2-1. Cost, fixed asset, and inventory cost were reduced by 15 percent, 25 percent, and 11 percent, respectively, due to businesses outsourcing their logistics activities. However, cost may not be one of the critical success factors for outsourcing logistics services. There are differing viewpoints in the logistics literature concerning which selection criteria dominate the supplier or business evaluation decisions. One viewpoint points out that the issue of cost is always a key, or even a top priority (Kremic et al., 2006; Wilding and Juriado, 2004), while another view stresses that the core competences of LSPs are the leading motives during these decisions (Sink et al., 1996).

Results		All regions			
Logistics cost reduction		15%			
Logistics fixed asset reduction		25%			
Inventory cost reduction		11%			
Average order cycle length	Changed from	17 days	to	12 days	
Order fill rate	Changed from	73%	to	81%	
Order accuracy	Changed from	83%	to	89%	

Table 2-1: Benefits of Outsourcing Logistics Services

Source: Grant (2012: p. 73)

There are some studies which state that the better service capabilities of LSPs not only lead to better service performance but also assist them in gaining more competitiveness than their competitors (Lai, 2004; Liu et al., 2010; Kersten and Koch, 2010; Panayides and So, 2005). Liu et al. (2010) explained that the most critical capability of LSPs was service quality, which was reflected in the study by Kersten and Koch (2010). Panayides and So (2005) considered operations and relationship management factors were important to the capability of LSPs.

Performance seems to be one of the better tools for measuring and presenting LSP capabilities. The nature and quality of an organisation's behaviour when completing its main tasks and functions and generating a profit are measured by business performance (Wang et al., 2010). There are two main core dimensions of business performance: operational, and financial performance. Operational performance refers to a business' performance whilst serving customers in terms of quality, flexibility, on time delivery, and so on. Huo et al. (2008) stated that operational performance could be classified into two main dimensions: cost, and service performance. Cost performance refers to cost and price, whereas service performance is commonly used in terms of the quality of service of on-time delivery and flexibility of the service, as seen in many studies (Daugherty et al., 2009; Green et al., 2008). It could be said then that an efficient LSP that performs particularly well in regards to service performance can lead to an increase in a firm's competitiveness throughout the entire supply chain by providing service differentiation.

Banomyong (2012) conducted an interesting preliminary survey of ASEAN key players' perceptions about the future of logistics and transport in ASEAN in 2025. The respondents of this survey were all participants attending the World Bank seminar being held in Phnom Penh in 2012, and the participants in this seminar were comprised of policy makers at 50 percent, businesses at approximately 40 percent, and academics at around 10 percent of the total participants, as shown in the findings of this survey in Figures 2-10 to 2-12.

The preliminary findings presented an enhancement of the logistics market in ASEAN, no matter the concentration in international road freight transport market, shipping market, and advanced logistics services, including the share of intra-ASEAN freight in ASEAN transported by ASEAN LSPs. The respondents gave the average highest increase rate to the share of intra-ASEAN freight in ASEAN transported by ASEAN LSPs at 3.91 from 5 points, while the concentration in the market for providing advanced logistics services in the ASEAN was the question which received the lowest increase rate of a group question of the logistics market by 2025, as detailed in Figure 2-10.

As mentioned previously, the criteria customers used to select LSPs relates to the outsourcing issue and LSP performance. Figure 2-10 shows the perceptions of the key players in ASEAN concerning the logistics service outsourcing in ASEAN by 2025, and Figure 2-11 presents the

perception of key players in ASEAN regarding the competitiveness in ASEAN by 2025. It appears that the respondents rated at a similar average level in regards to the increase of outsourcing within ASEAN for users of logistics services, logistics information processing, or material management and value-added services.

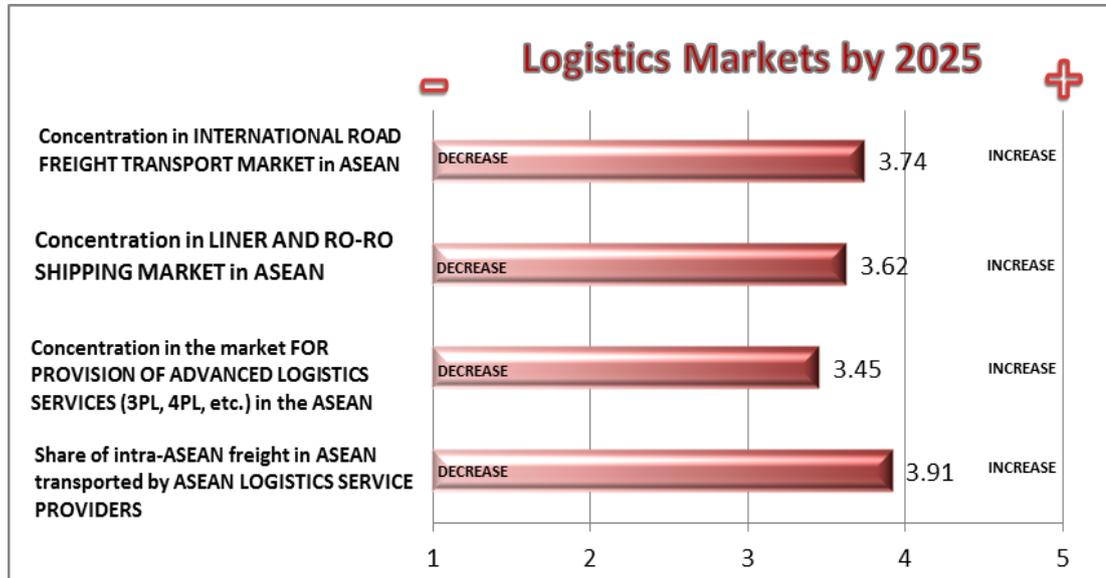


Figure 2-10: Perceptions of ASEAN Key Players about the Change of Logistics Markets in ASEAN by 2025

Source: Banomyong (2012)

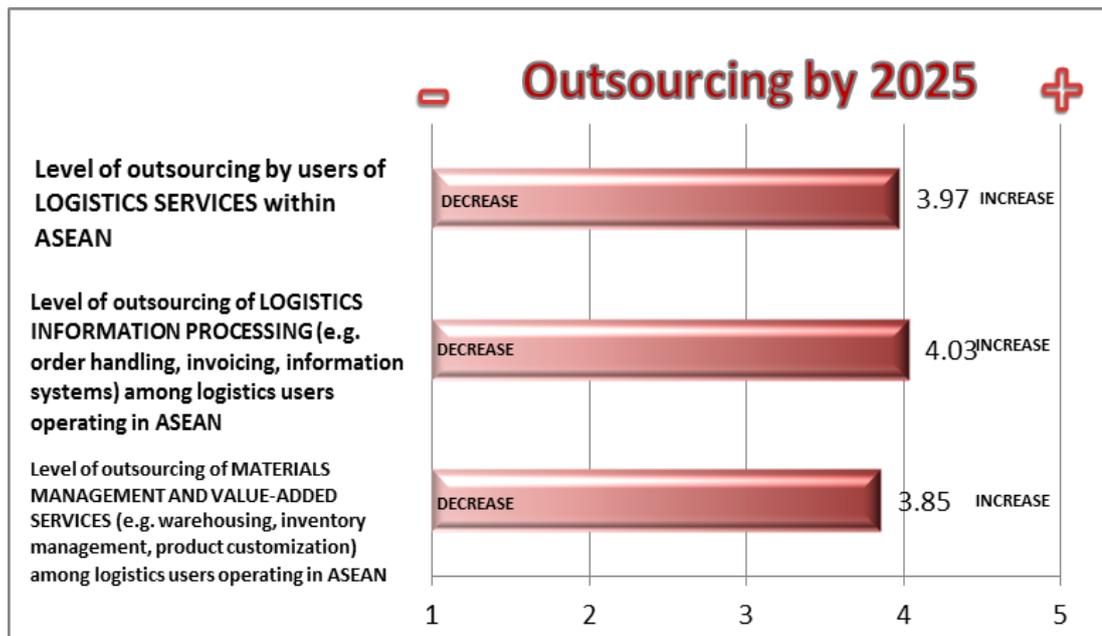


Figure 2-11: Perceptions of Key Players in ASEAN about Logistics Service Outsourcing in ASEAN by 2025

Source: Banomyong (2012).

The findings from Figures 2-10 and 2-11 support the results from the perceptions of the key players in ASEAN about the competitiveness in ASEAN by 2025, as shown in Figure 2-12. It is now known that businesses can gain a comparative advantage and compete with their rivals by providing service differentiation, enhancing the logistics market and increasing their outsourcing level within ASEAN, and these measures can help any business in the supply chain to survive. It can be seen from Figure 2-12 that respondents perceived an increase in the importance of the logistics and transport sector related to the competitiveness of ASEAN and for the aim of attracting foreign direct investment into ASEAN. This is supported by the average rating received for the competitiveness section, approximately 4.5 points, which is the highest rating of the survey.

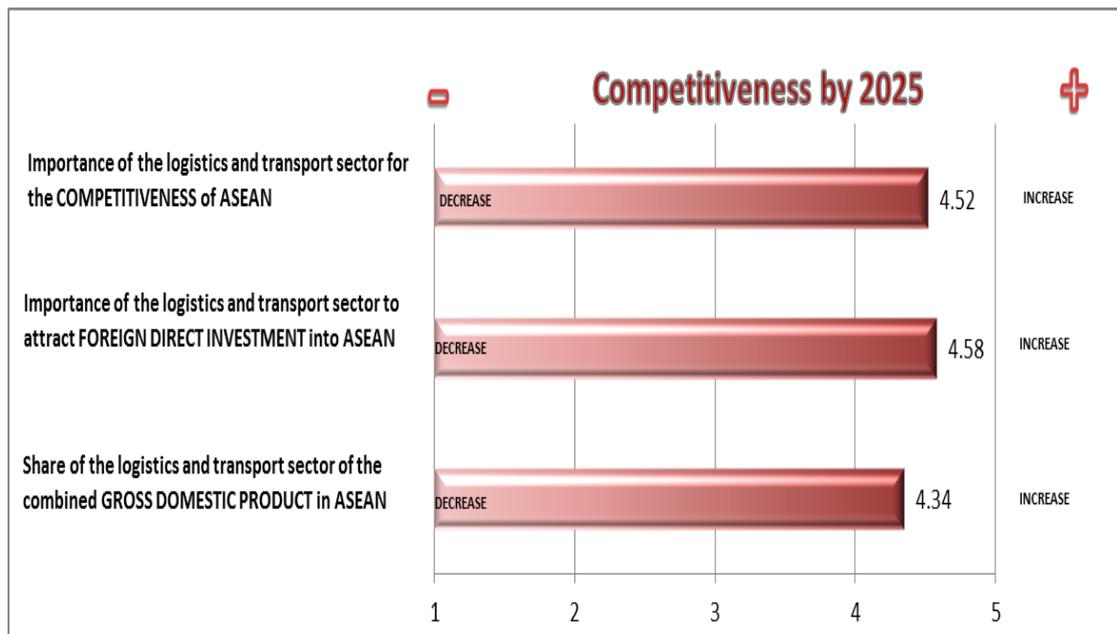


Figure 2-12: Perception of Key Players in ASEAN about the Competitiveness in ASEAN by 2025
 Source: Banomyong (2012)

In conclusion, total European merchandise exports have tended to decline since 2003, but especially so since the financial crisis in 2008. In contrast, the total Asia and Pacific merchandise exports have tended toward a dramatic increase with the full support of the international organisation UNESCAP and the improvement of the transport infrastructure connecting Asia and Europe. This has affected the level of competitiveness of LSPs in Asia, helping them to stand out as one of the key players in the delivery of goods and services to customers within ASEAN and other regions. Improving LSPs' service performance appears to be an important issue and measure regarding the customers' decision to select the best provider to serve their businesses.

2.4. Green Service Quality (GSQ)

2.4.1. Green services in logistics market

The importance of green management has increased dramatically over the past decade, and to achieve the goal of LSPs delivering services to customers in more environmentally friendly ways, LSPs need to improve their green performance (Isaksson and Huge-Brodin, 2013). It can also be seen that green issues in logistics service offerings have involved and will attract more managerial attention in the logistics industry in the future. Although LSPs have become aware of environmental problems and have made efforts to be greener, the integration of green service quality is still at an early stage.

Some studies have dealt with the way in which environmental issues are taken into account in the purchase of transport services. Aronsson and Hüge-Brodin (2006) stated that distribution has a central role in influencing the environmental impact of the company, which is in line with the research findings of Lieb and Lieb (2010). This study shows that the three most important reasons for establishing the companies' sustainability (or environmental) programme include 'a corporate desire to do the right thing', which is the most important reason, whereas 'pressure from customers' and 'corporate desire to enhance company image' are the second and third most important reasons. Moreover, there are a wide range of transportation-related steps that are important components of LSPs' commitment to environmental goals, such as experimenting with alternative fuels, reducing vehicle mileage, sharing vehicles across multiple customers, and reducing vehicle idling time (Lieb and Lieb, 2010).

Browne et al. (2014) mentioned that the use of light goods vehicles (vans) for the delivery of goods in urban areas is simply to reduce CO₂ emissions and also to increase the growth of road traffic in the UK and France. There are four factors concerning the high importance of van traffic growth since 1980 and in the future. These are as follows:

- Growth in smaller, more frequent collections and deliveries (JIT)
- Growth in demand for express and parcels services
- Outsourcing of service functions to specialist companies
- Growth in the population and number of households (resulting in more delivery and servicing needs at residential addresses)

These factors present the way that companies serve the needs of their customers no matter what customers require, in a flexible time frame, with flexibility of the product's size and speed of delivery. Moreover, the substitution of car trips in the case of home shopping and home delivery is raised as one of the reasons for the growth of road traffic (Browne et al., 2014). McKinnon et al. (2010) stated that vehicle technology can reduce the environmental impact of freight transport in three ways:

- Increasing vehicle carrying capacity
- Improving energy efficiency
- Reducing externalities such as air pollution and greenhouse gas emissions

To conform to the statement of McKinnon et al. (2010), Martinsen and Bjorklund (2012) proposed green categories, one of which is vehicle technology, as presented in Table 2-2. These nine green categories are considered in LSPs' offers to their customers.

Green category	Examples
Fuels	Bio fuels and renewable energy; if fossil fuels are offered or demanded, limitations can include type of environmental class
Vehicle technologies	Modern vehicles that cause less emissions; replace fleets more often
Modal choice	Shift from air to ocean, from road to rail; intermodal solutions
Behavioural aspects	Eco driving; driving behaviour with a focus on the reduction of fuel consumption
Logistics system design	More direct transports; continuous improvement of distribution networks; a reduction in average handling factors and average length of haul
Transport management	Well planned routes; high fill-rates
Choice of partners	Cooperation with customers to help them reach their own environmental targets; choosing environmentally conscious transport providers
Environmental management system	ISO14001, EMAS
Emissions data and energy data	CO ₂ reports; energy consumption from external transports; energy consumption in warehouse

Table 2-2: Green Categories and Examples

Source: Martinsen and Bjorklund (2012)

2.4.2. Environmental performance measurement

Environmental performance measurement is one of the environmental approaches used for measuring the level of companies' environmental performance. One of the main aims of environmental management across all industries and countries is to reduce the emission of all gases, especially carbon dioxide. That is why many companies have become focused on ways to measure and reduce their carbon emissions, also known as the 'carbon footprint' (Shaw et al., 2010).

Defra (2006) defined 22 environmental performance indicators and placed them into four categories:

- 1) Emission to air
- 2) Emission to water
- 3) Emission to land
- 4) Resource use

Moreover, environmental management systems (EMS) have been implemented in some companies to help manage the four categories, including the International Standards Organisation's ISO 14031:1999, which is "an environmental performance evaluation tool, and

while not a standard for certification it provides organisations with specific guidance on the design and use of environmental performance evaluations and on the identification and selection of environmental performance indicators” (Shaw et al., 2010: p. 326).

Hervani et al. (2005) stated that the ISO 14031 performance management system design is created for use in environmental performance evaluations with indicators in three main areas:

- 1) Environmental condition indicators
- 2) Operational performance indicators
- 3) Management performance indicators

Environmental performance measurement has also been implemented as an example of environmentally based performance measures in the balanced scorecard categories (Hervani et al., 2005). Environmental issues are adapted into four categories of the balance scorecard as: financial, customer, internal process, and learning growth, as shown in Table 2-3.

<p>Financial</p> <ul style="list-style-type: none"> Percentage of proactive vs. reactive expenditures \$ Capital investments \$ Operating costs Disposal costs Recycling revenues Revenues from green products \$ Fines and penalties Cost avoidance from environmental actions <p>Customer</p> <ul style="list-style-type: none"> # Green products Product safety # Recalls Customer returns Unfavourable press coverage <ul style="list-style-type: none"> Percentage of products reclaims after use Functional product eco-efficiency 	<p>Internal process</p> <ul style="list-style-type: none"> Percentage of production and office materials recycled # Certified suppliers # Accidents and spills Internal audit scores Energy consumption Percentage of facilities certified Percentage of product remanufactured Energy use Greenhouse gas emissions Hazardous material output <p>Learning growth</p> <ul style="list-style-type: none"> Percentage of employees trained # Community complaints Percentage of renewable use # Violations reports by employees # Employees with incentives related to environmental goals # Functions with environmental responsibilities Emergency response programs
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Table 2-3: Examples of Balanced Scorecard Measures for Sustainability

Source: Hervani et al. (2005)

Furthermore, ISO 14067: Carbon footprint of products seems one of the most important in the ISO 14000 series as it is a sign of the growing interest of companies in greenhouse gas quantification. The term carbon footprint (CFP) has become commonly recognised and is frequently used to describe the concept of relating a certain amount of greenhouse gas (GHG) emissions to a certain activity, product or population. Carbon footprint refers to an impact on the environment and also involves the calculation of greenhouse gas (GHG) emissions associated with a company, event, activity, or the lifecycle of a product or service. The UK

Carbon Trust hints at a life-cycle-orientated approach which states that the footprint should include direct and indirect emissions related to the subject, representing the CO₂ equivalent, calculated using global warming potential (Wright et al., 2011). Therefore, CFP seems to be an influential instrument for de-carbonizing the product supply chain (ISO, 2009). Regarding the discussion in the previous section, it is clear that green issues have become a part of business activities and play an important role in the supply chain, in particular, to the logistics industries. However, to match the expectations of customers who perceive the services and the actual services delivered by service providers, the measures of green service quality do need to be addressed or set up. The logistics performance index, therefore, is presented in the next section.

2.5. Logistics Performance Index (LPI)

Emerging economies are forecasted to grow more modestly than in the past, but measurements or indexes which identify the level of an economy's competitiveness with benchmarking to other economies and the global market seem more important in the present. The World Economic Forum (WEF) has produced an annual global competitiveness report which has studied and benchmarked many factors underpinning national competitiveness. It provides insight and discussion among all stakeholders to help countries to improve their competitiveness (World Economic Forum, 2014).

The Global Competitiveness Index (GCI) is a tool that measures the microeconomic and macroeconomic foundations of national competitiveness comprising three dimensions of sub-indexes as shown in Figure 2-13. Three sub-indexes can lead to three keys for factor-driven, efficiency-driven, and innovation-driven economies. Regarding the results of the 12 pillars of competitiveness, the global competitiveness top 10 rankings and the Asia-Pacific top 10 rankings have been presented in Table 2-4. The United Kingdom is ranked ninth in global competitiveness, while Singapore is ranked second in global competitiveness and takes first place in the Asia-Pacific competitiveness rank. Thailand was ranked thirty-eighth in the global rankings in 2012; however, it was ranked thirty-first in the global competitiveness index of 2014 (World Economic Forum, 2014). What this means is that Thailand has improved its competitiveness capability since 2012, which is in line with the World Bank LPI that will be explained next.

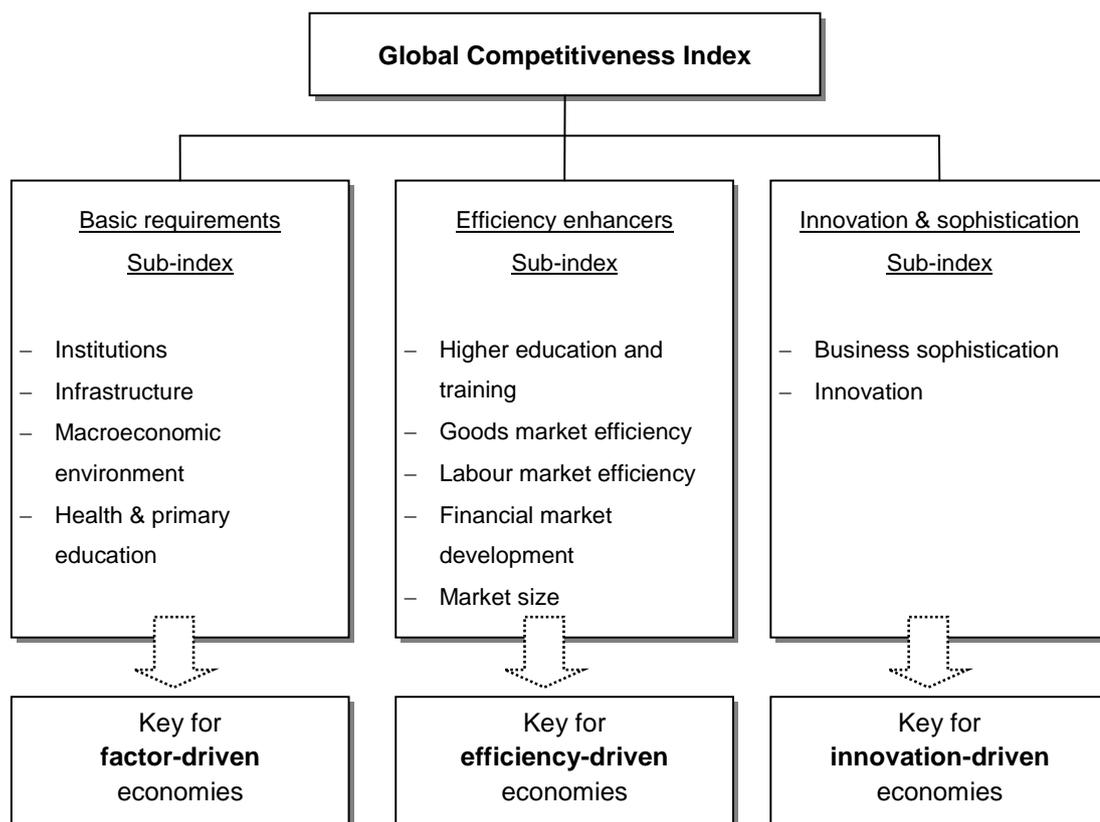


Figure 2-13: The Global Competitiveness Index Framework

Source: World Economic Forum (2014)

Rank	Global Competitiveness ^a	Global Rank	Rank	Asia-Pacific Competitiveness Top 10 ^b	Global Rank
1	Switzerland	1	1	Singapore	2
2	Singapore	2	2	Japan	6
3	United States	3	3	Hong Kong SAR	7
4	Finland	4	4	Taiwan, China	14
5	Germany	5	5	New Zealand	17
6	Japan	6	6	Malaysia	20
7	Hong Kong SAR	7	7	Australia	22
8	Netherlands	8	8	Korea, Rep	26
9	United Kingdom	9	9	China	28
10	Sweden	10	10	Thailand	31

Table 2-4: Competitiveness Rank 2014-2015

Source: World Economic Forum (2014)

****Note:* a = Global competitiveness; b = Asia-Pacific competitiveness Top 10

However, it has also been found that some pillars of the competitiveness index are related to the World Bank LPIs, such as infrastructure, goods market efficiency, technological readiness, business sophistication, and innovation pillars. A change in LPIs might affect the changes of the economy's competitiveness too. This is why LPIs play a key role in driving business competitiveness in terms of service performance.

The freight transport and logistics industry represents one of the most dynamic and important sectors of the European economy (World Bank, 2014). The global network of logistics operators for international trade includes ocean shipping, air freight, land transport, warehousing, and third-party logistics. Moreover, global logistics require that a seamless chain of LSPs support the physical movement of goods. To benchmark all logistics activities, the World Bank has established a logistics performance index (LPI) to introduce a standard and rank countries in terms of international logistics components. This global benchmark appears to play an important role (World Bank, 2014). The World Bank has determined the LPI using six components:

- The efficiency of customs and border management clearance
- The quality of trade and transport infrastructure
- The ease of arranging competitively priced shipments
- The competence and quality of logistics services
- The ability to track and trace consignments
- The frequency with which shipments reach consignees within scheduled or expected delivery times

By capturing these six components, the World Bank outlines two categories as: (1) area for policy regulation, which indicates main inputs to the supply chain, such as customs, infrastructure, and service quality; and (2) supply chain performance outcomes, which correspond to LPI indicators of time, cost, and reliability, as shown in the details of indicators in Table 2-5. Six constructs with 41 indicators have been measured using the survey. This survey classified and ranked the following five regions, including 160 economies, as East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, and South Asia (World Bank, 2014).

	LPI indicators by component					
	Level of fees and charges	Quality of infrastructure	Quality and competence of services	Efficiency of process	Source of major delays	Charges in the logistics environment
1	Port charges	Ports	Road	Clearance and delivery of imports	Reshipment inspection	Customs clearance procedures
2	Airport charges	Airports	Airport transport	Clearance and delivery of exports	Maritime transshipment	Trade and transport infrastructure
3	Road transport rates	Roads	Rail	Transparency of customs clearance	Criminal activities	Private logistics services
4	Rail transport rates	Rail	Maritime transport	Provision of adequate and timely information on regulatory changes	Compulsory warehouse/transloading	Other official clearance procedures
5	Warehouse/transloading charges	Warehouse/transloading facilities	Warehouse/transloading and distribution	Expedited customs clearance for traders with high compliance levels	Solicitation of informal payments	Telecommunication & IT infrastructure
6	Agent fees	Telecommunication & IT	Freight forwarders			Regulation related to logistics
7			Customs agencies			Solicitation of informal payments
8			Quality/standard inspection agencies			
9			Health/sanitary and sanitary agencies			
10			Customs brokers			
11			Trade and transport associations			
12			Consignees or shippers			

Table 2-5: World Bank Domestic LPI Indicators by Components

Source: World Bank (2014)

Figure 2-14 displays the Southeast Asian and key economies' competitiveness by global rank (2007-2014). As can be seen in the table, Thailand is ranked third among the countries in Southeast Asia according to measurements using World Bank LPIs, trailing Singapore and Malaysia respectively from 2007 to 2014. Although Thailand was able to rise from thirty-eighth in 2012 to thirty-fifth place in 2014, it remains distant from the United Kingdom and the US. To benchmark with the best in its class, the radar diagrams were built to explain and benchmark each dimension, starting with Figure 2-15, the Thailand LPIs World Bank Scorecard (2007-2014). The numbers within the radar diagram show the average LPI rate of each dimension in 2012, while the numbers outside the radar diagram display the average LPI rate in 2014. It can also be seen that there have been changes in the average LPI rate in every dimension except in regards to international shipments, which have barely changed since 2007.

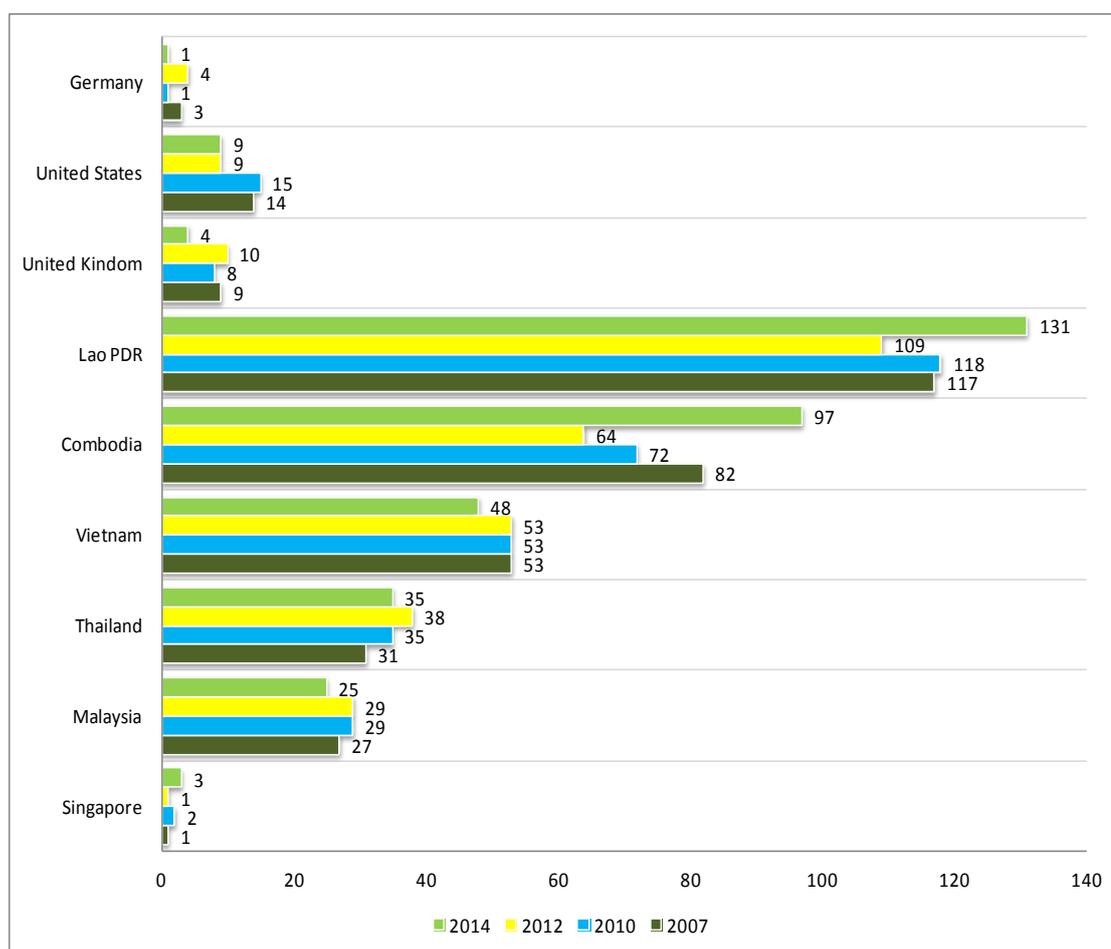


Figure 2-14: Southeast Asia & Key Economies Competitiveness in Global Rank (2007-2014)

Source: World Economic Forum (2014) combined by the author

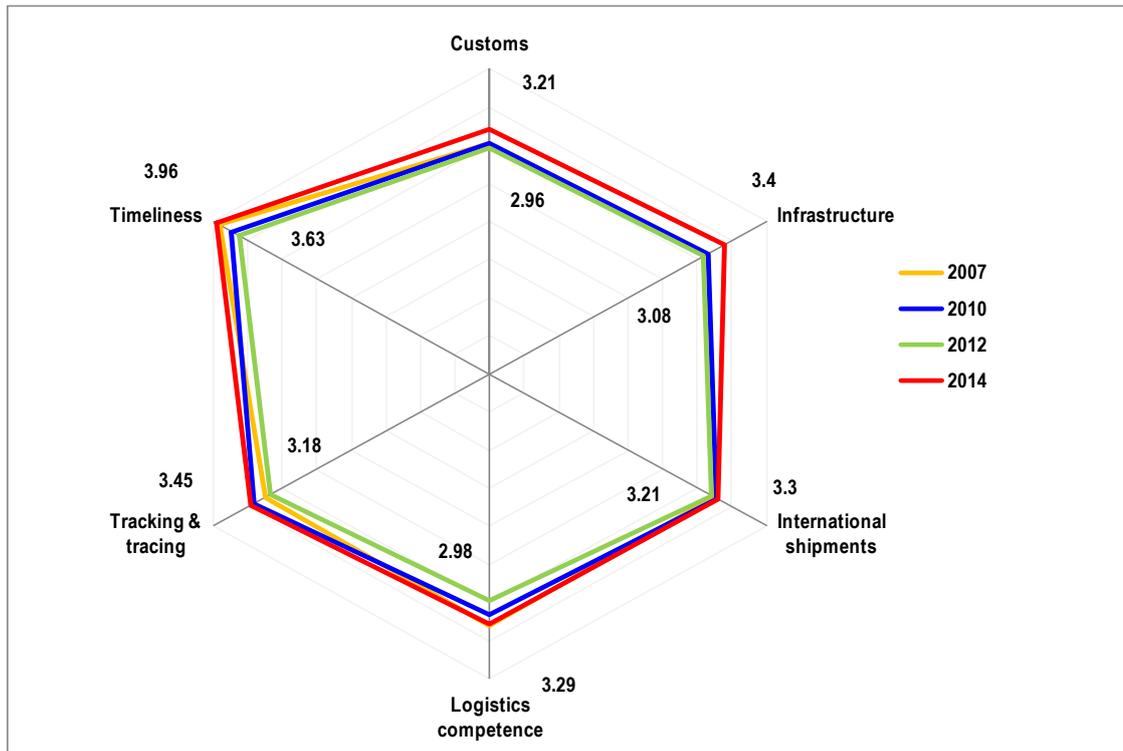


Figure 2-15: Thailand LPIs World Bank Scorecard (2007-2014)

Source: World Bank (2014) combined by the author

Figures 2-16 and 2-17 show a comparison between: (1) Thailand and Singapore; and (2) Thailand and the United Kingdom in 2014 via a radar diagram. According to Figure 2-16, there were five dimensions in which the difference of the average LPI rate in each dimension between Thailand and Singapore was higher than 0.3. These dimensions were customs, infrastructure, international shipments, logistics competence, and tracking and tracing at 0.8, 0.88, 0.4, 0.68 and 0.45, respectively. Timeliness was the only dimension in which the difference of the average LPI rate was 0.3.

Furthermore, considering the difference of the average LPI rate in each dimension between Thailand and the UK as shown in Figure 2-17, there were four dimensions which were higher than 0.3. These dimensions comprised customs, infrastructure, logistics competence, and tracking and tracing at 0.73, 0.76, 0.74, and 0.63, respectively. Timeliness and international shipments were the only two dimensions where the differences were approximately 0.3. According to these comparisons, it was concluded that the average level of LPI in customs, infrastructure, and logistics competence dimensions could be increased, as well as GCI, ultimately leading to the achievement of a higher competitiveness rank, because these LPIs are a part of GCI, as mentioned in the previous section.

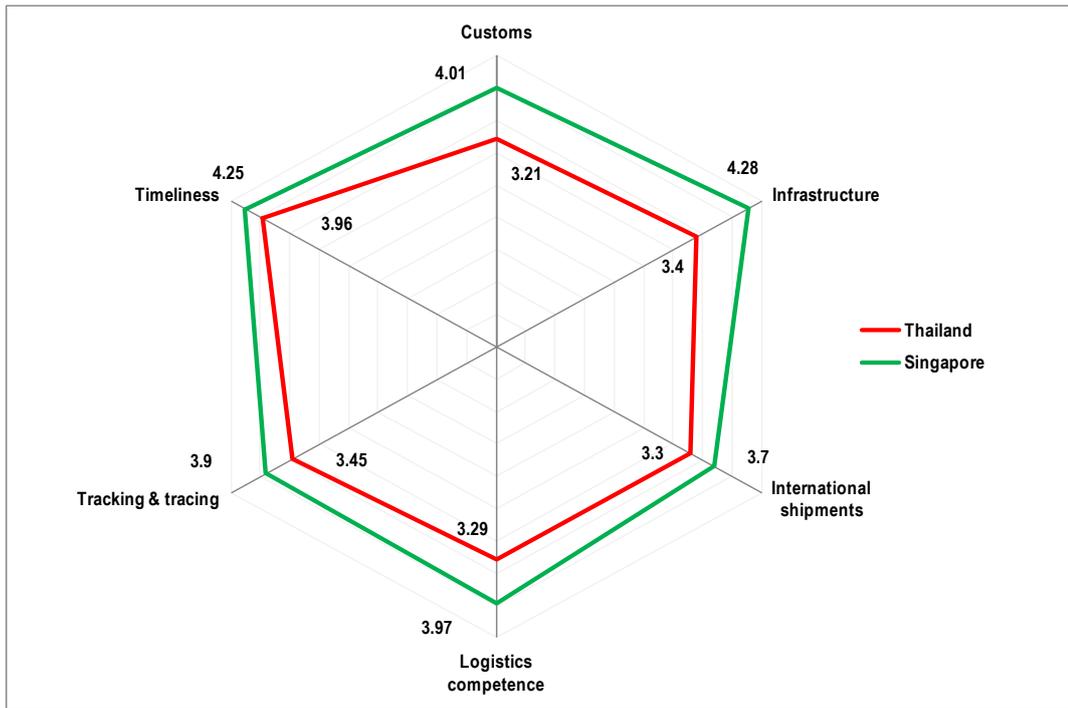


Figure 2-16: Comparing LPIs World Bank Scorecard between Thailand and Singapore, 2014
 Source: World Bank (2014) combined by the author

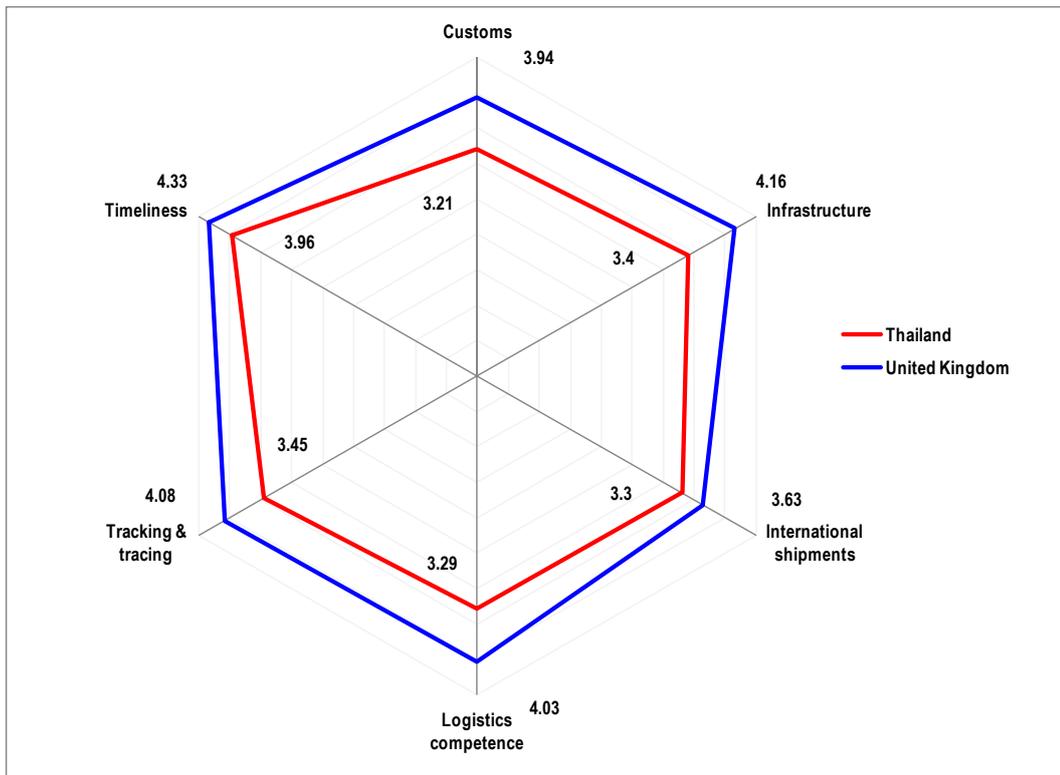


Figure 2-17: Comparing LPIs World Bank Scorecard between Thailand and the UK, 2014
 Source: World Bank (2014) combined by the author

2.6. Conclusion

In summary, Chapter Two has explored the existing literature which has helped to shape this research problem. This chapter has examined the explanation of the concepts of customer service, including a discussion on the service quality gap which has been proposed by Parasuraman et al. (1988), SERVQUAL, SERVPERF, and logistics service quality (LSQ) theories. In this part, the extant theory of service quality and in particularly logistics area were explained. However, a current review of the situation of the logistics service industry and other issues which are relevant to this industry have been important. The next section then introduced logistics service providers (LSPs) to discuss how important LSPs are to global trade, freight transport, and goods movement within and/or among the various regions/countries. Examining green service quality (GSQ) was another main issue in this research; the chapter thus explained the current conditions of green services in the logistics market and environmental performance measurements. Lastly, discussion on this impact was conducted in the later stage of this thesis as one main point. It is followed by discussion of the logistics performance index (LPIs) established by the World Bank.

As it is seen that there were four key points in this chapter, the extant theory of the service quality was the first point for presenting and explaining the concepts of SERVQUAL, SERVPERF, and LSQ. To clarify the key player in this thesis, LSPs were discussed and a relationship was shown between the LSQ and the LSP's performance, including the importance of LSPs in the global context. However, a set of measurements were required to measure the LSP's performance in terms of both green service quality and logistics service quality. The World Bank LPIs, therefore, are discussed as a standard and general measurement for the LSP's performance. These four key points are reviewed as a general literature review and will be discussed further in the next chapter as regards the Thai government's logistics performance index (TLPI) for the logistics sector.

3. Logistics in Thailand and Other Relevant Issues

3.1. Introduction

Chapter Two was the first chapter of the literature part presenting the current knowledge in this area before identifying the gaps in the body of knowledge that this research investigated, including customer service and logistics service quality (LSQ) theories. This chapter, Chapter Three, will continue to illustrate the political and business contexts of Thailand, which will be presented first. In later sections, the other relevant issues, such as Eastern-Western business philosophies, small and medium enterprises (SMEs), large companies, and benchmarking will be discussed. Chapter Two and this chapter will extract the gaps in the body of knowledge and the resulting research questions that are needed to fill this gap, as discussed in the next chapter.

3.2. The Context of Thailand: Policies and Businesses

3.2.1. The policy framework relates to green logistics service in Thailand

From this research, it can be seen that pressure from customers and the corporate desire to enhance the company image are important reasons for the companies to establish environmental programmes (Lieb and Lieb, 2010). In addition, the effects of rivals' capacities and the pressures from government policies are also important to the direction of a company's management and policies. Therefore, considering the Thai LSP's perspective on green service issues, there are two key national and international pressures affecting performance in terms of environmental aspects.

3.2.1.1. The Greater Mekong Subregion (GMS) Economic Cooperation Programme and Climate Changes

Climate change has important implications for both real sector development in the GMS and the effects on the ecosystem services. The Asian Development Bank's previous studies show that five billion dollars' worth of ongoing and planned GMS transport and energy projects are located partially or fully in areas most vulnerable to climate change (Asian Development Bank, 2011). To signify the importance of climate change, the Asian Development Bank (ADB) has integrated a climate change programme into the GMS Core Environmental Programme and Biodiversity Conservation Corridors (GMS CEP-BCI). Two main areas of focus have been identified (Asian Development Bank, 2011):

- Strengthening climate change adaptation capacity, such as enhancing the awareness of climate change impacts, strengthening government capacity in vulnerability assessment, and building the reducing emissions from deforestation and forest degradation (REDD) capacity in GMS countries to protect carbon stock and reduce deforestation.
- Climate change mitigation by reducing CO₂ emissions from land use changes and sectors such as energy and transport.

3.2.1.2. Thailand National Economic and Social Development Plan

Thailand has had its own National Economic and Social Development (NESD) Plan since 1995 and the latest plan is the eleventh such plan. This plan is set up every five fiscal years to plan the strategies and policies in terms of economic and social development throughout Thailand. Table 3-1 presents the Thailand National Economic and Social Development Plan, policies and strategies from 1955 to 2030. Furthermore, the NESD Plan sets up the direction of each time period in which the Thai government will act and describes its focus throughout that time. For example, the NESD plan from the years 1955 to 1980 focused on a resources-based economy, employing either import substitution or export promotion policies to try to gain a comparative advantage over other countries. However, international and domestic factors have had an effect on the Thai economy. The 11th National Economic and Social Development Plan (2012-2016) focuses on a green economy policy and its strategies are comprised of a low carbon society, zero waste, green products, and people participation.

Year	Focused Policy	Strategies
1955-1980	Resources-based Economy	– Natural resource-based, cheap labour, and mass productivity
2000	Knowledge-based Economy	– Value-added creation, global-local linkage, niche market, and area-based
2015	Green Economy	– Low carbon society, zero waste, green products, and people participation
2030	Sustainable Development	– Economic – stability / environmental friendly, society – equity / reducing poverty, environment – sustainable management / wisely use, and people – empowerment / participation

Table 3-1: Thailand National Economic and Social Development Plan, Policy and Strategies during 1955 to 2030

Source: Hatachote (2012)

The 11th National Economic and Social Development Plan (2012-2016) was developed with the philosophy that Thailand will be a happy society with such qualities as equality, fairness and resilience. It can be seen that there are three main strategies relating to a green logistics society or environmentally friendly economy and sustainable development, as strategies 3, 4, 5 and 6 illustrate in Figure 3-1. Strategies 3 to 5 appear to assist with economic restructuring, including increasing the strength of the agriculture sector, creation of regional logistics connectivity, and the restructuring of a sustainable economy just as strategy 6 seems to manage the natural resources and the environment to achieve sustainability by promoting the required production and consumption in order to redirect the country toward a low carbon emission society (Hatachote, 2012).

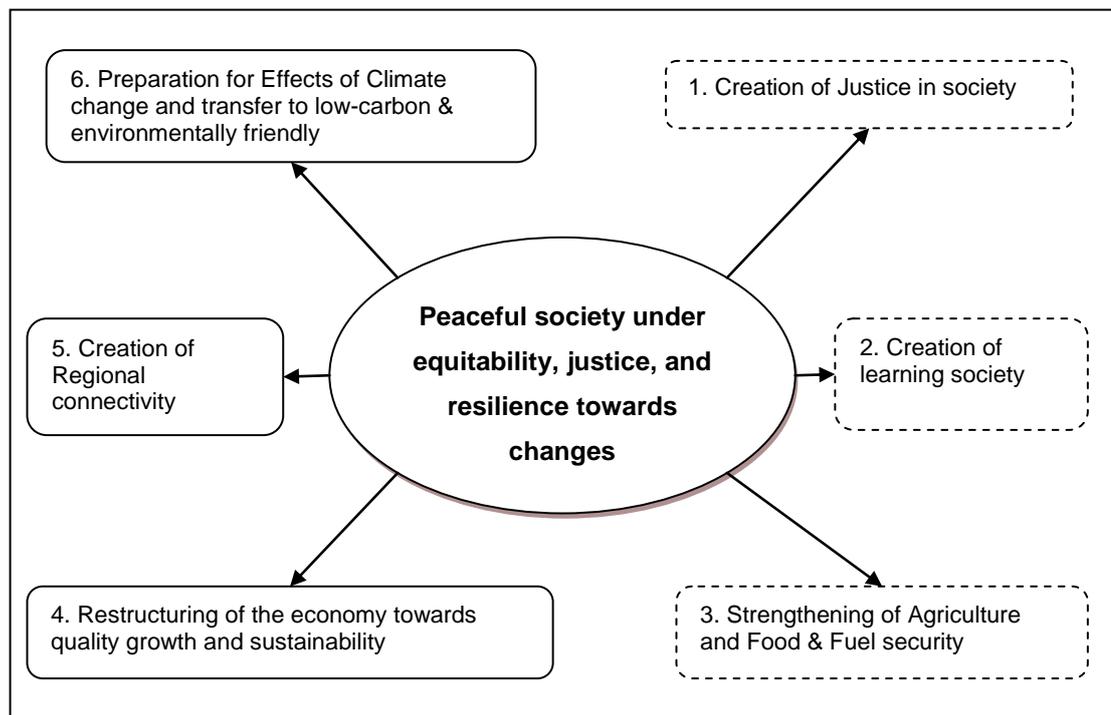


Figure 3-1: The 11th Thailand National Development Plan (2012-2016)

Source: Office of the National Economic and Social Development Board (2012)

3.2.1.3. Thailand's Environmental Policy

With the agreement of the GMS CEP-BCI and as a GMS member country, Thailand has established an environmental master plan, which is a response by the Thai Ministry of National Resources and Environment's Office of National Resources and Environmental Policy and Planning (ONEP). This master plan is called "Thailand Climate Change Master Plan (2011-2050)" and covers the impacts from carbon emissions and the usage of national resources in

many sectors, such as the power sector, industrial sector, agricultural sector, and transport sectors. However, there are two main issues for the master plan that relate to this research:

- Green logistics plan: the ONEP establishes a green logistics plan to develop Thailand's transport system in the long term, especially by shifting the mode choices of transport from road to rail and inland waterway modes
- Supporting LSPs to use fuel alternatives to reduce air pollution and greenhouse gas emissions

To achieve this master plan, the ONEP has built important mechanisms to deploy a strategic plan into action, such as:

- Setting up carbon trading in the industries by using the economic externalities concept to set up quotas for carbon emissions. This is a mechanism which attempts to decrease carbon emissions, whereby a firm with a higher level of carbon emissions than the allotted quota must pay for this negative externality. This helps not only to decrease carbon emissions across sectors, but also leads to increased carbon emissions trading, especially in the industry which is the third biggest contributor to the release of CO₂ emissions and has seen a continual upward trend since 1998.
- Using assessment tools such as strategic environmental assessment (SEA), environmental impact assessment (EIA), health impact assessment (HIA), and social impact assessment (SIA) in the policy-planning process helps to ensure that the plan fits with the goals of the master plan.

Furthermore, there is the Environmental Management Plan (2012–2016) and the Pollution Management Plan (2012-2016) both of which support Thailand's Climate Change Master Plan. The Environmental Management Plan (2012–2016) is a specific plan for managing the balance of natural resources and the environment. Moreover, there are several strategies to increase the capacity of local authorities in waste management, especially infectious waste and waste from electrical and electronic equipment (WEEE). The Pollution Management Plan (2012-2016) is a master plan for pollution management in Thailand and was developed by the Pollution Control Department at the Ministry of Natural Resources and Environment. This plan considers different sources of pollutants in different sectors (United Nations, 2013).

3.2.1.4. Thailand's Green Industry Project

Thailand's Green Industry Project, driven by the Thailand Ministry of Industry (MOI), is based on industrial organisations' willingness to conduct a community-friendly and environmentally friendly business for sustainable development (Office of Green Industry Promotion and Development, 2013). This is based on a framework from the United Nations Industrial Development Organisation (UNIDO), public-private partnership and total quality management

(TQM), combined with the concept of triple bottom line (TBL), the principles of Thailand's green industry have expanded to five levels. Table 3-2 presents the description and the criteria needed to achieve at each level.

These factors can impact on GSQ and LSP perspectives when considering environmental and social aspects through national and international policies. The policies deployed from the top to the bottom, and the outcomes of the action plans derived for the macro-economy, will be influenced from supportive factors and other partners in the supply chain.

Level	Description	Criteria
Level 1	<i>Green Commitment</i> means organisations which have a commitment, demonstrated by policy, goals and action plans, to reduce environmental impacts, and effective organisational internal communication.	<ul style="list-style-type: none"> – Organisation must define environmental policies covering the impact reduction on the environment, sustainable resource use, climate change mitigation, and protection or restoration of the national environment. – Organisations must communicate environmental policies to all staff for acknowledgement.
Level 2	<i>Green Activity</i> means an organisation which carries on activities in compliance with policies, goals and plans which have been set to reduce substantially environmental impacts as commitment states.	<ul style="list-style-type: none"> – Same as level 1 – Organisation must have a preparation environmental plan to reduce environmental impacts, and that plan must consist of objectives, targets, procedures, responsible persons, and time frame. – Organisation must implement environmental plan to achieve its aims.
Level 3	<i>Green System</i> means organisations which have systematic environmental management including follow-up, assessment and revision aimed at continuous development as well as receiving a widely-recognised award on environment and accreditations on a variety of environments.	<ul style="list-style-type: none"> – Same as level 2 but in more detail. – Follow up and evaluation must occur by providing the process of implementation for: (1) monitoring environmental quality and parameters used; (2) evaluating consistency between EMS and provisions of law during the defined time frame; (3) coping with existing environmental defects; (4) indicating the storage duration of keeping records relating to environmental implementation; and (5) conducting internal evaluation of environmental management.
Level 4	<i>Green Culture</i> means organisations which have the cooperation of employees on all levels of the organisation to implement a friendly environment in all aspects of business operation until it becomes a part of the organisation culture.	<ul style="list-style-type: none"> – Same as level 3. – Organisations must create an environmental organisation culture and implement it effectively by covering the criteria of corporate social responsibility ISO 26000 – Organisations must prepare environmental implementing reports for publication
Level 5	<i>Green Network</i> means organisations which demonstrate network extensions throughout green demand chains by promotion of business partners, and allies entering into accredited green industry process.	<ul style="list-style-type: none"> – Same as level 4. – Organisations must implement promotion, creation, and interrelation of environmental activity with stakeholders throughout the supply chain. – Organisations must prepare implementation reports and achievement reports for publication.

Table 3-2: Five Levels of Development of Green Industry in Thailand

Source: Office of Green Industry Promotion and Development, Thailand Ministry of Industry (2013)

3.2.2. Businesses and Performance:

3.2.2.1. *LSPs in Thailand*

Logistics play an important role for businesses in Thailand, as a gateway to the Indochina countries of Laos, Cambodia and Vietnam. It was found that logistics costs as a percentage of Thai Gross Domestic Production (GDP) in 2005 were approximately 19 percent, which is especially high when compared to other countries (Office of the National Economic and Social Development Board: NESDB, 2007). Therefore, the NESDB, as the government agency planning economics and social development policy, established the first Thailand logistics development strategy (2007-2011), to set up a world-class logistics system and support Thailand's position as Indochina's trade and investment centre (NESDB, 2007).

NESDB has classified LSPs in Thailand into seven categories by service activities: transport, post, warehouse, packaging, logistics serving more than one activity, materials handling, and other activities relating to transport. In 2011, there were approximately 18,399 LSPs registered with the Department of Business Development at the Thai Ministry of Commerce, as shown in Figure 3-2. The number of LSPs that are registered has continued to grow since 2005, at a rate of 3.7 percent per year (NESDB, 2011). Regarding Figure 3-3, it can be seen that the majority of LSPs were in the transport activity, and amounted to about 12,000 businesses or 66 percent of the total number of LSPs, while LSPs in the logistics activity were made up of only 214 businesses, or about 1.16 percent of the total number of LSPs. Moreover, it can be found that the three main regions where LSPs operated and were located, are Bangkok, and Central and Eastern Thailand, as shown in Figure 3-4.

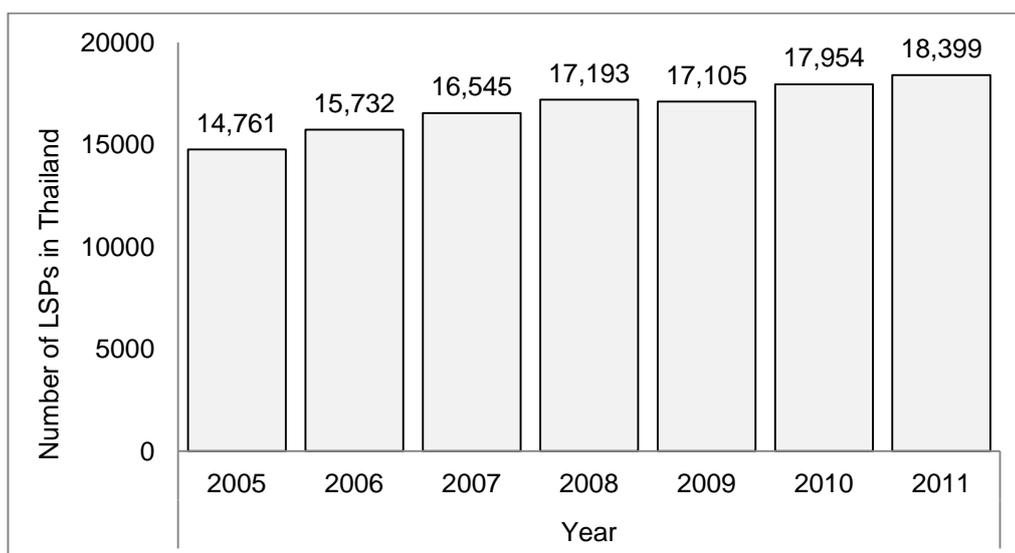


Figure 3-2: The Numbers of LSPs in Thailand during 2005-2011

Source: NESDB (2011)

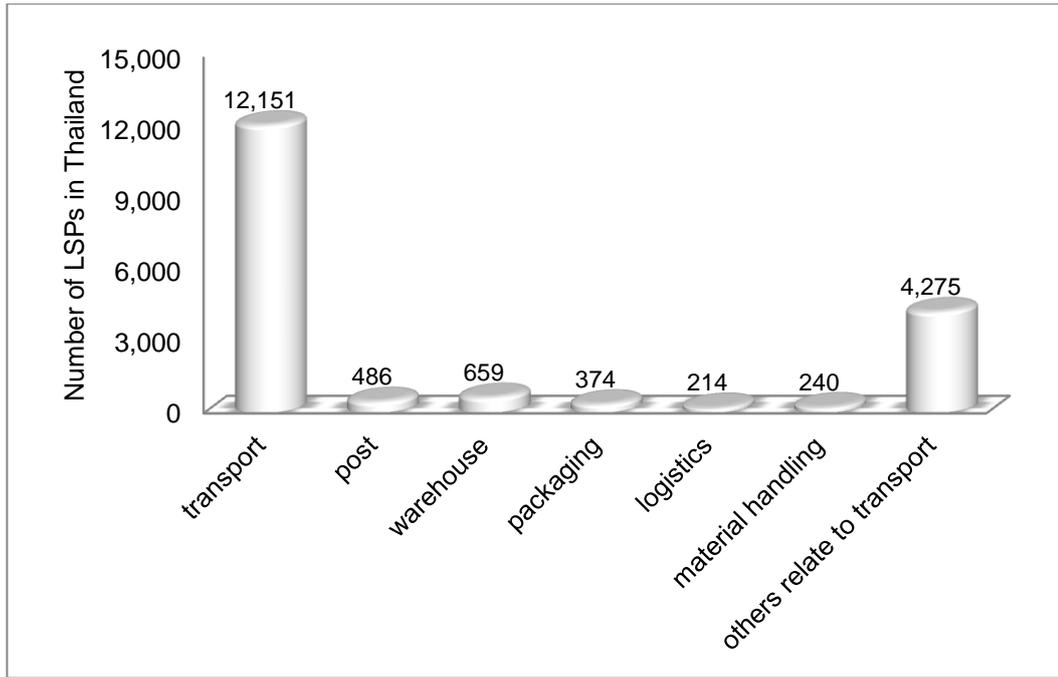


Figure 3-3: The Numbers of LSPs Registered with the Department of Business Development by Service Activity in 2011

Source: NESDB (2011)

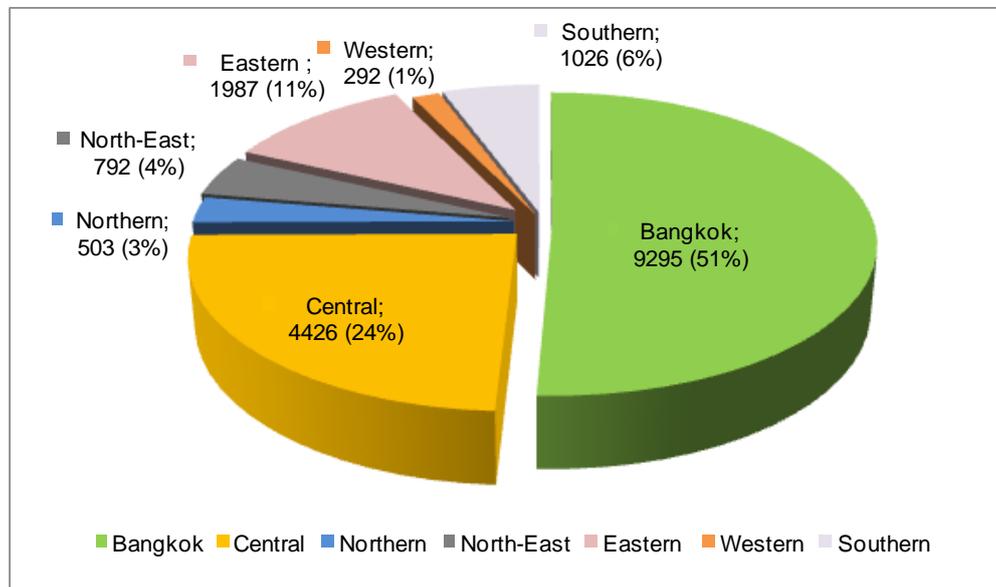


Figure 3-4: The Numbers of LSPs in Thailand by Region in 2011

Source: NESDB (2011)

3.2.2.2. *Thailand Logistics Development Strategy*

Thailand's logistics development strategy has been divided into five strategic agendas, as shown in Table 3-3: business logistics improvement; transport and logistics network optimisation; logistics service internationalisation; trade facilitation enhancement; and capacity building (NESDB, 2007)

Logistics development strategic agenda	Goal	Key Performance Indicator
<p>1. Business logistics Improvement ***</p> <p>1.1 To encourage businesses in agricultural, industrial and service sectors to implement logistics management techniques in their industries</p>	<p>Business in strategic industries will have an efficient logistics system that will be traceable throughout the supply chain</p>	<ul style="list-style-type: none"> - Lower logistics costs - Greater customer responsiveness - Increased number of LSPs or increased service value - Greater understanding among entrepreneurs of the importance of logistics and the need for an increased use of logistics services
<p>1.2 To support the development of logistics for supply chain optimisation by which the movement of goods can be tracked</p>		<ul style="list-style-type: none"> - Lower food transportation costs throughout the supply chain - Increase the number of business associations collaborating in the development of logistics services
<p>2. Transport and logistics network optimisation</p> <p>2.1 To support the management of transport for energy-saving purposes to reduce transport costs at both business and national level by developing the railway infrastructure in Thailand</p>	<p>To set up an integrated logistics management system to accommodate Thailand's status as Indochina's logistics hub in term of gathering, transferring, and distributing merchandise, both regionally and internationally</p>	<ul style="list-style-type: none"> - Reduce transport times on main trade routes - Lower investment costs of the private sector investing in the development of logistics or distribution centre - Lower logistics costs relative to sale revenues
<p>2.2 To develop new trade lanes to the Middle East, Africa, and Europe via Thailand's Andaman Sea and accommodate the expanding trade activities of its neighbouring countries by developing deep seaports on the west coast as well as an Economic Corridor</p>		<ul style="list-style-type: none"> - Andaman deep seaports ready to provide appropriate services - A railway system linking ports on the western coast with regional transport routes
<p>2.3 To develop an integrated logistics network both local and international to link with overseas market</p>		

Table 3-3: Summary of Thailand's Logistics Development Strategy (2007-2011)

Source: NESDB (2007)

Logistics development strategic agenda	Goal	Key Performance Indicator
<p>3. Logistics service internationalisation</p> <p>3.1 To promote investment in LSPs industry in both industrial parks and individual business</p> <hr/> <p>3.2 To promote a logistics service for the specific needs of local industries such as integrated logistics service for SMEs</p>	To upgrade Thai LSPs for remaining both in the competitiveness and high value-added category.	<ul style="list-style-type: none"> - Increasing the numbers of LSPs - Increasing co-operation among businesses <hr/> - Increasing the sales revenues of LSPs whose majority shareholders are Thai. - Increasing the number of specific service providers
<p>4. Trade facilitation enhancement</p> <p>4.1. To develop e-logistics and single window entry into a central system due to provide import/export and logistics services</p> <hr/> <p>4.2. To improve the taxation system and customs-clearance procedures related to import transportation and shipping businesses</p> <hr/> <p>4.3. To promote the setting up of distribution or logistics centres in order to increase Thai business competitiveness in foreign markets</p> <hr/> <p>4.4. To increase the efficiency and service quality to not only speed up the process of moving goods from manufacturers to customers but also reduce exporters' reverse logistics costs</p>	To reduce operators' import and export handling costs	<ul style="list-style-type: none"> - Less processing time for import/export documentation - Lower transaction costs for importers and exporters - Less use of paper in the process as part of a move towards a paperless system <hr/> - Reduce time for transporting import and export goods - Reduce costs for transporting import and export goods <hr/> - Lower distribution costs for Thai exporters in target market <hr/> - Reduce overall time spent by exporters in the merchandise-inspection process - Lower total export costs
<p>5. Capacity building</p> <p>5.1 To provide training to personnel in both real sector and LSPs' industry</p> <hr/> <p>5.2 To promote e-commerce businesses for reducing documentation and information delivery costs</p>	To produce knowledgeable logistics personnel for both the manufacturing and the logistics services industries	<ul style="list-style-type: none"> - To produce 100,000 logistics personnel at senior/executive in management and operator levels - To produce 1,370 trainers/lecturers with an international level of logistics skills by 2011 <hr/> - Setting up standardisation with regard to data sharing

Table 3-3: Summary of Thailand's Logistics Development Strategy (2007-2011) (cont.)

Logistics development strategic agenda	Goal	Key Performance Indicator
5.3 To improve the training process, research & development process, and the standard of logistics professionals to meet business requirements and international criteria.		<ul style="list-style-type: none"> – Increase the number of education institutes offering logistics courses that meet international criteria – Increase the number of research papers for improving logistics efficiency – Introduce clear standards for logistics professionals and logistics labour skills
5.4 To support the collection and development of data for logistics management both at the macro and business levels to drive the strategies		<ul style="list-style-type: none"> – Establishment of a data system which manages Thailand's logistics system linked in a network manner at macro and micro levels
5.5 To support the official establishment of the system for coordinating and monitoring policy, to act as the mechanism to drive the development of Thailand's logistics system.		<ul style="list-style-type: none"> – The national logistics development committee is appointed and functioning

Table 3-3: Summary of Thailand's Logistics Development Strategy (2007-2011) (Cont.)

The Thailand Ministry of Industry's Department of Primary Industries and Mines (2012) stated that there are at least four important national plans that relate to manufacturers and LSPs in Thailand for improving their competitiveness and that of the entire supply chain, as follows.

- The 11th National Economic and Social Development Plan (2012-2016)
- The 2nd Manufacturing Logistics Development Master Plan (2012-2016)
- The Transport and Traffic Development Master Plan (2011-2020)
- The 2nd Logistics Development Strategies Plan (2013-2017)

According to the four plans above, two main issues relating to this research are the development of business logistics capacity and the industry development of LSPs. The development of business logistics capacity has three subordinate plans to achieve this goal. Firstly, the government has focused on the efficiency of logistics and supply chain management in the industrial sector in terms of reducing costs, developing the logistics skills of personnel in the industrial sector, and outsourcing some logistics activities to LSPs. Secondly, the establishment of a production network and supply chain collaboration has been considered to help the whole supply chain in terms of increasing the quality of input through supply chain collaboration. Lastly, the government plans to support and build up logistics research and development to enhance competitiveness. The industry development of LSPs is

one of the main issues that Thai government agencies are giving a high priority and relate to this study. There are two subordinate plans for developing the efficiency of LSPs and establishing an LSP network to collaborate with the industrial sector. In summary, these main national measures have played an important role in not only supporting and developing the efficiency of logistics and supply chain management in Thai businesses, but also in establishing a network within the industry and among industrial sectors along the entire supply chain. Regarding the 2nd Manufacturing Logistics Development Master Plan, the objectives, goals, and strategic agendas have been established to support and relate to the 11th National Economic and Social Development Plan, and the 2nd Logistics Development Strategies Plan for gaining an advantage throughout the entire supply chain, as shown in Figure 3-5.

The 2nd Manufacturing Logistics Development Master Plan (2012-2016)

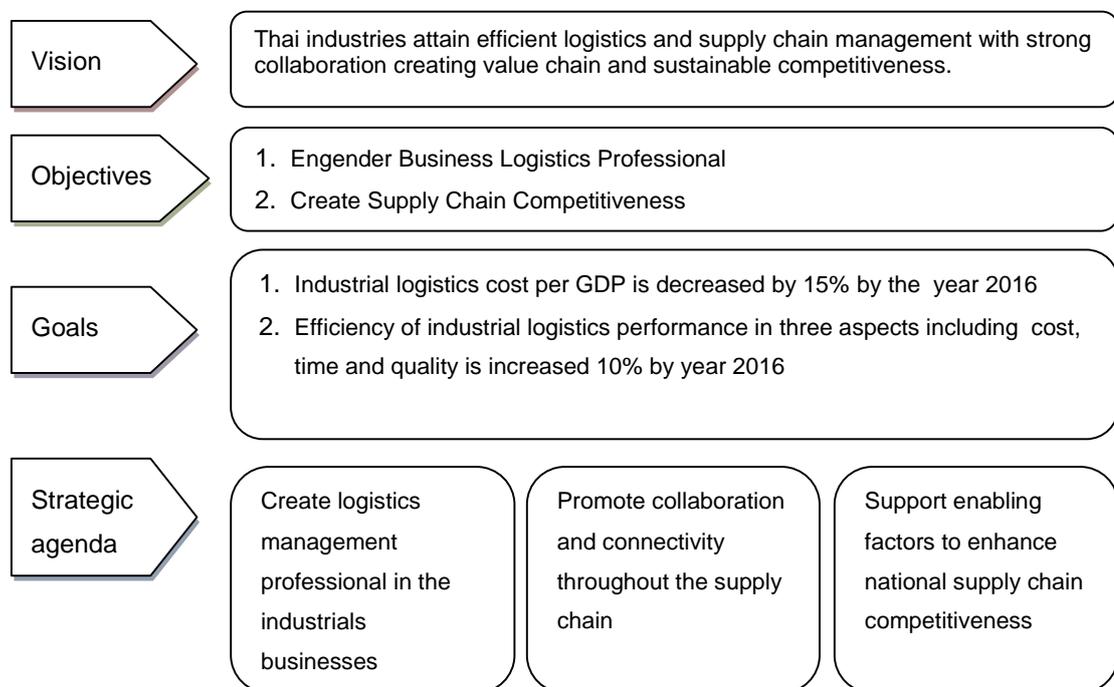


Figure 3-5: The 2nd Manufacturing Logistics Development Master Plan

Source: Thailand Ministry of Industry's Department of Primary Industries and Mines (2012)

During the period of 2007-2010 Thailand's logistics costs structure remained the same. For instance, in 2010 transportation cost was the largest cost component, at approximately 47.2 percent of total logistics costs, while logistics administration cost was the lowest at 8.8 percent. Upon looking at logistics cost components in the Thai economy, it can be seen that transportation costs were about 7.2 percent of GDP, and logistics administration costs were about 1.3 percent of GDP (NESDB, 2011). Following the 2nd Manufacturing Logistics Development Master Plan, the Thailand Ministry of Industry's Department of Primary Industries and Mines has set up two main goals which are: (1) the industrial logistics cost per GDP is

reduced by 15 percent by the year 2016; and (2) the efficiency of industrial logistics performance in three aspects (cost, time, and quality) is increased 10 percent by the year 2016 (Paijitprapapon, 2013).

3.2.2.3. Thai government's logistics performance index (TLPI)

As mentioned in Chapter Two, the World Bank Logistics Performance Index (LPI) has been set up for international trade by measuring the perceptions of foreign companies as either importers or exporters. That means this LPI doesn't represent the logistics status of countries at the micro level but shows the logistics performance status at the macro level. This group of indicators or measurements aims to focus on the macro level but not fit to the micro level, such as a particular firm or industry. However, the Thai Ministry of Industry has established a Thai LPI (TLPI) specifically for the Thai context by focusing on nine logistics activities in the three dimensions of cost, time, and reliability to support and deploy their logistics master plan into action. The TLPI was informed by Banomyong and Supatn (2011), Grant (2004), and Grant et al. (2006) to establish the importance of academic theory to practice and policy. However, not all of the TLPI measures are of equal importance. Only nine TLPIs reflect overall logistics performance, as shown in Table 3-4 below. Five main industries have been focused on as a target group for setting up a standard TLPI by industry. These industries comprise food, textiles, electronics, automobile and plastic industries, and TLPI in each dimension by sectors (Department of Primary Industry and Mines, 2010). With delimitation of this research focusing on road transport in Thailand, only five TLPIs have been used as the logistics performance index for this research, and these are: transport costs per sales ratio; average order cycle time; average delivery cycle time; DIFOT; and returned rates.

Thai government's logistics performance index			
	Costs	Time	Reliability
1	Transport costs per sales ratio	Average order cycle time	DIFOT (Delivered In-Full On-Time)
2	Warehouse costs sales ratio	Average delivery cycle time	Forecast accuracy
3	Inventory costs per sales ratio	Average inventory day (day)	Returned rates

Table 3-4: Thai Government's Logistics Performance Index

Source: Department of Primary Industry and Mines, Thai Ministry of Industry (2010)

To achieve the goals of the 2nd Manufacturing Logistics Development Master Plan, TLPIs have been deployed at the levels of nation, sectors, and firms, and controlled by specific authorising agencies such as the NESDB, MOI, and BOL, as shown in Figure 3-6. At the national level, the logistics cost per GDP will be investigated and controlled by NESDB, which is responsible for the Thailand macro economy, whereas the Bureau of Logistics under the responsibility of the Thailand Ministry of Industry will take responsibility for the levels of sectors and firms as a micro economy. It is seen that the BOL can help firms/businesses to increase their competitiveness by seeking a superior TLPI, which may either reduce transport cost per sales ratio or delivery cycle time, and the logistics cost per GDP will be changed in the final step. This includes a way for firms to benchmark each other, whether they are in the same/similar industry or not, to learn the best practices from the leading organisations.

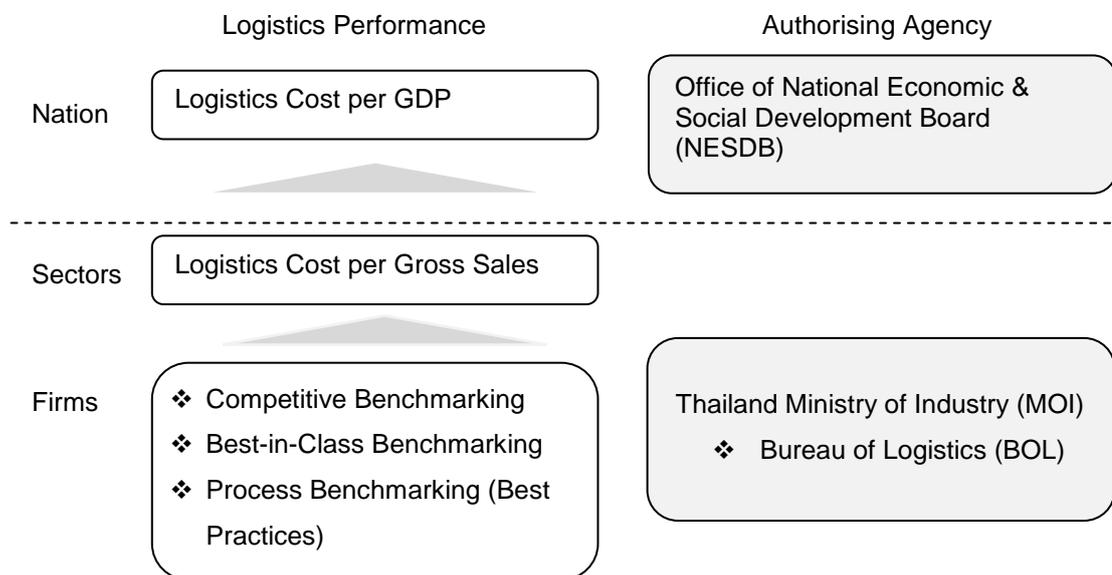


Figure 3-6: TLPIs for Benchmarking

Source: Pajitprapapon (2013)

3.3. Other Issues Relevant to Thesis

3.3.1. Eastern-Western Business Philosophies

Organisations in different industrialised countries and cultures seem to become more alike and adopt universal practices about work and corporate culture over time (Naor et al., 2010). Organisations can alter people's behaviour and undermine the effects of national cultures. Naor et al. (2010) addressed the theory that the organisational cultural dimensions of power distance, future orientation, and performance orientation differed between Eastern and Western countries. The organisation's structure and strategic policy were strongly influenced

to performance such as hierarchy and bureaucracy. Moreover, incentives, compensations, and awards for outstanding achievements have influenced the cultural dimension of performance orientation.

Ralston et al. (1997) stated that a range of behaviours exists within each culture group (the Eastern and Western cultures) and these can also be differentiated from each other. Buddhism and Taoism, the primary religions of the Eastern cultures, place similar stress on the importance of the group in society, which differs from the primary religions of the Western cultures, such as the Judeo-Christian religions (Ralston et al., 1997). It can be said that the difference between the Eastern and Western cultures is the relative focus of the Eastern cultures on the good-of-the-group (also called collectivism) while the Western cultures focus on the good-of-the-individual (also called individualism).

Hofstede (1983) addresses that the most relevant dimensions for leadership are individualism and power distance. The US can be found in an extreme position on the individualism scale, as opposed to leadership in a collectivist society - basically any Third World country or developing country. In collectivist cultures, leadership should respect and encourage employees' group loyalties; incentives should be given collectively, and their distribution should be left up to the group. On the other hand, people can be moved around as individuals, and incentives should be given to individuals in the individualist cultures (Hofstede and Bond, 1988).

Each country maintains a unique set of characteristics that affect the decision-making within the organisation. However, it was also found that many countries and their staff share common factors such as language, religion, customs, borders, beliefs, rules, and ethnic heritage (Pagell et al., 2005). Moreover, it is seen that more collectivist societies, such as Japan, demand greater emotional dependence from their members, in contrast to organisations in more individualistic societies, such as the US, where staff have broad responsibility for individual actions and are rewarded accordingly (Pagell et al., 2005). Members' reasons for complying with organisational requirements will be affected by the level of individualism or collectivism, much the same as the type of people admitted into positions of special influence.

There are several studies suggesting the importance of cultural values in explaining the differences in an organisation's overall performance (Shane, 1993; Tse et al., 1988). Nevertheless, it has been found that the levels of different organisations' performances are partially due to the different cultures defining desirable corporate performance in different ways. For instance, the US business culture may focus on short-term profitability while Japanese organisations have been more focused on building market share over a long period. A study of Franke et al. (1991) presents evidence of cultural differences defining an organisations' performance. Furthermore, several studies reveal that customers from different countries and cultural backgrounds have different expectations, react differently to service encounters, and reveal different behavioural intentions (Zhang et al., 2008). In addition, Sultan

and Simpson (2000) stated that the nationality of customers had an influence on the expectations and perceived performance of customers.

Koehn (1999) discussed the Eastern and Western business philosophies and how they affect business ethics. There were three key differences between Eastern and Western business philosophies, described as follows:

- 1) The meaning of trust: trust existed in a variety of relationships such as parents and children, employees and supervisors.
- 2) Relationships for life such as long-term relationships and friendships from Watsujian and Confucian perspectives.
- 3) Ethics beyond rights: Eastern cultures are duty-based while Western cultures are rights-based.

It appears that if the ethics of the Eastern cultures do not consider rights, they will equally have no idea of duty. Duties are the correlatives of rights and there cannot be one without the other. In conclusion, different cultures may cause the differences between organisations' performances and behavioural intentions due to several factors such as religion, cultural focus, types of societies (individualism or collectivism), and business ethics.

3.3.2. Small and Medium Enterprises (SMES) and Large Companies

Small and medium enterprises (SMEs) play an important role for the economies of most emerging countries from the viewpoint of generating employment and economic growth (Singh, 2011; Stokes and Wilson, 2006). Definitions of SMEs differ among regions. According to a World Bank study cited in Ayyagari et al. (2007), there are more than 60 definitions of SMEs used in the 75 countries. Table 3-5 presents the definition of SMEs used by the European Commission, the United States Small Business Administration, and the Office of Small and Medium Enterprises Promotion, Thailand. The UK has adopted the European Commission's definitions of SMEs as follows: a micro-sized firm employs less than 10 people, a small-sized firm less than 50, and a medium-sized enterprise 50 to 250. Meanwhile, the definition for SMEs used by the United States Small Business Administration classifies firms that employ less than 20 people as micro firms. Businesses with 20 to 99 employees are categorised as small-sized firms, and those with 100 to 499 employees are classified as medium-sized. Lastly, Thailand's Office of Small and Medium Enterprises Promotion defines firms and businesses with less than 50 employees as small-sized firms and those with 51-200 employees are classified as medium-sized.

Type	Employee (s)		
	Micro-size	Small-size	Medium-size
UK	< 10	< 50	50-250
USA	< 20	20-99	100-499
Thailand	-	< 50	51-200

Table 3-5: Definition of SMEs - UK, USA, and Thailand

Source: European Commission (2015); Office of Small and Medium Enterprises Promotion (2014); Yardpaga (2014).

Although many studies have investigated the relationship between the size of companies and the organisation's performance, there are several research studies considering the relationship between the size of companies and green issues. Sambasivan and Ng (2008) addressed some perceived benefits from implementing ISO 14001, which can be divided into four main factors such as company reputation and image improvement, the increases of staff morale and motivation, performance and opportunity, and customer loyalty and trust in line with a study of Tan (2005). Babakri et al. (2004) reported that a company's recycling performance is significantly affected by ISO 14001 certification, while a study of Nee and Wahid (2010) demonstrated that the size of the firm has a significant influence, as smaller firms experienced greater improvements in recycling performance compared to larger ones. It can be concluded that the size of companies may have an influence on the companies' green performance.

3.3.3. Benchmarking

Benchmarking is a technique for performance improvement by seeking to be the best (Beadle & Searstone, 1995). Benchmarking originated in Japan and was first addressed in the West by Xerox in the mid-1980s. There are many authors defining the benchmarking process from different views. Codling (1995: p. 7) defined benchmarking as "An ongoing process of measuring and improving products, services, and practices against the best that can be identified worldwide". Vaziri (1992) suggested that benchmarking is a process of comparing a company's performance on critical customer requirements against that of the best in the industry, called 'best practice', to identify what should be improved. Meanwhile, the British Quality Foundation (2015) demonstrated that there are seven types of benchmarking, as detailed in Table 3-6.

It could be said that benchmarking is generally used as a productive improvement tool to achieve and maintain competitive advantages by striving for world-class performance. It can involve similar or different industries, depending on the goals of the improvement. Although the majority of benchmarking studies are concerned with financial and management perspectives,

environmental benchmarking becomes a major element in the environmental management of organisations (Shaw et al., 2010). Performance benchmarking, therefore, is used in this research as a tool for comparing the logistics performance index affected by GSQ and LSQ between the focal LSPs and Thailand standard logistics performance index.

	Type of Benchmarking	Explanation
1	Strategic benchmarking	This involves examining long-term strategies to improve a business's overall performance.
2	Performance benchmarking (Competitive benchmarking)	This type focuses on the performance characteristics in relation to key products and services in the same sector/industry.
3	Process benchmarking	This focuses on the improvement of the critical processes and operations through comparison with the best practice in performing similar work.
4	Functional benchmarking	This type compares a business with partners from the different sectors/industries to find innovative ways of work process improvement. It can lead to dramatic improvements.
5	Internal benchmarking	This involves benchmarking the businesses or operations from within the same company. It can be the same business units in different countries.
6	External benchmarking	This type analyses the best in class or best practices outside companies to provide an opportunity to learn from those at the leading edge.
7	International benchmarking	This identifies and analyses the best practices elsewhere in the world. However, this type can involve spending more time and resources to implement and the results may need careful analysis, due to national differences.

Table 3-6: Types of Benchmarking

Source: British Quality Foundation (2015)

3.4. Conclusion

In summary, Chapter Three has explored the existing literatures which have helped to shape and share this research problem. This chapter has examined in detail the existing empirical studies in the context of Thailand's policies and businesses to understand specifically the existing approaches, constructs/items, and dominant theories in green logistics service quality, which are important to the future of the logistics field. This chapter concludes with the other relevant issues, such as Eastern-Western business philosophies, small and medium enterprises and large companies, and benchmarking. The next chapter will now turn to the existing empirical research and research questions.

4. Existing Empirical Research and Research Questions

4.1. Introduction

Chapters Two and Three have reviewed the existing literature which has helped to develop and shape this research debate and research questions. This chapter reviews empirical studies in the areas of green service quality, logistics service quality, and logistics service providers to examine work done to date, contributions and shortcomings. Firstly, this chapter will begin by examining a total of 30 key empirical studies in the fields of GSQ, LSQ, and LSPs, and the author summarises the key findings and gaps. Finally, the theoretical research framework is discussed with the proposed research questions/objectives for this thesis.

4.2. Review of Existing Empirical Studies

A total of 52 empirical studies have been identified as relevant to this research in the fields of GSQ, LSQ, and LSPs. The purpose of this thesis is to investigate how a Thai logistics service provider's overall performance is dependent upon its logistics service quality (LSQ) and green service quality (GSQ). A review of the three leading management web-based resources, ABI/INFORM Complete, Emerald Management Plus, and Science Direct, were examined and a review of other various publications, journals, texts and books has identified 52 articles which are of primary importance and relevance to this research debate, as seen in Table 4-1.

Aronsson and Hüge-Brodin (2006)	Martinsen and Björklund (2012)
Banomyong and Supatn (2011)	McIntyre et al. (1998)
Beamon (1999)	Meidutė-Kavaliauskienė et al. (2014)
Bienstock et al. (1997)	Mentzer et al. (1989)
Björklund and Forslund (2013) (a)	Mentzer et al. (1999)
Björklund and Forslund (2013) (b)	Mentzer et al. (2001)
Çerri (2012)	Murphy and Poist (2003)
Dapiran et al. (1996)	Núñez-Carballosa and Guitart-Tarrés (2011)
Daugherty et al. (1998)	Pazirandeh and Jafari (2013)
Emerson and Grimm (1996)	Perotti et al. (2012)

Table 4-1: Articles Examined in Fields of GSQ, LSQ, and LSPs

Eng-Larsson and Norrman (2014)	Phusavat and Kanchana (2008)
Ferguson (2011)	Pisharodi and Langley (1991)
Grant (2003)	Rafiq and Jaafar (2007)
Gil Saura et al. (2008)	Rahman and Laosirihongthrong (2008)
Hervani et al. (2005)	Rao (2002)
Holcomb (1994)	Rao and Holt (2005)
Hong et al. (2007)	Sahoil et al. (2006)
Isaksson and Hüge-Brodin (2013)	Shaw et al. (2010)
Kersten and Koch (2010)	Sterling and Lambert (1989)
Kilibarda et al. (2012)	Tacken et al. (2014)
Laosirihongthong et al. (2013)	Tian et al. (2010)
Large et al. (2011)	Thai (2013)
Lau (2011)	Van Hoek (1999)
Lieb and Lieb (2010)	Wichaisri and Sopadang (2013)
Lieb et al. (1993)	Wolf and Seuring (2010)
Liu et al. (2010)	Wu and Dunn (1995)

Table 4-1: Articles Examined in Fields of GSQ, LSQ, and LSPs (cont.)

Table 4-2 shows the examples of literatures that are relevant to the three main keywords of this study, their findings and gaps for 30 article examples. The total sample of 30 empirical studies have been identified as relevant to this study; six of these empirical studies specifically relate to logistics service quality/SERVQUAL/SERVPERF in the logistics industry, and six of these studies relate to green/environmental matters in the logistics industry. The remaining 14 empirical studies relate to LSP or LSQ or isolated green issues. There have been very few studies considering the three key words, especially linking to LSP performance, which is based on the logistics activities and three dimensions: cost, time and reliability.

Although, many researchers have studied LSQ in terms of the logistics industry, most of their research focused on only one side, either the perception of customers or that of LSPs (Emerson and Grimm, 1996; Liu et al., 2010; Martinsen and Björklund, 2012; Martinsen and Hüge-Brodin, 2014; Rafiq and Jaafar, 2007). Moreover, most studies that widely focus on the green issues in the logistics industry investigate the regions of Europe and the US; there are few studies focusing on Asia, as seen in Table 4-2. This may be because of the compulsory legalities and regulations covering environmental issues such as CO₂ emissions released and greenhouse gases, including awareness of the carbon footprints of the stakeholders, especially the end customers in Europe and the USA.

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(1) Rafiq and Jaafar (2007) “Measuring customers’ perceptions of logistics service quality of 3PL service”	Testing and validation of Mentzer, Flint, and Kent’s LSQ (MFK) instrument in the context of 3PLs industry in the UK.	MFK describes that technical aspects of service quality are perceived as more important than other factors, whereas this paper shows that the functional quality elements of LSQ are perceived more important than technical ones for customer satisfaction. This study focuses on external customers.	X	X		UK	Journal of Business Logistics
(2) Mentzer et al. (2001) “Logistics service quality as a segment-customized process”	The main objective of this study was to investigate the relationship between the different customer segmentation values and the aspects and level of logistics service quality.	Nine factors of LSQ: personnel contact; order release quantities; information quality; ordering procedures; order accuracy; order condition; order quality; timeliness; and order discrepancy handling There was a logistics service quality across the customer segmentation, but the relative parameters estimated differ for each segment.	X			US	Journal of Marketing

Table 4-2: The Four Most Relevant Papers

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(3) Martinsen and Björklund (2012) "Matches and gaps in the green logistics market"	The purpose of this study is to identify the matches and gaps between LSP's green supply chain and the shippers' green demands.	LSPs overachieved when it came to green categories and were also aware of this situation. Conversely, shippers were not aware of this situation and satisfied with services offered by LSPs.		X	X	Europe (Sweden)	International Journal of Physical Distribution & Logistics Management
(4) Björklund and Forslund (2013) "The purpose and focus of environmental performance measurement systems in logistics."	To investigate the purposes of implementing and environmental performance measurement system in logistics.	The respondents had several reasons to implement an environmental performance measurement system but the most common purpose was the internal-organisation. Respondents seemed to design their environmental performance measurement system mainly for internal management purposes.		X	X	Europe (Sweden)	International Journal of Productivity and Performance Management

Table 4-2: The Four Most Relevant Papers (cont.)

4.3. Development of Theoretical Framework

There is a wide range of literature concerning green policies or sustainability in the logistics industry, particularly in Europe and the US (Björklund and Forslund, 2013; Ferguson, 2011; Isaksson and Hüge-Brodin, 2013; Lieb, and Lieb, 2010; Martinsen and Björklund, 2012; Martinsen and Hüge-Brodin, 2014; Shaw et al., 2010; Tacke et al., 2014; Wolf and Seuring, 2010). However, there has been less investigation into the green service quality in the logistics industry, particularly regarding the views from both service providers and their customers (Thai, 2013). Literature on and research into green logistics service quality in connection with LSP performance is rare. The objective of the research is therefore to investigate the influences of LSQ and GSQ on Thai logistics service providers' performance.

Compared with the existing literature on LSQ, GSQ and TLPI, it can be seen that there has been a major gap in the literature with regards to the effects of GSQ and LSQ on Thai LSPs' overall performance. The main research question of this research is: 'how is a Thai logistics service provider's overall performance dependent upon its LSQ and GSQ?' In order to answer this research question, several underlying aspects of green logistics service quality behind LSP performance need to be explored:

Research Question 1: What are the LSP's LSQ competencies?

Logistics service quality is an extant theory which is well-known and has been conducted in many aspects in both logistics and marketing areas. It therefore firstly needs to explore what logistics service quality competencies are.

Research Question 2: What are the LSP's GSQ competencies?

Green service quality is a new context which is so far not well-established in academic literature, though green or environmental issues have been known since two decades ago. Many research studies on green or environmental issues have been undertaken in the logistics area, but most of the studies focus on either the LSP's offering or the LSP performance and its effects on the entire supply chain. Conversely, there is a lack of focus on green issues in terms of logistics service quality.

Research Question 3: How important are GSQ competencies relative to TLPIs through LSQ competencies?

There are several studies which address the relationship between LSQ and LSP performance, but nothing has been confirmed yet regarding the relationship between GSQ and LSQ. This research therefore needs to explore

the importance of GSQ competencies, relative to TLPIs through LSQ competencies.

To answer the main research question, a theoretical framework has been built based on the existing literature as explained above, incorporating three different levels (see Figure 4-1). This figure shows the three literatures presented in groups, each belonging to a specific level. Moreover, the links between these literatures are shown in the intersection of the circles where the overall research objective (RO) is found. LSQ as *the extant theory level* is the main theory of this research and will allow the researcher to assess and understand the importance of LSQ relative to GSQ and LSPs. As *the management level*, LSPs appear to play a key role in delivering customers' needs under a condition of GSQ as *the new context level*. An overview of this context will allow the researcher to identify the importance of GSQ competencies in relation to an LSP's LSQ competencies.

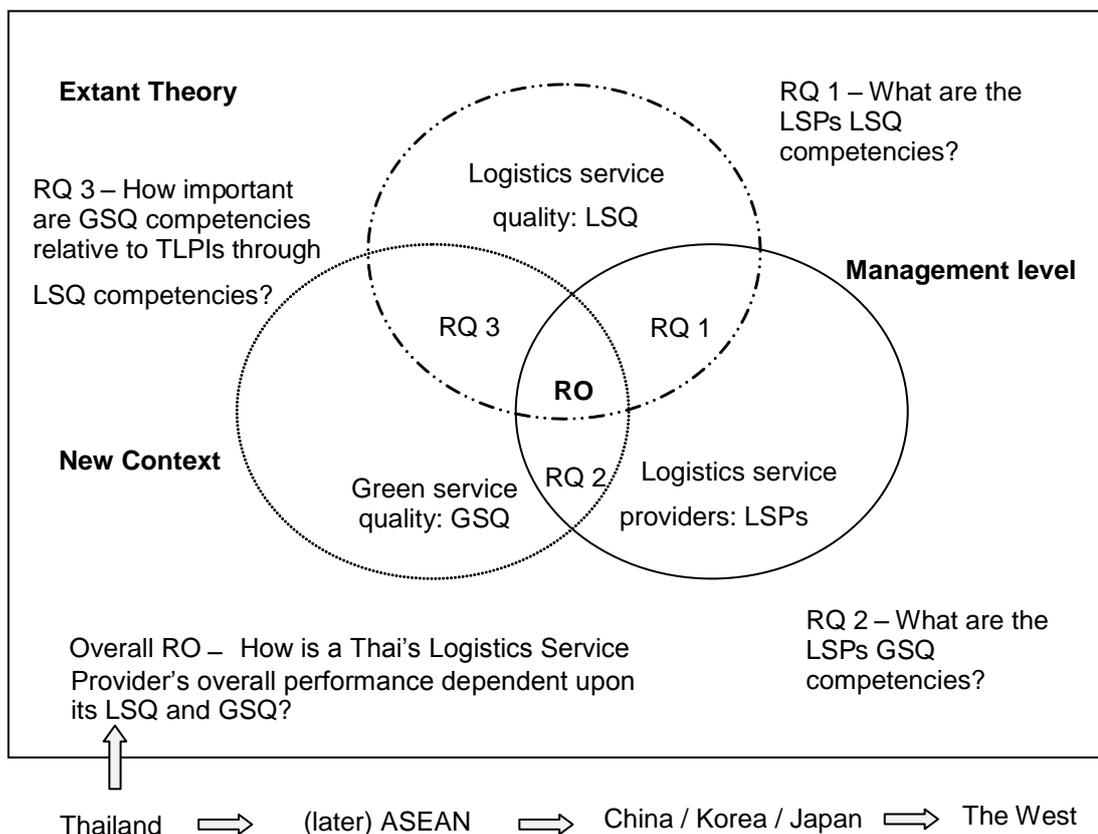


Figure 4-1: Proposed Theoretical Framework

The empirical studies produced by Grant (2003), Martinsen and Björklund (2012), Martinsen and Huge-Brodin (2014) and Rafiq and Jaafar (2007) are also extremely relevant and closely aligned with this thesis. That is because the studies of Grant (2003) and Rafiq and Jaafar (2007) involved a three-part survey and literature review to establish the relationships

between service quality and customer satisfaction by investigating customers' satisfaction with LSPs based on the study of Mentzer et al. (2001) and Parasuraman et al. (1988). In addition, the studies of Martinsen and Björklund (2012) and Martinsen and Hüge-Brodin (2014) reviewed the literature to establish key green constructs which could be applied to LSPs which are possibly offering greener services than their competitors.

Regarding the four key empirical studies (Grant, 2003; Martinsen and Björklund, 2012; Martinsen and Hüge-Brodin, 2014; Rafiq and Jaafar, 2007), the definitions of logistics service quality (LSQ) and green logistics service quality should be defined clearly for this research. Some researchers have argued that service quality should be a single construct or an aggregation of several dimensions. Parasuraman et al. (1988) suggested five dimensions in service quality, whereas Vargo and Lusch (2004) conceptualised the service quality from the perspective of economic and social components. Lovelock (2000) and Schneider and White (2004) adapted a similar view in the perception of service quality, which included the marketing crucial of service quality; the operational crucial of service quality; and the human-resources crucial of service quality. As there are limited studies in GSQ, the definition of GSQ shown below is used, as defined by Lovelock (2000) and Schneider and White (2004) as *The environmental initiatives crucial to operational service quality, particularly in logistics service provision*, while the LSQ is defined as: *the components of order release quantities; ordering procedures; order accuracy; order condition; order quality; timeliness; personnel contact quality; information quality; and order discrepancy handling*.

4.3.1. Intersections between LSQ and LSP Performance

Within the LSQ and LSP's performance literature, the concepts of LSP's LSQ competencies are found, as shown in Table 4-3. In this research literature, several LSQ studies have been conducted, but most of them focus on the expectation and perceptions of LSPs either based on the decision of LSP selection or factors affecting customer satisfaction (Aktas and Ulengin, 2005; Banomyong and Supatn, 2011; Bottani and Rizzi, 2006; Gil Saura et al., 2009; Mentzer et al., 1999; Millen et al., 1997; Rafele, 2004; Rajif and Jaafar, 2007; Wilding and Juriado, 2004). Thai (2013) proposed two new factors within a model of LSQ which were 'image' and 'social responsibility'. It suggested that businesses focus on five areas of logistics service quality, such as customer focus, order fulfilment, timeliness, information and corporate image.

Logistics Service Quality	Explanation
Information quality	Information given by the LSPs with regard to the variety of products that the customers choose (Mentzer et al., 2001; Novack et al., 1995). Information quality, especially in terms of adequacy and availability of the products, appears very important to customers for making their decisions.
Order procedures	Efficient and effective procedures for ordering products on the part of their LSPs.
Order releases quantities	The concept of product availability, which means LSP companies have the flexibility to deliver certain order sizes to their customers (Mentzer et al., 2001). Customers are mostly satisfied when they are able to obtain their required quantities (Jaafar, 2006).
Timeliness	The length of time between order placement and receipt (Jaafar, 2006).
Order accuracy	The ability of LSPs to deliver the right item or product at the required number as ordered and none of the orders being substituted with other items (Bienstock et al., 1997; Mentzer et al., 2001; Novack et al., 1995).
Order quality	The degree to which the products provided by customers or delivered by LSPs meet the product specifications set by the customers of customers (Novack et al., 1995).
Order condition	The damage levels of the products due to handling throughout the transportation activity and the lack of damage to the orders (Bienstock et al., 1997; Mentzer et al., 2001).
Order discrepancy handling	The degree to which LSPs deal with any discrepancies upon the arrival of orders reflects the order discrepancy handling (Jaafar, 2006).
Personnel contact quality	The customer orientation of the LSP's contact people (Mentzer et al., 2001) including customers care about whether customer service personnel are knowledgeable, empathise with their situation, and help customers resolve their problems (Bitner, 1990; Bitner et al., 1994; Gronroos, 1984; Hartline and Ferrel, 1996; Parasuraman et al., 1988).

Table 4-3: Logistics Service Quality Items

However, there is a lack of research investigating the performance of LSPs' LSQ, which is one of the study objectives: to find out what the competencies of LSPs' LSQ are. To identify factors of LSQ which might be important to customers of logistics services, the following 20 key selected articles have been reviewed. There are 12 different items or variables of logistics service quality that appear in the 20 key articles reviewed, either in discussions or as a result of empirical testing. These items are presented in Table 4-4. Nine items have frequencies of

15 or greater within the 20 selected articles. These items are listed below. These nine items of logistics service quality appear to be the most important to customers of logistics services due to their frequency in the literature. These items are also confirmed by the studies of Mentzer et al. (2001) and Rafiq and Jaafar (2007) as the constructs of LSQ.

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)	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Sterling and Lambert (1989)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Pisharodi and Langley (1991)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Holcomb (1994)	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Emerson and Grimm (1996)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Bienstock et al. (1997)	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
Daugherty et al. (1998)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Mentzer et al. (1999)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Mentzer et al. (2001)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Grant (2003)	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Rafele (2004)	✓		✓	✓		✓			✓		✓	

Table 4-4: Important Logistics Services Quality Items

Source: Adapted from Grant (2003) and Jaafar (2006)

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
Sahoil et al. (2006)	✓	✓	✓		✓	✓	✓	✓				✓
Hong et al. (2007)	✓	✓		✓	✓	✓	✓	✓				
Rafiq and Jaafar (2007)	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Rahman and Laosirihongthrong (2008)		✓	✓	✓	✓	✓	✓	✓	✓			
Gil Saura et al. (2008)	✓			✓		✓			✓		✓	
Kersten and Koch (2010)		✓	✓	✓	✓	✓	✓		✓		✓	
Tian et al. (2010)	✓			✓			✓	✓				
Banomyong and Supath (2011)	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Cerri (2012)	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Σ20	18	17	17	19	17	19	18	17	17	6	8	6

Table 4-4: Important Logistics Services Quality Items (cont.)

4.3.2. Intersections between GSQ and LSP Performance

Green supply chain management performance metrics are virtually non-existent and this includes environmental aspects as well (Cuthbertson and Piotrowicz, 2008; Hervani et al., 2005). Environmental performance measurement can be a critical aspect in LSPs' environmental offering (Bjorklund et al., 2012). To identify the items of GSQ which might be important to customers of logistics services, the 15 key selected articles have been reviewed.

There are 12 different items or variables of green service quality that appeared in the 15 key articles reviewed either in discussions or as a result of empirical testing. These items are presented in Table 4-5. These eleven items have frequencies of 5 or greater within the 15 selected articles. These items are listed below.

- 1) Fuels
- 2) Vehicle technologies
- 3) Modal choice
- 4) Behaviour aspects
- 5) Logistics system design
- 6) Transport management
- 7) Choice of partners
- 8) Environmental system
- 9) Emissions data
- 10) Social impact
- 11) Economic impact

These 11 items of GSQ are the most important to customers of logistics services due to their frequency in the literature. As explained in the previous section, there is a lack of research pertaining to GSQ. Considering the factors of GSQ includes not only environmental perspectives, but also social and economic perspectives as well. It is rare to find research that studies GSQ and that mentions or includes the triple bottom line (TBL) as discussed by Elkington (1998). Elkington (1998) explained that the triple bottom line comprised of three major points: economic, environmental, and social bottom lines. To be considered as having regard for environmental sustainability, companies need to focus on these bottom lines (Elkington, 1998).

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)	✓		✓	✓	✓	✓	✓		✓		✓	
McIntyre et al. (1998)					✓	✓			✓		✓	
Beamon (1999)						✓			✓		✓	
Van Hoek (1999)						✓			✓		✓	
Rao (2002)						✓		✓	✓		✓	
Murphy and Poist (2003)	✓					✓			✓	✓		
Hervani et al. (2005)						✓		✓	✓			
Rao and Holt (2005)						✓		✓	✓		✓	
Aronsson and Hugel-Brodin (2006)	✓		✓	✓	✓	✓			✓			
Lieb and Lieb (2010)	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓
Shaw et al. (2010)						✓		✓	✓	✓	✓	
Lau (2011)		✓	✓		✓	✓						
Martinsen and Björklund (2012)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Perotti et al. (2012)	✓	✓	✓		✓	✓	✓	✓	✓		✓	
Isaksson and Hugel-Brodin (2013)		✓	✓	✓		✓	✓		✓	✓	✓	
Σ15	6	5	7	5	6	15	5	6	14	5	10	1

Table 4-5: Important Green Service Quality Items

Source: Adapted from Martinsen and Bjorklund (2012)

Integrating the 11 items of GSQ reviewed in the literature with the concept of the triple bottom line, nine GSQ constructs have been developed and their explanations are shown in Table 4-6. The explanations of GSQ items are according to the literature related to each GSQ item as follows:

Green service quality	Explanation
Alternative fuels	Bio fuels and renewable energy
Vehicle technologies	Replace existing fleets with modern vehicles that cause less emissions
Modal choice	Shift from road to rail; intermodal solutions
Behavioural aspects	Eco driving; driving behaviour which focuses on decreasing fuel consumption
Logistics system design	More direct transport; continuous improvement of distribution networks; decrease in average handling factor and average length of haul
Transport management	Well planned routes; high fill-rates
Choice of partners	Cooperation with customers to help them reach their own environmental targets; choosing environmentally conscious transport providers
Environmental management system (EMS)	ISO14001, EMS certification
Externalities	CO ₂ reports; energy consumption from external transports; energy consumption in warehouse; greenhouse gas emissions; safety for both driver/staff and other people

Table 4-6: Green Service Quality Items

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

1) Alternative fuels:

Transportation is a major cause of environmental impacts and a consumer of fuels such as oil and natural gas (McKinnon et al., 2010; Wu and Dunn, 1995). More efficient use of transport might help reduce CO₂ emissions and protect the environment (Grant et al., 2013). Furthermore, there is a lot of green logistics and transport research that focuses on ways to reduce transport emissions (Aronsson and Hüge-Brodin, 2006; McKinnon, 2003; McKinnon, 2007), or into how logistics decisions affect transport emissions (Kohn, 2008; Kohn and Brodin, 2008). McKinnon (2003) demonstrated that logistics activities can lead to reductions in transport emissions by changing either the mode of transport, transport demand, or vehicle utilisation. Browne et al. (2014) found that energy use for vans is clearly related to vehicle size and the fuel source. Diesel engines have become increasingly popular among van operators since 1998 and the number of diesel vans rose to 95 per cent in 2011. Diesel engines seem to produce fewer CO₂ emissions than petrol engines per unit of distance travelled. Although using alternative fuels such as diesel and bio-diesel produces fewer CO₂ emissions, it is not cost

effective as additional equipment is required, there is limited refuelling infrastructure, and lower fuel efficiency compared to diesel, all of which lead to further costs.

Following the study of Tacke et al. (2014), as shown in Table 4-7, it is shown that respondent companies were forced to face a loss of guarantee from lorry manufacturers when using alternative fuels such as biodiesel, due to potential engine damage. Although transport costs may be reduced in the short-term, an overnight change is not feasible. The effectiveness of any environmental solution needs to be assessed over its full life-span (Renukappa et al., 2013; Tacke et al., 2014). However, using alternative fuels in LSP companies appears to enhance the corporate image or brand, which also affects customer satisfaction (Grant et al., 2014; Kristensen et al., 2014).

McKinnon's (2007, 2008) six green logistics parameters	Green logistics initiatives found in literature by this study's authors	Decision-making level by this study's authors
Modal split	Modal shift	Tactical/operational
Average handling factor	Network optimisation	Strategic
Average length of haul	Network optimisation Vehicle routing	Strategic Operational
Vehicle utilisation (Average load on laden trips and average empty running)	Consolidation Inter-company collaboration Increase backhaulage Increased vehicle dimensions	Operational Strategic Operational Strategic
Vehicle fuel efficiency	Driver training Driver incentive schemes Fuel efficient vehicle engines Reduced power rating Reduced vehicle tare weight Aerodynamics profiling of trailer and tractor Improved tyre performance Effective vehicle maintenance Fleet management (scheduling)	Tactical/operational Tactical Strategic/tactical Tactical/operational Strategic/tactical Strategic/tactical Strategic/tactical Tactical/operational Operational
Carbon intensive of fuel used	Alternative and less carbon intensive energy sources	Strategic/tactical

Table 4-7: Extension of McKinnon's Parameters for CO₂ Emissions Reduction Initiatives Relating Them to a Range of Initiatives Supported by Leading Green Logistics Journal Papers

Source: Tacke et al. (2014)

2) Vehicle technologies

There is much research available that investigates the improvements to the ratio of vehicle fuel efficiency among the logistics service providers studied (Tacke et al., 2014). Wu and Dunn (1995) noted that the impact of transport on the environment came originally from three sources: construction of transport networks, operation of transport vehicles, and disposal of transportation vehicles and parts. A high level of implementation of carbon emissions reduction initiatives in the transportation industry could be stimulated by the perception of long-term market opportunities in new high-margin, low-emission products and technologies, as well as cost savings from lower energy use and the development of carbon management related resources and capabilities (Browne et al., 2014; Grant et al., 2013; Leonardi et al., 2014; McKinnon et al., 2010; Renukappa et al., 2013).

3) Modal choice

Moving to other transport modes is subject to access to alternatives for reducing environmental impact of freight transport. Alternative transport modes are suitable for specific product characteristics; for example, water or rail freight are mostly suitable for heavy low-value items, whereas high-value goods (i.e. electronics goods) are delivered by air or road freight (Grant et al., 2013). McGinnis (1990) found that the transportation mode was mostly influenced by six factors: freight rates, reliability, transit time, loss/damage/claims processing/tracing, shipper market considerations, and carrier considerations. This study also concluded that service variables were more important than freight rates. Due to high competitiveness at present, a business offering more services to customers seems to have a comparative advantage over its competitors. These service attributes include quality of service, the company's performance (such as delivery lead-times), quantities accuracy and others (Ernst et al., 2007; Esper et al., 2003; Forslund et al., 2008; Martinsen and Björklund, 2012; Meixell and Norbis, 2008).

4) Behavioural aspects

Development of the right attitudes and skills for all key stakeholders, including employees, to help them cope with the daily practice of carbon emissions reduction is an essential step. However, deployment from top management seems to be more influential for the achievement of the project (Renukappa et al., 2013; Senge et al., 2007). Some studies found that driver training is a means of reducing vehicle fuel consumption. Moreover, compared to the size differences of companies, different approaches to driver training can be implemented, ranging from an internal driving instructor in medium-sized companies, to large instruction programmes for internal and external (subcontractors) drivers among the larger ones (Tacke et al., 2014).

5) Logistics system design

Implementing environmentally responsible practices was found to favour fewer shipments, less handling, shorter movements, more direct routes, and better space utilisation (Wu and Dunn, 1995). This includes the reduction of the average handling factor within distribution networks or the application of network optimisation in the hub facilities reserved for larger firms (Browne et al., 2012; Forslund et al., 2008; McKinnon, 2008; Tacke et al., 2014).

6) Transport management

Wu and Dunn (1995: p. 32) stressed that transportation is the “*single largest source of environmental hazard in the logistics system*”. There is evidence to support the suggestion that vehicle utilisation can have a significant effect on CO₂ emissions reduction initiatives for road freight transport (McKinnon, 2007; Tacke et al., 2014). In order to achieve a more environmentally friendly logistics system, companies should thus make logistics decisions that minimize the amount of transport emissions (Pazirandeh and Jafari, 2013). However, efficient transport management appears not only to reduce CO₂ emissions but also to affect the quality of service through on-time delivery (Forslund and Jonsson, 2007; Kallio et al., 2000).

7) Choice of partners

The choice of partner factor involves cooperating with customers to help them reach their own environmental targets, choosing environmentally conscious transport providers. To achieve a collaboration goal between companies, Grzybowska et al. (2014) suggested 17 factors which applied in their study, which were: information sharing, coordination, trust, willingness to collaborate, communication, common business goals, responsibility sharing, planning of supply chain activities, flexibility, benefit sharing, joint decision-making, organisational culture, organisational compatibility, resources sharing (integration), top management support, technological readiness, and training. Environmental collaboration between a LSP and its customers can also have an effect on the quality of service and LPS performance.

8) Environmental management system

An environmental management system (EMS) is a structured approach that addresses the environmental bottom line, and ISO 14001 is the most recognised EMS framework in regards to helping businesses both to manage the impact of their activities better on the environment and to demonstrate sound environmental management (Ann et al., 2006). EMS can become a tool to gain the benefits from this certificate and compete with others competitors. Furthermore, EMS is one of the non-trade barriers for international trade.

9) Externalities

In terms of externalities in this study, issues in CO₂ reports include: energy consumption from external transports; energy consumption in warehouses; greenhouse gas emissions; and safety for both drivers/staff and other people. Transport is the fastest growing industry in terms of the consumption of energy and the production of greenhouse gases (GHGs) either in the European Union or Asia (Oberhofer and Dieplinger, 2014; UNESCAP, 2014). Transport activity does not only affect the level of CO₂ emissions but also impacts on the stakeholders, such as people living near the transport routes, and the welfare of LSP staff.

However, some arguments point out that several GSQ items can be referred to as 'sustainable logistics'. The UN World Summit on Sustainable Development (WSSD) in 2002 brought up the issue of governance for sustainable development onto the global agenda, and promoted a sustainable global economy through an era of intense technological, economic, social and political metamorphosis (Elkington, 2004). The idea of TBL is to balance all three perspectives (social, economic, and environmental sustainability) to generate long-term economic benefits and create positive environmental and social impacts (Carter and Rogers, 2008; Elkington, 1998; Grant et al., 2013; and Wichaisri and Sopadang, 2013).

4.4. Research Questions

The purpose of this thesis is to investigate how a Thai logistics service provider's overall performance is dependent upon its logistics service quality (LSQ) and green service quality (GSQ); no other author has attempted this before. Figure 4-2 provides the final and most important conceptual model of the thesis, which draws together the key gaps in the background literature and body of knowledge to propose three research questions:

RQ1: *What are the LSP's LSQ competencies?*

RQ2: *What are the LSP's GSQ competencies?*

RQ3: *How important are GSQ competencies relative to TLPIs through LSQ competencies?*

From the existing literature review in previous sections, nine GSQ and nine LSQ constructs were found and used in the questions for the semi-structured interview in Phase One. Results from Phase One and the 18 GSQ-LSQ constructs from the existing literature reviews were developed as 28 GSQ items and 24 LSQ items, as shown in Figure 4-2.

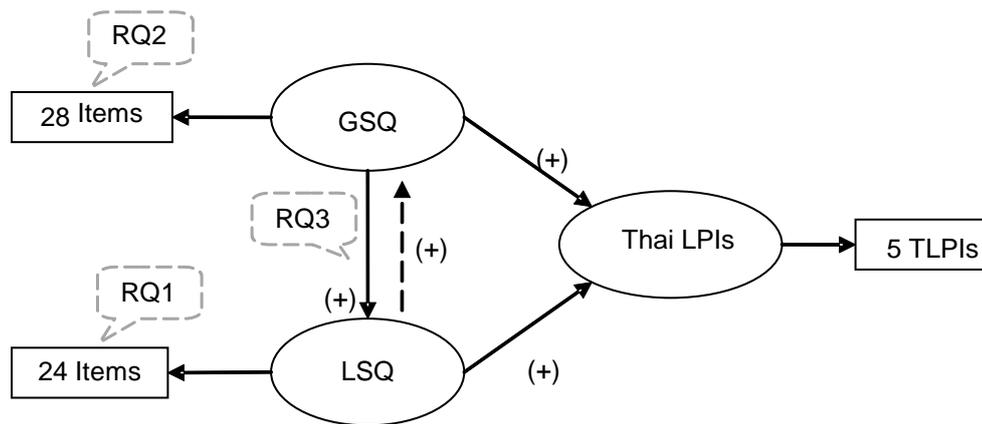


Figure 4-2: Final Conceptual Model for Research Core Purpose

4.5. Conclusion

Chapter Four has examined in detail the existing empirical studies in the fields of GSQ and LSQ to specifically understand existing approaches, constructs/items, dominant authors/articles and theories in green logistics service quality (GLSQ) constructs/items which are important to the future theory development in this field. Lastly, the research questions proposed will address the gaps and disparities in the current GSQ and LSQ literature helping to link existing theory to new in the field of GLSQ.

The next section will now turn to the research itself, with Chapter Five describing the full research methodology.

5. Research Methodology

5.1. Introduction

Chapters Two, Three, and Four have discussed the background literature and defined the research objectives. This chapter provides the research methodology for this thesis. Firstly, the research objectives and research questions are restated. This is followed by a discussion on the philosophical underpinnings of this research with an emphasis on theories and paradigms, and the researcher's paradigmatic position for this thesis. Next, the research design is discussed, along with design issues and limitations for consideration. Finally, the chapter is summarised as a prologue to the presentation of the empirical results in Chapters Six through to Nine.

5.2. Research Objectives Restated

The research questions depict a new area of research and theory development, and therefore this thesis uses methodological triangulation to maximize the amount of data collected and to explore the research phenomena from different perspectives (Mangan et al., 2004). In order to answer this research question, several underlying aspects of green logistics service quality and LSP performance need to be explored:-

RQ1: What are the LSP's LSQ competencies?

RQ2: What are the LSP's GSQ competencies?

RQ3: How important are GSQ competencies relative to TLPs through LSQ competencies?

The core contribution of this thesis is to investigate how a Thai logistics service provider's overall performance is dependent upon its LSQ and GSQ. This thesis will raise awareness among academics and practitioners of the importance of green service quality and logistics service quality, and how they affect Thai logistics service providers' performance as it can be observed in the current research.

In addition, the next section examines the theoretical and paradigmatic issues concerned with business research. It will also explore the epistemological framework and position for this

research, the importance of rigour and relevance, and an examination of the research methodologies appropriate for this thesis to answer the research questions.

5.3. Research Philosophy and Strategy

A research philosophy is an assumption of how knowledge is developed and analysed (Saunders et al., 2007). The axiom of 'knowledge' is driven by research paradigms, and bound up in the notions of ontology, epistemology and axiology (Bryman and Bell, 2011; Guba and Lincoln, 2005). It enables researchers to consider the type of data or evidence that is required, and how it will be gathered and interpreted, in order to identify clearly which research designs will work and which will not.

5.3.1. Epistemology, Ontology, and Axiology

Epistemology is defined in the Cambridge Dictionary as "the part of philosophy that is about the study of how we know things" (Cambridge, 2015). Saunders et al. (2007: p. 102) describe it as "what constitutes acceptable knowledge in the field of study" and Bryman and Bell (2011: p. 15) similarly describe it as "acceptable knowledge in the discipline". Epistemology is concerned with the study of knowledge and what we accept as being valid and acceptable knowledge.

Ontology is defined in the Cambridge Dictionary as "the part of philosophy that studies what it means to exist" (Cambridge, 2015). Ontology is a picture of how the world looks, or our worldview (Solem, 2003). There are two aspects of ontology as objectivism. The first describes the position that social entities exist in reality external to social actors concerned with existence. The other aspect is subjectivism which holds that social phenomena are created from the perceptions and consequent actions of those social actors. Researchers who adopt a positivist paradigm view reality as objective and external to the individual. In contrast, researchers who adopt an interpretive paradigm view reality as subjective and socially constructed, only understanding the social world by examining the perceptions of the human actors within it (Collis and Hussey, 2003).

Mason (2002) and Thomas (2004) have stated that the concept 'ontology' is a misty concept to define due to its nature and the essence of social elements, which are involved in understanding 'the chain of being'. In simpler terms, ontology is concerned with the 'reality' that researchers aim to study. Ontological assumptions reflect what exists and what does not exist in the research environment (Maylor and Blackmon, 2005). The epistemological and

ontological assumptions of the research will inevitably have an influence on methodological decisions (Mason, 2002).

Axiology is a branch of philosophy that studies judgements regarding value (Saunders et al., 2007). Heron (1996) said that “our values are the guiding reason of all human action”. Researchers can demonstrate axiological skill by successfully articulating their values as a basis for making judgements on which research they should conduct and how they might carry it out. Positivists believe that research is undertaken in a value-free way and a researcher is independent of the data, while maintaining an objective position. Conversely, interpretivists believe that research is value bound, and the researcher, who is part of what is being researched, cannot be separated and so will be subjective. The combination of these three elements is known as a ‘paradigm’.

5.3.2. Paradigms and Debate

Saunders et al. (2007) claimed that research philosophy is a rather profound matter that has rarely been given attention; however, researchers continue to discover ways of conducting research. Kuhn (1996: p. 175) described a paradigm as “an entire constellation of beliefs, values and techniques, and so on, shared by the members of a given community”, essentially “a cluster of beliefs and dictates which for scientists in a particular discipline influence what should be studied, how research should be done and how results should be interpreted”. Guba and Lincoln (2005) expressed that there are three main research paradigms which can be explained through ontological, epistemological and methodological positions, namely: positivism, critical realism and constructivism. The comparisons of the three main philosophical research paradigms are presented in Table 5-1.

Positivism views natural science and social reality as the truth; however, interpretivism views social reality as its meaning and the value of the differences between people and the objects of natural science (Bryman and Bell, 2011). In the positivist paradigm, the role of research is to formulate hypotheses and test them, while providing material for the development of laws (Easterby-Smith et al., 1991; Bryman and Bell, 2011). Considering how research methods are developed in natural science and transferable to social science, the positivist approach gives a clear sense of separating subjective and objective data interpretation. It is believed that social phenomena could be scientifically observed and measured under these assumptions.

Elements	Positivism	Critical Realism	Constructivism/ Interpretivism
Ontology	'Naïve realism' in which an understandable reality is assumed to exist, driven by immutable natural laws, the true nature of reality can only be obtained by testing theories about actual objects, or structures in the real world.	Critical realism – 'real' reality but only imperfectly and probabilistically apprehended.	Relativism – local and specific constructed reality; the social world is produced and reinforced by humans through their actions and interaction.
Epistemology	Dualistic/objectivist; verification of hypothesis through rigorous empirical testing; tight coupling among explanations, predictions and control.	Modified dualist/objective; critical tradition/community findings probably true.	Transactional/subjectivist; understanding of the social world from the participants' perspective through the interpretation of their meaning and actions.
Methodology	Hypothetical-deductive experiments/ manipulative; verification of hypotheses; mainly quantitative methods.	Modified experimental/ manipulative; falsification of hypotheses; may include quantitative methods.	Hermeneutical/ dialectical; interpretive case study; action research; holistic ethnography.
Enquiry Aim	Explanation: prediction and control		Understanding; reconstruction
Nature of Knowledge	Verified hypotheses established as facts or laws.	Non-falsified hypotheses that are probable facts or laws	Individual and collective reconstructions sometimes coalescing around consensus.
Knowledge Accumulation	Accretion – "building blocks" adding to "edifice of knowledge": generalisations and cause-effect.		More informed and sophisticated reconstructions; vicarious experience.

Table 5-1: Comparisons of Philosophical Research Paradigms

Source: Adapted from Guba and Lincoln (2005)

Conversely, the interpretivism paradigm is clearly presented by Max Weber, who defined sociology as "science which attempts the interpretive understanding of social action in order to arrive at a casual explanation of its cause and effects" (1947: p. 88). It can be said that a crucial point of interpretivism is that through it, an interpretive understanding of social action, rather than of external forces that have no meaning or involvement in the social action, can be gained.

Among these two extreme paradigms (positivism and interpretivism) is another emerging research paradigm referred to as critical realism, which views the world through three components namely: reality, actual and empirical (Sayer, 2000). Critical realism suggests that the existence of the 'true' domain involves objects and structures, requiring the casual power to be uncovered. Aastrup and Halldorsson (2008) stated that critical realism is based on the belief that "social systems are always open and generally complex and messy". In other words, everything is related and nothing is dependent. Among these three main paradigms, the ontology, epistemology and methodology positions will explain and reveal the way to conduct the research.

5.3.3. Researcher's Paradigm and Philosophical Position

It is important that there is no right or wrong paradigm; however, researchers must be aware of their own paradigm as it will influence their research and how it is conducted. The various paradigmatic positions are discussed in terms of an antithesis between two schools of philosophy in management research: positivism and interpretivism (Mangan et al., 2004). This thesis is rooted in the interpretative paradigm, adopting a relativist ontological approach and following the subjectivist epistemological tradition. This philosophical position is adopted mainly because green service quality (GSQ) is a new area of research. Furthermore, interpretive research is based on the belief that a deeper and richer understanding of the phenomena can be gained through understanding the interpretations of that phenomenon from the viewpoint of those experiencing it (Shah and Corley, 2006). The researcher is concerned with understanding practitioners' perceptions of GSQ in Thailand. These are the key players experiencing it at first hand and potentially indicating GSQ in the logistics industry. The research questions are exploratory in nature, seeking to understand and better explain GSQ and its relationship with the LSP's performance as research phenomena.

Moreover, this thesis is concerned with confirming GSQ variables and gaining a rich understanding and in-depth picture of which GSQ variables exist, and which are important (Phase One). The second purpose of this thesis is to investigate: (1) what the LSP's LSQ competencies are; (2) what the LSP's GSQ competencies are; and (3) how important GSQ competencies relative to LSQ competencies across a wider population are (Phase Two). The last purpose of this thesis is to validate the results from Phase Two. Therefore, this thesis will employ a combination of research methodologies to answer the 'what, why, and how' type questions, which are positioned firmly within the interpretivist and positivist paradigms. As this is a new area of research development, there is a need to build theory as discussed in Chapter Four. As a result, this thesis will utilise both qualitative and quantitative research methods to answer the three research questions.

Quantitative research methods are used with the descriptive and causal research designs but are occasionally associated with exploratory research. Additionally, quantitative research methods are closely associated with the positivist paradigm (Hair et al., 2010). The aim of quantitative research strategies is to collect numerical data and analyse the relationships between variables. Qualitative research, on the other hand, lends itself more to words than numbers (Bryman and Bell, 2011). Qualitative methods are a set of data collection and analysis techniques that can be used to provide description, build theory and test theory (Van Maanen, 1979). The aim of qualitative research strategies is to understand and interpret social phenomena in their real-life contexts. It is clear that the aim and the actual uses of quantitative and qualitative research methods differ due to the need to answer the 'what, why, and how' type questions.

Mangan et al. (2004) stated that quantitative and qualitative methods are not mutually exclusive in that they can be successfully paired and implemented in logistics research to provide multi-dimensional insights into many management research problems. This pairing is known as "triangulation" and refers to the application of both methodology types used in the study of the same phenomenon (Ghauri and Gronhaug, 2002). The use of different research approaches can overcome potential bias and the sterility of single method approaches (Collis and Husse, 2003).

Methodological triangulation presents a problem at a philosophical level as it leads to conflicts between paradigms (Mangan et al., 2004). Naslund (2002) argues that "it is necessary to use both quantitative and qualitative methodologies if we really want to develop and advance logistics research". Moreover, the use of methodological triangulation is supported by Mentzer and Flint (1997) in order to enable logistics research to approach the level of rigour sought in other areas of business research and to fully understand the phenomena we are trying to research.

However, this thesis is primarily exploratory in regards to the combined use of the qualitative approach (such as semi-structured interviews and structured interviews), and the quantitative approach (questionnaire survey) and this is a useful way of extending the explanatory range of this thesis, while maintaining its exploratory potential. Methodological triangulation is reviewed with regards to their appropriateness and consistency for the research design and will now be discussed in the next section.

5.4. Research Design

The phenomena considered in this study are items or variables, and the resultant constructs of green service quality: logistics service quality; the Thai logistics performance index; and their

relationships. The 18 items prevalent in the literature and discussed in Chapter Four are presented in Table 5-2. Two possible sets of constructs found in the literature were also discussed in Chapter Four. Constructs are unobservable variables which are termed latent, and construct development and the measurement issues of latent variables require a stronger methodological approach within the logistics discipline (Dunn et al., 1994).

Alternative fuels	Order condition
Behavioural aspects	Order discrepancy handling
Choice of partners	Order procedures
Environmental management system (EMS)	Order quality
Externalities	Order releases quantities
Information quality	Personnel contact quality
Logistics system design	Timeliness
Modal choice	Transport management
Order accuracy	Vehicle technologies

Table 5-2: Eighteen Initial Items of Green Logistics Service Quality

Churchill (1979), Churchill and Iacobucci (2010), Malhotra, Birks and Wills (2012), and Dunn, Seaker and Waller (1994), from their respective disciplines of marketing and logistics, together with Spector (1992) have each provided a framework for the development of items and constructs and their validation in marketing and logistics. A three-phase methodology was proposed for these frameworks, as shown in Table 5-3.

To begin with, the domain of the constructs must be defined (Churchill, 1979; Churchill and Iacobucci, 2010; Dunn et al., 1994; Malhotra et al., 2012; and Spector, 1992). The domain of this research includes GSQ, LSQ, TLPs, and relationships. Discussions of the definitions pertaining to each part of the domain are provided in Chapters Two, Three, and Four. Afterwards, items related to the constructs must be generated, and the findings from the literature used to identify the 18 dominant items for the initial investigation and contained in Table 5-3. The third step consists of using a pilot survey to develop and purify the latent variables in the fourth step, prior to conducting the main research in the last step.

This thesis stems from the original framework of Churchill (1979) in order to provide the rigour and relevance sought in logistics research. Phase One, which developed and confirmed the constructs of GSQ and LSQ, will cover steps one and two in Table 5-3. The main study discussed in Chapters Seven and Eight involves the second phase, or steps three and four, whereas Phase Three, which is the validation of the study, represents step five in Table 5-3.

Phase	Churchill (1979) and Churchill and Iacobucci (2010) regarding Marketing	Dunn, Seaker and Waller (1994) regarding Logistics	Spector (1992) regarding Scales	Malhotra, Birks and Wills (2012) regarding Marketing
Phase I	1	Specify domain of construct (literature search)	Define constructs	Develop theory
	2	Generate sample of items (Literature search, experience survey, insight stimulating examples, critical incidents, focus groups)	Develop potential items, check content validity, confirm substantive validity	Design
	3	Collect data	Pilot survey	Pilot test
Phase II	4	Purify measure (coefficient alpha, factor analysis)	Exploratory factor analysis, Item to total correlation	Administration and item analysis
	5	Collect data, assess reliability (coefficient alpha, split-half reliability), assess validity	Test theory, confirmatory factor analysis, reliability, convergent validity, discriminant validity (predictive and concurrent), normological validity	Validate and norm
Phase III				Statistical analysis and develop purified scale
				Select a reduced set of items based on qualitative judgement, collect data
				Evaluate scale reliability, validity and generalisability

Table 5-3: Three-phase Methodology for Item and Construct Development Validation

Source: Churchill (1979); Churchill and Iacobucci (2010); Dunn et al. (1994); Malhotra et al. (2012); Spector (1992)

5.4.1. Scale Development, Reliability and Validity

There are three main criteria for the evaluation of business and management research, namely reliability, replication, and validity (Bryman and Bell, 2011). Reliability refers to the consistency of a concept measurement, whereas validity refers to the extent to which an indicator evaluates a concept in the manner for which it was devised. Malhotra et al. (2012) stressed that there are three classifications of reliability relative to both quantitative and qualitative approaches (shown in Figure 5-1). Test-retest reliability is the first measure used to test the research's reliability as to whether or not a measure is stable over time. For instance, correlation is a measure of the strength of a relationship between two variables, and the higher the correlation coefficient, the greater the reliability. This reliability identifies scale items administered at two different times to the same set of respondents to assess whether the respondents give similar answers.

The second measure is alternative-forms reliability, and is an approach employed for assessing reliability when it requires two equivalent forms of the scale to be constructed. Subsequently, the same participants are measured at two different times. As in the case of test-retest reliability, this reliability test also aims to assess whether respondents give similar answers. The final measure is internal consistency, which assesses the reliability of a set of items, and in which several items are added together to form the total score for the scale (Malhotra et al., 2012). Cronbach alpha (α) is a coefficient of how items in the scale come together. As this study aims to investigate how GSQ competencies are relative to LSQ competencies, the internal consistency will be used to assess the reliability of a set of items, whereas test-retest and alternative forms of reliabilities are not used since the aim of this study is not to determine whether or not a measure is stable over time or two equivalent forms of the scale can be constructed.

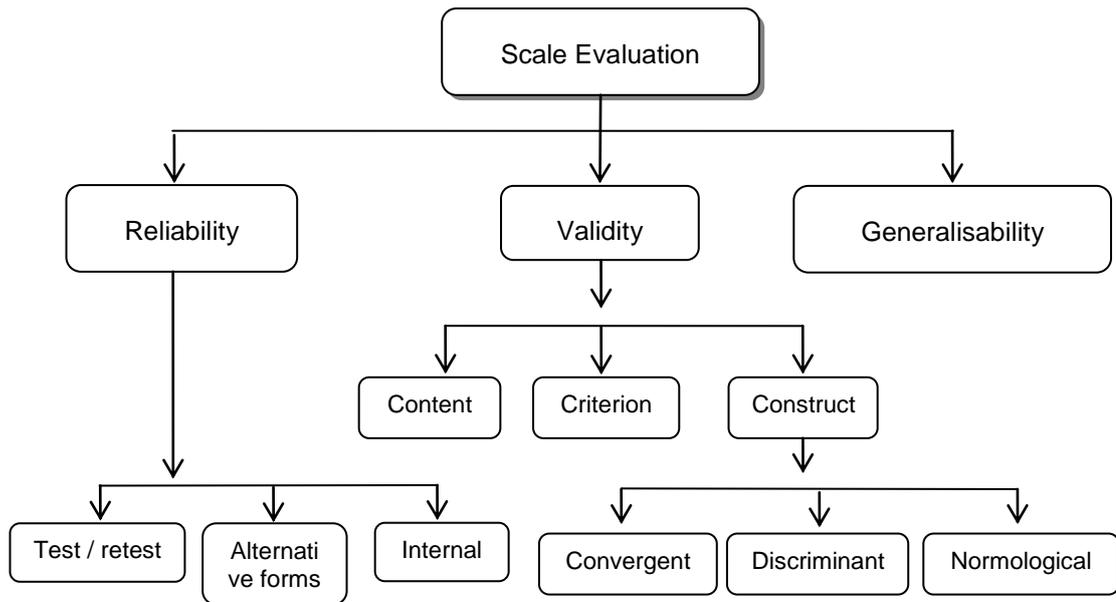


Figure 5-1: Scale Evaluation

Source: Malhotra et al. (2012: p. 432)

To validate the qualitative method, LeCompte and Goet (1982 cited in Bryman and Bell, 2011) stated that internal and external validity have been used to facilitate a good match between observations and theoretical ideas, and also the degree to which findings can be generalised across the social setting respectively. At the same time, five ways of establishing validity are explored in the context of a quantitative approach, namely: face validity; concurrent validity; predictive validity; construct validity; and convergent validity. However, Malhotra et al. (2012) suggested three types of validation (as seen in Figure 5-1) and these are: content validity, criterion validity, and construct validity.

Content validity is a type of validity which is sometimes referred to as face validity. It is a subjective but systematic evaluation of how well the content of a scale represents the measurement task at hand, while criterion validity examines whether the measurement scale performs to expectations as a meaningful criterion. The last one is construct validity and addresses the question of whatever a construct is measuring (Malhotra et al., 2012). Criterion validity is a type of validity used to show accurate inferences from test scores to a related behavioural criterion of interest. This validity measure can be considered in the context of predictive validity or concurrent validity. Construct validity concerns the theoretical relationship of a variable to other variables (Cronbach and Meehl, 1955). To assess the construct validity, convergent validity, discriminant validity, and normological validity are measured.

Convergent validity is the extent to which the scale correlates positively with the other measurements of the same construct (Malhotra et al., 2012). There are several ways to estimate the relative amount of convergent validity but for this research the factor loading,

average variance extracted (AVE), and composite reliability value will be used. Factor loading, or the size of factor loading, is an important measurement. High factor loading would indicate high convergent validity. A good rule of thumb is that the standardised loading estimate should be .5 or higher and ideally .7 or higher. AVE is the mean variance extracted for the item loading on a construct. Ideally, AVE should be .5 or higher but .4 is moderate and acceptable.

Discriminant validity is the extent to which a construct is distinct from other constructs. High discriminant validity is enough evidence to show that a construct is unique. In general, discriminant validity requires that AVE is higher than the average shared variance (ASV) as this suggests good validity (Hair et al., 2010). Normological validity is the extent to which scale correlates in theoretically predicted ways with other distinct but related constructs.

Lastly, generalisability refers to the extent to which one can generalise from the observations at hand to a universe of generalisations. Cronbach et al. (1963: p. 44) stated that the basic concept of generalisability is that “an investigator asks about the precision of reliability of a measure because he/she wishes to generalize from the observations in hand to some class of observations to which it belongs”. In this thesis, the scales developed are based on a single data set from the logistics industry, and the researcher can generalise the scales to other industries.

5.4.2. Triangulation

Triangulation refers to the use of different research approaches, methods and techniques in the same study, and can overcome the bias and sterility of single method approaches (Hussey and Hussey, 1997). Naslund (2002) pointed out that “it is necessary to use both quantitative and qualitative methodologies if we really want to develop and advance logistics research”. Triangulation can successfully operate within and across research strategies. This is in line with Mentzer and Flint (1997), who also supported the use of different methodologies in logistics research into the true nature of phenomenon. Moreover, triangulation can also be used to refer to a process of checking the validity of findings derived from qualitative and quantitative research (Bryman and Bell, 2011). Triangulation can be classified into four different types of triangulation (Mangan et al., 2004):

- Data triangulation where data is collected at different times or from different sources
- Investigator triangulation where different people collect data on the same situation or data, and then the results are compared
- Methodological triangulation where both quantitative and qualitative techniques are used

- Triangulation of theories where a theory from one discipline is used to explain a phenomenon in another discipline

Even though combining quantitative and qualitative methods in one research project leads to a conflict of paradigms, some researchers believe that the use of quantitative and qualitative methodologies will provide a middle ground between the contrasting positivist and phenomenological paradigms and perspectives. Many researchers strongly encourage using several methods and methodologies (Mangan et al., 2004; Saunders et al., 2007).

In this research, methodological triangulation is used to validate the findings of the quantitative research (questionnaire survey) with the qualitative research (semi-structured interview and structured interview). Three-phase methodological triangulation research is employed to investigate how a Thai logistics service provider’s overall performance is dependent upon LSQ and GSQ, as shown in Table 5-4. From a philosophical perspective, this research will attempt to view the issues under investigation from both positivist and interpretivist perspectives, rather than from either extreme viewpoint alone.

Phase One (inductive)	Semi-structured interview with eight key actors in the top management level in LSPs, and LSP customers	<u>Expected output:</u> confirm the GSQ constructs and any other green issues
Phase Two (deductive)	<ul style="list-style-type: none"> – Questionnaire development from Phase One results and a pilot survey with six participants from academia, international organisation, and business – Questionnaire survey to two respondent groups: LSPs and LSP customers 	<u>Expected output:</u> the GSQ and LSQ constructs; and their relations affect TLPIs
Phase Three (inductive)	Structured interview with fifteen key actors in academia, LSPs, and LSP customers	<u>Expect output:</u> validation of Phase Two findings

Table 5-4: Three-Phase Triangulation Methodology

5.4.3. Secondary Analysis and Official Statistics

The primary and secondary data can be used to conduct the research study; however, the researcher occasionally chose to use secondary data rather than primary data because of the costs involved. A large amount of business and management data has been collected by marketing firms, professional associations, and several others. This data can be used to help the researcher when analysing further business insights. Though the secondary data may come with many advantages, some of the disadvantages of the secondary data are still one of the research’s limitations, as shown in Table 5-5. It is, however, obvious that using the

secondary data can not only help the researcher to reduce cost but it also seems to consist of high-quality data.

Advantages of Secondary Data	Disadvantages of Secondary Data
Easily accessible, relatively inexpensive and quickly obtained	Objectives and methods used to collect the secondary data may not be appropriate to the current situation
Helps to interpret primary data with more insight	May be lacking in accuracy
Validate qualitative research findings	Complexity of the data
High-quality data	No control over data quality
An opportunity for longitudinal analysis	Absence of key variables
When large samples are the source of data, a subgroup of individuals or subset of questions can be analysed	
Opportunity for cross-cultural analysis	

Table 5-5: Advantages and Disadvantages of the Secondary Data

Source: Bryman and Bell (2011); Malhotra et al. (2012)

Secondary data may be divided into either internal or external data. Internal data is mostly generated within the organisation or firm upon which the study is focused, while external data is that generated by sources outside the focal organisation. This data might exist in a form of published data, online databases, or information created by syndicated services. This thesis is conducted on the generalisation of the LSPs and the green service quality among LSPs' customers' industries. Most of the secondary data is published secondary data and is taken from government sources and general business sources, as shown in Figure 5-2.

The government sources originate from the country's statistical office, which produces lists of the publications available. The publications may be divided into census data and other publications (Malhotra et al., 2012). The government publications for this research study are from Thailand and other regions' statistical databases, policies related to the environment and sustainability, and logistics development. Furthermore, the general business sources consist of information in the form of books, periodicals, journals, reports, and trade literature. The sources of the data are available as guides, directories, indexes, and statistical data. Furthermore, the database lists of LSP companies and LSP customers' companies come from this kind of published secondary data, as discussed in the next section as the research populations and samples.

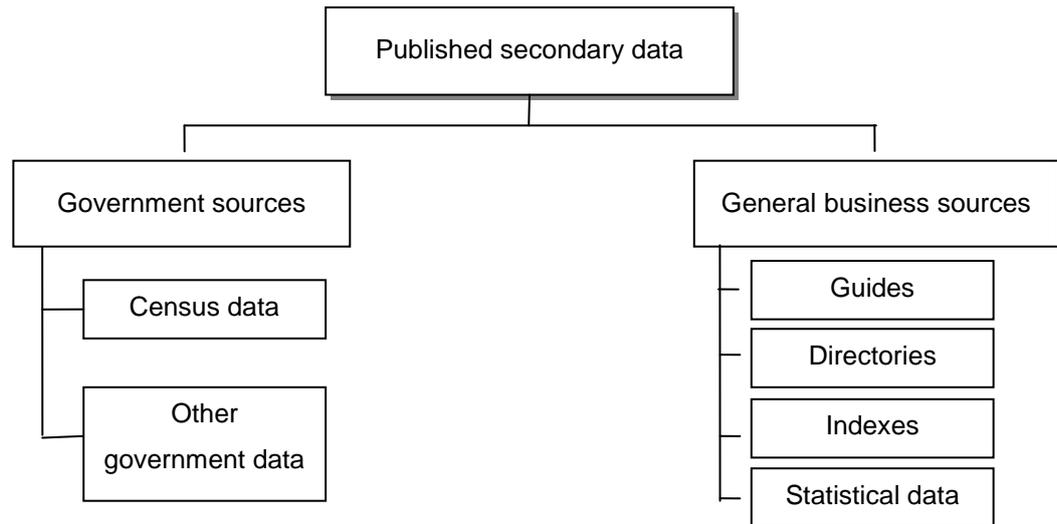


Figure 5-2: A Classification of Published Secondary Data

Source: Malhotra et al. (2012: p. 125)

5.4.4. Unit of Analysis

Regarding the main research objective of this research study, which is the relationships between LSQ, GSQ, and a Thai LSP's overall performance, one of the contributions of the research study is to provide practical direction and guidance on how logistics service providers can focus on GSQ to compete with their rivals. That means it presents the position or/and gap between GSQ and LSQ based on the perceptions' of LSPs and LSPs' customers. Therefore, the population of this research consist of LSPs and LSPs' customers in Thailand.

5.4.4.1. LSPs Population

Bangkok, and Central and Eastern Thailand are the largest areas in which LSPs provide their services to customers. This amounts to 86% of the total LSP services in Thailand (NESDB, 2011). Moreover, manufacturers located in the eight industrial parks in Central and Eastern Thailand will not only receive an incentive from the Thailand Office Board of Investment, but will also benefit in other ways, such as through existing infrastructure and access to a large transportation network to deliver goods to customers. This thesis will be based on a geographical sample of LSPs and their customers operating in Bangkok, and Central and Eastern Thailand.

With regard to the statistics of NESDB (2011), 82.6% of the total volume of freight transported in Thailand is delivered by road transportation, whereas inland waterway is the second most common mode of transport chosen by firms to deliver their goods, accounting for 9.5% of the total volume of freight transported. This group is not only significant to Thailand's

competitiveness in the ASEAN Economic Community (AEC), but is also important to its economy. Regarding Figure 3-4, in section 3.2.2.1, the population of this study is one of LSPs providing transportation services located in the areas of Bangkok, and Central and Eastern Thailand, representing 51, 24, and 11 percent of the total number of LSPs in Thailand, respectively, whereas the number of LSPs involved in transport activities in Thailand (shown in Figure 3-3, section 3.2.2.1) is 12,151 business firms. It is found that at least 86 percent of LSPs in Thailand are located in Bangkok, and Central and Eastern Thailand. That means this amount can represent the overall number of LSPs in Thailand. Therefore, the population numbers are calculated from the LSP statistics shown in section 3.2.2.1, as follows:

$N = \% \text{ of (LSPs in Bangkok + Central + Eastern Thailand) } * \text{ No. of LSPs involved in transport activities}$ $= (51\%+24\%+11\%)*12,151 \qquad = 10,450$
--

Consequently, the population of this study is 10,450 LSPs that have been registered with the Thai Ministry of Commerce, and the Department of Business Development. However, regarding the focal populations, a sampling list will be selected from the database of the Thai Transportation and Logistics Association and Export-Import Transportation Guide. The number of LSPs involved in transport activities will be 221 and 190 companies, respectively.

5.4.4.2. LSPs' Customer Population

The Bank of Thailand (BOT, 2015) expressed that the growth of the Thai economy is affected by five key factors, as follows: 1) a gradual improvement in the export sector in line with the recovery of the global economy; 2) the recovery of private investment and the tourism sector; 3) an expedition of public expenditure and investment; 4) the recovery of car sales and production; and 5) the decline in the crude oil price.

OECD (2005) defined year on year (YoY) thus: "Year-on-year growth rates are rates of change expressed over the corresponding period (month or quarter in relation to the frequency of the data) of the previous year". With regard to the annual economic review, in which 2014 is presented by BOT (2015), the manufacture of products continues to increase due to the recovery of global demand, as shown in Table 5-6. It was found that the export value of product manufacture has grown by 3.1 percent YoY. However, there is not only positive growth in industries such as apparel, chemical products, machinery and parts, and television and radio equipment, but there are also the industries experiencing contraction at a decelerated pace, such as automotive, petroleum products, food and beverages, and textiles.

Export Major Products	2013 (%YoY)	2014 (%YoY)	Q 4 - 2014 (%YoY)
Manufacturing	1.8	0.1	3.1
Food and beverage products	-2.6	-2.5	1.8
Electronics	-0.8	1.8	6.6
Automotive	7.6	0.1	3.3
Petro-chemical and petroleum products	1.8	-2.4	-8.9
Metal and steel	-5.5	-11.2	5.9
Apparels and textile materials	3.6	-0.3	-0.2

Table 5-6: Thailand Export Value of Major Products (2013-2014)

Source: Bank of Thailand (2015)

Considering the Thai export market, it was found that Thai exporters supplying major markets such as the US, EU (15) and ASEAN (9) expanded in the fourth quarter of year 2014, as shown in Table 5-7. Exports to the US grew by 7.2 percent, accelerating from 3.4 percent in the third quarter of 2014, which is in line with the US economic recovery. Moreover, the exports to the EU grew by 1.7 percent, decelerating from 2.0 percent in the quarter, reflecting the deceleration of the European economy. Exports within ASEAN grew by 5.2 percent, accelerating from 1.1 per cent in the previous quarter. Furthermore, exports to Australia increased for the first time in six quarters (from the third quarter of 2013 to the fourth quarter of 2014) by 14.6 percent, compared with a 14.4 percent contraction in the third quarter of 2014 due to an expansion in automotive and parts exports. However, exports to Japan and China continue to contract by 0.6 and 15.3 percent respectively due to the economic slowdown in Japan and China. Similarly, exports to Hong Kong have contracted by 1.8 percent.

(%YOY)	2013					2014								Shared Q4/14
	Year	Q1	Q2	Q3	Q4	Year	Q1	Q2	Q3	Q4	Oct	Nov	Dec	
United States	0.7	0.8	-3.5	0.6	5.2	4.1	0.6	4.9	3.4	7.2	6.4	2.7	13.2	11.0
Japan	-5.2	1.5	-6.3	-10.1	-5.5	-1.9	0.7	-6.4	-1.0	-0.6	4.1	-10.7	5.9	9.4
EU (15)	2.7	7.0	-5.3	3.3	6.2	4.7	4.8	10.9	2.0	1.7	8.5	-5.2	1.4	9.1
China	1.4	7.3	-13.4	-0.4	12.9	-7.9	-4.5	-4.2	-6.3	-15.3	-7.8	-18.7	-18.8	11.3
ASEAN (9)	5.0	5.9	2.4	10.8	1.2	0.2	-5.4	-0.1	1.1	5.2	7.2	9.0	-0.6	26.4
Australia	6.0	33.6	16.3	-5.5	-10.7	-10.1	-17.4	-20.3	-14.4	14.6	16.0	24.0	4.5	4.6
Hong Kong	0.7	11.2	7.7	-1.4	-12.0	-4.4	-1.8	1.7	-13.5	-1.8	2.9	1.8	-9.5	5.1
Korea, South	-4.0	-2.2	9.8	-16.3	-6.8	-1.5	-13.3	-3.9	11.7	1.8	-8.1	-5.9	21.2	1.9
Total Exports (Customs basis)	-0.3	3.9	-2.2	-1.7	-1.0	-0.4	-1.4	-0.0	-1.8	1.6	4.0	-1.0	1.9	100.0
Exports, f.o.b. (BOP basis)	-0.2	4.1	-1.9	-1.8	-0.9	-0.3	-1.1	0.3	-1.7	1.5	4.1	-1.8	2.3	98.7

Table 5-7: Thailand Export Value of Major Countries

Source: Bank of Thailand (2015)

From the reasons for the movement of export products from Thailand to the major countries, it appears that transport activity plays an important role in international trade and its growth. Thus, the five major export industries are more important as one of the key customer groups for logistics companies. The Department of Industrial Works and the Thailand Ministry of Industry (2015) stated that there are approximately 41,835 factories in the five major export industries registered with the Department of Industrial Works, as shown in Table 5-8. It is clear that the largest number of factories registered is within the metal and steel industry, followed by automotive and auto parts, food and beverage products, apparels and textile materials, and electronics industries, respectively. However, this number covers the entirety of the factories in the five major industries in Thailand, not only those within the focal scope of research in Bangkok, and Central and Eastern Thailand. To pinpoint the specific research areas, a list of LSP customers has been selected from the database of the Thailand Office of Board of Investment's Eastern Region Investment and Economic Centre, and the Federation of Thai Industries, Central and Eastern Regions. The numbers of companies in the five major industries from the two databases are 590 and 723, respectively.

Industry	No. of factories (factory)	Investment Funds (Million Baht)
Food and beverage products	8,975	622,763.67
Apparels and textile materials	5,397	200,162.79
Metal and steel	14,169	566,045.57
Electronics	2,822	399,291.01
Automotive and auto parts	10,472	510,267.51
Total	41,835	2,298,530.55

Table 5-8: Number of Factories and Investment Funds in Five Major Export Industries

Source: Department of Industrial Works, Thailand Ministry of Industry (2015)

5.5. Research Method: Phase One

In Phase one, the GSQ and LSQ items of this research were defined, developed, and confirmed through semi-structured interviews. There are two main types of interview. The first is structured interviews or survey research, and is used on the fixed-response categories and combined with quantitative data analysis. The second type is unstructured interviews, where the respondents are given almost full freedom to discuss opinions and behaviours on the particular issues (Ghauri and Gronhaug, 2002). However, the semi-structured interview type is discussed in the literature as being the same as the previous two types of interviews mentioned. Regarding semi-structured interviews, a researcher handles bias through the

careful design of techniques. Semi-structured and unstructured interviews obtain information concerning attitude and value-laden materials which differs from the information gained through structured interviews (Ghauri and Gronhaug, 2002). In addition, an in-depth interview offers a more accurate and clear picture of a respondent's position or behaviour. With the purpose of Phase One being to confirm the items of GSQ and LSQ in the context of the Thailand logistics industry, a semi-structured interview is selected as an approach for this phase.

5.5.1. Semi-structured Interview Protocol Development

Figure 5-3 presents the interview protocol development and there are six processes. Starting at the first stage (specify the information needed), the researcher will decide upon the information to be sought. According to the expected outcome from Phase One, which is to confirm the GSQ constructs and any other green issues, the researcher should specify which interview method is suitable for the answers or expected outcomes (the second stage). There are the GSQ constructs from the literature, as well as the semi-structured interview, which was selected as this type of interview will not only lead the researcher to the right answers, but also allow for the extension of questions relating to the research answers. The third stage involves the individual question content, the researcher's previous decisions such as information needed, and methods of administration which largely control the decisions regarding individual question content, but the researcher should ask some additional questions. Stages Four to Six will discuss the most appropriate wording for each question and also the order of questions in the interview protocol. By following the interview protocol development, the semi-structured interview protocol has been completed as shown in Appendix 2.

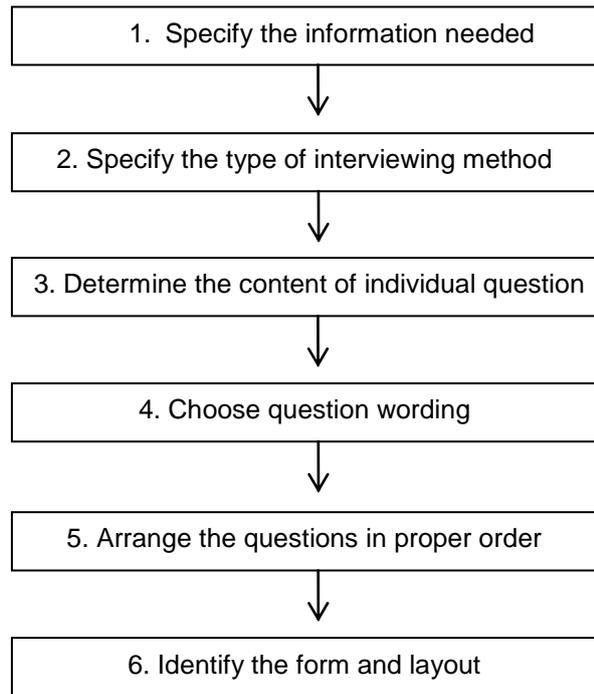


Figure 5-3: Interviews Protocol Development

Source: Adapted from Malhotra et al. (2012)

5.5.2. Sampling

Teddlie and Tashakkori (2009) proposed two types of sampling technique, the purposive or non-probability technique, and the probability sampling technique. Differences among these techniques are described in Table 5-9. It was found that purposive (or non-probability sampling) serves a similar overall purpose to probability, except it focuses on the depth of information generated by the cases suitable to the objective of Phase One to confirm the items of GSQ and LSQ in the logistics industry. Moreover, the probability sampling is large in order to establish a representative difference from that of the purposive sampling, which generally uses typically small cases to analyse the data.

Dimension of Contrast	Purposive (Non-probability) Sampling	Probability Sampling
Overall purpose of sampling	To generate a sample that will address the research questions	To generate a sample that will address the research questions
Issue of generalisability	Seeks a form of generalisability (transferability)	Seeks a form of generalisability (external validity)
Rational for selecting cases/units	To address specific purposes related to the research question; selection of cases deemed most informative in regard to the research question	Selection of cases that are collectively representative of the population
Sample size	Typically small (usually 30 or fewer cases)	Large enough to establish representativeness (usually at least 50 units)
Depth/breadth of information per case/unit	Focuses on depth of information generated by the cases	Focused on breadth of information generated by the sampling units
Time of sample selection	Before the study begins, during the study, or both	Before the study begins
Selection method	Uses expert judgment	Often applies mathematical formulas
Sampling frame	Informal sampling frame somewhat larger than sample	Formal sampling frame typically much larger than sample
Form of data generated	Focuses on narrative data, though numeric data can also be generated	Focuses on numeric data, though narrative data can also be generated

Table 5-9: Comparisons Between Purposive and Probability Sampling Techniques

Source: Teddlie and Tashakkori (2009: p. 179).

The purposive sampling is selected in this phase however, an appropriate purposive sampling technique is still to be selected for Phase One. There are four main types of purposive sampling technique used to gather the qualitative data, as shown in Table 5-10. It can be seen that the main criteria for classifying the advantages of each technique are cost, time, researcher's convenience, and also the purpose of the sample selection. With one of the main advantages of in-depth interviews being that a clear picture of a respondent's position or behaviour is gained, the sampling techniques of the research in this phase are the judgmental sampling and snowball sampling techniques.

Non-probability (Purposive) Sampling Techniques	Details	Advantages
Convenience sampling	A simple technique which was available to the researcher by virtue of its accessibility	Least expensive and time consuming, most convenient
Judgemental sampling	A form of convenient sampling based on the judgement of the researcher	Low cost, convenient and not very time consuming. This kind of sampling is subjective and its value depends on the researcher's judgement.
Snowball sampling	A form of convenient sample but with this method, the researcher was able to make initial contact with a small group of people relevant to the research topic and use these to make contact with others	Can estimate rare characteristics.
Quota sampling	A form is to produce a sample reflecting a population in terms of the relative proportion of people in the different categories. It is mostly used in commercial research such as marketing research and political opinion polling.	Sampling can be controlled for certain characteristics.

Table 5-10: Advantages of Non-probability Sampling Techniques

Source: Bryman and Bell (2011); Malhotra et al. (2012)

Regarding the main objective of the Phase One process, which is to confirm the items of GSQ and LSQ in the context of the Thailand logistics industry, the opinions and perceptions of the respondents in this phase seem vital and valuable. The researcher was introduced by an expert in the logistics field to a list of the potential interviewees who would most likely offer valuable data and also their practices and lessons learnt in their own business. Following the suggestion made by the snowball sampling technique, judgemental sampling is used to form the samples of the research in Phase One. In Phase One, the sampling is selected using the judgmental sampling and snowball sampling. Using the researcher's experience of logistics, the researcher selected a professional logistics expert as the first contact and the first of the samples. As a well-known person in both academic and business circles in Thailand, the list of the potential participants in the top management level is accurate and trustworthy. Subsequently, the eight participants have been selected on personal advice as a snowball sample, and also based on the reputation of the companies in logistics, for collecting data in this phase. Although the sample size is small with just eight participants, it is possible to conduct in-depth personal interviews at an average of one every hour to an hour and thirty

minutes. With the advantages of the snowball and judgemental sampling technique, the results from interviewing the respondents provide fairly rich data. In addition, the snowball sampling technique, and the judgemental sampling technique are used to form the samples of the research in Phase Three as in Phase One; however, the number of participants in Phase Three is higher than in Phase One.

5.5.3. Data Collection and Data Analysis

It appears that focus groups offer more benefits and advantages than in-depth interviews for many reasons. For example, a well-conducted focus group interview can provide hugely important insights that one-on-one in-depth interviews may be not able to generate. It is used to gain insight into a great variety of problems, and respondents' ideas and experiences can increase the productivity of the discussion (Parasuraman et al., 2004). Though one of the strengths of focus groups is that they are valuable for documenting major crises/conflicts and encourage cooperation and collaboration, interviews are more useful for uncovering participants' perspectives than focus groups (Marshall and Rossman, 2011).

Table 5-11 presents the differences between the in-depth interview and focus group methods. It shows that in-depth interviews allocate time per respondent in a similar fashion and that it is easier to deal with respondents regarding sensitive topics, such as cost, or other projects supporting green or service quality, which are the main issues of this research study. Moreover, most respondents in this phase are at the executive management level, and it is quite difficult to arrange a meeting or group discussion; therefore, in-depth interviews seem more appropriate for Phase One. However, the lack of interaction among the respondents may be one of this research technique's limitations as group discussion is likely to raise some important issues.

Factor	In-Depth Interviews	Focus Groups
Time	<u>Interviews</u> : substantial amount of time per respondent <u>Analysis</u> : substantial amount of time for analysing large volumes of information	<u>Interviews</u> : normally takes 1 ^{1/2} to 3 hours for the whole group <u>Analysis</u> : group analysis takes a lot less time
Group dynamics	No group interaction and probing depends on the interviewer	Main strength of focus group is that it allows for the exchange of ideas and peer influence may affect responses
Topic sensitivity	May be easier to deal with sensitive topics	Respondents may be embarrassed to reveal their feelings unless brought out by other respondents
Time for the topics	In-depth probing of each respondent is possible	Limited time for each respondent
Geographic constraints	Respondents can be drawn from geographically dispersed locations	Geographic constraints exist as respondents can be drawn only from an existing focus group facility
Domination of individuals	Everybody is given a similar amount of time	Some individuals tend to dominate
Logistics	Easier to schedule interviews	Recruiting and running several focus groups in multiple locations is ungainly

Table 5-11: Differences between In-Depth Interviews and Focus Group

Source: Parasuraman et al. (2004: p. 217)

Regarding the three-phase methodology for items and constructs development from Churchill and Iacobucci (2010), the items of GSQ and LSQ have been developed and confirmed in Phase One using the semi-structured interviews method. Phase One has four steps of data collection, as shown in Figure 5-4, starting with the preparation of an interview guide and interview protocol. The interview protocol is developed from the 18 items found in the literature, as shown in section 4.3. This protocol contains open-ended questions used to extract the respondents' opinions on the GSQ, LSQ, and their relations (shown in Appendix 2). Sampling selection and interviewing appointment are the next step of this phase. As mentioned in section 5.5.2, the sampling techniques used are the judgemental sampling and snowball sampling within the purposive sampling to select the samples. Most respondents are in the executive management levels and have a responsibility to pursue the company's vision and strategies. That means their opinions, comments, and suggestions are rich data for confirming the items of GSQ and LSQ in the context of Thailand. Each interview appointment is scheduled at a place and time from May to August 2013.

After making the appointment with each interviewee, the interviews are conducted as scheduled in the third step. This step not only provides richness of data from the elite

respondents but also confirms the items of GSQ and LSQ which are used to develop a questionnaire protocol in Phase Two. Transcripts, coding and analysis are the last steps in this phase used to confirm the items of GSQ, LSQ, and their relationships before continuing on to Phase Two (the questionnaire survey), which is the main research study.

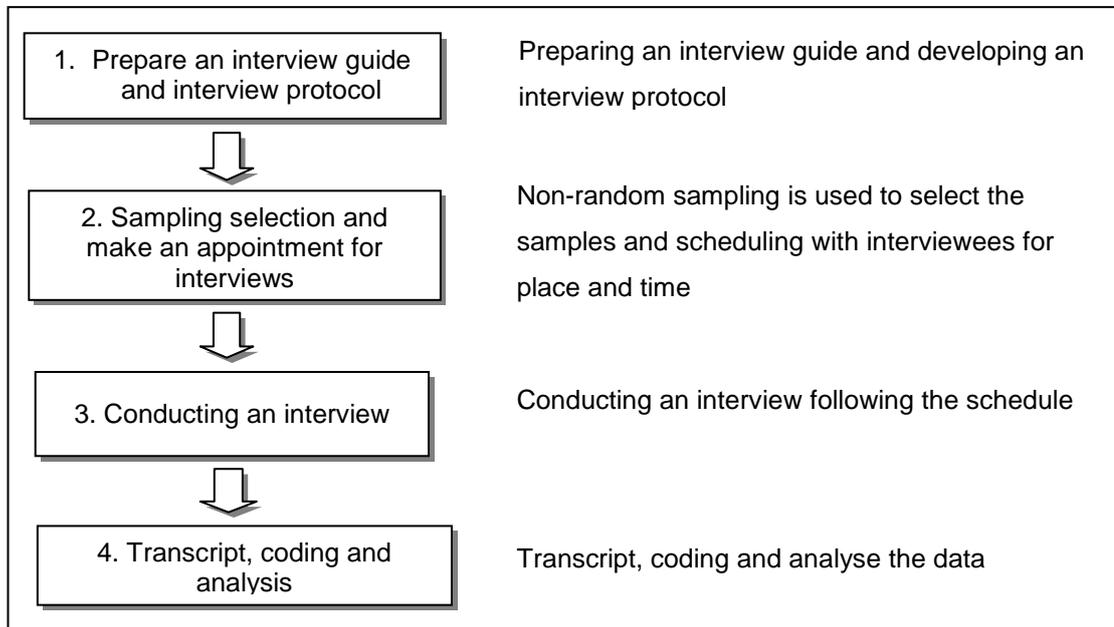


Figure 5-4: Data Collection processes in Phase One

Source: Adapted from Churchill and Iacobucci (2010)

Table 5-12 presents the details of interviewees from Phase One, combined with his/her responsibilities in the company, and the time and place of the interviews. These interviewees are at the executive management level and come from national and international companies in the logistics industry, and the main five export industries in Thailand. The average time spent with each interviewee is about 60 to 90 minutes and covers three main open-ended questions. After completing this phase, the items of GSQ and LSQ are confirmed and developed into the survey questionnaire protocol in the next phase.

Case	Details of interviewees	Stakeholders	Time	Place
L-11	Managing Director from LSP company	Logistics	31/05/2013	company
L-12	Managing Director from LSP company	Logistics	04/06/2013	company
L-13	Managing Director from LSP company	Logistics	20/06/2013	company
L-14	Vice President, Thai Transportation and Logistics Association (TTLA)	Logistics	21/06/2013	TTLA
C-11	Chairman, Thai National Shippers' Council (TNSC)	Customer	30/05/2013	TNSC
C-12	Manager from automotive company	Customer	12/06/2013	company
C-13	CEO & Managing Director from animal-feed producer	Customer	25/06/2013	company
C-14	Manager from retail company	Customer	17/07/2013	company

Table 5-12: Details of Interviewees from Phase One

Note: L = LSP, C = LSP customer; for example L-11 meant participant 1 from LSP company in Phase One.

For the processes of data analysis, there are four steps in the qualitative approach (Ghauri and Gronhaug, 2002; Malhotra et al., 2012). These steps are applied to Phase One (semi-structured interviews) and Phase Three (structured interviews), as shown in Table 5-13. Starting with the data assembly, the primary and secondary data is gathered from a variety of sources such as interview transcripts and documents produced by the participants. This is followed by the data reduction step, which involves handling the data which was organised or disregarded. Data coding is done in this step just as in the classified categories. Data display and data verification are the last two steps of data analysis for analysing and presenting the results. After confirming the items of GSQ, LSQ, and its relationship, the result from Phase One are used to develop the questionnaire protocols for both LSPs and LSPs' customers, which are presented in the next section (5.6: Research Method: Phase Two).

Data analysis processes	Details of the analysis in Phase One
Data assembly	Data inputs are collected through in-depth interviews
Data reduction	This involves organising and structuring the data by disregarding some data. This part refers to the process of selection, focus, simplification, abstracting, and transforming the data which appears in transcriptions.
Data display	To refer to an organised, compressed assembly of information that permits the outlining of conclusions and taking action. It is in the form of a data matrix and figures.
Data verification	The drawing of conclusions is in the understanding and becoming able to explain the actual phenomenon

Table 5-13: The Process of Data Analysis - Phase One

Source: Adapted from Ghauri and Gronhaug (2002) and Malhotra et al. (2012)

5.6. Research Method: Phase Two

Regarding Churchill (1979) and Churchill and Iacobucci (2010) from Table 5-3 in the previous section, the data collection and purity measurements are taken in Phase Two of the three-phase method for item and construct development validation. This phase is the main study of the research project. This section comprises the components of the research hypotheses model, sampling selection, non-response bias, translation and back translation, data collection and analysis, which were presented respectively.

5.6.1. Questionnaire Protocol Development

The questionnaire survey is used for investigating the research questions from Phase Two. Six stages of the protocol development from Figure 5-3 are adapted for developing the questionnaire survey protocol. The outcome expected from this phase is the GSQ and LSQ competencies, and the effect of their relations on TLPIs. The process of the questionnaire protocol development is quite similar to the semi-structured interview protocol development, but the differences between these two protocols lie in the type of questionnaire used and the method of administration. This stage requires decisions about the structure and disguise to be used in the questionnaire and whether the survey will be administered by email or fax or be paper-based. The questionnaire protocol is developed from the results of Phase One, where GSQ constructs and any green issues are raised by the participants in that phase. Question structure, question wording, and the form and layout are decided and selected for the samples.

5.6.2. The Components of Research Hypotheses Model

Based on the literature reviewed in Chapters Two, Three, and Four, this section presents the hypothesised model and hypotheses developed for the study. It explains the effects of each hypothesis as well as the rationale underlying the related hypotheses of the theoretical framework, based on the research questions. The hypotheses are theoretically deduced and supported by previous theoretical and empirical studies. The main effects of the related hypotheses and their supported arguments for GSQ and LSQ are discussed in two separate sections, 5.6.2.1 to 5.6.2.3, as shown in Figure 5-5.

5.6.2.1. Green service quality and replicated hypotheses

As mentioned in the previous chapters, there is some research which focuses on the effect of GSQ on LSPs' performance. It appears these studies looked at the overall performance or the World Bank LPIs only. With the special context of Thailand, which developed its own TLPIs, referred to as TLPIs, the hypotheses are set up to investigate the relationship and effects among GSQ and TLPIs, as shown in Figure 5-5.

Regarding Figure 5-5, the 28 items have been developed from the studies of Martinsen and Björklund (2012), Martinsen and Hüge-Brodin (2014), and Elkington (1998), which were presented in section 4.3, and the results from the semi-structured interviews in the Phase One. However, respondents are asked to consider the importance of GSQ variables affecting the logistics service that they (LSPs) provide or they (LSP customers) perceive by selecting a point on a seven-point Likert scale with 1 being 'not at all important' and 7 'very important'. Respondents are also asked to rate the perception of the performance (TLPIs) they (LSPs) provide or they (LSP customers) perceive by selecting a point on a seven-point Likert scale with 1 being 'lowest score of performance' and 7 being 'highest score of performance'.

H1: Perceptions of GSQ constructs (28 items) positively affects TLPIs (5 items).

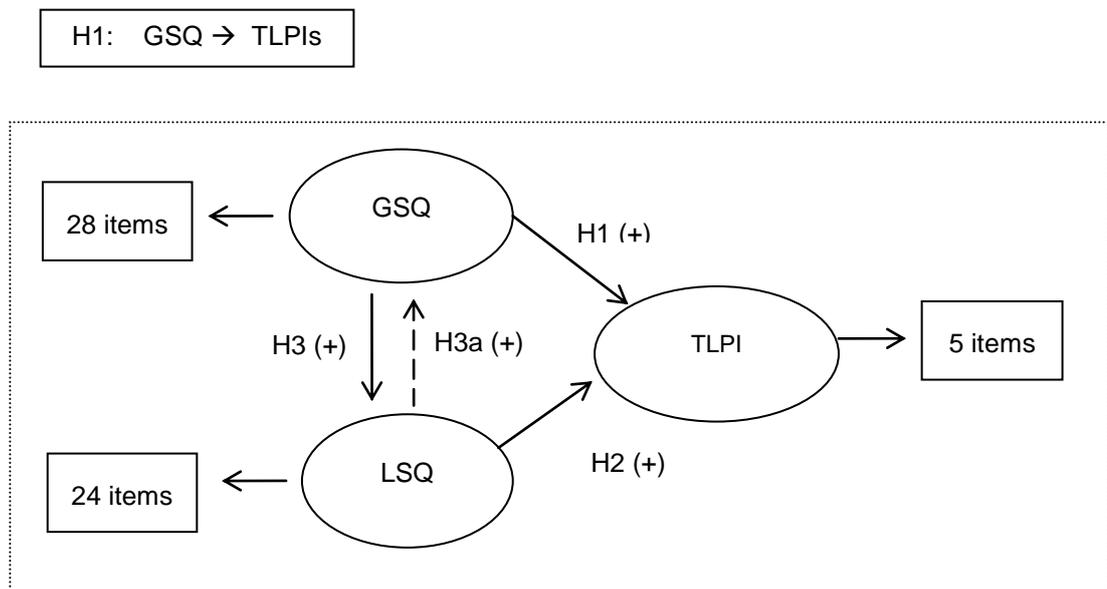


Figure 5-5: Research Hypotheses

5.6.2.2. Logistics service quality and replicated hypotheses

The concepts of LSP's LSQ competencies are found in the literature in Chapter Four. Several LSQ studies have been conducted, but most of them focus on the expectations and perceptions of LSPs, either based on the decision of LSP selection or factors affecting customer satisfaction. However, there is a lack of studies investigating the performance of LSP's LSQ. Regarding Figure 5-5, the 24 items are developed from the studies of Grant (2003) and Jaafar (2006), which are presented in the previous section, 4.3. Moreover, respondents are asked to consider the importance of the LSQ variables affecting the logistics service that they (LSPs) provide or they (LSP customers) perceive, by selecting a point on a seven-point Likert scale with 1 being 'not at all important' to 7 'very important'. Furthermore, respondents are also asked to rate the perception of the performance (TLPs) they (LSPs) provide or they (LSP customers) perceive by selecting a point on a seven-point Likert scale with 1 as 'lowest score of performance' to 7 as 'highest score of performance'. All 24 items of LSQ were found in the literature and the semi-structured interviews in Phase One that positively affect TLPs.

H2: Perceptions of LSQ constructs (24 items) positively affects TLPs (5 items).

H2: LSQ → TLPs

5.6.2.3. GSQ, LSQ, TLPs and replicated hypotheses

Accordingly, in answering the third research question, the hypotheses concerning the relationships among the GSQ constructs, LSQ constructs, and Thai LPIs are set and tested as shown in H3 below (seen in Figure 5-5).

H3: Perceptions of GSQ constructs (28 items) positively affects TLPs through LSQ constructs (24 items).

H3: GSQ → LSQ

The similarities and differences between GSQ, LSQ, and TLPI items in the perceptions of LSPs and LSPs' customers have to be measured as well. The results from this phase do not only answer the research questions, but also present a gap analysis of green logistics service quality between LSPs and LSPs' customers. It helps LSPs to understand how they may focus on GSQ to achieve a better performance level, which is important to customers, and hence offers more competitiveness with rivals. Similarities and differences in expectations and

perceptions of the main relationships also provide guidance for LSPs to reduce their LSQ gap with customers and increase their capabilities to achieve higher customer satisfaction (Chaisurayakarn et al., 2014).

5.6.3. Sampling Selection

The probability sampling technique is generally used in quantitative research. Table 5-14 presents the advantages of probability sampling techniques. There are four probability sampling techniques used to select the sampling. How and which criteria did the researcher use to choose a probability sampling technique for the research? Details and advantages of each probability sampling technique are presented as the criteria to choose a sampling technique which fits with and represents the population of the research. Stratified random sampling (SRS) seems the most basic of the probability sampling techniques, while the systematic sample is directed to the frame of sampling. SRS and cluster sampling appear suited to the selection of subgroups.

In Phase Two, stratified random sampling is used for the sampling selection. According to the two population groups of this research, which are LSPs and LSP customers, the sampling selection of each group is randomly separated. The list of LSPs for sampling is prepared from two databases: the database of Thai Transportation and Logistics Association; and that of Export-Import Transportation Guide. The number of LSPs in the transport industry from the two databases is 441 companies. In addition, the list of LSP customers is prepared from the two databases which are: the database of Thailand Office of Board of Investment (BOI), Eastern Region Investment and Economic Centre; and that of the Federation of Thai Industries, Central and Eastern regions. The number of companies in five major industries from the two databases is 1,313. From these lists of LSPs and LSP customers, the researcher takes a random sample by telephone appointment to seek his/her participation in this research.

Probability Sampling Techniques	Details	Advantages
Simple random sample (SRS)	It is the most basic probability sample and each unit of the population had an equal probability of inclusion on the sample	Easily understood, results projectable
Systematic sample	The selection of samples is directly chosen from the sampling frame	Can increase representativeness, easier to implement than SRS. Sampling frame not always necessary
Stratified random sampling	The technique is used when the proportion of subgroups (strata) is known in the population and the selection would be random but from each of these subgroup	Includes all important subpopulations and precision
Cluster sampling	The population is divided into mutual subsets and the random samples of subsets are selected.	Easy to implement and cost effective

Table 5-14: Advantages of Probability Sampling Techniques

Source: Bryman and Bell (2011); Malhotra et al. (2012)

Bryman and Bell (2011) outline the main types of survey into structured interview and self-completion questionnaire, as shown in Figure 5-6. The first type, structured interview, is explained in section 5.7, whereas the self-completion questionnaire is presented in this section. The self-completion questionnaire comprises three modes: supervised, postal and via internet. In terms of the internet survey, it is either by email embedded/attached or a web survey. The advantages and characteristics of each mode differ and also achieve a different rate of response. Though the internet survey seems more convenient and inexpensive compared to the postal survey, the rate of response for the postal survey is slightly higher than that of internet survey (Ranchhod and Zhou, 2001; Tse et al., 1988). This is for many reasons, such as the low level of internet knowledge in organisations, and the lack of potential respondents' experience and knowledge of e-mail use (Ranchhod and Zhou, 2001).

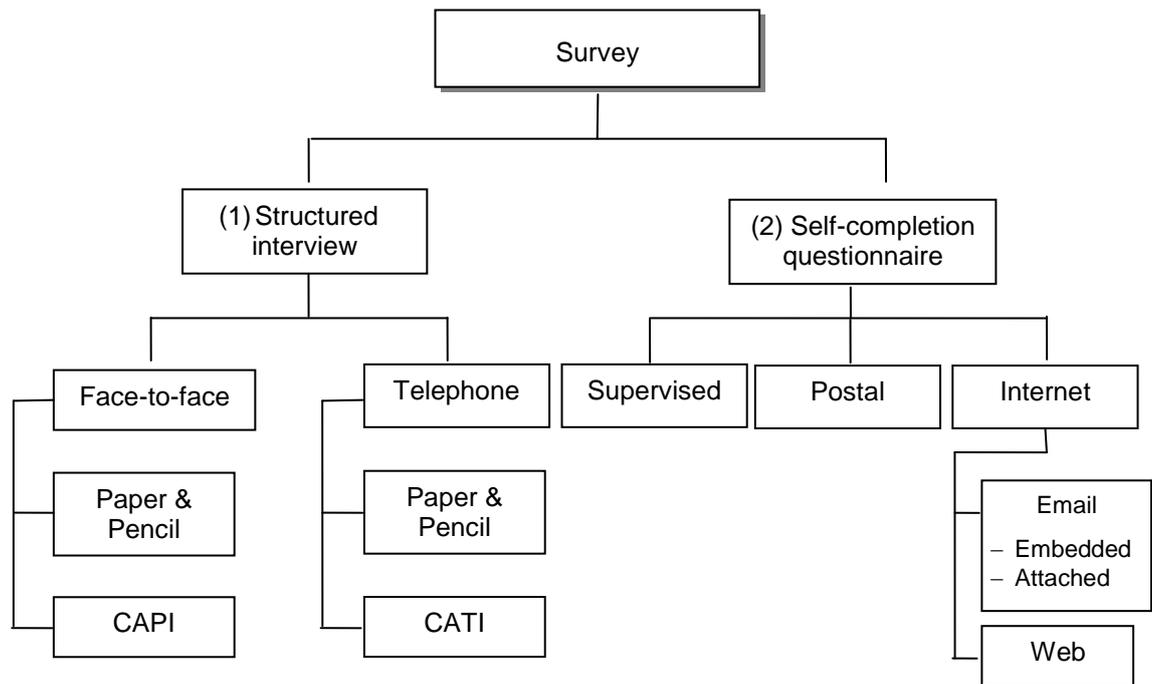


Figure 5-6: Main Modes of Administration of a Survey

Source: Bryman and Bell (2011: p. 175)

To avoid a low rate of responses, this research uses postal self-completion questionnaires as the main distribution channel and email or fax as the optional distribution channel for data collection in Phase Two. As mentioned in the previous section, the population of LSPs and LSPs' customers is large, and thus the sampling of these groups then is selected from the database of well-known and reliable organisations which represent the population of this research. The list of LSPs sampled is prepared from the database of the Thai Transportation and Logistics Association and that of the Export-Import Transportation Guide. The number of LSPs in transportation from the two databases is 441 companies. In addition, the list of LSPs' customers is prepared from the database of the Thailand Office of Board of Investment, Eastern Region Investment and Economic Centre and that of the Federation of Thai Industries, Central and Eastern regions. The total number of companies in the five major industries from the two databases is 1,313.

5.6.4. Non Response Bias

After developing the questionnaire, cluster sampling is applied to this study as this type of method selection can reflect a population in terms of the relative proportions of LSPs in different geographical areas (Zikmund, 2003; Bryman and Bell, 2011). To achieve a high response rate and reduce non-response bias, a pre-notification telephone call is used to verify

a list of companies which are willing to participate in this study. Afterwards, the questionnaire survey is delivered to two samples groups selected from: (1) the registered companies lists of the Thai Transportation and Logistics Association and the Export-Import Transportation Guide, that is to say, organisations representative of Thai industrial logistics; and (2) the registered companies lists of the Thailand Office of Board of Investment, Eastern Region Investment and Economic Centre, and the Federation of Thai Industries, Central and Eastern regions, or in other words, organisations representative of Thailand's industrial companies.

However, one of the criticisms of the mail survey is non-response bias, which is important, as the responses from persons/companies might differ from those who have not responded (Armstrong and Overton, 1977). There are several ways in which non-response bias is estimated; this study uses the extrapolation method for estimating the bias. In this method, it is assumed that the responses from persons/companies who answer via email are likely to be similar to non-respondents (Armstrong and Overton, 1977). Therefore, the responses of the respondents via postal and supervision are compared with those of email respondents.

5.6.5. Translation and Back translation

Back translation is a translation technique which has been widely used to test the accuracy of translations and to detect errors in translation, especially in cross-cultural research (Douglas and Craig, 2007). As the context of this research is Thailand, the questionnaires have been distributed to the target group and are in the Thai language as a cross-cultural translation questionnaire. The questionnaire is also required to be translated for administration in Thai culture. However, direct translation of certain words and phrases may come with faults in the event that a translator is not fluent in both languages and not familiar with both cultures. For this research study, the researcher has selected one of the translation techniques to cross-check the reliability of this cross culture research.

5.6.5.1. Criteria for a classification of translation techniques

Guthery and Lawe (1992) cited in Behling and Law (2000) stated that there are four main criteria for classifying translation techniques into six types. These are: (1) informative to the degree of objective indications of the focus language version of the instrument; (2) source language transparency to the degree that the technique provides useful information to a monolingual researcher to understand and solve problems with the focus language; (3) security to the degree of building in the opportunities to check the work of the original

translator; and (4) practicality to the degree of gaining a finished focus language instrument quickly, cheaply, and easily.

5.6.5.2. Types of translation techniques

Table 5-15 summarises the judgements of the degree to which the six techniques meet the four criteria. These six methods are used to prepare target language versions of existing instruments. Starting with a simple direct translation, an instrument is translated from the source language into the target language by a bilingual individual. This technique can be obtained cheaply and quickly (practicality criteria) but did not score well on the other criteria. The quality of the target language version depends on a translator's skill and his/her judgement. Modified direct translation is the next technique and it is a technique which involves a translator being checked on the work of the original instrument by a panel of experts who review a draft target instrument. The discussion among the panel members and the translator lead to a modification of the direct translation (Behling and Law, 2000; McGorry, 2000).

However, it seems that translation/back translation and parallel blind techniques score well in every criterion. Malhotra et al. (2012) states that "*Back translation is a translation technique that translates a questionnaire from the base language is the one into which the questionnaire is being translated.* This version is then retranslated back into the original language by someone whose native language is the base language." Conversely, the parallel blind technique is "a translation method in which a committee of translators, each of whom is fluent in at least two languages, discusses alternative versions of questionnaire and makes modifications until a consensus is reached" (Malhotra et al., 2012). Regarding Table 5-15, translation/back translation technique is used in this research because the average score of translation/back-translation is higher than that of the parallel blind technique.

	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
Ultimate test	High	Low	High	low

Table 5-15: A Classification of Translation Techniques' Degrees

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

However, it seems that back translation and parallel translation techniques attempt to avoid errors. Douglas and Craig (2007) presented that a review of the Journal of International Marketing from 1993 to 2005 identified a total of 45 articles which reported surveys that used multiple languages. In 75 percent of these (or 34 cases) the back translation technique was used and only six cases used the parallel blind technique for equivalent meaning across languages. Considering the reasons mentioned previously, the translation technique used in this research is the back translation technique to validate this research, thus: (1) the original questionnaires for the LSPs and LSPs' customers have been translated from English into the Thai language by a researcher; and then (2) the Thai versions of these questionnaires have been back translated by two bilingual translators individually to avoid errors and for the validation. To select the right persons for back translation, one of the key criteria is a bilingual translator, as per the details of translators shown in Table 4-16 below. Two translators are selected and it is seen that they are qualified to not only understand the jargon and the contexts of Thailand and the logistics industry, but they also graduated overseas to qualify their bilingual language skills. Details for carrying out the translation and back translation are presented in the next section: data collection and data analysis.

	Details of back translators	Academic degree
T-21	Lecturer in Logistics Management from Burapa University, Thailand	PhD in Management at The University of Hull, UK
T-22	Senior operational officer from International Affair Bureau, Office of SME Promotion of Thailand	MSc in Transport and Maritime Management, at University of Antwerp, Belgium

Table 5-16: Details of Back Translators in Phase Two

5.6.6. Data Collection and Data Analysis

This section presents the steps of data collection and data analysis. The time period for data collection in Phase Two was from late December 2013 to early April 2014. There are nine steps in this phase, as shown in Figure 5-7, the details of which were:

- 1) Develop the questionnaire protocols for LSPs and LSP customers: after extracting the confirmed items from Phase One (the semi-structured interview), two questionnaire protocols were developed and translated into the Thai language by the researcher.
- 2) Back translation: regarding validity and reliability, the two questionnaire protocols in the Thai version were back translated by two bilingual persons individually to cross-check as per the details of translators shown in the previous section. The modification of these questionnaires for the translation and back translation was carried out in this step.

3) Pilot survey: after modifying the Thai version of these questionnaires, they were delivered to the pilot respondents for a pilot survey, as detailed in Table 5-17. The respondents of this pilot survey comprised three main groups of stakeholders: two persons from academia, one person from an international organisation, and three persons from business. Feedback and comments were returned one week later to the researcher for modifying and/or correcting the questionnaires before delivering the finalised survey to the sample group of both LSPs and LSPs' customers.

Case	Details of pilot respondents	Stakeholders
A-21	Associate Professor in International Logistics from Thammasat University, Thailand	Academia
A-22	Lecturer in Logistics Management from Sripatham University, Thailand	Academia
G-21	Economic Affairs Officer, Transport Policy and Development Section, UNESCAP	International organisation
B-21	Manager from local logistics company	Business
B-22	Manager from logistics MNCs	Business
B-23	Manager from retail MNCs	Business

Table 5-17: Details of Pilot Respondents in Phase Two

Note: A = Academia; G = Government/International organisation; B = Business

4) Finalise the questionnaire protocols and prepare a list for sampling: the finalised questionnaire protocols and the lists of LSPs and LSPs' customers for sampling were prepared. The list of LSPs for sampling was prepared from the database of the Thai Transportation and Logistics Association; and that of the Export-Import Transportation Guide. The number of LSPs in transports from the two databases is 441 companies. In addition, the list of LSPs' customers was prepared from the database of the Thailand Office of the Board of Investment, Eastern Region Investment and Economic Centre; and that of the Federation of Thai Industries, Central and Eastern regions. The number of companies in the five major industries from the two databases is 1,313s.

5) Make a call to ask for their participation: making a call to a focal person who may be a logistics manager or in a higher position at the management level to seek his/her participation in this research, including offering an explanation of the research's objectives and related information. There are 441 companies from the LSP side and 1,313 companies from the LSPs' customer side in the list of telephone appointments.

6) Questionnaires distribution: it appears that the responses to industrial mail surveys are gained through survey sponsorship by a university or organisation that is familiar to the respondents. After confirming the participation of the LSPs and LSPs' customers' companies, the copies of cover letters from both Kasetsart University as a sponsor and the researcher who

conducted this research, attached with a copy of the questionnaire survey (shown in Appendix 3), were sent to the participants via the preferable channels, such as email attachment, fax, email with embedded links, and by post.

7) Follow up and reminder: a follow up and reminder one week before the deadline by telephone and/or email was carried out for all participants. In addition, an extension period was considered if a respondent required more time.

8) Gathering the questionnaires and coding: the questionnaires were gathered depending on the preferable channels of survey distribution. Coding of the questions and answers was conducted using the IBM SPSS Statistics 20.

9) Data analysis: the database for these questionnaires was analysed in both the gathered groups and separated groups of LSPs and LSPs' customers. Statistical analysis such as t-test, z-test, factor analysis, structural equation modelling (SEM) was used to test the hypotheses.

The t-test or z-test is a hypothesis-testing procedure for parametric tests which assumes that the variables of interests are measured on at least an interval scale (Malhotra et al., 2012). It is the most popular parametric test for examining hypotheses about means differences. T-test or z-test is used for examining the similarities and differences of GSQ-LSQ variables among the respondent groups, types of business, company size, etc.

Factor analysis is a class of primary procedures used for data reduction and summarisation. 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 (Hair et al., 2010; Loehlin, 1998). Confirmatory factor analysis (CFA) and structural equation modelling (SEM) were used to determine the validity, reliability and relationships amongst remaining variables and latent constructs. CFA is different from EFA in that it attempts to confirm or test a priori hypotheses concerning the possible factor structures by fitting variables to them (Hair et al., 2010; Loehlin, 1998). SEM is also a multivariate analysis technique that examines a set of dependent relationships, simultaneously using regression and covariance analysis amongst latent constructs (Hair et al., 2010; Loehlin, 1998). These three techniques are used to investigate the relationships among GSQ, LSQ, and LPI variables.

The results of data collection and data analysis from Phase Two are included in the statistical analysis. However, the researcher needs to validate the results of the main study (Phase Two) through the structured interviews with 15 key persons among the stakeholders, academia, government, and business, which are conducted in Phase Three. This will be explored in section 5.7, Structured Interviews Validation.

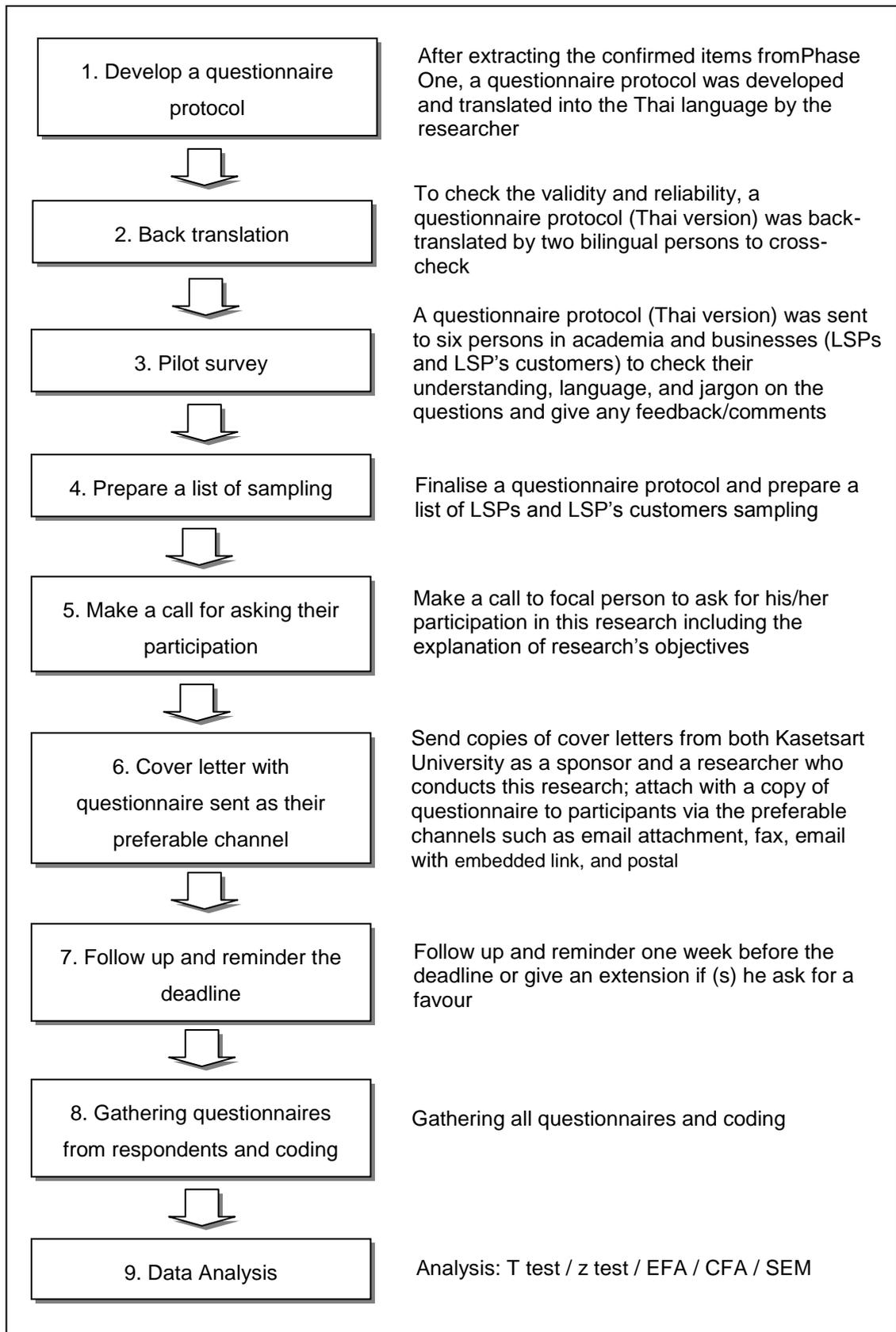


Figure 5-7: Data Collection Processes in Phase Two

Source: Adapted from Churchill and Iacobucci (2010)

5.7. Research Method: Phase Three

The last phase of the three-phase methodology for item and construct development validation is conducted through the structured interviews. This phase is comprised of three main sub-sections: methods or techniques for structured interviewing; structured interview and self-completion questionnaire; and data collection and data analysis. Although it is mentioned in the previous section that the structured interview is a part of the survey (Bryman and Bell, 2011), as is a self-completion questionnaire, the objective of using this type appears to be different from the questionnaire survey.

The structured interview, sometimes referred to as a standardised interview, entails the administration of an interview schedule by an interviewer. To give exactly the same context of questions, it is expected that each respondent receives exactly the same interview, and this causes the interviewees' replies to aggregate and the reliability to be increased, by reducing errors due to variability, and increasing accuracy and ease of data processing. The next section presents the differences between a structured interview and a self-completion questionnaire including data collection and data analysis.

5.7.1. Structured Interview Protocol Development

The outcome expected from Phase Three is the validation of Phase Two findings. Therefore, the structured interview is selected for this phase. Following Figure 5-3, the six stages are similar to the previous phases but the questions will be both open-ended and closed questions. Bryman and Bell (2011) mention that the survey is comprised of a structured interview and a self-completion questionnaire. However, what are the differences between structured interviews and self-completion questionnaires? Table 5-18 presents the differences of these two types, such as cost of surveys, collection time, convenience for respondents, risk of missing data, etc. It was found that the structured interview technique is suitable for research: avoiding the risk of missing data; obtaining accurate and clear answers from the respondents; asking questions that may increase the understanding of the context of those questions; and finally recruiting the right respondents, which is vital for conducting the research.

Conversely, conducting the self-completion questionnaire survey seems to have many advantages for the researcher, such as: lower costs for the survey compared to a structured interview; distributing the questionnaires in large quantities at the same time; and flexibility for respondents to do the questionnaire any time they prefer. It is seen that structured interviews and self-completion questionnaires appear in the position best suited to the type of research

method or technique required. With the purpose and objective for conducting Phase Three being to validate the main research study, a structured interview was used to validate the results from Phase Two within a similar context to the questionnaire survey. Comparing the results in Phases Two and Three, they represent the support and arguments among the perceptions of these two groups.

	Structured interview	Self-completion questionnaire
Cost for survey	Quite expensive	Cheaper than interviewing
Collection time	Spend much time to conduct each interview	Can be set out by post or distributed in large quantities at the same time
Convenience for respondents	Have to wait for the respondents' preferable time	More convenient for respondents because respondents can complete a questionnaire when they want
Prompt for help the respondents	Researcher can help or explain when respondents have any questions or are not clear about a question	No one present to help respondents if they are having difficulty answering a question
Risk of missing data	Researcher can ask respondents to answer every question.	Self-completion questionnaire carries a greater risk of missing data than interviews. It is easier for respondents to not answer a question when they complete their own than when they are asked by a researcher.
Number of questions	Researcher can ask as many questions as they want	It is difficult for researcher to ask a lot of questions because long questionnaires are rarely feasible
Collect additional data	Researcher may be asked to collect more information about workplace, organisation management or whatever else they wish	With the one-way communication like self-completion questionnaire, it is not possible to collect more data
Get the right person to be respondents	Researcher can find the right person for answering the questions. However, this advantage does not apply when the former is administered by telephone.	With the self-completion questionnaire, a researcher cannot be sure that the right person has answered the questionnaire. It is impossible to have any control over the intrusion of non-respondents in the answering of the questions.

Table 5-18: Difference between Structured Interview and the Self-Completion Questionnaire

Source: Bryman and Bell (2011)

5.7.2. Data Collection

Regarding Figure 5-6 in the previous section, the structured interview is conducted in two modes: face to face, and telephone. The researcher can conduct a face-to-face structured interview by using paper and pencil or using computer-assisted personal interviewing (CAPI). This is in line with telephone structured interviews in which the researcher can use pencil and paper or computer-assisted telephone interviewing (CATI). Regarding computer-assisted interviewing, the questions comprised an interview schedule appearing on the screen with the questions and answers keyed on the screen immediately. Though there are advantages to this technique, there is very little evidence to show that the data quality derived from computer-assisted interviewing is superior when compared to paper and pencil interviews (Bryman and Bell, 2011).

The processes of data collection and data analysis are identical, as shown in Figure 5-4 and Table 5-13 mentioned in the previous section. Table 5-19 presents the details of interviewees from Phase One which are combined with his/her responsibility in the company, and the time and place of the interviews. These respondents are at management level and come from national and international logistics companies and the five main export industries in Thailand. The average time spent with each interviewee is about 60 to 90 minutes. Details of the interviewees in Phase Three comprise three persons from academia, five persons from government office, three persons from LSP companies, and four persons from LSPs' customers' companies.

The protocol involves open-ended questions to ask the respondents' opinions concerning the GSQ, LSQ and their relationships (shown in Appendix 4). Each interview appointment is scheduled for a place and time in August 2014. The results from this phase represent the perceptions of each stakeholder and give the reasons why there are differences and/or similarities in the perceptions of these groups.

Case	Details of interviewees	Stakeholders	Time	Place
A-31	Associate Professor in International Logistics from Thammasat University (TU), Thailand	Academia	28/8/2014	ICLT conference
A-32	Professor in Maritime and Logistics Management from Chulalongkorn University (CU), Thailand	Academia	15/8/2014	CU
A-33	Associate Professor in Logistics Management from King Mongkut's University of Technology Thonburi (KMUTT), Thailand	Academia	19/8/2014	KMUTT
G-31	Senior officer from the Bureau of Logistics, Department of Primary Industries and Mines (DPIM), Ministry of Industry, Thailand	Government	14/8/2014	DPIM
G-32	Senior officer from the Bureau of Logistics, Department of Primary Industries and Mines, Ministry of Industry, Thailand	Government	14/8/2014	DPIM
G-33	Senior officer from the Bureau of Logistics, Department of Primary Industries and Mines, Ministry of Industry, Thailand	Government	14/8/2014	DPIM
G-34	Senior officer from the Bureau of Logistics, Department of Primary Industries and Mines, Ministry of Industry, Thailand	Government	14/8/2014	DPIM
G-35	Senior operational officer from the International Affairs Bureau, Office of SME Promotion of Thailand	Government	11/8/2014	Telephone
L-31	Manager from logistics MNCs	Logistics	14/8/2014	Telephone
L-32	Manager from local logistics company	Logistics	12/8/2014	Telephone
L-33	Manager from logistics MNCs	Logistics	14/8/2014	company
C-31	Manager from retails MNCs	Customers	18/8/2014	Telephone
C-32	Manager from automotive MNCs	Customers	17/8/2014	Telephone
C-33	Manager from pharmaceutical MNCs	Customers	16/8/2014	Telephone
C-34	Manager from local electronics company	Customers	16/8/2014	Telephone

Table 5-19: Details of Interviewees in Phase III

Note: A = Academia; G = Government; L = LSPs; C = LSP customer

5.8. Conclusion

Chapters Two, Three, and Four have explored the existing literature which has helped to shape this research problem. This chapter has examined in detail the existing empirical studies in the field of GSQ, LSQ, and TLPs to specifically understand existing approaches, paradigms, constructs/items, dominant authors/articles and theories in GSQ and LSQ, which are important to the future theory development in this field. The Churchill (1979) and Churchill and Iacobucci (2010) framework has been utilised to ensure the thesis follows a rigorous step by step research approach to enable valid and accurate conclusions to be drawn. Finally, the research questions proposed will address the gaps in GSQ-LSQ literature helping to link existing theories to new theories in the field of GLSQ.

The next section will now turn to the data analysis and discussion which will cover Chapters Six through Nine.

6. Semi-structured Interviews (Phase One)

6.1. Introduction

Chapter Five discussed the research methodology underpinning this study. This chapter will now present the analysis and results from the semi-structured interview research (SI-1) which was conducted from May to August 2013. The main purpose of the chapter is to inductively answer research questions: RQ2. The results from Phase One provide the foundations and insights required for Phase Two of the research design, which commenced in late December 2013 and continued until early April 2014. This chapter is structured as follows: firstly, key issues in case interviews from the semi-structured interview (SI-1) findings are reviewed in the context of the three key research questions; and finally the chapter is concluded with a summary which acts as a prelude to Chapter Seven.

6.2. Semi-structured Interview (SI-1): Data Collection

In Phase One, the sampling was selected using judgmental sampling and snowball sampling. With the experience of the researcher in logistics, a professional logistics expert was identified to be the first contact at the beginning point of the samples. As a well-known person in both academic and business circles in Thailand, they were able to prepare a list of the potential participants at the top management level successfully. Afterwards, the eight participants were selected as a snowball for collecting data in this phase following personal advice and based on the reputation of the companies in logistics. Although the sample size was small with just eight interviews, it was possible to conduct in-depth personal interviews with an average duration of one hour to one hour and 30 minutes.

Using the semi-structured interview protocol (see in Appendix 2), the interview contained three main questions which were developed from the literature review. Table 6-1 reports the structure of the questions asked in Phase One. The appointment for each interview session was carried out at the respondent's preferred time and place, but it was quite difficult to oversee as most of the participants were at the top management level and so had little time to spare. Eight semi-structured interviews were conducted from 30 May to 31 August 2013. Each in-depth interview was audio recorded to better analyse the results (Hannabuss, 1996; Kvale, 1996; Maxwell, 2005). The audio recordings and researcher's notes were treated with confidentiality so as not to disclose the participant's identity or company.

Question	RQ	Explanation
Q 1	RQ 2	Participants were asked for their opinions on the importance of nine GSQ items relating to LSP service quality. These nine items were developed from the literature in Chapter Two. Participants also were asked for the reasons behind their opinion, why they thought these items mentioned were important to LSP service quality and how important of them.
Q 2		Participants were asked for their opinions of any green items beyond these items but they thought that green items were important to LSP's service quality.
Q 3		Participants were asked to rate the most important GSQ items, in their opinion, with their reasons, and the strength of this relationship.

Table 6-1: Structure of Semi-structured Interview Protocol in Phase One

Each interview (SI-1) was fully transcribed 'word-by-word' from the audio recordings into a Microsoft Word document and cross-checked again by the researcher. The full transcriptions were then overlaid with the researcher's field notes, which included comments, and key themes. Furthermore, full transcriptions of SI-1 enabled the researcher to reduce the data into key categories/themes by question; this was also transcribed into a Microsoft Word document. A final Microsoft Word document was produced displaying a summary of the key themes from each interview. Lastly, a key word count analysis was performed on the full transcriptions to identify any other key words and constructs which emerged from SI-1.

Regarding the ethics of this research, the semi-structured interview protocols (Phase One) and the structured interview protocols (Phase Three) with precedent regarding confidentiality and anonymity and participants' verbal grants were read to each participant prior to the interview. Each participant was then coded and/or referred to in this thesis anonymously. The eight participants in this phase are coded and referred to as shown in Table 6-2.

Case Interview	Participant	Company Size and Ownerships	Industrial Sector
Case Interview A	L-11	SMEs, Total Thai-owned company	Logistics company
Case Interview B	L-12	Large, Total Thai-owned company	Logistics company
Case Interview C	L-13	Large, Total Thai-owned company	Logistics company
Case Interview D	L-14	SMEs, Total Thai-owned company	Logistics company
Case Interview E	C-11	Large, Total Thai-owned company	Exporters
Case Interview F	C-12	Large, Total Thai-owned company	Automotive company
Case Interview G	C-13	Large, Total Thai-owned company	Animal-feed producers
Case Interview H	C-14	Large, MNCs	Retailers

Table 6-2: SI-1 Case Interview, Company's Size, Ownerships, and Industrial Sector

6.3. Cases Interviews and Interesting Issues

The in-depth interview is an effective tool for obtaining a rich understanding of a new phenomenon such as green service quality (Hannabuss, 1996; Maxwell, 2005; Sekaran, 2007; Wright, 1996). With regard to the second primary research question (RQ2), 'What are the LSP's GSQ competencies?', the semi-structured interview is conducted for data collection in Phase One. In this phase, a case interview will be the tool used to analyse and interpret this data to develop the questionnaire survey protocol which will be used in Phase Two. There were eight case interviews and each case interview presented the highlight of the company case and the lessons learnt, including their opinions.

Case Interview A: Green Vehicle and Safety

Company's profile

Company A was established in 2000. With the founders' combined experience in the automobile industry, Company A offers a fleet of dry van flatbed trailers along with a dependable professional crew of drivers on the road. The goal of the company is to become a strong partner with customers in the transportation and distribution field. The company's policy is to give customers their strict attention along with the flexibility necessary in the ever-changing truck market (Company A, 2014).

Company's practices

Case A represents the practices concerning the green vehicle and safety. Starting from the background of this case, L-11, the managing director of the company, used to work at a logistics company with which the large automotive company MNC was a customer. After resigning from the logistics company, he established his own logistics company and, unbelievably, the automotives MNC became one of his key customers. Therefore, he knew very well the standard system and what the automotive company's needs were.

The main purpose of the automotive company was to go green and this green policy should be implemented along the whole supply chain, in particular in transportation activity. Therefore, the company in Case A could implement the concept of green as per the customer's requirement for reducing CO₂ emissions. It started with the use of alternative fuel as the first priority activity to deliver excellent service to its customers. However, although using some alternative fuel may reduce CO₂ emissions, it came with the same cost of maintenance as the vehicle's motor was worn out. With the acceptable cost increase after

implementing green vehicles using the alternative fuel from the customer, all requirements for customer satisfaction were completed.

To protect the use of green vehicles in the long run, staff, and in particular drivers, would be trained to drive safely and in how to maintain the green vehicle. Nevertheless, the company in Case A had their fair quality standard as per the customers' requirements; however, some problems with drivers always occur. One important problem was the increase of the accident rates. It was found that some drivers often drove faster than the speed limit to increase their turnaround to make money. This cause may have affected the increase in the company's accident rates and the low service quality. To control the accident rates, L-11, as the managing director, used many strategies: either controlling the speed by GPS-tracking the vehicle, or convincing drivers to think about the fact they might leave their families behind if they died from an accident.

Moreover, the company also offered an option to drivers as to whether they would like to have their own vehicle to deliver products to customers rather than just driving the company's vehicle, the company in Case A providing the loan for this to occur. The main reason that the company in Case A offered this option was, L-11 thought, that drivers may be more intent on driving carefully. The benefits of this offer were not only a reduction in the accident rates and affecting the service quality of the company, but also increasing the welfare of staff, especially drivers and their families. These business ethics demonstrated by the company in Case 1 may be different from the approach of the MNCs, which employed the Western style of running their business, and may represent Eastern ethics.

Case Interview B: Operational Efficiency

Company's profile

Company B was incorporated in 2002 with an initial registered capital of 5 million Baht. Its promoter came from a family business with experience in integrated customs clearance and logistics services for more than 30 years. At present, Company B offers a broad range of logistics services, including transportation and distribution of goods, provision of supporting facilities for transportation of special purposes, and consultancy on solutions and modes of transportation to match each group of customers. In addition, it provides customs clearance services for imported and exported goods, warehouse management, packaging, transportation, storage, and distribution of goods. At the end of year 2011, Company B became a subsidiary of one of Japan's largest electrics and electronics companies (Company B, 2014).

Company B works closely with customers in tracking and tracing working progress through a standard service system known as the Global Positioning System (GPS) for transportation services and a transport management system (TMS) for management services.

Company's practices

Case B will represent the practice of operational efficiency. Even though Company B was a large, totally Thai-owned company, its business philosophy meant it was run as a family business, as is known in the Eastern style. In this company, L-12, as the managing director, would create a new green project from the top to bottom levels. L-12 addressed the fact that the new green project should include changes to increase operational efficiency. No matter what the green concept is and how the green concept was discussed more widely, most companies would think an increase in revenue or a reduction in costs was the first priority.

L-12 decided that the company should have high service quality and achieve customer service satisfaction rather than focus on the green issue. However, L-12 was concerned about the green issue and thought green awareness or a green project would increase operational efficiency. He then started focusing on a small element of production function. This action not only had the advantage of increasing efficiency, as in-process waste reduction is as good as reduction of operational costs, but also launched the green issue as part of the company's reputation.

Strategic deployment for Case B came from the top management level following a top-down design similar to the bottom-up design, through which operations staff could suggest or present an initiative project to the executive management level as a specialist.

Case Interview C: Service quality standard

Company's profile

Company C was founded in 2002 specifically to provide chemical and dangerous goods transportation services, focused on safety, health and the environment in all areas of operation. Company C has earned the trust of many multi-national chemical companies and expanded its business into many large industrial estates. Its service focuses on safety, health, the environment and quality as per the Safety and Quality Assessment System (SQAS) which was developed by the European Chemical Industry Council and is widely used as the International Organization for Standardisation (ISO) for chemical transportation (Company C, 2014). The system consists of almost 100 procedures for a transporter to follow. One of the strengths of Company C is its emergency procedure. Company C has set

up an emergency plan, regular training and emergency rescue team to be ready for any accident and to stop contamination into the environment or community.

Company's practices

Case C will represent the practice of the service quality standard. As Case C is a large and totally Thai-owned company, L-13, as a managing director, the respondent has directed the positioning of the company to serve or deliver services to customers in a niche market. To succeed in this market, the key success would be to deliver services to customers to a high service quality standard.

L-13 stated that the high service quality standard which he mentioned is not like the quality standard from the ISO. However, it was set at the same level as this standard. The process, quality control, and documents related were also the same as the ISO.

As the company in Case C delivers hazardous products, the service quality had to be at a high level and include the protection of the delivery from one point station to another. When asked about the price, the company in Case C charged a high price comparing to its rivals. Though the price was high, demand in this market was still high too, as L-13 said.

Moreover, L-13 still believed that customers in the niche market were willing to pay as long as service providers like the company in Case C delivered a high service quality standard and that the ISO certificate does not mean anything to customers at all.

Case Interview D: Green Collaboration

Company's profile

Company D was established in 1973 and registered as 'a transportation association'. Company D is a professional institute for transportation and logistics companies, which was established as a non-profit organisation. Its main function is to develop transportation and logistics activities to achieve the required standard of service quality and to collaborate with all members to maximise efficiency and effectiveness. This has led to its acceptance and recognition from both government and private sectors domestically and internationally (Company D, 2014).

Company's practices

Case D will represent the practice of green collaboration. As Case D is an SME association in which all members are SMEs and totally Thai-owned companies. L-14, acting as the

executive officer, indicated that the main green issue in his opinion was green collaboration. With the limitations on resources and service quality standards, L-14 suggested that the collaboration should begin between the service providers and between the service providers and their customers.

Collaboration might start with the utilisation between the service providers of the vehicle's capacity to get the high fill rate for delivery. The obvious advantage of this collaboration was the reduction of transportation costs, but the hidden advantage was the reduction of CO₂ emissions and other negative externalities. That kind of hidden advantage affected green issues absolutely.

Case Interview E: CO₂ Emissions and Safety

Company's profile

Since its establishment, Company E has fulfilled its role as the representative organisation for exporters looking to promote and protect their interests. This has led to acceptance and recognition from both government and private sectors domestically and internationally. Company E is a private sector institute for exporters, which was established as a non-profit organisation. Its main function is to promote and protect the interests of exporters; it enhances the competitiveness of Thai exporters by focusing on international logistics and global supply chains. The three main functions of Company E comprise: (1) acting as a centre for enhancing competency in the field of logistics and global supply chains for exporters; (2) acting as a consultation centre for members and general exporters; and (3) acting as an information centre for the Thai economy, export climate, and logistics and global supply chains (Company E, 2014).

Company's practices

Case E will represent the practice of CO₂ emissions and safety. As Case E is a large and totally Thai-owned company from the customer side, the opinion and lessons learnt might be different or similar to the LSP side. C-11, acting as the executive officer, stated that they are very greatly concerned about green issues because their customers, and in particular their customers in Europe or other Western countries, were greatly aware of the green issues. For example, their customers often looked at the carbon footprint shown on the product's label.

As an exporter, C-11 would be very concerned about CO₂ emissions because they want to respond to their customers' needs. However, they found that there was a lack of the exact knowledge about the carbon footprint and how to calculate this figure. Without this knowledge and the awareness of service providers, the MNC service providers may take this

advantage to win the demand of this group of customers if totally Thai-owned service providers remain unaware about green issues such as the carbon footprint.

Case Interview F: Transport Management

Company's profile

Company F was established in 2010 with a registered capital of 3,114 million baht. It is a joint venture between a Japanese automobile group and a large, totally Thai-owned cement company. Company F has developed a diverse range of agricultural products to accommodate all the application needs of Thai farmers. The products include tractors, implements, combine harvesters, rice transplanter, excavators, riding tillers, power tillers, and diesel engines, as well as other agricultural spare parts under the brand of Company F (Company F, 2014).

Company's practices

Case F will represent the practice of transport management. As Case F is a large and totally Thai-owned company coming from the customer side and the delivery of the product requires specific vehicle products, C-12 highlighted green issues as a means to achieve the high fill rate. With the conditions of the vehicles for delivering a specific product like a truck, the utilisation of vehicle capacity could get a high fill rate.

Moreover, it was not easy to deal with large vehicles such as a truck trailer, as this includes the traffic laws or regulations which do not allow a driver to drive a truck trailer in some areas and also specify times they can be used in some areas. This issue may not affect the LSP's overall service quality but it is very interesting to see whether LSPs could manage their vehicles properly. Accidents may occur and of course, these occurrences will affect all stakeholders.

Case Interview G: Green Vehicle and Transport Efficiency by Product's Characteristics

Company's profile

Company G was established in 1983, with the initial registered capital of 20 million Baht. It was listed on the Stock Exchange of Thailand in 1990 and became a public limited company in 1994 with the current registered capital of 922.18 million Baht. Company G has obtained the certificates for Good Manufacturing Practices (GMP) and Hazard Analysis and Critical Control Point (HACCP) in the category of animal-feed manufacturing in order to ensure hygienic products. The ISO 9001:2008 certification for the entire system reflects the selection of raw materials, production processes, quality inspections, and health management, as well as the international standard product quality and corporate social responsibility, since good animal feed means quality and safe food for consumers. Moreover, Company G has strong concerns about and awareness of environmental protection and its impacts (such as wastewater, dust, and air pollution) on communities and society. Company G's principal business activities are: (1) the manufacture of animal feed; (2) crop drying, silos; (3) experimental farming; and (4) crop farming. The company's animal-feed mills are divided into geographic regions for sales purposes, so as to attain maximum cost efficiency in regard to transportation and distribution costs (Company G, 2014).

Company's practices

Case G will represent the practice of green vehicles and transport efficiency according to the product's characteristics. As Case G is a large and totally Thai-owned company in the animal-feed producers industry which needs to meet specific requirement, C-13, acting as the executive officer, stated that green issues might be a part of their daily activities. Though Company G provided green vehicles to all management levels to support the green concept and enhancement the company's reputation, C-13 still indicated that with the vehicles delivering products or goods it does not matter about using alternative fuels or green vehicles. Characteristics of products would indicate the type of vehicle to be used, especially if the product is perishable food; here, the green issue to be considered should be transport efficiency rather than green vehicles. Thus, it does not matter that green vehicles would offer an advantage for the green concept, but the requirements for the characteristics of the product will be the early priority.

Case Interview H: Transport Management and In-process Waste

Company's profile

Since 1994, Company H has been a leading retail business operator in Thailand; its business includes five main types of retail stores: plus mall, extra, hypermarket, market and express. There are over 1,000 stores and over 45,000 employees across Thailand. Thailand and Asia's first zero carbon store was opened in 2011 in the Eastern region of Thailand. The store is designed to use as little energy as possible, with any energy needed being generated on-site from a wind turbine and a solar farm of PV cells. The first zero carbon store in Europe and Asia demonstrates the commitment of Company H to supporting the Thai economy and sustainable conservation of the environment. Moreover, the first regional distribution centre (RDC) in Thailand was launched in 2014. It is the first composite distribution centre of any Thai retailer which can handle all product categories on one site, including ambient goods, fresh food, chilled food and frozen food. It services over 300 stores in the Northeast Thailand with the capacity to handle up to three million cases per week.

Company's practices

Case H will represent the practice of transport management. As Case H is a large MNC retailer, the policies and strategies came from the headquarters. C-14, acting as part of the management team, stated that green issues for the MNCs were identified by cost-benefit as the first priority. Generally, a company would consider how to reduce costs. Transport management may be one of many ways to reduce costs, because the company in Case H will try to push suppliers to collaborate and manage the transport route together.

However, while some initial projects may not achieve the desired efficiency, the benefit of undertaking a green project may include enhancing the company's reputation. C-14 still said that if there was a question of what he thought was involved when talking about green issues, he would definitely answer that it should be in-process waste reduction.

Eight case interviews have been conducted to give an insight into the details of the GSQ constructs and how they affect an LSP's service quality. These case interviews might show whether or not Thai or MNC companies, large or small or medium companies, would implement a green service quality within their businesses. All eight participants agreed that the nine GSQ items taken from the literature were important.

6.4. Importance of GSQ Items

As Question One in the semi-structured interview protocol, participants were asked for their opinions on the importance of these nine green service quality items and reasons why they were important or not important. Table 6-3 presents the summary of the participants' perceptions and their reasons, which have been transcribed into English. It found that all the GSQ items taken from the literature were important relative to LPIs in the participants' perceptions.

Moreover, in Question Three in the semi-structured interview protocol, participants were asked to rate the importance of GSQ items and to note which one had the most GSQ importance. It was found that the 'externalities', particularly in 'safety', was the most important in GSQ but there were another three GSQ items which were proposed too. There were five participants including three LSP participants and two LSP customer participants who perceived the importance of this item. The items 'alternative fuel', 'transport management', and 'choice of partner' items were ranked later, as shown in Figure 6-1.

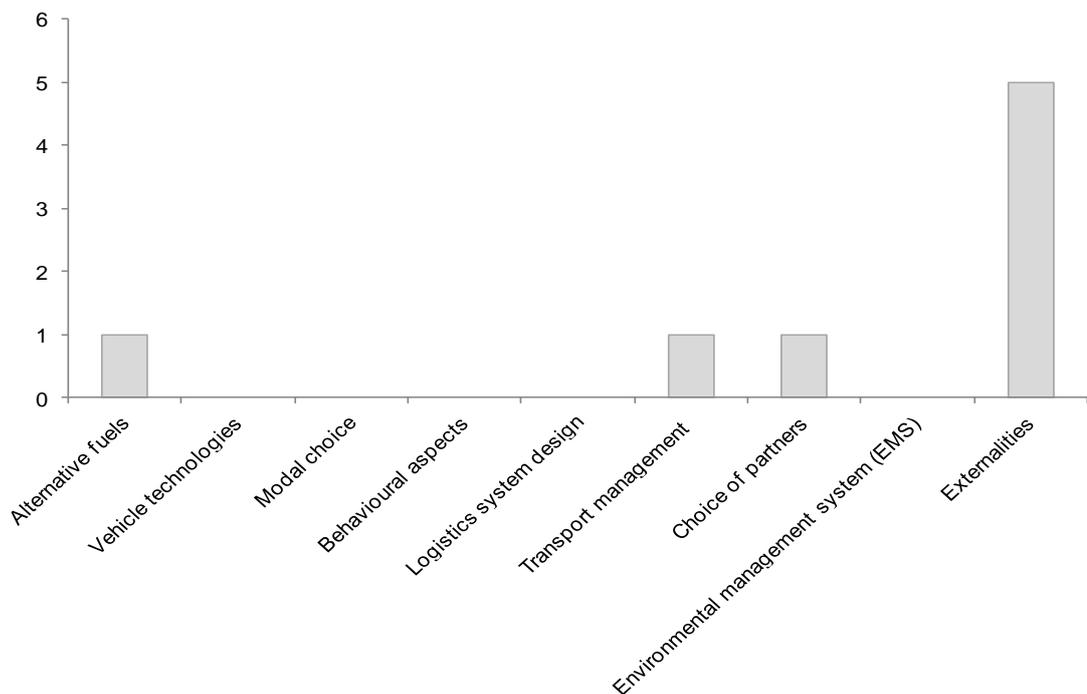


Figure 6-1: Bar Chart - The Most Important GSQ Items

Green service quality	Organisation	Summary of Interview transcription
Alternative fuels	C-11	<p>Yes, it relates to the service quality. First of all, either CNG or NGV still have a limitation of gas stations and there is an excess of demand as the Government subsidises these alternative fuels, which means the price is quite low when compared with diesel. A limitation of gas stations is that it leads to quite long queues to refuel; the lead time for delivery will be longer than using fuels like diesel. Secondly, the quality of alternative fuels will affect the quality of service as well. If this alternative fuel requires a specific vehicle for using the alternative fuels, it will increase the total cost. In this case, some companies may use alternative fuels with regular vehicles, and this may have an impact on the motor in the vehicle and then affect the quality of service in the last step.</p>
	L-11	<p>Yes, it relates to the service quality directly in terms of the order condition or customers' requirements. For example, if company A has delivered a green policy within its company then they require all vehicles delivering their goods/product which use alternative fuels to be green. On the other hand, if company B implements a milk run system, vehicles which serve this company can't use alternative fuels such as biodiesel or CNG because too much time will be spent at the gas station and it may affect the customers' milk run system. In line with some companies with fixed lead-times, we can't use alternative fuels on vehicles for the same reason. Too much time spent at the gas station means that the scarcity of the stations will make for long lead-times for delivery.</p>
	L-12	<p>It definitely relates to LSP service quality in terms of time and cost. For example, with CNG or NGV, there are only few stations supplying CNG/NGV throughout Thailand, but compared with the users' demand, it isn't enough. Demand is greater than supply. The price is lower than for other fuels too due to the Government policy's substitution. That means using alternative fuels means spending more time at the fuel station than if diesel was used. Firms can't deliver it on time or can't compete with other rivals in terms of speed or time. It also affects transportation costs. Cost seems to be lower than when using diesel. However, using this kind of fuel within the transport activity at the right time appears to be important because if a company implements it too late, it can become a barrier to compete with other foreign companies in terms of environmental issues.</p>

Table 6-3: Interviews Summary on the GSQ Items

Green service quality	Organisation	Summary of Interview transcription
C-12		In our view, we look at cost as a first priority. Anything that the LSP has done and benefited our company is surely supported by us. Alternative fuel is in a similar situation. I think alternative fuels relate to the service quality in terms of lead-time (negative) and total cost (positive). A lack of gas/supply stations will make the lead-time for delivery much longer than is normal. If there is no maintenance for the vehicle's motor or it can't receive good quality maintenance, the vehicle's motor will be damaged easily. This includes ease of finding an auto-part to repair the motor. It affects the lead-time for delivery and order accuracy in the end. Concerning the positive effect, total cost may be reduced in the long-run.
L-13		It is relative to cost rather than the service quality because nowadays the Government substitutes the cost of alternative fuels to persuade LSPs to use this energy rather than diesel. However, it may affect the service quality in terms of lead-times due to a lack of gas stations to supply these alternative fuels. LSPs may spend much more time delivering goods to customers.
L-14		Firstly, alternative fuels are relative to the cost as the Government subsidises the price of these fuels. However, the lack of gas stations will create a situation of excess demand, and then we have to spend much more time in the gas station. In this event, alternative fuels are relative to the service quality in term of timeliness. LSPs may have more lead-time for delivery if it uses alternative fuels for its vehicles.
C-13		It may be relative to the service quality in terms of lead-time as we have to spend much more time at the gas station.
C-14		In my opinion, cost is included in the service quality. Using alternative fuels may mean the fuel costs decrease as it is subsidised by the Government, but looking at the maintenance cost, it is quite high and will cause the total cost to increase. I think alternative fuels are relative to service quality in a negative way. It might give a good reputation to a customers' company.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
Vehicle technologies	C-11	There are few LSPs which invest in vehicle technologies to support their services. It does not seem to relate to the service quality because the limited number of gas stations and this kind of technology is currently unstable. Vehicle technologies will come with the alternative fuels. If there is still an excess demand for the alternative fuels, the investment in the vehicle technologies won't happen. This includes the stability of the vehicle technologies too. Cost and availability are the most important factors that an LSP considers.
	L-11	Maybe relates to the service quality. If vehicle technologies are stable and reliable, using this technology will affect the service quality through timeliness as the first priority.
	L-12	It is divided into two points: cost efficiency and service. Firstly, cost efficiency, it can be pointed out by customers that if a company invests in vehicle technology, the total cost is really cheap, isn't it? Is the total cost lower than another lower technology? This means we change the vehicle technology to support the alternative fuels. Of course, the price of alternative fuels is probably cheaper than diesel but the maintenance cost seems higher than for a vehicle using the old technology. It can be said that the total cost of using vehicle technology appears cheaper than the old cost. On the other hand, looking at service, using vehicle technology which supports alternative fuels seems to affect the quality of service due to an increase in delivery time. Customers will receive the goods with longer lead-time compared with firms using fuels for their vehicles.
C-12	Today, I don't think vehicle technologies will relate much to the service quality as it is still at the beginning of its process development. However, if these technologies are developed to the stability process, or to the stage called the growth step of the product life cycle, the vehicle technologies are absolutely relative to the quality of service. It is as though I still haven't any confidence in the technologies' stability.	

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
	L-13	I don't think vehicle technologies are relative to the service quality. LSPs don't choose what kind of vehicle technologies they will use but they choose from the cost of vehicle technologies instead. If you want an entrepreneur to have a conscience about green issues, you won't see it because business has to consider the cost as the first priority and after that if firm has a profit, social responsibility will come.
	L-14	Most issues around using vehicle technologies or not is the cost. I think that vehicle technologies nowadays aren't stable and require high levels of investment, which may affect the service quality as well. For example, an automobile tyre, we can change from a canvas tyre to a radial tyre to save fuel and it isn't affect to our service quality. Some vehicle technologies will be relative to the service quality, but some won't.
	C-13	It has to be proved that the vehicle technologies used are reliable. If this technology is still unstable and used for delivering goods/products, it is definitely relative to service quality in the negative way.
	C-14	It maybe relative to the service quality but the LSP has to measure how the service quality is better from using vehicle technologies such as decreasing defects/damage to goods, decreasing lead-time.
Transport modal choice	C-11	This competency will affect service quality in a negative way due to double handling increases. It can increase a number of defects due to broken goods. We can't guarantee the arrival time if we choose the rail mode, and also there will be some natural disasters, for example, a storm in southern Thailand. Modal choice or shift mode is suitable for some goods that are damaged and difficult and customers who want to reduce the transport cost but for some products, a single mode of transport will be good for delivery including the overall of service quality.
	L-11	Depending on what your customers want, between cost and time, because sometimes using multiple modes of choice will reduce the cost but increase lead-time. It can be said that modal choice is relative to the service quality through timeliness, the quality of products, and the customer' condition.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
L-12		Of course, it is related to the quality of service but it appears like a pair of modal choices. For example, road and rail or road and maritime transport can be a match for the characteristics of goods or the requirements of customers. However, some goods seem specific in the mode of transport. If we offer modal choice to customers, it would be great for our service. It depends on what customers need, i.e. door to door, multiple drops or cost.
C-12		Looking at the service quality, our goals are: to deliver all goods to the customer with no defects and no damage at the right time, condition and quality. So the right modes of choices have to be selected with these factors, but there is a limitation of modal choice in Thailand. There is rarely modal choice for delivering goods to the customer. For example, in Japan manufacturers can choose any mode of transport or pair modal choices for their goods. There are rail routes over Japan which also connect to road modes. This can help manufacturers to have a choice of transport modes. Moreover, using the rail mode in Japan allows an estimate of the exact lead-time for delivery but it can't do so in Thailand with the same mode of transport as the rail mode's management is still inefficient. It may be concluded that modal choice seems to have no relationship to the service quality.
L-13		It may affect the service quality depending on the customer's requirements around cost and time.
L-14		In my opinion, I think giving a modal choice to customers may reduce the cost but it would definitely affect the service quality. It may increase double-handling in the processes, and therefore, defects/damaged goods increases, timeliness. These will be relative to the service quality.
C-13		Depending on which goods/products are delivered to customers. Some products needs a specific mode of choice and can't use multi-modal choices. In this case modal choice isn't relative to the service quality.
C-14		It is relative to the service quality. It seems LSPs give us the options of services and we as customers can consider which modal choice is suitable for our products. It may give shorter lead-times or better conditions to customers.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
Behavioural aspects	C-11	Safety comes first and relates to the service quality and then behavioural aspects, like driving behaviour, focusing on decreasing fuel consumption will come after that because of a change in driver behaviour.
	L-11	It is difficult to train drivers to adopt driving behaviour which focuses on decreasing fuel consumption. I think it isn't relative to the service quality. But the behaviour focusing on safety seems relative to the quality of service.
	L-12	Yes, it is, but we consider driving behaviour focusing on safety rather than decreasing fuel consumption. Safety will affect service quality directly through accuracy, timeliness, quality of goods, and condition. Driving behaviour focusing on decreasing fuel consumption seems not so important because our company pays the cost of fuel to the driver as the average cost. If a driver's behaviour focuses on decreasing fuel consumption, he will get back money from cost saving. This seems compulsory for a driver's behaviour.
	C-12	It is relative to the cost of the LSP but not for the service quality. However, cost reductions from this action will finally affect our company. Driving behaviour which focuses on decreasing fuel consumption doesn't make any difference to our company but driving behaviour which focuses on safety will do. In our case, we don't care much about a driver's behaviour because we set up the conditions for the characteristics of drivers who we want to let LSPs use.
	L-13	In this factor, some LSPs pay the expenses for fuel as an average to a driver. A driver will get money if he drives focusing on decreasing fuel consumption and be paid the expense of the fuel cost lower than the average cost. It seems like driving behaviour which focuses on decreasing fuel consumption is relative to the cost rather than the service quality, which may be an indirect effect.
	L-14	Driving behaviour which focuses on decreasing fuel consumption is quite far away from his view. The driver won't focus on this topic; he is only looking at his job. The LSP also doesn't focus on this topic much; it looks at how fuel or transport cost can be reduced.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
	C-13	It isn't relative to service quality as drivers normally don't behave focusing on decreasing fuel consumption. Moreover, it is relative to cost rather than service quality.
	C-14	It is relative to the service quality indirectly as I think if an LSP can develop drivers' characters to think of green issues, the overall quality of service is definitely better. It isn't only increasing the service quality, but also helping the environment as well.
Logistics system design	C-11	Absolutely, modern trade trends to grow dramatically, then the needs of distribution centres appear greater than in the past. A characteristic of product distribution will change to distribute a large amount and there is a variety of goods/products. Logistics system design seems to be an important relation to service quality. When distribution is decentralised, that means the distance in the relationship between customers and suppliers will reduce and this is reflected in the quality of service eventually.
	L-11	It affects service quality. However, it depends on the characteristics of the products which are delivered too.
	L-12	This is quite important to the quality of service as the opening of the AEC is completed by 2015. Then customers' needs from Laos, Vietnam etc. will determine that LSPs should have a good logistics system design. If any firm doesn't have a good quality/standard of service, it can't survive in this industry. Though this factor does not seem so important in the past, it is more important when there's free flow of service and goods in the AEC in 2015.
	C-12	It depends on the characteristics of the products for this factor. For example, our products' delivery is quite difficult to do as a logistics system design because our products include varieties of tractors so we design our logistics system by ourselves and let the LSP only deliver our goods to our customers. That means that logistics system design isn't relative to the service quality.
	L-13	Depending on the characteristics of goods. The LSP has to consider the logistics system design to suit the characteristics of the goods. However, it is relative to the service quality, surely.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
	L-14	Yes, it is relative to service quality. Processes will decrease and it makes the quality of service better.
	C-13	Yes, it is. Decreasing double handling will decrease the damaged/defective number of goods and also increase timeliness.
	C-14	Yes, it is. If we can decrease the average handling factor, the opportunity of making a mistake will decrease. That means the number of defective/damaged products will decrease too.
Transport management	C-11	It is important to the service quality. It relates to production planning, scheduling and milk-run implications for some companies which apply a milk-run system in their outbound logistics.
	L-11	It affects the service quality. If we can plan a route and get high-fill rates, the lead-time for delivery will be short and the number of defects/damaged goods will be lower too.
	L-12	Sharing and collaborating in the planning of transport management are very important to the service quality because it can benefit neither LSP nor customers. Don't have to talk about how accurate they are because it is a plan. But if there is no collaboration or transport management, it is quite difficult to manage the transportation route and also high-fill rates. If the LSP can manage the route and fill-rate of goods, it is absolutely related to timeliness, accuracy and cost.
	C-12	Yes, it is. We plan and design the transportation routes together because our products are tractors and we can't deliver our goods with other products. Vehicles used for delivery are used only for our products, so we have to consider many factors such as higher costs due to low fill-rate, cost from accidents, high transportation costs, etc. Moreover, vehicles used for our products are two-storey lorries; this will be influential so the routes are suitable to reduce accidents.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
	L-13	If our customers can share their forecast with us, it helps us to make a high fill-rate and well-planned route. It is relative to the service quality in term of timeliness, and other conditions. However, it is rare that customers will give us this information; we have to do the transport management based on the information we have.
	L-14	It is relative to the service quality as customers will receive goods/products in full on time with good product quality and meeting the customers' conditions. Sometimes, LSPs can consolidate goods/products to have a high fill-rate.
	C-13	It affects service quality in terms of timeliness. If the LSP has a well-planned route, the lead-time for delivery will decrease and the quality of service will be better.
	C-14	It is relative to the service quality in term of timeliness, cost, and customer's conditions. If the LSP has a well-planned route and high fill-rate, the cost will decrease and it can deliver on time in full too.
Choice of partners	C-11	Collaboration or sharing is mostly defined as planning collaboration rather than environmental help.
	L-11	Due to our good relationships with customers, we are sharing some information such as forecasting, planning a route. This makes us improve our quality of service in term of timeliness and quality of goods. But I think the choice of partners helping each other in the green issue won't be relative much to the service quality.
	L-12	It should be a collaboration between the LSP and its customer; only synchronicity will benefit all parts of the supply chain. Most of the waste comes from the fact that there are no collaborations, no planning between the LSP and its customers. No matter whether this planning is accurate or not, because it is only planning, but sharing this planning will help other parts in the supply chain plan and identify the flow of goods delivered from the beginning of the chain to the end of the chain. So this construct relates to service quality, surely.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
	C-12	It depends on the characteristics of the goods or products. For example, our products are a variety of tractors and cannot be delivered with other goods and also used with multiple modes of choice or pairing modes of choice. Therefore, the choice of partners does not seem relative to the service quality.
	L-13	If you can give a choice of partner to customers, it may be relative to the service quality. But it doesn't matter much as most goods delivered by land transport will use only one mode of choice. As I said that sharing information about products is rare between customers and their suppliers, it is difficult to talk about helping with the green issue.
	L-14	Customers don't normally share information about goods much. It affects the scheduling of the LSP. As we said that green issues won't be much of a concern for the customers and LSPs in Thailand, sharing or choosing a partner for the green issue won't appear in Thailand. But if we talk about choice of partner in other terms, it does relate to service quality.
	C-13	I don't think it is relative to service quality. Businesses don't concern themselves or help each other much on green issues. If there is choice of partner, it may be relative to some business, especially in a large business, because it may affect the company's reputation.
	C-14	I think it is relative to service quality but not much. To share and help each other with green issues can increase the service quality of the LSP and its services.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
Environmental management system	C-11	At the first time implementing a kind of environmental system, no firm wants to do this, but they get pressure from customers to do it to get a new customer and secure an existing customer. After that, some firms just do it when they have to, but some firms learn from this implementation that a process system in their companies seems systematic and also have no trouble with society. This also helps to screen any person that wants to join a company because (s)he will have to follow many regulations to deserve the certificates. People who join a company should have attitudes of a similar direction as the company. Eventually, the level of service will be increased automatically.
	L-11	In my opinion, ISO is one of the trade barriers. It is unnecessary for you to have a kind of certificate, and this certificate isn't relative to service quality. For example, our company don't have the EMS/ISO 140001 but we have our own regulations and standards that our customers accept as the same as ISO 14001. It depends on the standard of the service quality that your company has. If your company's management isn't systematic, this kind of certificate may help you to set up a standard of processes and increase the quality of service.
	L-12	It can relate to the quality of service about 30-40% of the time as some customers don't require this kind of certificate as one of the service requirements. Some new customers say it is preferable if the LSP has a certificate. In this case, we can tell customers that we haven't had this kind of certificate, but we have a standard of service which seems to cover most of your requirements. He thinks that EMS will help a firm in their process improvement in terms of service quality. If a firm can achieve this kind of certificate, the firm has a standard of service. Therefore, it can relate to the quality of service indirectly. It also helps companies for their internal development.
	C-12	It isn't necessary that an LSP has a kind of environmental certificate to provide a good quality of service. It depends on what its customers require and whether the LSP can do it or not. EMS and other certificates absolutely help a LSP to set up a standard for its processes. Though our company has launched ISO 14001, we haven't pushed our suppliers like the LSPs to have this certificate too.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
	L-13	It is quite important to the service quality to set up a standard and also expand into the new market with concerns about green issues. If you have this kind of certificate, customers will have confidence that you will get all as promised about green issues.
	L-14	It is beneficial to business but it is unnecessary to have this kind of certificate. Some customers may require this certificate but some don't. It is up to the customer's requirements. EMS may be like a guideline to take a greener approach in business but in the business competition in Thailand, cost is the first priority that customers will consider. EMS may be relative to the service quality but not much, especially in high value or health products.
	C-13	It is relative to the service quality as a set of standards of process. Some companies require the EMS as a condition. It appears that EMS can help LSP to serve with a better quality of service.
	C-14	It is relative to service quality but not much. This kind of certificate can set up a standard of processes and this will help the quality of service indirectly. It also guarantees that the LSP will deliver all the services as promised by the certificate. Though some LSPs may have their own way to undertake the green approach, I think an LSP which has a certificate/EMS will have more chance to approach the market.
Externalities	C-11	Safety is quite important and relates to the service quality through the number of accidents, costs increasing from the accidents, the number of goods that are defective/damaged, especially from Japanese customers. In the past, expenses for safety protection was seen by the LSP as a cost, but the attitude to this point has changed nowadays. If you don't have concerns about or pay attention to safety, costs from an accident may be higher than the expense of safety protection.
	L-11	Safety is most important for service quality. We have to train our drivers to drive carefully and with concern about accidents. One accident can make customers unsatisfied due to the long lead-time, or defective/damaged goods.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Green service quality	Organisation	Summary of Interview transcription
L-12		As previously said, safety from delivering goods to customers seems important for service quality; it won't only decrease the number of accidents but also hit the total cost. Safety will reflect the DIFOT indicator, as we have to deliver goods to customers in full and on time. If an accident occurs due to a driver's carelessness, it will directly affect the service quality. Release of CO ₂ emissions will relate to the quality of service when customers are concerned by or pay attention to green issues.
C-12		Driving behaviour which focuses on safety is closely related to service quality through timeliness, defects in the goods/products, products damaged, etc. For other issues, such as CO ₂ emissions, if the LSP can reduce CO ₂ emissions, it will be good in terms of social responsibility but not to the service quality directly.
L-13		Driving behaviour focusing on safety may be relative to service quality. It depends on your company's policy and who your customer is. If your customers pay attention to safety, then safety will be one of the service quality's measurements. The CO ₂ emissions do not seem important to the service quality as no customers are concerned.
L-14		If we talk about safety, it is relative to service quality in term of timeliness, the quality of goods, defective/damaged goods/products. If driving behaviour focuses on safety, the accidents will decrease and will have a direct effect on the service quality. Nowadays, there is rarely a business that is concerned about CO ₂ emissions, so it seems not to affect the service quality. However, the changes will be happening and business will consider carbon credit more than in the present. At that time, this topic will be relative to the service quality in term of customer's condition.
C-13		Not relative much in terms of service quality, as I think most of the LSPs in Thailand aren't concerned with this factor much. Safety may only be relative to service quality in term of defects in goods and timeliness.
C-14		Yes, it is especially for welfare of staff, as I believe that better welfare will make staff happy and provide a good service.

Table 6-3: Interviews Summary on the GSQ Items (cont.)

Table 6-4 presents the importance of GSQ items and the reasons for this. Most participants rated the 'externalities' item as the most important with keywords offered to support this reason as it affected the timeline, accuracy, defects, and service quality. The 'alternative fuels' item affected lead-times while the 'transport management' item affected timeliness and cost. Lastly, the 'choice of partner' item affected information sharing and quality.

GSQ Item	Reasons
Externalities –specifically 'safety' item	<ul style="list-style-type: none"> – Safety is the most important to the service quality as it affects the timeliness and quality of goods. – Safety is the most important to the service quality because if a driver drives a vehicle carefully and not too fast, accidents will be reduced. This also affects the service quality through accuracy, timeliness and quality. – Safety is the most important to the service quality because it directly affects timeliness, defects with goods, goods damaged, etc. The service quality can be improved or made better by the driver's behaviour focusing on safety. – Safety is the most important to the service quality nowadays. Driving behaviour will directly affect the quality of service such as goods' quality, lead-time, defects of goods, etc. – Safety is the most important aspect of the service quality as it affects timeliness and quality of goods.
Alternative fuel	It is most important to the service quality because a lack of gas stations can create long lead-times for delivery.
Transport management	It is most important to the service quality because it affects timeliness and cost.
Choice of partners	It is most important to the service quality. The more sharing of information, the better the service quality.

Table 6-4: Importance of GSQ Item and the Reasons

6.5. Any Other GSQ Items

In Question Two in the semi-structured interview protocol, participants were asked for their opinions on any other green items; however, they thought that green items were important to the LSP's service quality. Three participants thought there were other green items which were important to service quality, as seen below.

L-12 from company B made this comment:

Policies, law, and regulations relating to environmental issues and how to make it compulsory for either logistics firms or other firms in the supply chain to reduce or become concerned with CO₂ emissions and other safety issues, which are probably considered one of the green service quality competencies.

C-11 from company E made this comment:

Leadership is one of the most important competencies for an LSP's service quality. If the top management of a company has leadership on the green issue, (s)he can deploy the company's green policy to the operational staff and also be a role model too. Actually, awareness among the people in the company is the most important factor for performing well as a green company, but it is difficult to measure. Cost saving is used as a measurement for green achievement as with carbon credit.

C-14 from company H gave a comment:

Waste in the processes, such as double handling, should be one of the green service quality competencies but it can be included in the 'logistics system design' construct.

6.6. Concerns or Awareness about Green Issues in the Thai Logistics Industry

After completing the three questions in the semi-structured interview protocol, participants were asked for their opinions of how many LSP concerns about or awareness of green issues they had. It found that all participants totally agreed that there were few LSPs concerned about green issues and some participants gave their further opinions on this question. Table 6-5 shows that whether the participant came from an SME or a large business or from totally Thai-owned companies or MNCs, the answer to this question is there are 'not many' LSPs with concern or awareness about green issues. That means the green issue seems a new trend for LSPs in Thailand and only a few LSPs think it is one of the important factors affecting their service quality and performance.

Company	Answer and Comments
Company A	Not many
Company B	Few, as most of the LSPs and their customers consider cost as the first priority, even though AEC will affect it by 2015. However, some firms have gone their own way to reduce waste from the process but they haven't done it for the green or sustainability objective. They do it because if waste has been reduced, the total cost also reduces as well. If its customers require or pay attention to the green issue, the LSP will respond to this requirement too as its customer will respond to all cost increases from going green. But nowadays there is no policy or regulation to make it compulsory for either LSPs or manufacturers to reduce emissions or show concern about green issues; therefore, there is no reflection from either industry.
Company C	Few, when compared with safety issues, as customers aren't concerned about green issues much. It doesn't relate to the service quality much, which is the opposite of the safety issues that do relate directly to the service quality in both timeliness and quality of goods.
Company D	Not many
Company E	Not many, for both LSP and its customers because "green" will come with costs increases. Not many customers can accept the increased cost for the same level of service quality. If its customers are willing to pay the cost increase which comes from the green issue, the LSP will pay attention and implement green practices into its processes, either changing to use alternative fuels and vehicle technology or implementing the environmental management system. However, if carbon credit is known and applied to the whole supply chain in Thailand, both LSP and its customers will be concerned with this issue.
Company F	It is quite low, not much awareness in either our suppliers or customers, especially LSPs.
Company G	Not many
Company H	Not many

Table 6-5: Comments on the Number of Companies Concerning or Awareness about Green Issues in Thailand

6.7. Development of the Questionnaire Protocol for Phase Two

Regarding Sections 6.3 to 6.5, all nine GSQ items from the literature appear to affect service quality in terms of relevant issues such as cost, product availability, CO₂ emissions, operational efficiency, and environmental collaboration. Table 6-6 presents GSQ items and

issues related to the perceptions of the top management levels in logistics and other industrial sectors. It was from the findings of the semi-structured interviews in Phase One that an overall bigger picture about green service quality in the context of Thailand logistics service became visible. It found that all of the participants perceived the importance of each GSQ construct differently, whereby some participants targeted alternative fuels while some targeted transport and logistics design. However, no GSQ constructs were able to be taken out of the construct development for Phase Two as it may be one of the GSQ competencies in the macro view.

Item	Issue related	Participant (s) who strongly support
Alternative fuels	Cost/corporate image/product availability	L-11, C-12, C-14
Vehicle technology	Cost/innovation/CO ₂ emissions	L-12, C-13
Transport modal choice	Cost/product availability/product's size flexibility	L-11, L-12, C-14
Behavioural aspects	Fully trained on environmental and safety issues/accident rate/CO ₂ emissions	C-11, L-12, C-14
Logistics system design	Product availability/lead-times/high filled rate	C-11, L-12, L-14
Transport management	Product consolidation/back haul	C-11, L-11, L-12, L-13, L-14
Choice of partners	Knowledge sharing/collaboration on environmental issue and activities	L-12, C-14, L-14
EMS	Operational efficiency/environmental regulations	L-13, C-13
Externalities	CO ₂ emissions/aspect changes/green awareness	C-11, L-13, C-14

Table 6-6: GSQ Items and Issues Related

Interestingly, the health and safety issue is not included in the initial GSQ construct from the literature, but it is one of the most important items which most participants address. This means that not only the nine constructs from the literature will be considered but the health and safety construct will be added and developed into the questionnaire protocol for Phase Two. It is noted that health and safety is included into the definition of sustainability (Elkington, 1998; Grant et al., 2013). From this point, the development of the questionnaire protocol will not only use the GSQ constructs and related issues which are presented in Table 6-6 but also include any other GSQ items in section 6.5 as a basis for the development of questionnaire protocol. It can be concluded that all nine GSQ items affect LSP service quality; however, the question concerning which one is the most important will be discussed in the next chapter.

6.8. Conclusions

This chapter has presented the results from Phase One of this research design. Eight case interviews were conducted covering the highlighted GSQ issues, the participants' opinions, their experiences of dealing with the issues, and the practices and lessons learnt. These case interviews could help the researcher to gain insight into how green issues could affect an LSP's performance. Moreover, it has helped the researcher to partially confirm the GSQ items, and there is one important item which does not show in the literature. This is the 'safety' item. These nine GSQ constructs and one 'safety' added topic will now be tested in online and postal surveys with a large sample of respondents to fully understand and empirically answer RQ1 to RQ3. The next two chapters will present the results from Phase Two: the questionnaire survey. Chapter Seven will present the non-bias response and the descriptive analysis and Chapter Eight will present the factor analysis.

7. Survey: Non-bias and Descriptive Analysis (Phase Two)

7.1. Introduction

Chapter Six discussed the results from the semi-structured interview research which was conducted in May to August 2013 (Phase One). Chapters Seven and Eight will discuss the questionnaire survey pertaining to Phase Two. This chapter will now present the survey analysis and the descriptive results from Phase Two which was conducted during late December 2013 to early April 2014. The main purpose of this chapter is to test the non-bias response and present the descriptive analysis including the importance of GSQ variables, LSQ variables, and TLPI variables.

7.2. Data Collection

Continuing from the findings of the semi-structured interview in Phase One, the questionnaire survey protocols on the perspectives of LSPs and LSP customers were developed. Translation/back translation technique was used in this research because the average score of translation/back-translation seems better than that of parallel blind technique. Two questionnaire protocols for LSPs and LSP customers in the Thai version were back translated by two bilingual persons individually to cross-check as per the details of translators shown in Chapter Five. The modification of these questionnaires for the translation and back translation are done in this step between 7th and 14th January 2014.

After modifying the Thai version of these questionnaires, they were delivered to the pilot respondents for a pilot survey. The respondents of this pilot survey came from three main stakeholder groups: two respondents from academia, one respondent from an international organisation, and three respondents from business. Details of all pilot respondents were shown in Chapter Five. Feedback and comments were returned to the researcher around one week later (16th – 23rd January 2014) for modifying and/or correction of the questionnaires before delivering the finalised survey protocols to the sampling groups of both LSPs and LSP customers.

The fourth step of this phase, the finalised questionnaire protocols and the lists of LSPs and LSP customers for sampling were completed and well prepared. The list of LSPs sampled is prepared from two databases: the databases of the Thai Transportation and Logistics Association; and that of the Export-Import Transportation Guide. The number of LSPs in

transportation from the two databases is 441 companies. In addition, the list of LSP customers is prepared from two databases: the database of the Thailand Office of Board of Investment, Eastern Region Investment and Economic Centre; and that of the Federation of Thai Industries, Central and Eastern regions. The number of companies in five major industries from the two databases is 1,313. It took about two weeks (26th January – 6th February 2014) for confirming the participations of potential respondents.

Next step, the researcher and her colleague made a phone appointment to a focal person who might be a logistics manager or a higher position at the management level for asking his/her participation in this research, including the explanation of the research's objectives and other related matters. To make a proper telephone call, the researcher and her colleague followed a script for asking his/her willingness to participate (seen in Appendix 3). The list of companies contacted included 441 companies from the LSP side and 1,313 companies from the LSP customer side.

A four page self-administered questionnaire protocol was developed to measure the importance of GSQ and LSQ variables relating to Thai LPI variables in the context of Thailand. The questionnaire comprised four sections, as presented in Table 7-1.

Section	RQ	Explanation
Section 1	RQ 2	The questionnaire listed the 28 different GSQ variables. Respondents were asked to indicate on a seven-point Likert scale how important they thought each variable was in affecting LSP logistics services to their customers; or the LSP's logistics services that LSP customers perceive (Questions 1-28). This was to ensure that GSQ variables important to respondents were not overlooked (RQ2).
Section 2	RQ 1	The questionnaire listed the 24 different LSQ variables. Respondents were asked to indicate on a seven-point Likert scale how important they thought they were in the logistics services that LSPs provide to their customers; or that for the logistics services that LSP customers perceive from their own LSPs (Questions 29-52).
Section 3	RQ 3	The questionnaire listed the five TLPI variables. Respondents were asked to indicate on a seven-point Likert scale whether they thought what were the LSP's LPI variables (Questions 53-57). They also were asked to indicate how important GSQ competencies were relative to their LSQ competencies (Question 58).
Section 4		The questionnaire listed the seven questions. Respondents were asked to indicate on a set of questions related to their company (Questions 59-65). Finally, respondents were provided with an opportunity to request a copy of the survey results as their incentive to participate.

Table 7-1: Structure of the Questionnaire Survey Protocol

The responses to the industrial mail surveys were encouraged through survey sponsorship by a university or organisation that was familiar to the respondents. After confirming the participations from the LSPs and LSP customers' companies, the copies of cover letters from both Kasetsart University as a sponsor and the researcher who conducts this research, with a copy of questionnaire survey attached, were sent out to the participants via the preferable channels, such as email attachment, fax, email with embedded link, and by post. Gathering all returned questionnaires in early April 2014 meant the time period for data collection in Phase Two was from late December 2013 to early April 2014.

Regarding the sufficient number of responses to undertake exploratory factor analysis, it appears that 208 to 260 responses are sufficient to undertake 52 variables at a ratio of four to five respondents per variable (Hair et al., 2010). However, 429 is more acceptable (Dunn et al., 1994, Hair et al., 2010).

A breakdown of the sample industry group responses is shown in Table 7-2. An overall response rate was approximately 24.46 per cent of the total number of LSPs and LSP customer respondents. However, looking at each response rate between LSPs and LSP customer, the LSPs' response rate was about 13.17 percent of total respondents, which was higher than the LSP customers' response rate, which was about 11.29 per cent of total LSP customer respondents. Considering the five focus industries on the LSP customer side, automotives and parts showed the highest response rate, followed by electronics and parts, plastics, food, and textiles, respectively.

	No. of Samples (count)	No. of Returned Questionnaires	
		Count	%
Overall (LSP + LSP customers)	1,754	429	24.46
LSPs		198	11.29
LSP customers		231	13.17
Food		28	1.60
Textiles		16	0.91
Plastics		30	1.71
Automotives and auto-parts		72	4.10
Electronics and parts		35	2.00
Others		50	2.85

Table 7-2: Response Rates

7.3. Examination and Non-response Bias

Survey research is used as a technique generally to test hypotheses and build theory to help scholars understand the factors that lead businesses to succeed. One interesting issue for scholars addressed by Mentzer (2008) in the logistics survey research field is to maximise the generalisation of the research. It is to ensure that the research samples sufficiently represent the population of interest. Over the past several years, response rates to survey requests have declined (Griffis et al., 2003; Larson, 2005). That means the researchers are aware of how well the research can represent non-response bias.

The data were first examined for normality and survey bias. Normal probability plots were generated for the 28 variables related to green service quality (GSQ). Figure 7-1 shows the probability plot for one of the GSQ variables. Normality is indicated if response plots are clustered around the straight line. All normal probability plots were examined and the data were considered normal for statistical analysis, thus the data were not transformed.

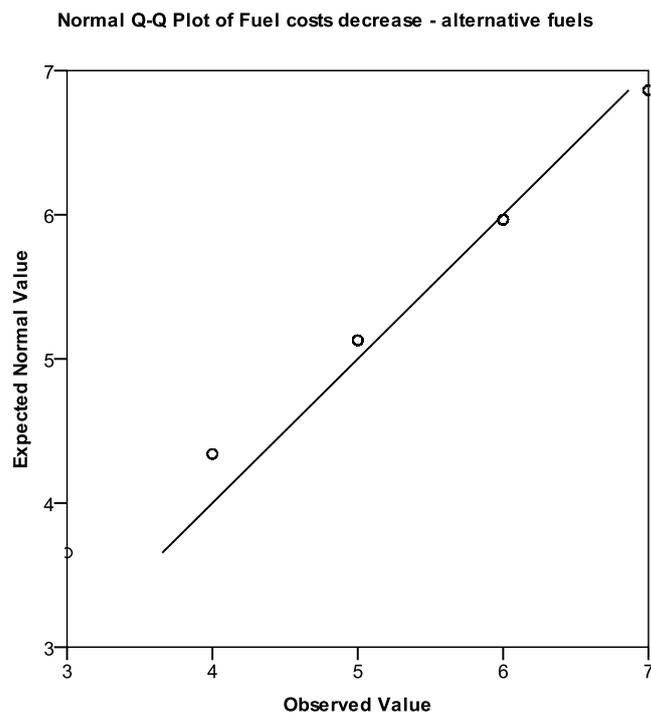


Figure 7-1: Example Normal Probability Plot for Question One

Non-response bias can be described as differences among the results from people who respond to a survey and those from sampled individuals who did not respond in a way relevant to the study. Moreover, low rates of non-response can have large effects on the results of a survey. Wagner and Kemmerling (2010) stated that there are four most commonly used methods to assess non-response bias as:

- Comparison of responses from early vs. late respondents (assumes that late respondents are most similar to non-respondents because their replies required more prodding and took the longest time)
- Comparison of responses from respondents vs. responses from a random sample of non-respondents obtained after a pre-cut off date
- Comparison of respondents vs. non-respondents on multiple characteristics (usually demographic)
- Comparison of the demographics of respondents to those of the population

With limitations to questionnaire survey distribution, the non-response bias used was the comparison of respondents vs. non-respondents on multiple characteristics. Questionnaire data were entered into SPSS Version 20.0 for Windows. The data were then reviewed for errors and 'cleaned' where necessary (Hair et al., 2010). The demographic and control data of the 429 respondents (198 LSPs and 231 LSP customers) were collected from Section 4 of the questionnaire (Questions 38-43).

A one-way analysis of variance (ANOVA) was performed on the 28 GSQ variables across the two groups of responses to test for any significant differences between the means of each group. If the probability value (p-value) is less than or equal to 0.05 then the researcher can conclude that a significant difference exists between the two response groups and non-response bias exists. If the p-value is greater than 0.05 then no significant differences exist between the two groups of responses and non-response does not exist. The results are displayed in Table 7.3 for Section 1 from the questionnaire survey. Only one p-values were less than the significance value of $P = 0.05$; therefore, it could be concluded that there were no significant differences between the two groups of survey responses and that non-response bias did not exist.

Absolute t-test values were less than 1.96 at the 5% significance level for 27 GSQ variables. Therefore, there were no statistically significant differences in means for the 28 variables and it was inferred that responses from email attachment and postal respondents were the same and non-response bias was therefore non-existent.

Variables	Email attachment Mean	σ	Postal Mean	σ	T	p-value
GS-1	6.08	.780	5.96	.784	1.452	.147
GS-2	5.55	1.275	5.71	.890	-1.389	.166
GS-3	5.35	1.456	5.55	1.023	-1.527	.128
GS-4	5.86	1.310	5.82	.973	.358	.720
GS-5	5.45	1.178	5.53	1.098	-.608	.543
GS-6	5.74	.983	5.61	.890	1.268	.206
GS-7	5.68	.948	5.67	.877	.142	.887
GS-8	5.74	.983	5.73	.877	.028	.978
GS-9	5.95	.861	5.86	.770	1.089	.277
GS-10	5.81	1.036	5.77	.914	.332	.740
GS-11	6.02	1.023	5.92	.946	.962	.336
GS-12	5.75	1.221	5.78	.994	-.250	.803
GS-13	5.58	1.104	5.75	.844	-1.620	.106
GS-14	5.94	.941	5.61	.955	3.091	.002
GS-15	5.72	.847	5.63	.790	.990	.323
GS-16	5.61	.996	5.76	.894	-1.499	.135
GS-17	5.96	.918	5.92	.847	.472	.637
GS-18	6.05	.897	6.04	.814	.149	.881
GS-19	5.69	1.131	5.61	.828	.787	.432
GS-20	5.68	1.188	5.82	.994	-1.151	.250
GS-21	5.74	1.114	5.80	.920	-.585	.559
GS-22	5.87	1.093	5.92	.849	-.482	.630
GS-23	6.01	.934	6.02	.874	-.067	.947
GS-24	6.12	.926	6.00	.837	1.209	.227
GS-25	5.92	.987	5.88	.838	.384	.701
GS-26	5.85	1.298	5.59	1.196	1.961	.051
GS-27	5.86	1.036	5.73	1.008	1.215	.225
GS-28	5.85	1.085	5.86	.984	-.149	.882

Table 7-3: Non-response Bias Test

7.4. Descriptive Data Analysis

As discussed in section 5.4 in Chapter Five, this thesis uses the three-phase methodology for item and construct development validation (Churchill et al. frameworks mentioned in Chapter Five) to investigate and analyse data collected from the questionnaire survey. Details of the test are given where appropriate in this chapter. This section generally describes the tests and issues undertaken. Descriptive statistics involving data frequencies, means, standard deviations and graphs will be performed for all data.

7.4.1. Respondents Demographic

There are 429 respondents comprising 198 respondents from the LSP side and 231 respondents from the LSP customer side. With the differences of respondent types in both LSP and LSP customer groups, Figure 7-2 and Figure 7-3 report the percentage of business types in each group. Figure 7-2 describes the LSP responses classified by logistics activities. The majority of the respondents from the LSP group was operating in transport firms with 75.76 percent, followed by logistics, warehousing, other sectors related to transport, and packaging at 13.13, 6.57, 2.53, and 2.02 percent respectively.

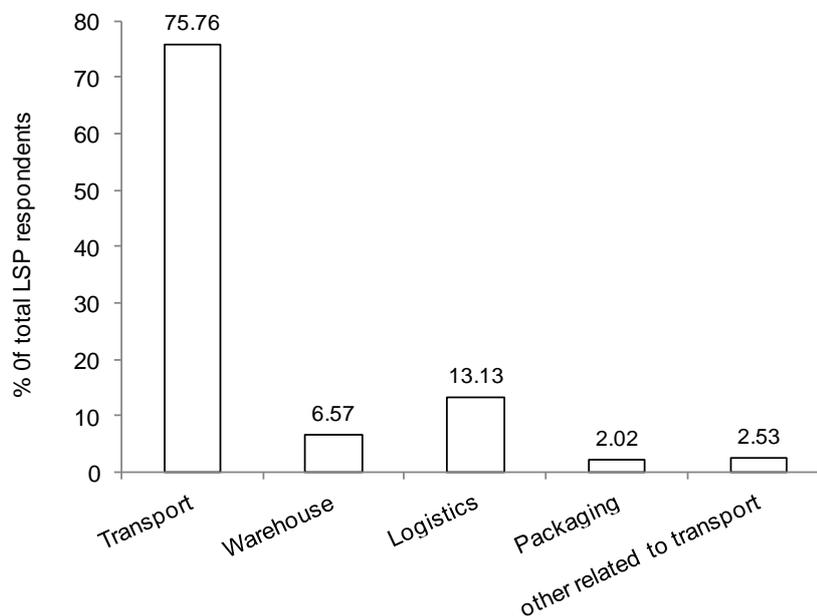


Figure 7-2: LSPs Responses by Logistics Activities

Figure 7-3 describes the LSP customer responses as classified by industry. The percentage of LSP customer respondents were divided into five key industry sectors: automotive and parts with 31.17 percent of total LSP customer respondents; electronics and parts with 15.15 percent; plastics with 12.99 per cent; food with 12.12 percent, and textiles with 6.93 percent. The rest of the respondents, which represented 21.65 percent, came from other industrial sectors.

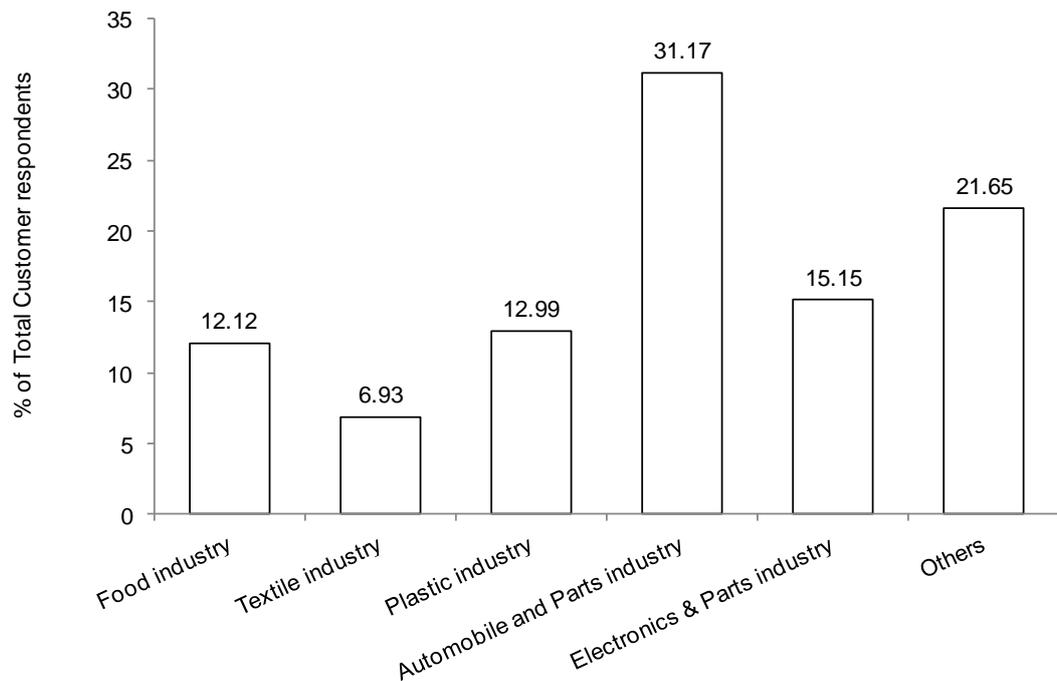


Figure 7-3: LSP Customer Responses by Industry

However, when considering the current position of the respondents, about one-third of the respondents from both sides was in 'supervisory/junior/first line manager' positions. Eighteen percent of the LSPs group was in the top management level with the explanation that the respondents' company size for the majority of LSP respondents was SME company and this will be discussed in Figure 7-4. One of the reasons behind these figures is the relationships within SME businesses and the main characteristic of this kind of business is to run a business like a family or so-called 'family business' management, which is used widely in Eastern countries.

As discussed, LSPs and LSP customers respondents were located or provided their services within the areas of Bangkok, and Central and Eastern Thailand, and it was seen that LSP respondents were mostly in business for between 6 to 25 years (80 percent of the total LSP respondents), whereas almost 70 percent of the total LSP customer respondents were in business for 11 to 25 years, as shown in Figure 7-5. However, the number of years in business

at the respondent's company might be one factor that had influenced the perceptions of LSPs and LSP customers toward the GSQ and LSQ competencies related to LSP performance in the Thai context, as discussed in the next part.

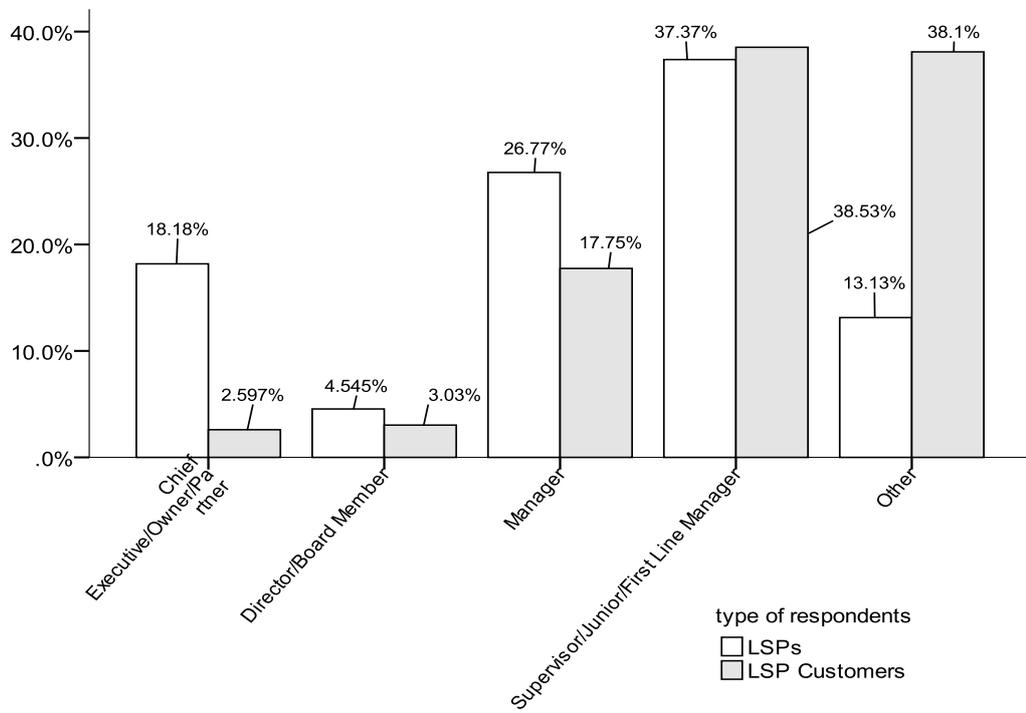


Figure 7-4: Current Position of the Respondents

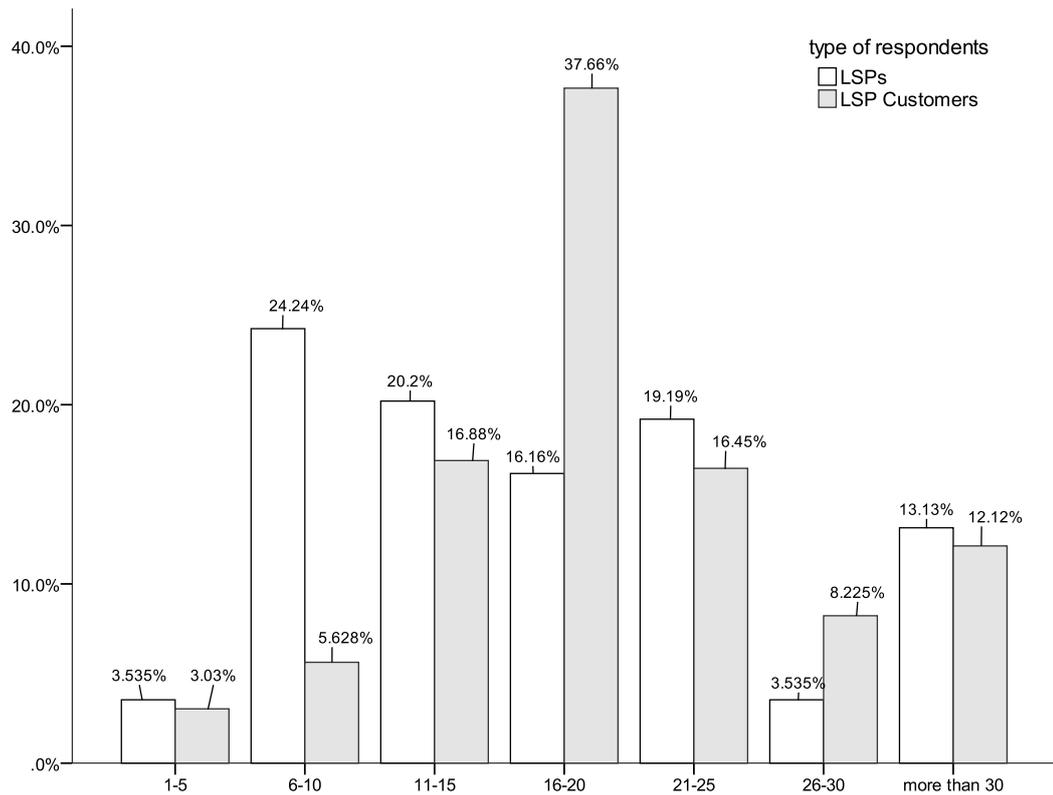


Figure 7-5: Years in Business of the Respondent's Company

The Office of Small and Medium Enterprises Promotion (2014) has classified the type of size of companies in Thailand into three types: small enterprises (1-50 employees in the company); medium enterprises (51-200 employees); and large enterprises (more than 200 employees). Regarding Figure 7-6, it was seen that the respondents were first classified by the average number of employees (or size of company) and then the second classification was done by the ownership structure of the respondent's company. For instance, there were 87.5 percent of total small enterprises (1-50 employees in the company) that were 'totally Thai-owned companies'; 8.33 percent of the total number of small enterprises were MNCs; and the rest of them had another ownership structure. Considering the interactive two variables between the average number of employees and the ownership structure of the respondent's company, it appeared that most LSP respondents were totally Thai-owned SMEs while most of the LSP customer respondents were multi-national companies (MNCs), which were corporate companies.

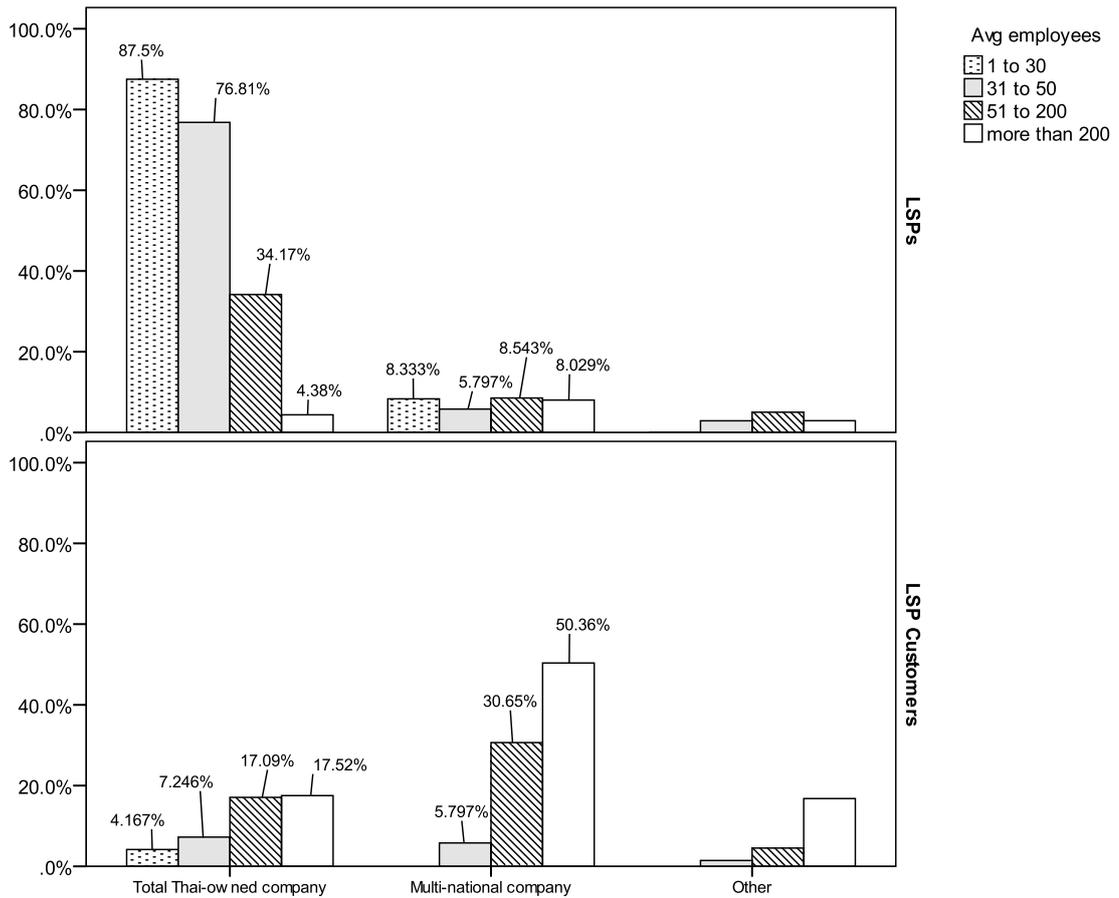


Figure 7-6: Ownership Structure of the Respondent's Company

Interestingly, there was some influence among these two variables relating to the importance of GSQ and LSQ variables in the perceptions of LSPs and LSP customers. Following with the question above, the similarities and differences of the importance of GSQ and LSQ in the perceptions of LSPs and LSP customers will be discussed in the next section.

7.4.2. Differences and Similarities of GSQ and LSQ Variables and Company Information

Respondents were asked to consider the importance of GSQ and/or LSQ variables affecting the logistics service that they (LSPs) provide or they (LSP customers) perceive by selecting a point on a seven-point Likert scale with 1 as 'not at all important' to 7 as 'very important'. Twenty-eight GSQ variables with their names and 24 LSQ variables with their names are presented in Tables 7-4 and 7-6 respectively.

GS-1	Fuel cost by alternative fuel	GS-15	Product availability by logistics system
GS-2	Corporate image by alternative fuel	GS-16	High fill rates by transport management
GS-3	Product availability by alternative fuel	GS-17	Product consolidation by transport management
GS-4	CO ₂ emissions by vehicle technology	GS-18	Back haul reduction by transport management
GS-5	Technology innovation	GS-19	Knowledge sharing on environmental
GS-6	Fixed cost by vehicle technology	GS-20	Environmental targets achievement
GS-7	Product availability by transport modal choice	GS-21	Environmental collaboration enhancement
GS-8	Product size flexibility by transport modal choice	GS-22	Back haul reduction by collaboration
GS-9	Transport modal choice - transport cost	GS-23	Waste decrease within operations and processes
GS-10	Staff fully trained on environment and safety	GS-24	Environmental regulations
GS-11	Accident rate reduction	GS-25	Operational efficiency
GS-12	CO ₂ emission by behavioural aspects	GS-26	CO ₂ emission from awareness of LSP stakeholders
GS-13	Distribution network improvement	GS-27	Environmental aspects changes
GS-14	Lead times reduction by logistics system	GS-28	LSP stakeholders' green awareness

Table 7-4: GSQ Variable's Name

Table 7-5 shows the top ten ranking of the mean GSQ variables among the combined and the separated groups of LSPs and LSP customers. GSQ variables in the ranking in both the combined group and separated group were the same variables. There was no difference among these three groups.

Rank	Combined LSP & Customers		LSPs		Customers	
	Items	Mean	Items	Mean	Items	Mean
1	GS-18	6.04	GS-18	6.14	GS-24	6.00
2	GS-24	6.03	GS-23	6.13	GS-18	5.97
3	GS-23	6.01	GS-1	6.11	GS-17	5.94
4	GS-1	5.99	GS-24	6.03	GS-23	5.92
5	GS-11	5.94	GS-11	6.00	GS-9	5.90
6	GS-17	5.93	GS-22	5.95	GS-1 / GS-11	5.89
7	GS-22	5.91	GS-25	5.93	GS-22 / GS-28	5.87
8	GS-25	5.89	GS-17 / GS-21	5.91	GS-25	5.85
9	GS-9	5.88	GS-20	5.90	GS-4 / GS-27	5.81
10	GS-28	5.86	GS-4 / GS-9	5.86	GS-10 / GS-26	5.75

Table 7-5: Top 10 Rank of the Mean GSQ Variables Mean among the Combined and Separated Groups

LS-1	Flexibility to deliver	LS-13	Information quality - complete
LS-2	Failure to deliver required quantities	LS-14	Ordering procedures - effective
LS-3	Right items	LS-15	Ordering procedures - easy to use
LS-4	Right quantities	LS-16	Ordering procedures - flexible
LS-5	Right items substituted	LS-17	Undamaged product from warehouse
LS-6	Order quality - substitute items	LS-18	Undamaged product from carrier
LS-7	Meet the product specification	LS-19	Order discrepancy handling - satisfactory
LS-8	Personnel contact understand situation	LS-20	Reporting process adequately
LS-9	Personnel contact problem resolving	LS-21	Satisfaction on the quality reports
LS-10	Knowledge/experience of personnel contact	LS-22	Arrive on the date promised
LS-11	Information quality - accurate	LS-23	Placing & receiving time shortly
LS-12	Information quality - adequate	LS-24	Back-order is short

Table 7-6: LSQ Variable Names

Differently from the GSQ top ten ranking, there were six LSQ variables in the ranking which were differences between the combined group and the separated groups of LSP and LSP customers, as shown in Table 7-7. These were LS-2 / LS-19 / LS-11 / LS-3 / LS-21 / LS-13. Four LSQ variables (LS-2 / LS-11 / LS-3 / LS-21) were indicated in the top ten ranking of both the combined group and LSP group as being the same as LS-13, which was indicated in the ranking of both the combined group and the LSP customer group; but only one variable (LS-19) was shown only in top ranking of the customers group.

Rank	Combined LSP & Customers		LSPs		Customers	
	Items	Mean	Items	Mean	Items	Mean
1	LS-22	6.45	LS-22	6.52	LS-22	6.40
2	LS-18	6.30	LS-18	6.33	LS-14	6.31
3	LS-17	6.29	LS-2 / LS-7 / LS-17	6.29	LS-17	6.29
4	LS-14	6.28	LS-14	6.25	LS-18	6.26
5	LS-7	6.26	LS-4 / LS-11	6.24	LS-7	6.24
6	LS-2	6.21	LS-3 / LS-21	6.23	LS-19	6.20
7	LS-4	6.20	LS-20	6.21	LS-13	6.19
8	LS-1 / LS-5 / LS-20 / LS-3 / LS-11	6.17	LS-5 / LS-10	6.19	LS-4	6.17
9	LS-21	6.16	LS-12	6.17	LS-5	6.16
10	LS-13	6.15	LS-23	6.16	LS-20	6.14

Table 7-7: Top 10 Rank of the LSQ Variables Means among the Combined and Separated Groups

As discussed, there were differences of the GSQ-LSQ top ten ranked variables among the combined and separate groups of LSP and LSP customers; however, the company's size is one criteria that might present similarities and differences between GSQ and LSQ variables in the perceptions of LSPs and LSP customers. T-test analysis was used to analyse any similarities or/and differences among: (1) the type of respondent group, and (2) the company's size, which is represented by the average numbers of employees. Verifying any differences between the results from combining the LSP and LSP customer respondent groups and separate respondent groups, it was found that the results among these groups are quite similar, and the results from the combined LSP and LSP customers groups will be represented in this analysis part. The respondents evaluated the existing importance level of GSQ and LSQ variables in their perceptions on a seven-point scale (1 = not at all important, 7 = very important). From 28 GSQ variables and 24 LSQ variables, 19 variables in terms of company size in the perceptions of combined LSP and LSP customer respondents groups have absolute t-test values greater than 1.96, which indicate significant differences between means, and all 19 variables have positive t-test values, as shown in Table 7-8. From 19 GSQ-LSQ variables, the overall levels of these variables were statistically different among these six pair

groups: for instance, micro-sized firms and small-sized firms. That meant large companies (with more than 200 employees) exceed the perceptions for these variables and respondents rate the overall importance levels of GS-8, GS-16, GS-17, GS-26, GS-27, GS-28, LS-6, LS-17, and LS-19 variables.

Among the green service quality variables, the small and medium-sized companies ranked 'fuel cost by alternative fuel' at the highest level of importance. This was followed by 'product consolidation by transport management' and 'back haul reduction by transport management' to complete the top three. Meanwhile, the large-sized companies ranked 'back haul reduction by transport management' at the highest level of importance, followed by 'product consolidation by transport management' and 'LSP stakeholders' green awareness' to complete the top three. Overall, there is an association between company size and the importance of green service quality, according to the statistical difference among the six groups (F value > 1.96). The micro-sized companies ranked 'fuel cost by alternative fuel', 'product size flexibility by transport modal choice' and 'product consolidation by transport management' more highly than the small and medium-sized and large-size companies did.

The level of importance of logistics service quality among the six groups showed differences. The micro-sized, small and medium-sized and large-size companies rated the 'arrive on the date promised' first, then 'ordering procedures – effective', and 'undamaged product from warehouse'. There was an association between company size and the importance of logistics service quality, according to the statistical difference among the six groups (F value > 1.96). The micro-sized firms were more likely to rank the importance of 'knowledge/experience of personnel contact', 'ordering procedures – effective', and 'arrive on the date promised' than the small and medium-sized and large-size companies did. Interestingly, considering the two groups of small and large-size companies, and medium and large-size companies, there was an association between the company's size in these two groups and the importance of green and logistics service quality, including 'high fill rates by transport management', 'back haul reduction by transport management', 'CO₂ emission from awareness of LSP stakeholders', 'information quality – complete', 'ordering procedures – effective', and 'arrive on the date promised'.

It presented that there were significant differences between GSQ and LSQ variables in the perceptions of LSPs and LSP customers in term of company size in the LSP and LSP customer respondents. These different variables comprised nine GSQ and ten LSQ variables. However, it was not certain that all 19 GSQ-LSQ variables were considered as the GSQ-LSQ competencies. Discussion on the effect of company's size and GSQ-LSQ competencies will be discussed in Chapters Nine and Ten. The results of this discussion will support the RQ1 and RQ2.

	Average Employees in Company (Means)				F Value						
	Micro 1 to 30	Small 31 to 50	Medium 51 to 200	Large more than 200	Overall	Mi-Sm	Mi-Me	Mi-L	Sm-Me	Sm-L	Me-L
GS-1 Fuel cost by alternative fuel	6.42	6	5.96	5.94	2.646	3.189	.927	1.175	1.704	1.303	.033
GS-5 Technology innovation	5.08	5.43	5.48	5.66	2.196	.004	.125	.699	.471	2.078	.947
GS-8 Product size flexibility by transport modal choice	5.29	5.8	5.69	5.84	2.818	5.277	4.693	10.290	1.305	1.065	7.882
GS-16 High fill rates by transport management	5.63	5.51	5.72	5.85	2.293	1.825	3.709	6.506	.260	3.162	3.040
GS-17 Product consolidation by transport management	5.67	5.86	5.89	6.07	2.332	3.020	3.573	4.433	.097	.205	.962
GS-18 Back haul reduction by transport management	6.5	5.88	6.02	6.08	3.431	1.307	.884	.007	.245	2.890	2.725
GS-26 CO ₂ emission from awareness of LSP stakeholders	4.67	5.51	5.64	5.93	8.161	1.700	5.677	8.759	1.079	3.887	2.023
GS-27 Environmental aspects changes	5.13	5.67	5.74	5.96	5.200	.169	2.587	1.856	3.164	2.151	.015
GS-28 LSP stakeholders' green awareness	5.63	5.83	5.78	6.03	2.187	9.523	8.046	9.710	1.029	.197	.497
LS1 Flexibility to deliver	5.67	6.1	5.91	5.97	2.040	.181	.968	.684	.790	.501	.010
LS-6 Order quality - substitute items	6.13	6.14	5.92	6.29	3.650	.217	.000	.203	.308	.000	.499

Table 7-8: Differences of GSQ-LSQ Variables in the Perception of the Combined LSP and LSP Customer Respondent Groups and Average Employees

	Average Employees in Company (Means)				F Value						
	Micro 1 to 30	Small 31 to 50	Medium 51 to 200	Large more than 200	Overall	Mi-Sm	Mi-Me	Mi-L	Sm-Me	Sm-L	Me-L
LS-8 Personnel contact understand situation	6.33	6.09	5.94	6.15	2.732	.073	.502	.078	2.267	.669	.774
LS-10 Knowledge/experience of personnel contact	6.33	6.28	5.96	6.07	3.066	2.679	1.112	1.477	.038	.009	.115
LS-13 Information quality - complete	6.38	6.07	6.07	6.26	2.133	.006	.451	4.338	1.232	9.268	7.095
LS-14 Ordering procedures - effective	6.54	6.17	6.21	6.4	2.784	2.091	1.997	.224	.000	3.136	4.550
LS-15 Ordering procedures - easy to use	6.38	6.16	6.01	6.17	2.414	.369	.811	.618	.268	.039	.186
LS-17 Undamaged product from warehouse	6.38	6.38	6.17	6.4	2.524	.112	1.263	.579	2.040	.523	1.016
LS-19 Order discrepancy handling - satisfactory	5.92	6.16	6.11	6.33	2.705	.080	.001	.014	.111	.088	.014
LS-22 Arrive on the date promised	6.92	6.41	6.37	6.51	3.842	28.999	42.133	30.494	.030	2.441	3.820

Table 7-8: Differences of GSQ-LSQ Variables in the Perception of the Combined LSP and LSP Customer Respondent Groups and Average Employees (cont.)

As with the results in the context of the average of employees, the results of the differences in GSQ and LSQ variables in the context of the ownership structure of the company in the perceptions of combine LSPs and LSP customers were similar to the results of the separate respondent groups; the results from the combined LSPs and LSP customers groups will be represented in this analysis part as shown in Table 7-9. The respondents evaluated the existing importance level of GSQ and LSQ variables in their perceptions on a seven-point scale (1 = not at all important, 7 = very important). From 28 GSQ variables and 24 LSQ variables, nine variables had absolute t-test values greater than 1.96 that indicate significant differences between means and all variables have positive t-test values. That meant the MNC companies exceeded perceptions for four variables and respondents rated highly the importance level of (GS-5) 'technology innovation', (GS-26) 'CO₂ emission from awareness of LSP stakeholders', (GS-28) 'LSP stakeholders' green awareness' and (LS-6) 'order quality - substitute items' variables. The totally Thai-owned company companies exceed perceptions for three variables and respondents rated highly the importance level of (GS-2) 'corporate image by alternative fuel', (GS-11) 'accident rate reduction', (GS-12) 'CO₂ emission by behavioural aspects', (GS-13) 'distribution network improvement', and (GS-23) 'waste decrease within operations and processes'.

Among the green service quality variables, the totally Thai-owned company companies, MNCs, and others ranked 'waste decrease within operations and processes' at the highest level of importance. This was followed by 'LSP stakeholders' green awareness', 'accident rate reduction', and 'CO₂ emission from awareness of LSP stakeholders', and 'CO₂ emission by behavioural aspects' to complete the top five. Interestingly, considering the two groups of totally Thai-owned companies and MNCs, there is an association between the company ownership structures of these two groups and the importance of green and logistics service quality as 'corporate image by alternative fuel', and 'CO₂ emission from awareness of LSP stakeholders'.

However, considering the results from the differences between GSQ-LSQ variables in the perception of the combined LSP and LSP customer group in term of the average number of employees and the ownership structure of company, there were four GSQ-LSQ variables which are shown in Tables 7-8 and 7-9. These four variables were (GS-5) 'technology innovation', (GS-26) 'CO₂ emission from awareness of LSP stakeholders', (GS-28) 'LSP stakeholders' green awareness' and (LS-6) 'order quality - substitute items', which the large companies and MNCs rate at a higher importance level than others. That meant the large MNCs rated these four variables of higher importance than other GSQ-LSQ variables. It represented that there were significant differences between GSQ and LSQ variables in terms of the company ownership structure company. These different variables comprise eight GSQ and one LSQ variable. However, it was not certain that all nine GSQ-LSQ variables were considered as GSQ-LSQ competencies. Discussion on the effect of the ownership structure of

the company and GSQ-LSQ competencies will be discussed in Chapter Nine and Ten. The results of this discussion will support RQ1 and RQ2.

Variables	Ownership Structure			F Value			
	Total Thai-owned company (TT) Mean	MNCs Mean	Others Mean	Overall	TT-M	TT-O	M-O
GS-2	5.70	5.56	5.92	2.622	2.600	13.210	11.129
GS-5	5.43	5.53	5.80	2.193	.159	4.987	3.449
GS-11	5.97	5.83	6.18	2.717	6.350	.256	1.301
GS-12	5.79	5.68	6.04	2.299	5.836	.854	4.953
GS-13	5.70	5.63	5.96	2.437	.001	22.859	15.198
GS-23	6.01	5.93	6.31	3.360	.973	.227	1.212
GS-26	5.50	5.76	6.02	4.611	4.882	8.300	3.338
GS-28	5.78	5.86	6.18	3.165	.662	1.069	0.273
LS-6	5.99	6.15	6.29	2.273	1.827	.214	0.221

Table 7-9: Differences of Variables in the Perception of the Combined LSP and LSP Customer Respondent Groups and the Ownership Structure of Company

The LSP and LSP customers' types of businesses were also one variable that this study was focusing as shown in Table 7-10 and 7-11. The 4 GSQ-LSQ variables indicated significant differences between means and all variables have positive t-test values. Not surprisingly, the electronics and parts industry exceeded the perception of the importance for (GS-7) 'product availability by transport modal choice' variable, as availability and speed factors were quite important for electronics products (Mason-Jones et al., 2000). On the other hand, the food industry exceeded perception of the importance for (LS-8) 'personnel contact quality to understand situation', (LS-9) 'personnel contact problem resolving', and (LS-10) 'knowledge/experience of personnel contact' variables.

Variables	Food Mean	Textile Mean	Plastic Mean	Automobile Mean	Electronics Mean	Others Mean	F	Sig
GS-7	5.50	5.13	5.37	5.47	5.91	5.92	4.139	.001
LS-8	6.29	6.06	5.37	5.99	6.06	6.18	4.598	.001
LS-9	6.25	5.56	5.27	6.00	6.00	6.10	5.696	.000
LS-10	6.25	6.00	5.33	5.96	5.89	6.26	4.929	.000

Table 7-10: Differences between Variables in the Respondents' Perceptions and the LSP Customers' Types of Businesses

From Table 7-11, there was one difference for (GS-3) 'the product availability by alternative fuel' variable of the perceptions of LSP types of business. The rest of the 27 GSQ variables and 24 variables were similar in the perceptions of the LSP types of business. Comparing the five main LSP types of business, the logistics business exceeded the perception of the importance for 'the product availability by alternative fuel' rather than other LSP types of business.

Variables	Transport Mean	Warehouse Mean	Logistics Mean	Packaging Mean	Others related to transport Mean	F	Sig
GS-3	5.65	4.54	5.77	4.25	5.60	4.278	.002

Table 7-11: Differences between Variables in the LSPs' Perceptions and the LSP Types of Business

The five TLPI variables also seemed as important as GSQ and LSQ variables in the perceptions of LSPs and LSP customers. The size of company which was represented by the average employees in the company in the perceptions of LSPs and LSP customers, therefore, was considered as a criteria to analyse any differences or/and similarities among the five TLPI variables: transport cost per sale ratios, order cycle time, delivery cycle time, delivery in full on time (DIFOT), which are key performance indicators for measuring a LSP's delivery performance, and return rates. From Table 7-12, order cycle time, and delivery cycle time variables in terms of the classification of companies' size and types of respondent groups had absolute t-test values (3.271 and 5.262, respectively) greater than 1.96, which indicated significant differences between means, and all the variables had positive t-test values.

On the other hand, there was no inter-relation between company size and the respondents' groups on the transport cost per sales ratio, DIFOT, and returned rates as t-test values less than 1.96. It could be said that when considering both the company's size and the types of respondents, large LSP customer companies (more than 200 employees in the companies) exceed the perception of the average time range of order cycle time and delivery cycle time, rather than large LSP companies. Moreover, large LSPs and LSP customer companies exceed the perception for the average time range of order cycle time and delivery cycle time, rather than other sizes of companies. For example, in a case in which the average number of employees was more than 200 persons, LSP customers' perception of the order cycle time was about nine days, which is transformed by the coding (see Appendix 5), and the LSPs' perception of the delivery cycle time was about four days. In addition, the perception of LSP customers of the delivery cycle time was about four days and the LSPs perceived that they could deliver goods/services to LSP customers' customers within four days too.

Average employee numbers in the respondent's company	Type of respondents	Order cycle time				Delivery cycle time			
		Mean	σ	F	Sig	Mean	σ	F	Sig
1 to 30	LSPs	1.39	.722			2.04	.706		
	LSP Customers	5.00				7.00			
31 to 50	LSPs	1.88	.930			2.78	1.161		
	LSP Customers	1.90	.738			2.80	1.033		
51 to 200	LSPs	1.84	.803			2.77	1.198		
	LSP Customers	2.23	1.256			3.18	1.205		
more than 200	LSPs	2.19	1.569			3.05	1.071		
	LSP Customers	2.34	1.223			3.21	1.262		
Average employees (Employ)					2.404	.067		2.771	.041
Type of respondent (Type)					11.54	.001		17.800	.000
					3				
Employ * Type					3.271	.021		5.262	.001

Table 7-12: Differences in Performance Variables in the LSPs & LSP Customers' Perceptions and Types of Respondents & Average Employee Numbers in the Company

7.4.3. Importance of GSQ to TLPs

Respondents were asked to consider the importance of GSQ variables that affected the logistics service that they (LSPs) provide or they (LSP customers) perceive by selecting a point on a seven-point Likert scale, in which 1 was 'not at all important' and 7 was 'very important'. Twenty-eight questions were asked in Section 1. The mean and standard deviations from the perception of LSPs and LSP customers of the importance of GSQ and LSQ variables were calculated for each variable. The LSPs-GSQ perception sum of means of 163.3 marginally exceeded the LSP customers-GSQ perception sum of means of 160.88, as shown in Table 7-13. The +2.5 difference indicated the LSPs' perceptions of GSQ importance exceeded LSP customers' perceptions. Seven variables had absolute t-test values greater than 1.96 that indicated significant differences between means, and all variables had positive t-test values. That meant LSPs exceeded perceptions for these variables and respondents rated the importance level of GSQ variables.

GSQ variables	LSPs Mean	σ	Customers Mean	σ	t-test	Sig (2 tail)
GS-1 Fuel cost by alternative fuel	6.11	.757	5.89	.794	2.905	.004
GS-2 Corporate image by alternative fuel	5.83	.843	5.53	1.106	3.074	.002
GS-15 Product availability by logistics system	5.77	.798	5.55	.800	2.761	.006
GS-18 Back haul reduction by transport management	6.14	.804	5.97	.854	2.124	.034
GS-20 Environmental targets achievement	5.90	1.021	5.68	1.060	2.266	.024
GS-21 Environmental collaboration enhancement	5.91	.908	5.68	1.014	2.497	.013
GS-23 Waste decrease within operations and processes	6.13	.824	5.92	.931	2.437	.015
Sum of Means (all GSQ items)	163.30		160.88			

Table 7-13: Differences in Green Service Quality Variables in the Perceptions of LSPs and LSP Customers

7.4.4. Importance of LSQ to TLPs

Respondents were asked to consider the importance of LSQ variables affecting the logistics service that they (LSPs) provided or they (LSP customers) perceived by selecting a point on a seven-point Likert scale with 1 as 'not at all important' and 7 as 'very important'. Twenty-four questions were asked in Section 2. The LSP-LSQ perception sum of means of 148.71 marginally exceeded the LSP customer-GSQ perception sum of means of 146.91, as shown in

Table 7-14. The +1.8 difference indicates LSPs' perceptions of LSQ importance exceeded the LSP customers' perceptions. Three variables had absolute t-test values greater than 1.96 that indicated significant differences between the means and all the variables had positive t-test values. This meant LSPs exceeded perceptions for these variables and respondents rated the importance level of LSQ variables highly.

LSQ Variables	LSPs Mean	σ	Customers Mean	σ	t-test	Sig (2 tail)
LS-1 Flexibility to deliver	6.06	.755	5.86	.814	2.602	.010
LS-9 Personnel contact problem resolving	6.11	.898	5.93	.884	2.083	.038
LS-10 Knowledge/experience of personnel contact	6.19	.794	5.97	.911	2.611	.009
Sum of Means (all LSQ items)	148.71		146.96			

Table 7-14: Difference of Logistics Service Quality Variables in the Perceptions of LSPs and LSP Customers

7.4.5. Importance of GSQ related to TLPs through LSQ

Respondents were asked to consider the importance of GSQ variables for the logistics service quality that they (LSPs) provided or they (LSP customers) perceive by selecting a point on a seven-point Likert scale from 1 as 'not at all important' to 7 as 'very important'. Both LSPs and LSP customers perceived the importance of these two main competencies. LSP customers, more than LSPs, perceived GSQ as important to LSP performance, as shown in Table 7-15. However, both similarly perceived the importance of LSQ for LSP performance. In summary, LSP respondents' perceptions in the report marginally exceeded LSP customers for the important variables. However, they reported perceptions less LSP customer for the importance of GSQ competencies related to LSQ competencies in Thai LSPs.

Variables	LSPs Mean	σ	Customers Mean	σ	t-test	Sig (2 tail)
Importance of GSQ relate to LSQ	5.46	1.406	5.81	1.136	-2.844	.005

Table 7-15: Importance of GSQ related to LSP in the Perceptions of LSPs and LSP Customers

Nevertheless, there was no significant difference between the means of the LSP and LSP groups. Considering the types of industries for each group, there were some interesting points. Figure 7-7 shows the importance of GSQ related to LSQ in the perception of the LPS group classified by logistics activities. All types of LSP group perceived the importance of GSQ as it relates to LSQ because the percentages of the 'important' and 'very important' levels were

more than 50 percent. Others related to transport perceived the importance of GSQ-LSQ as the highest score, followed by packaging, logistics, and transport with the same score as warehousing with 80 percent of total LSP respondents for each logistics activity, then 75 percent, 65 percent, and 54 percent respectively.

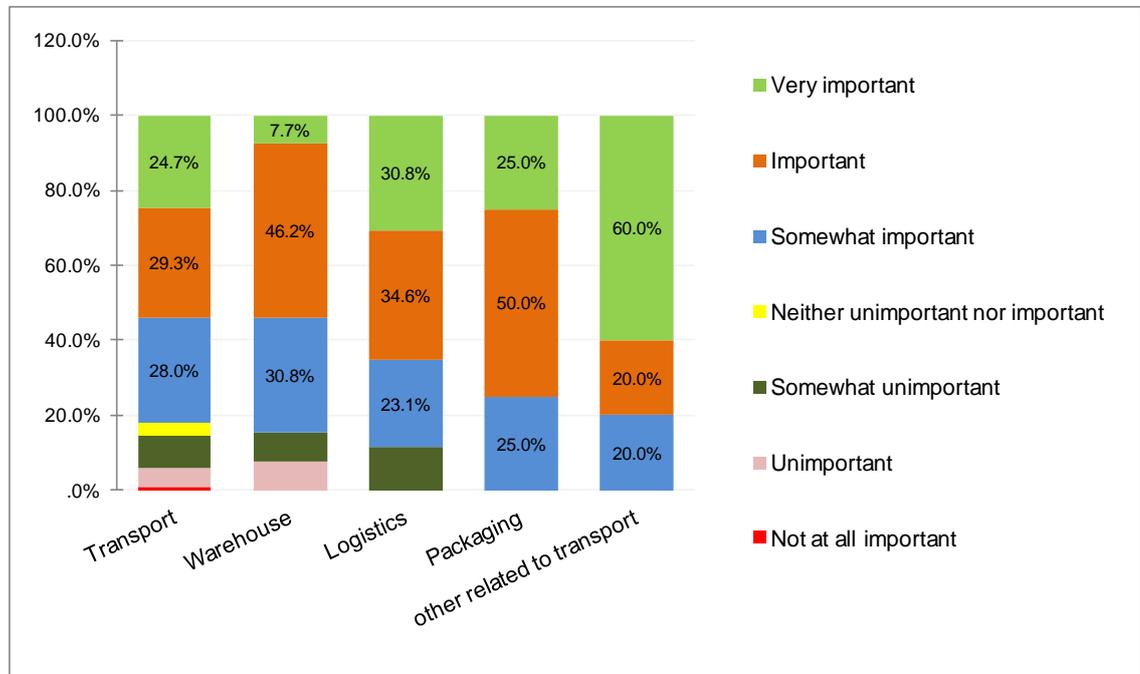


Figure 7-7: Importance of GSQ related to LSQ in the Perception of LSPs by Logistics Activities

Figure 7-8 represents the importance of GSQ related to LSQ in the perception of LSP customers, classified by industries. Considering types of LSP customers classified by industries, the percentages of the 'important' and 'very important' levels were higher than LSPs' perception, as was already indicated in the means from Table 7-15. Regarding the five important industries for Thailand's economy, electronics and parts companies perceived the importance of GSQ-LSQ as the highest score with 74 percent of total LSP customer respondents, followed by food, plastics, automotives and parts, and textiles with each industry at 71 percent, 70 percent, 68 percent, and 50 percent respectively.

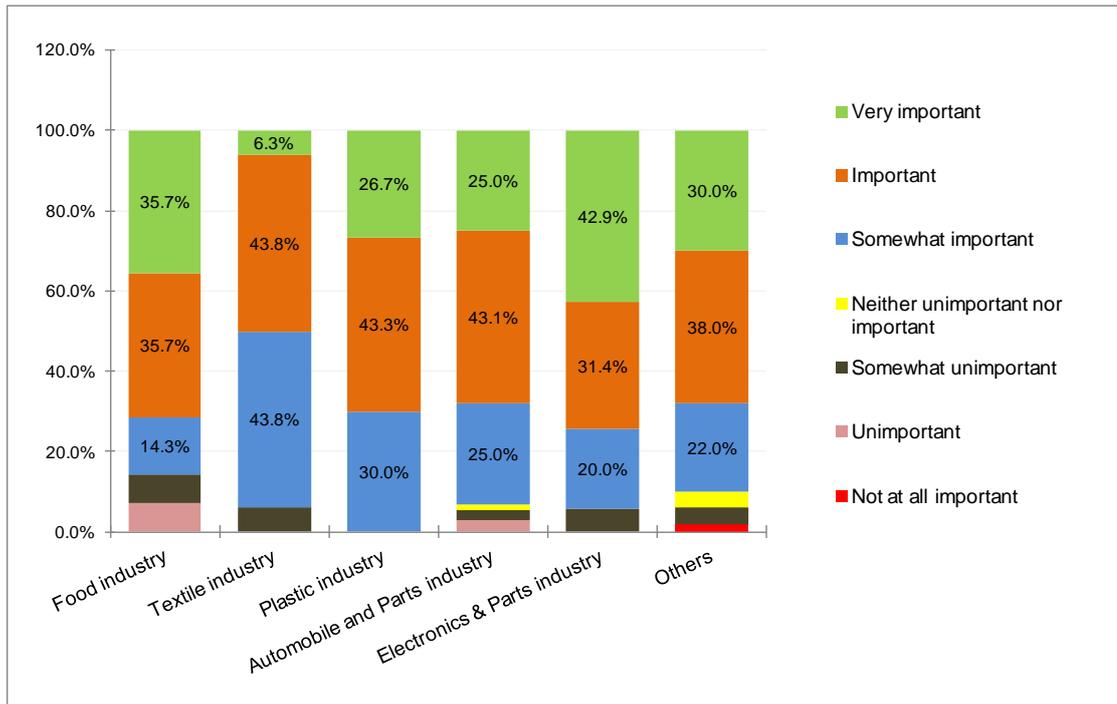


Figure 7-8: Importance of GSQ related to LSQ in Perception of LSP Customer by Industry

7.4.6. Importance of TLPIs

Respondents were asked to consider their perception of their company's performance based on their LSP performance by selecting a point on a seven-point Likert scale, indicating a range of the amount relevance. Five questions were asked in Section 3.

7.4.6.1. Differences of the perceptions of LSPs and LSP customers for TLPIs

Table 7-16 represents the differences between TLPI variables in the LSPs and LSP customers' perceptions. Three variables had absolute F-test values greater than 1.96 that indicated significant differences between the means and all the variables had positive F-test values. Only three variables had absolute F-test values greater than 1.96, which indicated significant differences between means.

TLPIs	LSPs Mean	LSP Customers Mean	F	Sig.
P-1 Transport costs per sales ratio	3.59	3.47	1.070	.301
P-2 Order cycle time	1.84	2.28	16.936	.000
P-3 Delivery cycle time	2.72	3.19	16.795	.000
P-4 Delivered in-full on-time	5.92	5.60	14.042	.000
P-5 Returned rates	2.35	2.31	.099	.754

Table 7-16: Differences between TLPI Variables in LSP and LSP Customer Perceptions

Besides the differences between the TLPI variables presented in Table 7-14, the ranges of the five TLPI variables in the perceptions of LSPs and LSP customers were described using a boxplot, as shown in Figures 7-9 and 7-10. Figure 7-9 represents (P-1) 'transport costs per sales' according to the perceptions of LSPs and LSP customers. It was seen that LSPs rated the range of transport costs per sales between 3.1 and 5.0 percent. The boxplot from the LSP perspective was similar to the boxplot from LSP customers, though there is no difference of P-1 mean between LSPs and LSP customers.

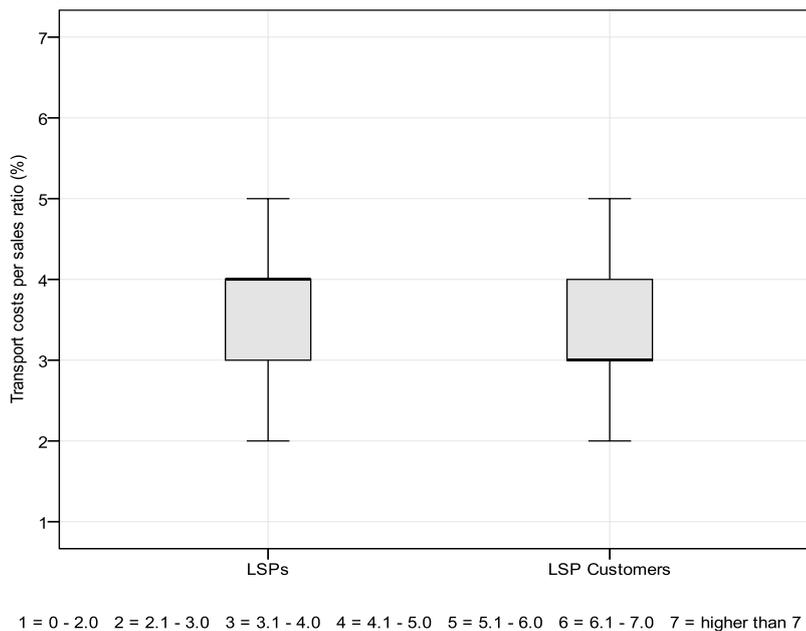


Figure 7-9: Boxplot for Transport Costs per Sales in the Perceptions of LSPs and LSP Customers

On the other hand, Figure 7-10 represents (P-2) the 'order cycle time' in the perceptions of LSPs and LSP customers. It was seen that LSPs rated the range of order cycle time between 0 and 10 days, while LSP customers rated the range of order cycle time between 0 and 15 days. This variable seemed to be opposite to the case of P-1, because there was a difference

between the ranges of P-2 value, but the means of LSP and LSP customers showed no significant differences. The rest of LPI variables' boxplots were discussed in Appendix 5.

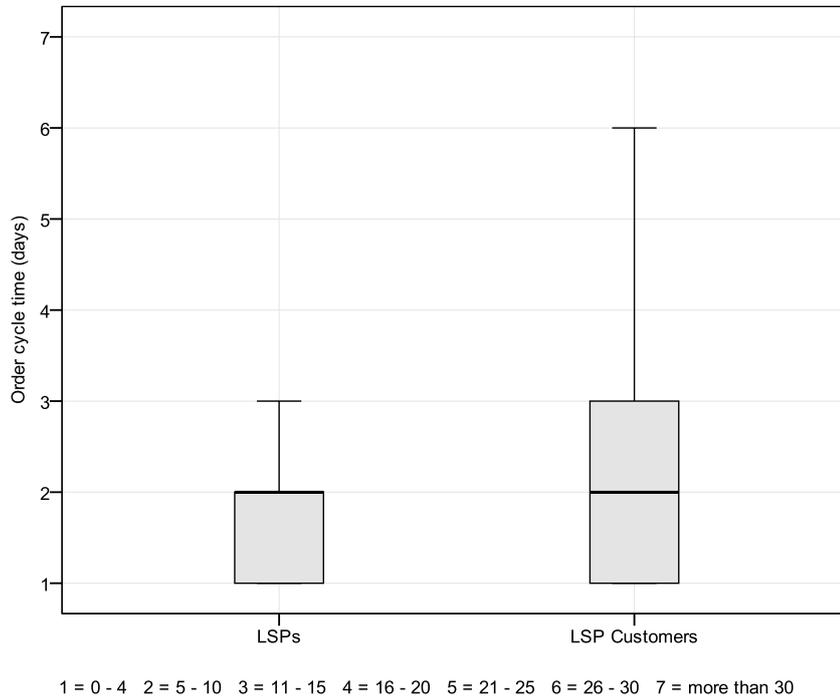


Figure 7-10: Boxplot for Order Cycle Time in the Perceptions of LSPs and LSP Customers

7.4.6.2. Differences in the perceptions of LSP customers by industry

Besides the analysis of the differences of perceptions of LSPs and LSP customer groups, industrial sectors are another type for which the comparisons among five industrial sectors play an important role in this research because there are the standard Thai PLIs which are set up by the Thai Ministry. These standard TLPIs were analysed using the databases of 200 best-in-class companies in five key industries in Thailand. The ranges of the five TLPI variables in the perceptions of LSP customers classified by industries were translated into the boxplot, as shown in Figure 7-11. Considering only the five focal industries, the ranges of (P-1) 'transport cost per sales' in the three industries plastics, automotives, and electronics were in the same range, which was 3.1 to 5.0 percent, whereas food and textiles had a longer range of transport cost per sales, which was 3.1 to 6.0 percent. The rest of the TLPI variables' boxplots classified by industries are discussed in Appendix 5.

The results from section 7.4.6 will be discussed again in Chapter Ten: Discussion of the Gap Analysis and Benchmarking, particularly in the green logistics service quality gap analysis and the logistics performance index gap analysis.

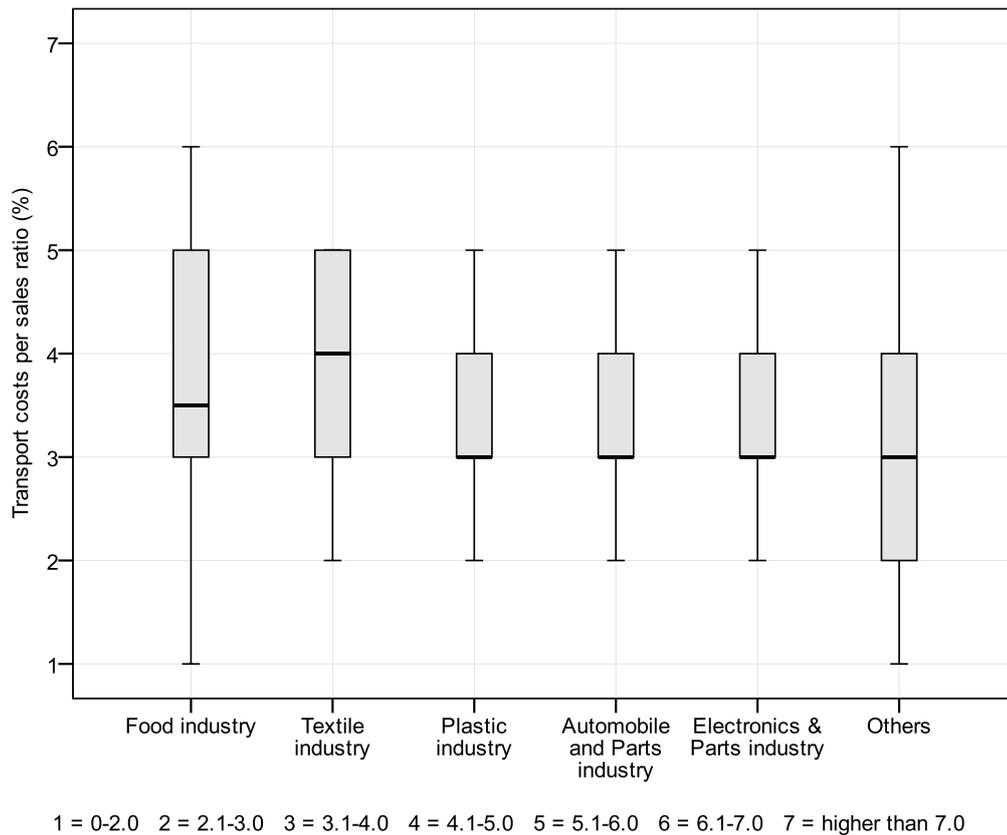


Figure 7-11: Boxplot for Transport Costs per Sales in the Perception of LSP Customers by Industry

7.5. Conclusions

This chapter discussed the main study conducted for this thesis, which represents Phase Two of the three-stage process of the item and construct development detailed in Chapter Five. This chapter tested the non-bias response and conducted descriptive analysis. The non-bias response used was the comparison of respondents vs. non-respondents over multiple characteristics. There were no statistically significant differences in means for the 28 variables and it is inferred that responses from online and postal respondents were the same and non-response bias was therefore non-existent. Referring to the respondent demographic, 75 percent of total LSP respondents were in the transport business while one-third of total LSP customer respondents were in the automobile and parts industry. On the other hand, LSPs exceeded perceptions for three LSQ variables and respondents rated the importance level of LSQ variables highly. According to the importance of GSQ related to LSQ, LSP respondents report perceptions marginally exceeded LSP customers for the important variables. However, they report perceptions less LSP customer for the importance of GSQ competencies related to the LSQ competencies in Thai LSPs.

Nineteen variables in terms of company size among the perceptions of the combined LSP and LSP customer respondent groups have absolute t-test values greater than 1.96, which indicates significant differences between means, and all 19 variables have positive t-test values. Meanwhile, nine variables have absolute t-test values greater than 1.96 that indicate significant differences between means, and all variables have positive t-test values. That means the MNC companies exceeded perceptions for four variables and respondents rated highly the importance level of (GS-5) 'technology innovation', (GS-26) 'CO₂ emission from awareness of LSP stakeholders', (GS-28) 'LSP stakeholders' green awareness' and (LS-6) 'order quality - substitute items' variables. The totally Thai-owned companies exceeded perceptions for three variables and respondents rated highly the importance level of (GS-2) 'corporate image by alternative fuel', (GS-11) 'accident rate reduction', (GS-12) 'CO₂ emission by behavioural aspects', (GS-13) 'distribution network improvement', and (GS-23) 'waste reduction within operations and processes'. Lastly, there are differences between the perceptions of LSPs and LSP customers of TLPIs, and the perceptions of LSP customers by industry. Differences in the results related to the company's size and GSQ-LSQ variables and the company's ownership structure and GSQ-LSQ variables will be discussed together with the results of the structural equation modelling to confirm whether or not these GSQ-LSQ differences will be the GSQ-LSQ competencies.

The exploratory factor analysis, confirmatory factor analysis, and structural equation modelling will be presented in Chapter Eight.

8. Survey: Factor Analysis (Phase Two)

8.1. Introduction

Chapters Seven and Eight discuss the questionnaire survey pertaining to Phase Two. Chapter Seven discussed the non-bias response and the descriptive analysis including the importance of green service quality (GSQ), and logistics service quality (LSQ) to the Thai government's logistics performance index (TLPI); and the importance of GSQ to LSQ. This chapter presents the survey analysis and the results of the exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modelling (SEM). The main purpose of this chapter is to test the outputs from the questionnaire survey with the aim of deductively answering research questions RQ1, RQ2 and RQ3.

8.2. Exploratory Factor Analysis (EFA)

Exploratory factor analysis (EFA) was used to examine latent constructs and the internal consistency of individual GSQ and LSQ items in the LSPs and LSP customer groups. Factor analysis is a multivariate analysis technique that determines underlying dimensions or factors in a set of correlated variables (Hair et al., 2010; Loehlin, 1998; Spector, 1992). EFA is used to explore the data for such factors when the underlying factors are not known a priori (Loehlin, 1998).

Factor analysis need not only be exploratory; confirmatory factor analysis (CFA) can be used for theory building and hypothesis testing (Hair et al., 2010). This technique was utilised in section 8.3 to confirm proposed latent path models in this thesis prior to structural equation modelling of the latent constructs.

Hair et al. (2010) provide steps for the use of EFA, as shown in Table 8-1. The first step is to check whether this technique is appropriate for the data under consideration. This number of survey respondents or cases is almost eight cases per variable, which is well within the suggested five to ten case per variable parameter. 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.

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

Table 8-1 : Factor Analysis Decision Process

The Kaiser Meyer Olkin (KMO) measure of sampling adequacy provides an index from zero to one, reaching one when each variable is perfectly predicted without error by the other variables. Moreover, communality (h^2) is the variance shared in common with all other variables included in the analysis (Hair et al., 2010). Principle component analysis (PCA) is appropriate to use when the objective is to summarise most of the original variance in a minimum or parsimonious number of factors for predictive purposes (Hair et al., 2010). KMO, h^2 , and PCA were used to conduct the factor analysis in this research by following the seven-step process presented in Table 8-1.

However, the first step was to determine the appropriate factor loading to represent the correlation between an original variable and its factor. Generally, a factor loading level is significant based on the sample size (Hair et al., 2010), and Table 8-2 shows the guidelines for identifying significant factor loading based on sample size. Although the total number of respondents of this research was almost 400, the respondents classified by type numbered about 200 in each group, i.e. LSPs and LSP customers. Thus, the significant factor loading used in this thesis was 0.40 in order to conduct group analysis.

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

Table 8-2: Guidelines for Identifying Significant Factor Loading Based on Sample Size

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

8.2.1. EFA of variables and groups

EFA was used to derive significant constructs pertaining to GSQ and LSQ variables. Regarding the two groups of respondents, EFA was used to analyse them separately and in combination to consider what the differences and similarities were between them. There were three steps presenting a set of EFA tests in this thesis. Three main parts were conducted by the classification of respondent group and GSQ-LSQ variables as parts A, B, and C. The first step (or part A) would be to separate the groups and then analyse the LSPs with their own GSQ or LSQ variables, then customers with their own GSQ or LSQ variables. The second step (or part B) would be to analyse all GSQ and LSQ variables for both sets of groups independently. The last step (or part C) would be to analyse the combined group. It was found that the number of factors and also the variables in each factor were similar for the separate and combined group analyses in parts A, B, and C.

The EFA results from the combined group in part C was used to explain both GSQ and LSQ competencies, including the importance of GSQ competencies related to LSQ, in the context of Thai LSPs, as shown in Table 8-3. Reliability was assessed by Cronbach's alpha, the value of which is normally in the range of 0 and 1 and generally agreed to be greater than 0.7. However, it may decrease to 0.6 in exploratory research, and thus this thesis uses this value (Hair et al., 2010). To assess the internal consistency or reliability of the variables and seven factors, coefficient alpha is used as a tool for testing. As discussed, internal consistency refers to the degree to which indicator variables are internally consistent and measure the same unobserved constructs. Coefficient alpha is calculated using inter-item correlations contained in the Pearson correlation matrix. Therefore, values will be in the range of 0.0 and 1.0. Coefficient alpha scores exceeding a threshold of 0.60 are considered to be reliable (Dunn et al., 1994; Hair et al., 2010).

The model in Figure 4-2 in Chapter Four undertook an EFA of all 28 GSQ and 24 LSQ variables to investigate other relationships amongst them that may indicate different constructs. The EFA result is shown in Table 8-3 and is statistically significant. The first two-order factors of the EFA GSQ variables were reduced to one construct (factor 1) that shares almost all of the resultant variables in the EFA of the GSQ variable in the combined respondent groups (part B). The variables (GS-2) 'corporate image by alternative fuel', (GS-5) 'technology innovation', (GS-14) 'lead times reduction by logistics system', (GS-22) 'back haul reduction by collaboration', (LS-7) 'meet the product specification', (LS-8) 'personnel contact understand situation', (LS-9) 'personnel contact problem resolving', (LS-10) 'knowledge/experience of personnel contact', (LS-13) 'information quality – complete', (LS-17) 'undamaged product from warehouse' and (LS-18) 'undamaged product from carrier' were deleted in the EFA process just as the variables (GS-16) 'high fill rates by transport management' and (GS-17) 'product consolidation by transport management' are added.

Although Cronbach's alpha of factor 6 is smaller than 0.6, these four variables (GS-23) 'waste decrease within operations and processes', (GS-1) 'fuel cost by alternative fuel', (LS-11) 'information quality – accurate', and (LS-12) 'information quality – adequate' are in the CFA process, which will be the next step of analysis. Factors 1, 5 and 6 are considered to underline constructs of green service quality, whereas factors 2, 3, 4 and 7 are considered to underline constructs of logistics service quality for this sample.

Factor	Factor Loading	h ²	Initial Eigenvalues	Cumulative Variance	Alpha
<i>Factor 1: Green Safety, Regulations and Collaboration (GSRC)</i>			13.090	34.4%	.929
GS-27 Environmental aspects changes	.764	.686			
GS-28 LSP stakeholders' green awareness	.748	.617			
GS-12 CO ₂ emission by behavioural aspects	.742	.656			
GS-26 CO ₂ emission from awareness of LSP stakeholders	.732	.717			
GS-4 CO ₂ emissions by vehicle technology	.686	.591			
GS-20 Environmental targets achievement	.685	.597			
GS-25 Operational efficiency	.684	.537			
GS-10 Staff fully trained on environment and safety	.663	.560			
GS-21 Environmental collaboration enhancement	.661	.577			
GS-11 Accident rate reduction	.636	.608			
GS-13 Distribution network improvement	.613	.546			
GS-19 Knowledge sharing on environmental	.600	.543			
GS-24 Environmental regulations	.544	.535			
GS-16 High fill rates by transport management	.424	.496			
GS-17 Product consolidation by transport management	.423	.484			
<i>Factor 2: Time and Services (TS)</i>			3.470	43.6%	.877
LS-23 Placing & receiving time shortly	.746	.638			
LS-21 Satisfaction on the quality reports	.712	.650			
LS-24 Back-order is short	.686	.656			
LS-22 Arrive on the date promised	.681	.666			
LS-20 Reporting process adequately	.652	.590			
LS-19 Order discrepancy handling - satisfactory	.623	.576			
<i>Factor 3: Order Service Quality (OSQ)</i>			1.695	48.0%	.860
LS-4 Right quantities	.742	.688			
LS-3 Right items	.700	.728			
LS-6 Order quality - substitute items	.671	.615			
LS-5 Right items on substituted	.663	.602			
LS-2 Failure to deliver required quantities	.615	.673			

Table 8-3: Principal Component Rotated Factor Solution

Factor	Factor Loading	h ²	Initial Eigenvalues	Cumulative Variance	Alpha
<i>Factor 4: Order Procedures (OP)</i>			1.334	51.6%	.813
LS-15 Ordering procedures - easy to use	.813	.763			
LS-16 Ordering procedures – flexible	.749	.763			
LS-14 Ordering procedures – effective	.707	.710			
<i>Factor 5: Green Technology and Transport Management (GTTM)</i>			1.323	55.0%	.666
GS-6 Fixed cost by vehicle technology	.623	.535			
GS-7 Product availability by transport modal choice	.589	.462			
GS-8 Product size flexibility by transport modal choice	.568	.520			
GS-9 Transport modal choice - transport cost	.509	.492			
GS-3 Product availability by alternative fuel	.459	.398			
<i>Factor 6: Green Cost and In-process Waste (GCW)</i>			1.143	58.0%	.413*
GS-23 Waste decrease within operations and processes	.667	.645			
GS-1 Fuel cost by alternative fuel	.544	.537			
<i>Factor 7: Information Quality (IQ)</i>			1.048	60.8%	.736*
LS-11 Information quality – accurate	.693	.754			
LS-12 Information quality – adequate	.689	.748			
KMO measure	.936				
Bartlett's X ²	8693.06				
*inter-item correlation					

Table 8-3: Principal Component Rotated Factor Solution (cont.)

Coefficient alpha scores for the five factors are also presented in Table 8-3. Scores for factors 1, 2, 3, 4, and 5 were .929, .877, .860, .813, and .666 respectively. Since they largely meet or exceed 0.60, they were considered internally reliable. Thus, factors 1, 2, 3, 4, and 5 are considered to underlie constructs of green service quality and logistics service quality for this sample. Factors 6 and 7 do not have an alpha score. Coefficient alpha's purpose is to compare each item or variable to the remaining items as a group and it is therefore meaningless for two item factors (Hair et al., 2010; Mentzer et al., 1999). The inter-item correlation of .413 between 'waste decrease within operations and processes' (GS-23) and 'fuel cost by alternative' (GS-1) and the inter-item correlation of .763 between 'information - quality accurate' (LS-11) and 'information quality – adequate' (LS-12) are reported in Table 8-3. The KMO index for this thesis was .936 and is considered 'meritorious' (Hair et al., 2010).

However, to confirm there is no difference between the EFA results at the 0.40 and 0.50 factor loading levels, an EFA was conducted at the 0.50 level. It is found that both the EFA results at the 0.4 of significant factor loading and the 0.5 of significant factor loading were similar. Although only three variables are deleted into the GSQ constructs at the 0.5 of significant factor loading, the rest of them are the same as at the 0.4 of significant factor loading. The EFA results at the 0.4 of significant factor loading shown in Table 8-3, therefore, are used in this research. Table 8-4 presents the names of factors or constructs for this study.

Factor's Name	
Factor 1	Green Safety, Regulations and Collaboration (GSRC)
Factor 2	Time and Services (TS)
Factor 3	Order Service Quality (OSQ)
Factor 4	Order Procedures (OP)
Factor 5	Green Technology and Transport Management (GTTM)
Factor 6	Green Cost and In-process Waste (GCW)
Factor 7	Information Quality (IQ)

Table 8-4: Names of Factors/Constructs

To clear the code and variable's name for the next analyses, which are the confirmatory factor analysis (CFA) and the structural equation modelling (SEM), the construct, revised variable codes, and names are presented in Table 8-5. The resulting 28 variables from the original GSQ variables comprise a reduced total of 22 variables: 15 variables of the GSRC construct, 5 variables of the GTTM construct, and 2 variables of the GCW construct. Furthermore, the resulting variables from the original LSQ variables comprise a reduced total of 17 variables: 6 variables in the TS construct, 5 variables in the OSQ construct, 3 variables in the OP construct, and 2 variables in the IQ construct.

Construct	Initial Variable	Revised Variable	Variable's Name
GSRC	GS-27	GSRC1	Environmental aspects changes
	GS-28	GSRC2	LSP stakeholders" green awareness
	GS-12	GSRC3	CO ₂ emission by behavioural aspects
	GS-26	GSRC4	CO ₂ emission from awareness of LSP stakeholders
	GS-4	GSRC5	CO ₂ emissions by vehicle technology
	GS-20	GSRC6	Environmental targets achievement
	GS-25	GSRC7	Operational efficiency
	GS-10	GSRC8	Staff fully trained on environment and safety
	GS-21	GSRC9	Environmental collaboration enhancement
	GS-11	GSRC10	Accident rate reduction
	GS-13	GSRC11	Distribution network improvement
	GS-19	GSRC12	Knowledge sharing on environmental
	GS-24	GSRC13	Environmental regulations
	GS-16	GSRC14	High fill rates by transport management
	GS-17	GSRC15	Product consolidation by transport management
TS	LS-23	TS1	Placing & receiving time shortly
	LS-21	TS2	Satisfaction on the quality reports
	LS-24	TS3	Back-order is short
	LS-22	TS4	Arrive on the date promised
	LS-20	TS5	Reporting process adequately
	LS-19	TS6	Order discrepancy handling - satisfactory
OSQ	LS-4	OSQ1	Right quantities
	LS-3	OSQ2	Right items
	LS-6	OSQ3	Order quality - substitute items
	LS-5	OSQ4	Right items on substituted
	LS-2	OSQ5	Failure to deliver required quantities
OP	LS-15	OP1	Ordering procedures - easy to use
	LS-16	OP2	Ordering procedures – flexible
	LS-14	OP3	Ordering procedures – effective
GTTM	GS-6	GTTM1	Fixed cost by vehicle technology
	GS-7	GTTM2	Product availability by transport modal choice
	GS-8	GTTM3	Product size flexibility by transport modal choice
	GS-9	GTTM4	Transport modal choice - transport cost
	GS-3	GTTM5	Product availability by alternative fuel
GCW	GS-23	GCW1	Waste decrease within operations and processes
	GS-1	GCW2	Fuel cost by alternative fuel
IQ	LS-11	IQ1	Information quality – accurate
	LS-12	IQ2	Information quality – adequate

Table 8-5: Variable's Name with EFA

8.3. Measurement Model and Confirmatory Factor Analysis

Phase Two, as the second stage of the three phases of item and construct development, used confirmatory factor analysis (CFA) and structural equation modelling (SEM) to determine the validity, reliability and relationships amongst the remaining variables and latent constructs. CFA is different from EFA because CFA attempts to confirm or test a priori hypotheses about the possible structure of dimensions or factors by selecting and fitting variables to the structures. It is used to provide a confirmatory test of a measurement theory which specifies how measured variables logically and systematically represent constructs in a theoretical model. Construct validity was used to assess measurement model validity.

The CFA process for testing and refining the unidimensional constructs begins with each latent variable or construct. CFA is a tool for enabling the researchers to either “confirm” or “reject” their perceived theory as is used for providing a confirmatory test of the measurement theory. The squared multiple correlations or R^2 values for each manifest variable indicate the proportion of variance of each variable that is explained by the construct relationship, and the square root of the R^2 values is the loading. High R^2 values also indicate good reliability (Hair et al., 2010). An R^2 value of .25 was used for the main study as an indicator consistent with the test for loading. This value indicates that more than 25% of a variable’s variance is explained by the respective latent construct. Factor loadings, composite reliability, and average variance extracted (AVE) are indicators to assess convergent validity (Hair et al., 2010).

In the questionnaire survey instrument, the GSQ construct consisted of nine dimensions or constructs; however, following validation, ‘Green Technology and Transport Management’ (GTTM) and ‘Green Cost and In-process Waste’ (GCW) were removed from further analysis due to a low correlation or loading relative to other constructs that impacted the validation of the GSQ construct. While GTTM and GCW were relevant to some respondents, it was not relevant to them all and hence was confounding the analysis. Additionally, the dimensions of ‘Information Quality’ (IQ) and ‘Time and Services’ (TS) were loaded on a single construct, and it was decided to merge them into one component called ‘Time and Services’ (TS).

Standardised loading, R^2 , and measures of composite reliability and AVE were recalculated for the revised and smaller LSQ and GSQ constructs. The values are shown in Table 8-6 and better meet the assessment thresholds, particularly the AVE threshold. Thus, the remaining 28 manifest variables and four constructs of GSRC, TS, OSQ, and OP all exhibit unidimensionality, reliability, and convergent validity.

Variable	Loading (>.50)	R ² (<.25)	Coefficient Alpha (>.70)	Composite Reliability (>.70)	Average Variance Extracted (>.40)
GSRC1 Environmental aspects changes	.78	.579	.926	0.919	0.468
GSRC2 LSP stakeholders' green awareness	.74	.523			
GSRC3 CO ₂ emission by behavioural aspects	.76	.545			
GSRC4 CO ₂ emission from awareness of LSP stakeholders	.71	.462			
GSRC5 CO ₂ emissions by vehicle technology	.75	.545			
GSRC6 Environmental targets achievement	.70	.489			
GSRC7 Operational efficiency	.51	.503			
GSRC8 Staff fully trained on environment and safety	.72	.455			
GSRC9 Environmental collaboration enhancement	.68	.468			
GSRC10 Accident rate reduction	.69	.435			
GSRC11 Distribution network improvement	.65	.407			
GSRC12 Knowledge sharing on environmental	.63	.402			
GSRC13 Environmental regulations	.61	.387			
TS1 Placing & receiving time shortly	.72	.456	.882	0.859	0.423
TS2 Satisfaction on the quality reports	.78	.593			
TS3 Back-order is short	.75	.495			
TS4 Arrive on the date promised	.77	.574			
TS5 Reporting process adequately	.72	.484			
TS6 Order discrepancy handling – satisfactory	.73	.492			
IQ1 Information quality - accurate	.60	.352			
IQ2 Information quality - adequate	.63	.333			
OSQ1 Right quantities	.82	.680	.823	0.821	0.540
OSQ2 Right items	.82	.703			
OSQ3 Order quality - substitute items	.65	.332			
OSQ4 Right items on substituted	.73	.445			
OP1 Ordering procedures - easy to use	.78	.589	.813	0.814	0.593
OP2 Ordering procedures - flexible	.79	.607			
OP3 Ordering procedures - effective	.81	.583			

Table 8-6: Final Measurement Model Assessment with CFA

To assessing measurement model validity, the construct validity is done as convergent validity, construct reliability, and discriminant validity. To find the fit model with the construct validity, the CFA has been calculated and recalculated by considering the factor loading in each variable, which influences the construct validity through the Cronbach's alpha, CR, AVE, and ASV.

Figure 8-1 shows SEM output for testing construct validity. The findings from this test are used to calculate composite reliability (CR), average variance extracted (AVE), and average shared variance (ASV).

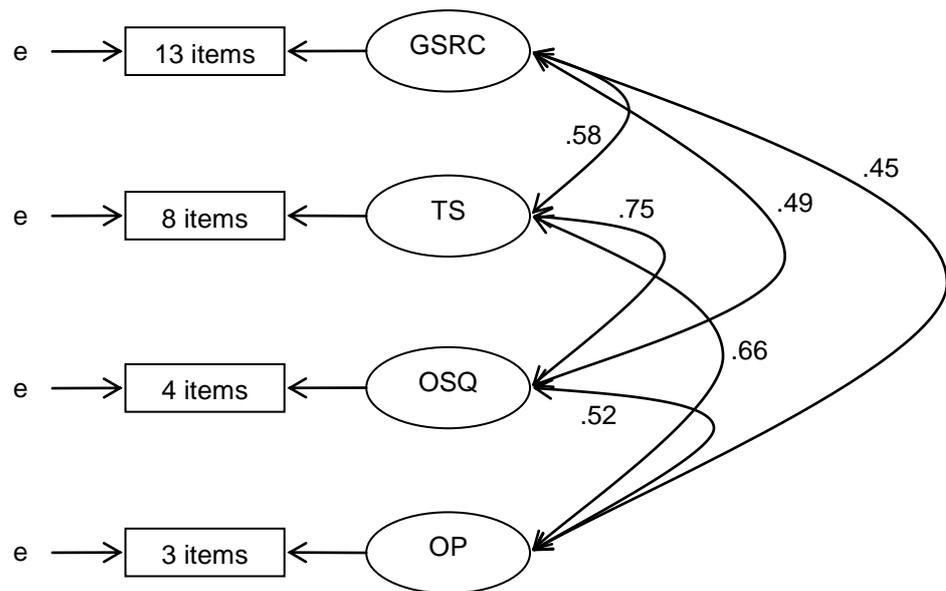


Figure 8-1: SEM Output for Testing Construct Validity

Table 8-7 presents the summaries of the reliability and the validity of the model. Convergent validity is an indicator of a specific construct which converges to share a high proportion of variance in common. Composite reliability (CR) and AVE represent the convergent validity in this research. The rule of thumb for the CR estimate is that .7 or higher suggests good reliability but reliability between .6 and .7 may be acceptable. The rule of AVE was that an AVE of .4 or higher is good. On the other hand, discriminant validity is the extent to which a construct is distinct from other constructs. The rule of thumb for the discriminant validity is that an AVE higher than the ASV suggests good validity (Hair et al., 2010).

Construct	Coefficient Alpha	CR	AVE	ASV
Green Safety, Regulations and Collaboration (GSRC)	.926	.919	.468	.255
Time and Services (TS)	.882	.859	.423	.441
Order Service Quality (OSQ)	.823	.821	.540	.355
Order Procedures (OP)	.813	.814	.593	.300

Table 8-7: Coefficient Alpha, Convergent Validity and Discriminant Validity

Another confirmation of the discriminant validity is assessed by comparing the difference in Chi-square (χ^2) statistics values between pairs of constructs when the correlation between them was unconstrained, i.e. a free parameter, and when it was constrained to a value of 1.0 (Hair et al., 2010; Malhotra et al., 2012). To assess the discriminant validity, it can be obtained with a χ^2 difference assessment of 'nested' structural models (Anderson and Gerbing, 1988; Fornell and Larcker, 1983). Estimates are calculated of all manifest variables in the model, as follows: with no constraints, i.e. 'free' variables and known as model 0; all constrained to one latent variable and known as model 1; all constrained to two latent variables and known as model 2; and the final structural model, known as model 3. The χ^2 and degrees of freedom differences are calculated and significant values indicate discriminant validity between the variables. Models 0, 1, and 2 are shown in Figure 8-2 for illustration purposes and Table 8-8 shows the different calculations. Both difference tests shown in Table 8-8 are significant at $p < .001$ and the proposed model thus exhibits discriminant validity.

	Model 0	Model 1	Model 2	Model 3
χ^2	7691.6	3188.2	2238.003	1829.298
Degree of freedom	528	494	493	491
	Model 0 - Model 1	Model 1 - Model 2	Model 2 - Model 3	
χ^2	7691.6 - 3188.2	3188.2 - 2238.003	2238.003 - 1829.298	
	4503.4	950.197	408.705	
Degree of freedom	34	1	2	
significant	$p < .001$	$p < .001$	$p < .001$	

Table 8-8: Nested' Model χ^2 Difference Tests of Discriminant Validity

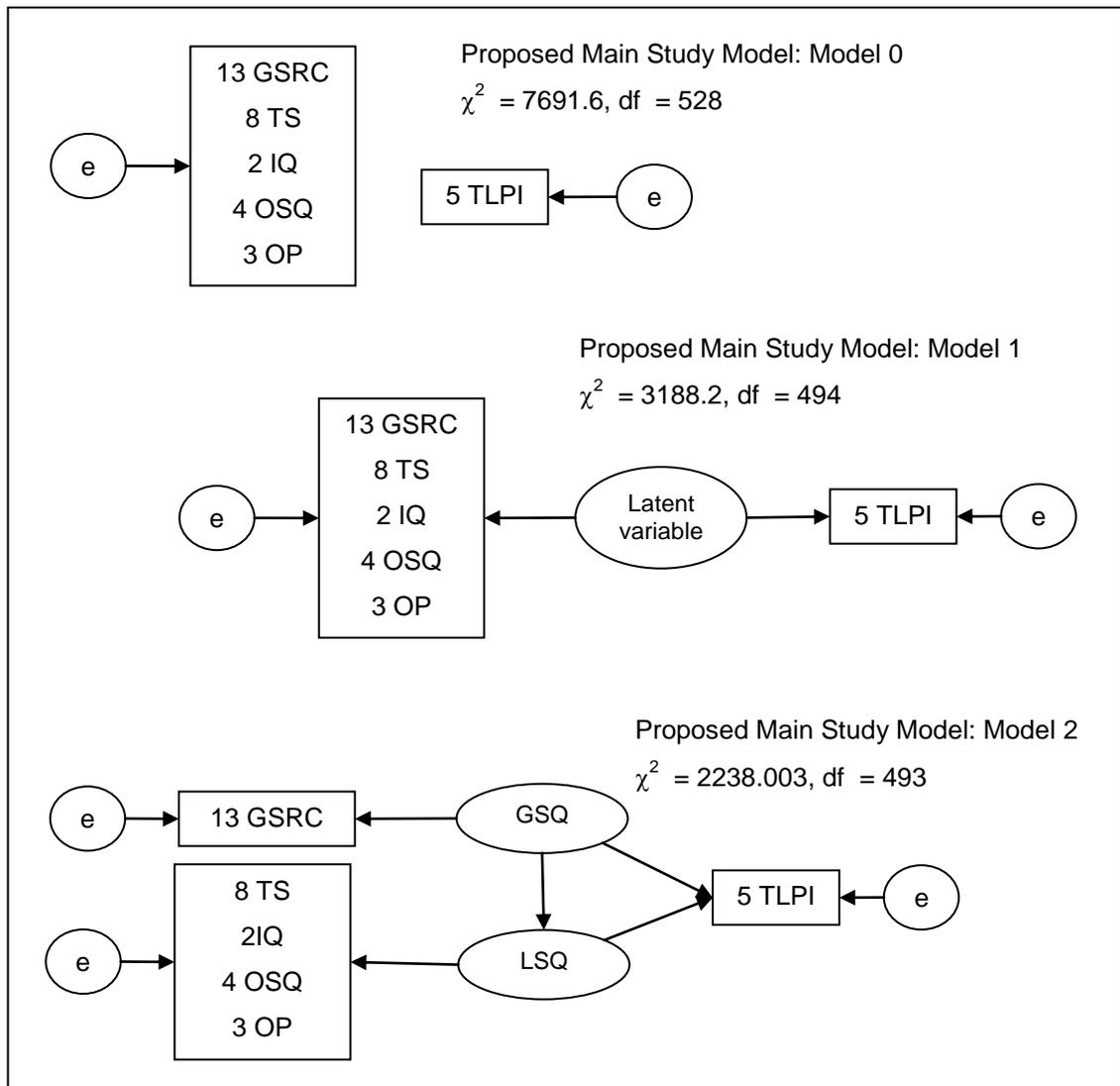


Figure 8-2: SEM Output for 'Nested' Model Tests of Discriminant Validity

All four constructs meet the rule of thumb for the convergent validity and discriminant validity. Though the AVE of TS construct was very slightly less than the AVS, there was rarely no significant difference. Thus, it could be concluded that the overall results from this research have reliability and validity and the model is fit for this research. The measurement model for the main study was found to contain constructs that are unidimensional and reliable, and that exhibit convergent and discriminant validity. All these assessments comprise the second phase of the three stages of the Churchill et al. framework discussed in Chapter Three.

After checking the reliability and validity of the constructs, the assessment of the measurement model fit is done in the next step. A measurement model specifies manifest or indicator variables for exogenous and endogenous latent variables or constructs. CFA can assess the reliability of each latent variable or construct for estimating the causal relationships (Hair et al., 2010; Loehlin, 1998). The uses of CFA, regression or path analysis and related components

meet methodological requirements for the second phase of the Churchill framework and the software package AMOS[®] was used to analyse the measurement and structural models. Hair et al. (2010) classified the goodness of fit measurements into the following three classes as:

- 1) Absolute measures of fit determine the degree to which the overall model (structural and measurement models) predicts the observed covariance or correlation matrix
- 2) Incremental goodness-of-fit measures compare the proposed model to the most common baseline as a null model
- 3) Parsimonious goodness of fit is designed to test parsimony by assessing the goodness-of-fit of the model to the number of estimated coefficients or conversely to the degrees of freedom

The goodness-of-fit indices which were used for the analysis are Chi-square, GFI, and CFI. The details of each index will be explained with the standard measures in the proposed SEM result. Table 8-9 presents the characteristics of different goodness-of-fit indices used in this thesis. All tests are acceptable according to the parameters and hence the model is fairly robust.

Goodness-of-fit	Explanation	N > 250, m ≥ 30	Model
Chi-square	A key measure of differences between the observed and estimated covariance matrices.		1829.298
CFI	A comparison fit index which is an improved version of the normed fit index.	Value range between 0 to 1	0.813
GFI	An indicator of the relative amount of variances and covariances jointly accounted for by the SEM.	GFI value is 0 to 1	0.789

*** N: Number of observations per group when applying CFA, m: number of observed variables

Table 8-9: Characteristics of Different Goodness-of-fit Used in this Study

The revised proposed green logistics service quality model is presented in Figure 8-3. There are one GSQ construct, which is the 'Green Safety Regulations and Collaboration' (GSRC) construct, and three LSQ constructs, which are the 'Time and Services' (TS), 'Order Service Quality' (OSQ), and 'Order Procedures' (OP) constructs for analysing the path analysis in the next section.

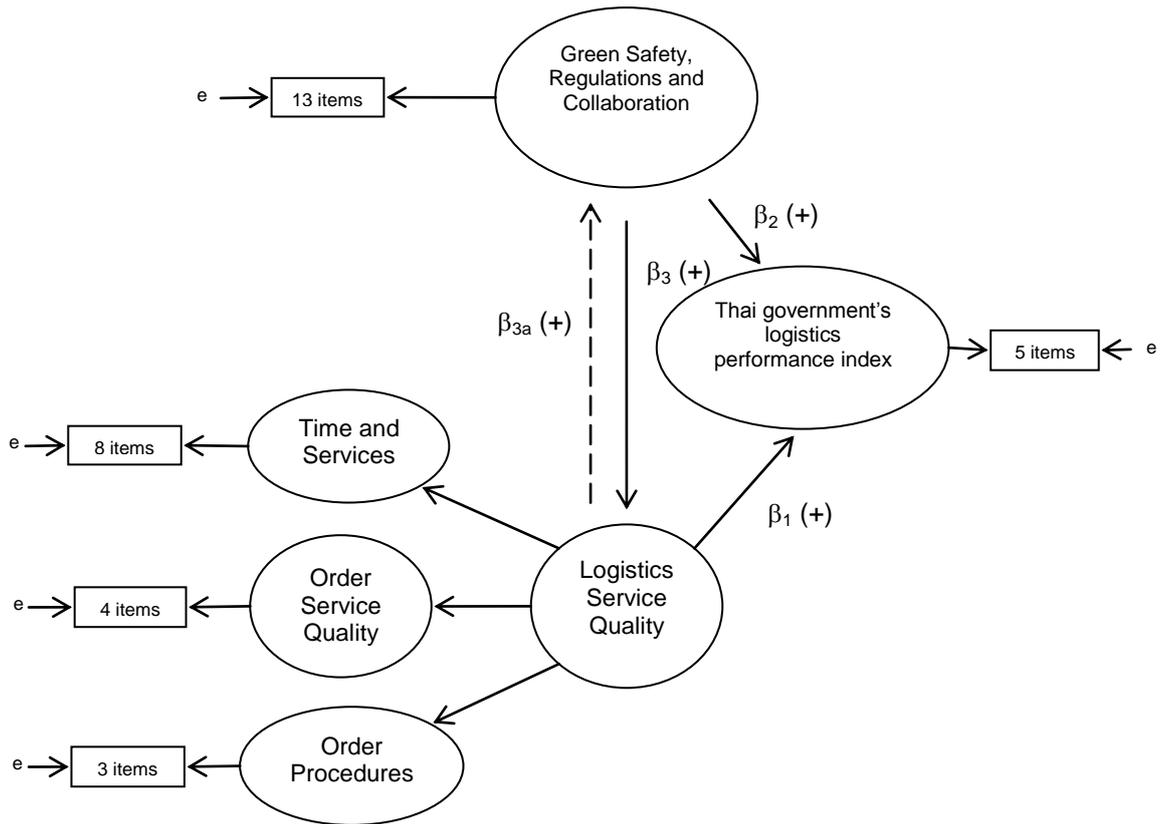


Figure 8-3: Revised Conceptual Main Study Model

8.4. Amended Hypotheses for the Revised Conceptualised Study Model

Revised hypotheses for the path model relationships were derived and are denoted in Figure 8-3 for testing the model by the symbol β for relationships between endogenous latent constructs. To avoid any confusion with the hypotheses mentioned in the previous chapter, all hypotheses here have been renumbered.

Two of the GSQ constructs, the GTTM and GCW constructs, are deleted in the CFA process, and then only GSRC presents to the GSQ construct. In addition, one of the LSQ constructs, the IQ construct, is deleted in the CFA process, and then only TS, OSQ, and OP present to the LSQ construct. Thus, the resultant hypotheses are as follows:

- H1:** LSQ positively affects TLPI, i.e. $\beta_4 > 0$
- H2:** GSRC positively affects TLPI, i.e. $\beta_5 > 0$
- H3a:** GSRC positively affects TLPIs through LSQ, i.e. $\beta_6 > 0$

H3b: LSQ positively affects TLPIs through GSRC, i.e. $\beta_{6a} > 0$

8.5. Structural Equation Modelling

Structural equation modelling (SEM) is a popular technique and is also known as latent variable analysis or covariance structure analysis. SEM is a multivariate analysis technique that examines a set of dependence relationships simultaneously using regression and covariance amongst latent constructs or variables (Loehlin, 1998; Hair et al., 2010). CFA forms the basis of the former; therefore, issues affecting CFA also affect SEM as well as issues of structural model fit. For the part of construct validity, which is necessary for theory testing and building, Hair et al. (2010) recommended using variance/covariance matrices for testing the theory, and it will be used for the construct validity in this study.

Following testing the hypotheses in Figure 8-3, four hypotheses pertaining to structural relationships in the revised conceptual main study model were presented in the previous section and were supported/not supported by using the results from Figures 8-4 and 8-5. As GSRC was the only construct of GSQ, therefore the GSRC construct directly affects LSQ and TLPIs. Starting with the effect of the GSRC construct on the TLPIs directly and indirectly, seen in Figure 8-4, it can be found that the effect of LSQ on TLPIs (β_4) was 0.48, which was a positive effect, whereas the effect of GSRC to TLPIs (β_5) was -0.39, which was a negative effect. However, GSRC positively affects LSQ (β_6) as 0.75. From this path analysis, the hypotheses of H1, H2, and H3 were tested. Hypothesis 1 and 3 were supported, while hypothesis 2 was not supported from the result.

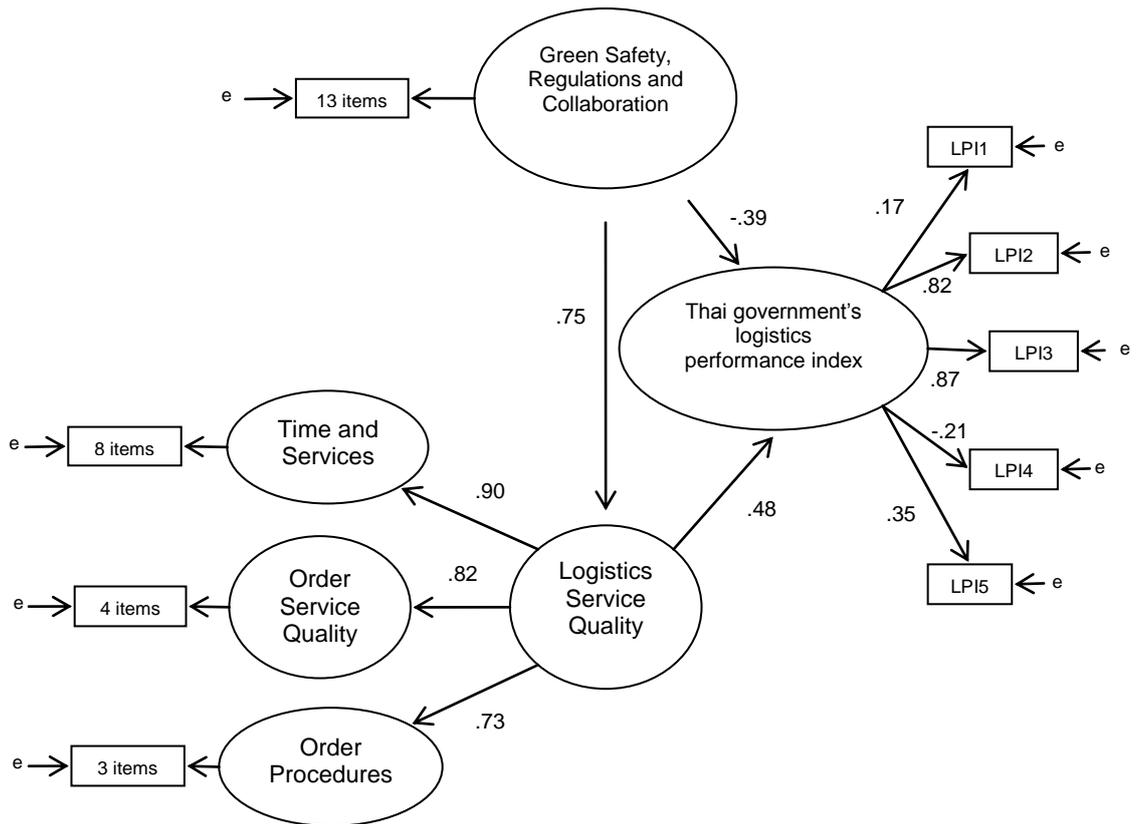


Figure 8-4: GSRC-LSQ-TLPI Path Analysis

Figure 8-5 presents the effects of the LSQ construct on TLPIs directly and indirectly. It can be found that the effect of LSQ to TLPIs was $.36$, which was a positive effect, whereas the effect of GSRC to TLPIs was $-.32$, which was a negative effect. However, LSQ positively affects TLPIs through GSRC (β_{6a}) as $.67$. Although LSQ positively affects TLPIs through GSRC, GSRC negatively affects TLPI. This path analysis model, thus, cannot be fit for this research study.

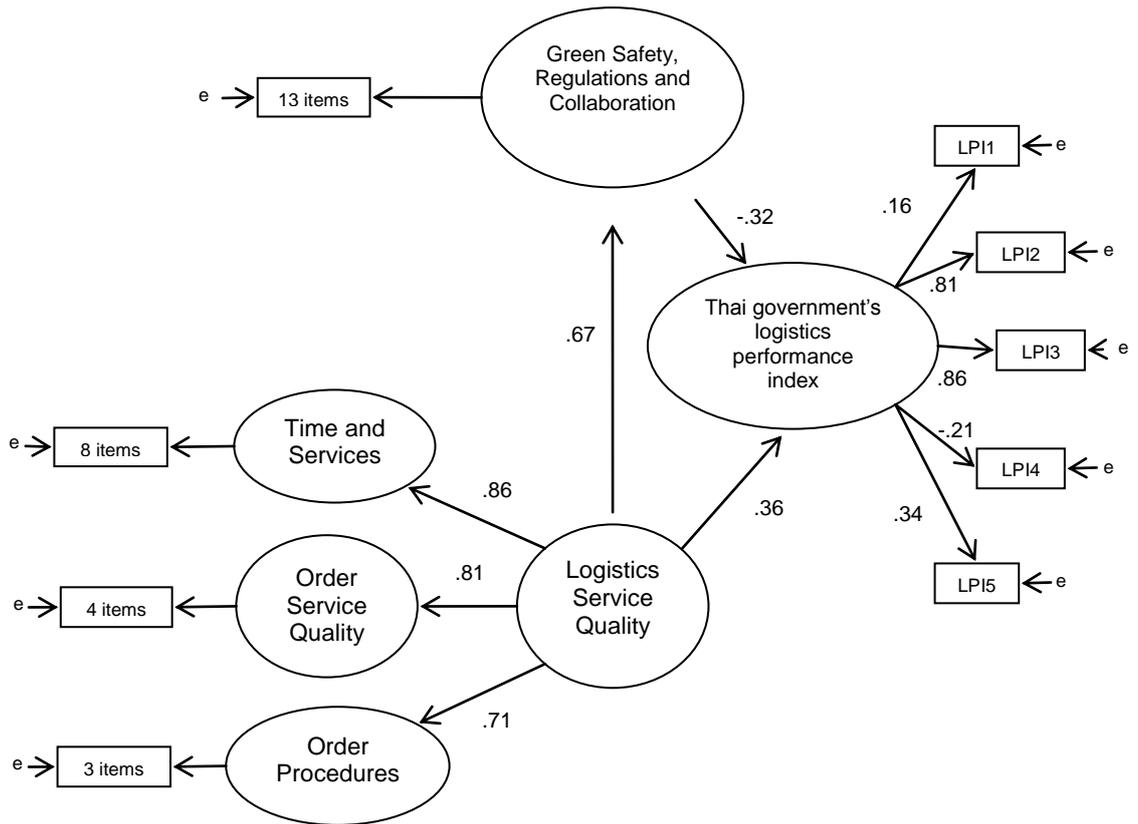


Figure 8-5: LSQ-GSRC-TLPI Path Analysis

Four hypotheses pertaining to structural relationships in the conceptual main study model were presented in the previous section and are rejected/not rejected by using the results from Figures 8-4 and 8-5 as follows.

H1: LSQ positively affects TLPI, i.e. $\beta_4 > 0$

This hypothesis is rejected with a standardised positive coefficient of 0.48

H2: GSRC positively affects TLPI, i.e. $\beta_5 > 0$

This hypothesis is not rejected with a standardised negative coefficient of 0.39

H3: GSRC positively affects TLPI through LSQ, i.e. $\beta_6 > 0$

This hypothesis is rejected with a standardised positive coefficient of 0.75

H3a: LSQ positively affects TLPI through GSRC, i.e. $\beta_{6a} > 0$

This hypothesis is rejected with a standardised positive coefficient of 0.67

Although LSQ positively affects GSRC, GSRC has no effect on TLPIs. Using the various standardised coefficients, mathematical equations expressing relationships between latent constructs in the model would be: $TLPI = .48LSQ$,

$$\text{where } LSQ = .75GSRC + .90TS + .82OSQ + .73OP$$

A resultant equation from substitution in terms of all first order constructs would be:

$$TLPI = .48 * (.75GSRC + .90TS + .82OSQ + .73OP), \text{ or}$$

$$TLPI = .36GSRC + .43TS + .39OSQ + .35OP$$

To examine the direct effect of LSQ without the GSRC on TLPIs (shown in Figure 8-6), the strength of the coefficient is .30. When considering the GSRC-LSQ-TLPIs path analysis (Figure 8-4), the strength of the coefficient increases to .48. It can be said that the GSRC has indirectly affected TLPIs through LSQ, and the GSRC makes the strength of the LSQ-TLPI coefficient is higher. This is supported by the results from Phases One and Three. L-12 (2013), representing a LSP company in Phase One, showed that whether a company would create or implement a green project initiative depended on the cost reduction and/or process efficiency. That means the green aspect will affect the service quality in the perceptions of LSP companies. In line with the views of most participants in Phase Three, most agreed that the green construct affected logistics service quality constructs.

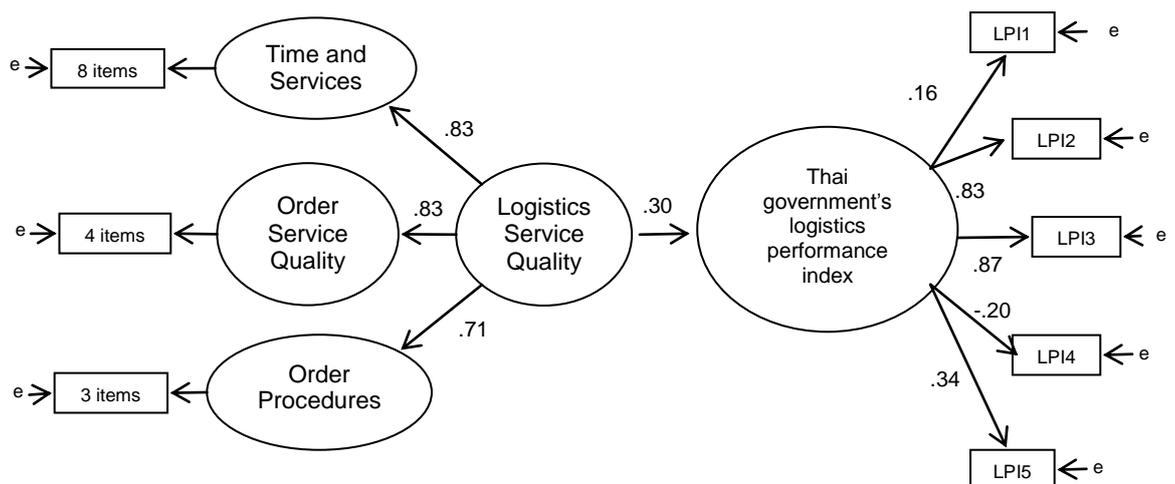


Figure 8-6: LSQ-TLPI Path Analysis

As seen from Figures 8-4 and 8-5, the GSRC construct indirectly affects TLPIs, while there were three sub-constructs under the LSQ construct which directly affect TLPIs, as shown in the final path analysis for the structural equation modelling in Figure 8-7. To explain in more detail how the importance of GSQ and LSQ competencies for TLPIs, the criteria of types of business (service providers and their customers), the Eastern and Western business cultures (or philosophies), and the size of company will be considered and discussed.

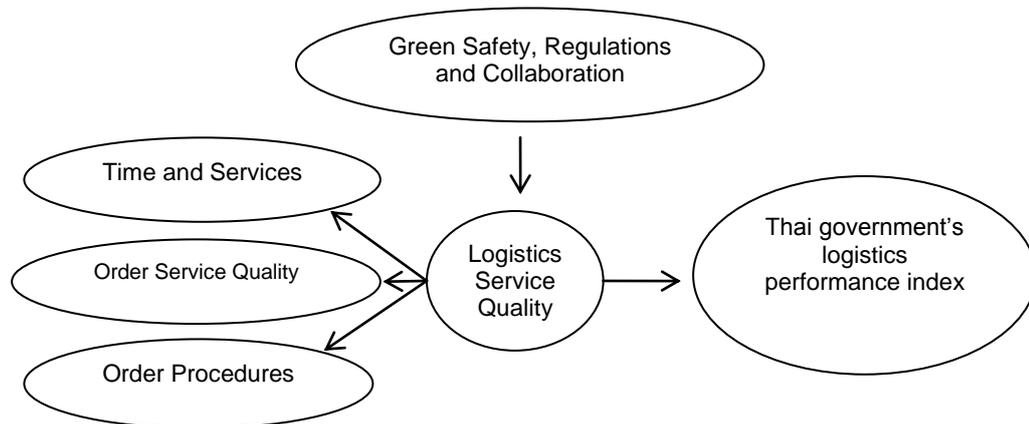


Figure 8-7: Final Path Analysis for the Structural Equation Modelling

Regarding Figure 8-7, the final path analysis for the combined LSP and LSP customer groups showed the effects of GSRC and LSQ on TLPIs. However, considering the effects of GSRC and LSQ on TLPIs for each perspective might help businesses to understand the weight of GSQ and/or LSQ constructs' effect on TLPIs. Figure 8-8 presents the effects of GSQ and LSQ to TLPIs from the perspectives of LSPs (seen in Figure 8-8a) and LSP customers (seen in Figure 8-8b). There were five differences in the effects of GSQ and LSQ on TLPIs in the path analysis. Firstly, LSP customers exceeded perceptions and rated the importance of OSQ for LSQ as .85, whereas LSPs rated the importance of OSQ to LSQ as .77. Looking at four variables of the OSQ construct, it combined with three variables in order of accuracy attributes, and one variable in order of quality attributes. Order accuracy represents the ability of the service providers to deliver the right product at the required quantity as ordered with none of the orders being substituted with other products (Bienstock et al., 1997; Mentzer et al., 2001, 1999, 1989; Novack et al., 1995; Rinehart et al., 1989). Order quality refers to the degree to which the services provided by the service providers meet the service specifications set by the customers (Novack et al., 1995). It was not surprising that LSP customers exceeded perceptions and rated the importance of OSQ for LSQ highly.

Secondly, there were the three significant differences among the effects of GSQ and LSQ on TLPIs, such as (TLPI2) 'order cycle time', (TLPI3) 'delivery cycle time', and (TLPI4) 'DIFOT'. However, it found that there were four effects of GSQ-LSQ on TLPI: TLPI1, TLPI2, TLPI4, and

TLPI5. The effects of GSQ and LSQ on 'transport cost per ratio' (TLPI1) showed that LSP customers exceeded perception and rated the importance of GSQ and LSQ on TLPI1 as .25, whereas LSPs rated the importance as .04. It could be explained from the results of Phase One and Chapter Six that LSPs could deliver any green service quality that their customers required, as long as their customers were willing to pay for the cost occurred. That was why LSP customers rated the importance of GSQ and LSQ on LPI1 more highly than LSPs did. Thirdly, the effects of GSQ and LSQ on 'order cycle time' showed that LSP customers exceeded perception and rated the importance of GSQ and LSQ on LPI2 as .92, whereas LSPs rated the importance as .86. It was similar to the effects of GSQ and LSQ on 'DIFOT', whereas LSP customers rated the importance of GSQ and LSQ on TLPI4 as .12, but there is no effect of GSQ and LSQ on TLPI4 from the perspective of LSPs. Lastly, the effects of GSQ and LSQ to 'returned rates', interestingly, showed that LSPs exceeded perception and rated the importance of GSQ and LSQ on TLPI5 as .68, but LSP customers rated the importance of these constructs as quite low.

However, there were only two GSRC competencies that differed significantly in the perceptions of LSPs and LSP customers; there were no significant differences for all the LSQ and TLPIs. Thus, it may be said that LSPs exceeded and highly rated the importance of the GSQ competencies, particularly in 'environmental targets achievement', and 'environmental collaboration enhancement' competencies rather than other GSQ competencies, and there was no difference in GSQ-LSQ competencies in the perceptions of LSPs and LSP customers.

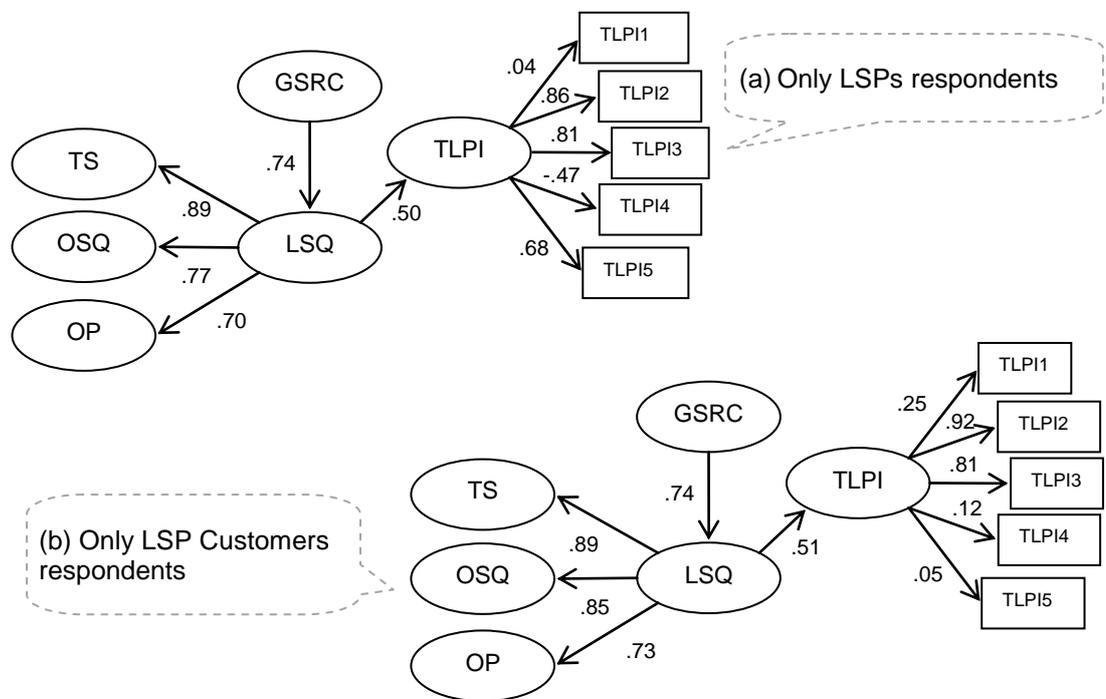


Figure 8-8: Structural Equation Modelling - Perspectives of LSPs and LSP Customers

Figure 8-9 presents the effects of GSQ and LSQ to TLPIs in the perspectives of large companies (seen in Figure 8-9a) and SME companies (seen in Figure 8-9b). There were six differences in the effects of GSQ and LSQ on TLPIs in the path analysis. The researcher had rechecked that whether or not all six relationships were significantly different, and then using the database from the survey the micro-size, small-size, and medium-size companies were transformed to one group as SMEs. It can be seen that there were fourteen differences about the effects of GSQ-LSQ on TLPIs between the perceptions of large companies and SMEs. These differences included seven GSQ competencies, five LSQ competencies, and two TLPIs covering the GSRC, TS, OSQ, and OP. Looking at the Figure 8-9:

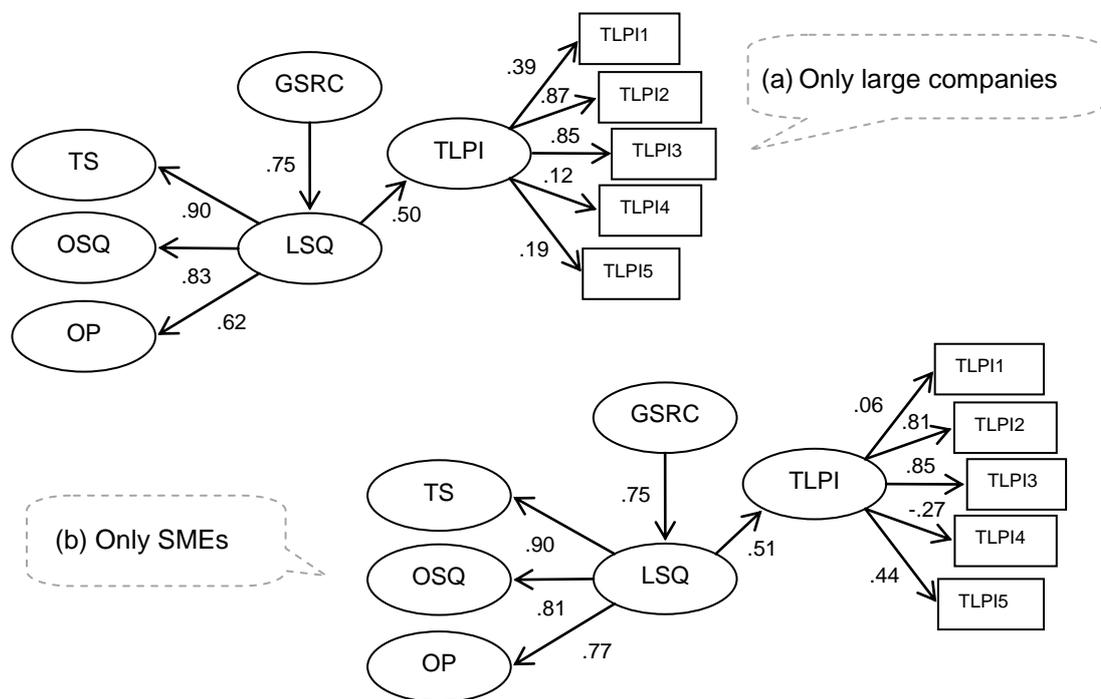


Figure 8-9: Structural Equation Modelling - Perspectives of SMEs and Large Companies

Large LSP and LSP customer companies seemed to indicate broadly that GSQ competencies covered all four parts: collaboration; sustainability; green regulation and standardisation; and vehicle technology and logistics design. Interestingly, LSPs focused on the environmental issues due to a company's collaboration with its customers. One of benefits which LSPs can perceive from the environmental collaboration is cost reduction due to sharing the information and resources including leaning their customers' best practices. It is supported by the studies of Sandberg (2007) and Spekman et al. (1998), who stated that the most important reasons to engage the collaboration within the supply chain are caused by issues related to cost reduction as same as service.

Figure 8-10 presents the effects of GSQ and LSQ on TLPs from the perspectives of MNC companies (seen in Figure 8-10a) and local companies (seen in Figure 8-10b). There were four differences between the effects of GSQ and LSQ on TLPs in the path analysis. Rechecking the differences of GSQ-LSQ-TLPs from the perceptions of MNCs, representing the Western business philosophy, and local companies, representing Eastern business philosophy, it found that there were ten significant differences with GSQ-LSQ effects on TLPs from the perceptions of MNCs and local companies. These differences included three GSQ competencies, one LSQ competencies, and all five TLPs. Although the path analysis of these two groups did not show the differences of LSQ competencies, it showed the differences of GSQ competencies and TLPs.

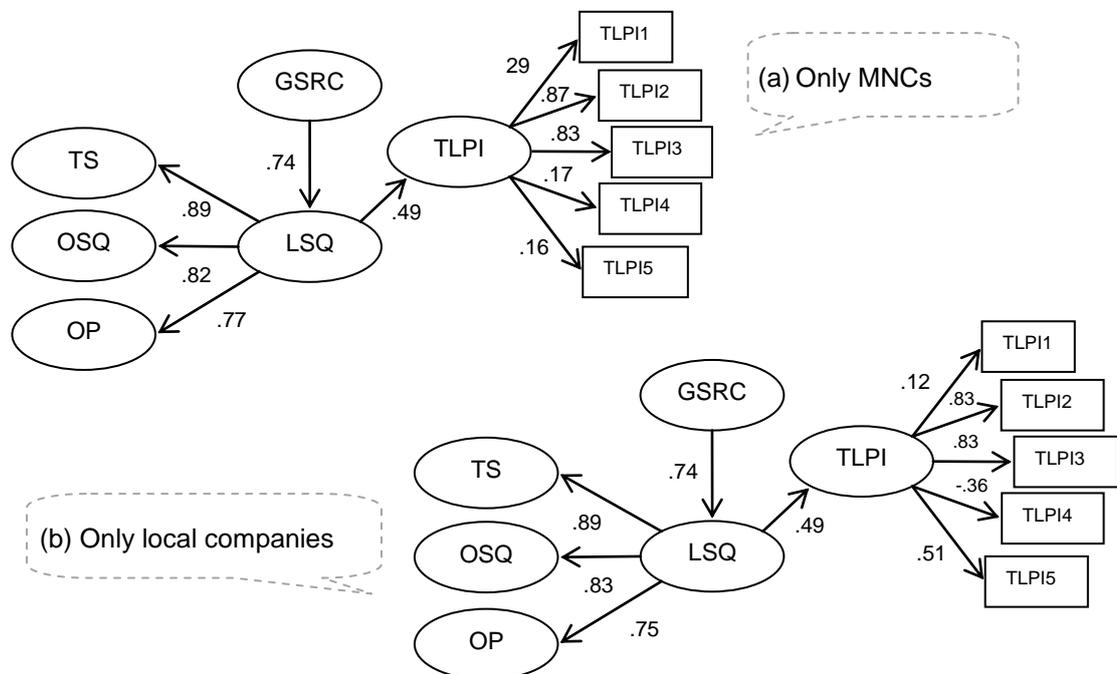


Figure 8-10: Structural Equation Modelling - Perspectives of MNCs and Local Companies

MNCs companies, representing the developed countries or companies running in the Western business style, pay more attention to the sustainability, in particular health and safety, than the local companies, representing the developing countries or companies running in the Eastern business style. Elkington (1998) explained that the triple bottom line comprised of three major points: economic, environmental, and social bottom lines. It can be seen that health and safety is under the social perspective. Mostly companies in the developing countries are concerned with the quality of products and services, and then they have registered many ISO certificates, such as ISO 9000 or ISO 14000 series. These certificates

have their own protocols and processes including formal measurement and report. Sambasivan and Ng (2008) identified some perceived benefits from implementing ISO 14001 which can be illustrate as four main factors in line with a study by Tan (2005), such as: the company reputation and image improvement; increases in staff morale and motivation; performance and opportunity; and customer loyalty and trust. Bouzaabia et al. (2013) stated that the expectation of customers' service quality from the service providers may be affected by cultural dimensions. That means MNC companies who represent the Western culture pay more attention to sustainability than the local companies who represent the Eastern culture. This idea is supported by the ethics of the Eastern cultures, which are based on rights and duty equally, whereas the Western cultures are rights-based (Koehn, 1999; Naor et al., 2010; Ralston et al., 1997). There are several studies suggesting the importance of cultural values in explaining the differences in an organisation's overall performance (Shane, 1993; Tse et al., 1988).

It can be concluded that the path analysis for the structural equation modelling as seen in Figure 8-7 is representative among all respondents, i.e. LSPs and LSP customers, SMEs and large companies, and MNCs and local companies (as seen in Figures 8-8 to 8-10).

8.6. Discussion of Findings

8.6.1. EFA and CFA Discussion

8.6.1.1. GSQ construct

Initially, there were three GSQ constructs, GSRC, GTTM, and GCW constructs, but EFA did not find significant sub-constructs for GSQ. After conducting CFA, GSQ indicated there were 13 modified variables from GSRC constructs. GTTM and GCW constructs were deleted in the CFA process, as shown in the Section 8.3. Looking at the EFA results in section 8.2, factor loading for each GTTM variable was between 0.4 and 0.6, which was quite low like the h^2 values, which were 0.4 to 0.5. In addition, initial eigenvalue of the GTTM construct was only 1.323 and the coefficient alpha was 0.66. These occur the same for the GCW construct. Due to deleting the GTTM and GCW constructs, it can be seen that there was not much change on the effect of the GSQ construct on TLPIs because of the most important factor loading on the GSRC construct.

LSPs exceeded perceptions for 'fuels cost by alternative fuel' (GCW1) and 'waste reduction within operations and processes' (GCW2) variables and respondents rated the importance level of GSQ variables highly, as discussed in section 7.3.3, Chapter Seven. Moreover, only three GSQ variables, OCW1, OCW2, and 'transport modal choice - transport cost' (GTTM4),

were among the top ten rankings of the GSQ variables means of both the combined and separated groups (LSPs and LSP customers), as discussed in Chapter Seven. The rest of the GTTM variables, 'fixed cost by vehicle technology' (GTTM1), 'product availability by transport modal choice' (GTTM2), 'product size flexibility by transport modal choice' (GTTM3), and 'product availability by alternative fuel' (GTTM5), were not important to TLPs, as was supported by the results from Phase One, Chapter Six.

Only one participant in Phase One ranked the alternative fuels construct which related to GTTM5 and OCW2 as the most important GSQ affecting service quality. In addition, none of the participants from Phase One agreed that the vehicle technology and transport modal choice were among the most important GSQ constructs affecting service quality. It was supported by Wu and Dunn (1995), who stated that the impact of transport on the environment came originally from three sources: construction of transport networks, operation of transport vehicles, and disposal of transportation vehicles and parts. The high level of implementation of carbon emissions reduction initiatives in the transportation industry could be stimulated by the perception of long-term market opportunities in new high-margin areas (Grant et al., 2013; McKinnon et al., 2010; Renukappa et al., 2013), but it was quite far away for developing countries like Thailand, where most LSPs focused on the cost of operations.

Moving to other transport modes is subject to access to alternatives when reducing environmental impact of freight transport. Different transport modes are suitable for different product characteristics (Grant et al., 2013), but the in-process of connecting the multimodal transport in ASEAN using the modal choice of transport seems inefficient. Regarding these reasons, it could be said that GTTM and GCW constructs did not affect TLPs in the context of Thailand and they could be deleted from the CFA process.

8.6.1.2. LSQ construct

Initially, EFA provided four sub-constructs of LSQ which included six variables from TS, five variables from OSQ, three variables from OP, and two variables from IQ, but EFA did not find significant sub-constructs for LSQ. After conducting CFA, LSQ indicated 15 modified variables from TS which combined with IQ, OSQ, and OP constructs. In the CFA process, the IQ construct was combined with TS, and one variable of the OSQ construct was deleted. However, it found that 'failure to deliver required quantities' (OSQ5) was ranked one of top ten LSQ variables means from both the combined and separated groups (LSPs and LSP customers), but there was similarity in means from both the combined and separated groups, as discussed in Chapter Seven.

8.6.2. Results regarding to Research Questions

From the results above and the analyses in the previous sections, the three research questions can be answered as follows:

RQ1: What are the LSP's LSQ competencies?

There are 15 LSQ variables, which comprise eight variables from the 'Time and Services' (TS) construct, four variables from the 'Order Service Quality' (OSQ) construct, and three variables from the 'Order Procedures' (OP) construct according to the confirmatory factor analysis. However, after testing the hypotheses, eight variables from the 'Time and Services' (TS) construct, four variables from the 'Order Service Quality' (OSQ) construct, and three variables from the 'Order Procedures' (OP) construct positively affected TLPIs. Considering the 15 LSQ competencies, it was found that these competencies are under the logistics service quality attributes proposed by Mentzer et al. (1989) and the service quality dimensions proposed by Parasuraman et al. (1988).

RQ2: What are the LSP's GSQ competencies?

There are 13 GSQ competencies that came from the 'Green Safety, Regulations and Collaboration' (GSRC) construct. The results from H5 represented that GSQ competencies did not positively affect TLPIs, but they positively indirect affect to TLPIs. The 13 GSQ competencies were classified into three key issues: green safety, green regulations, and green collaboration. In term of the green safety issue, this includes staff awareness, staff being fully trained in environmental issues and safety, and other environmental aspects from the LSP stakeholders. Deployment from the top management level seems to be more influential for the achievement of the green safety projects (Renukappa et al., 2013; Senge et al., 2007). Grzybowska et al. (2014) said that the willingness to collaborate, communication, common business goals, and responsible sharing are some of key success factors for achieving a collaborative goal between the companies. To succeed in green safety, sharing and collaboration involve not only focusing on the organisation itself, but also collaborating with the partners in the supply chain.

RQ3: How important are GSQ competencies relative to TLPIs through LSQ competencies?

GSQ (or GSRC) competencies are quite important relative to the LSQ competencies, which are .75. The degree of importance of GSQ competencies relating to LSQ competencies were

at the same level in any criteria: providers or customers, SMEs or large companies, and MNCs or local companies.

8.7. Conclusions

This chapter discussed the main study conducted for this thesis, which represents Phase Two of the three-stage process of the item and construct development detailed in Chapter Four. This stage assesses construct validity of the convergent and discriminant validity. Following on from the pilot study, 28 GSQ, 24 LSQ, and 5 LPI variables were derived for investigation. LSP and LPS customer respondents were selected from the logistics sector and five key important sectors (or industries as a study sample for surveying the initial research issues of green logistics service quality and LSP performance.

The model for the study was amended from three key constructs: a green service construct adapted from Elkington (1998), and Martinsen and Bjorklund (2012); a logistics service construct adapted from Grant (2003) and Jaafar (2006); and the Thai logistics performance index developed by the Thailand Ministry of Industry. Four hypotheses were derived pertaining to the relationships between all the constructs. The list of companies contacted included 1,313 LSP customers and 441 LSPs which were contacted by phone to request their participation. There were 429 LSP and LSP customer responses, representing 24.46 percent of the total respondents (LSPs and LSP customers).

CFA and structural equation modelling (SEM) were applied to assess the measurement and structural models of the main study model. The resulting measurement model possessed 28 variables and 4 constructs that were unidimensional and reliable and exhibited convergent and discriminant validity. The Chi-square statistic and goodness-of-fit indices were acceptable. The 'Time and Services' (TS), 'Order Service Quality' (OSQ), and 'Order Procedures' (OP) constructs did positively affect the Thai government's logistics performance index (TLPIs) but the 'Green Safety, Regulations and Collaboration' (GSRC) construct positively affected the LPI only indirectly. Three hypotheses were supported while one hypothesis was not supported.

These findings confirm the domain and validity of the amended constructs being investigated and the items generated for investigation. The findings thus provide a substantive and rigorous set of results. However, an interpretation of the conceptualised model and a discussion of its predictive validity and relationship to existing theory are required. The validation/confirmatory phase will be conducted in Chapter Nine with the structured interviews.

9. Structured Interviews (Phase Three)

9.1. Introduction

Chapters Seven and Eight discussed the questionnaire survey pertaining to Phase Two. This chapter will now present the analysis and results for the final stage of the research design, a structured interview, which was conducted in August 2014. The main purpose of Phase Three was to understand the findings and also to become more certain of the outcomes through the validation of the research. This was achieved by conducting a structured interview (SI-2) with the different main stakeholders related to the research from academia, government, and business.

This chapter is structured as follows: firstly, an overview of the demographic of respondents is discussed; secondly, the structured interview (SI-2) results are reviewed in the context of the three research questions and the previous phases of this research; then finally, the chapter is concluded with a summary which will act as a prelude to Chapter Ten.

9.2. Structured Interview (SI-2) and Data Analysis

To ensure SI-2 followed a rigorous and robust process, the researcher followed the data collection process stated in section 5.7.2, Chapter Five. Firstly, the preparation of an interview guide and developing an interview protocol was done from the findings of the survey in Phase Two and then sampling was selected by judgmental sampling and snowball sampling. The structured interview protocol development and the data collection followed from Figure 5-3, 5-4, and Table 5-13, Chapter Five. With the experiences of the researcher in logistics and some advice from the practitioners, three professional logistics experts were identified as the first group of interviewees in this phase. These three professionals came from academia and also were well-known as logistics specialists in Thailand, and then snowball sampling was used in the next step.

There were 15 interviewees in total who were mainly professionals in the logistics area from academia, government, and business. Using the structured interview protocol (see in Appendix 4), six main questions were asked, following the questionnaire survey protocol in Phase Two, as per the details shown in Table 9-1. The interview would be approximately 60 to 90 minutes for each interviewee. The appointment for each interview session was done with the participants' preferable time and place, but with the time limitation for collecting the data in this

phase, all appointments were proposed during July 2014 to be confirmed again when the researcher was in Thailand in August 2014. The participants were then asked to reflect upon their answers and give feedback. This feedback from the respondents helped to increase the overall validity and credibility of the interviews findings. The results of SI-2 will now be presented in the next section.

Question	RQ	Explanation
Q 1	RQ 1	The questionnaire listed the 24 different LSQ variables. Respondents were asked to indicate on a ten-point Likert scale how important they think each variable should be for the LSPs.
Q 2	RQ 2	The questionnaire listed the 28 different GSQ variables. Respondents were asked to indicate on a ten-point Likert scale how important they think each variable should be for the LSPs.
Q 3		<ul style="list-style-type: none"> – The questionnaire listed the five different LPI variables. Respondents were asked to indicate on a ten-point Likert scale how important they think each variable. – Respondents were asked to rank which TLPI variables they think the most important.
Q 4	RQ 3	Respondents were asked to indicate the importance of GSQ-LSQ relationships on a ten-point Likert scale to show how strong they consider each relationship
Q 5		Respondents were asked to indicate the importance of LSQ-TLPIs relationships on a ten-point Likert scale to show how strong they consider each relationship
Q 6		Respondents were asked to indicate the importance of GSQ-TLPIs relationships on a ten-point Likert scale to show how strong they consider each relationship
Q 7		Any feedback or suggestions from the respondents

Table 9-1: Structure of the Structured Interview Protocol

9.2.1. Demographic Analysis

Fifteen interviewees were selected as the samples of the research study in Phase Three. There were three professors in logistics management who were interviewed as members of the academic sector. With support from the Bureau of Logistics at the Thai Ministry of Industry from the begin of this research study, four officers who had their responsibilities in ‘Thai TLPIs’ and ‘green industry’ projects were invited to participate in this phase to give their perceptions of logistics service and green service including the relevant policies and strategies. However,

while the business sector played an important role as the real players in this thesis, the participants from academia and government played an important role as well to balance the perspectives among these main group players. These seven participants were selected from the criteria of focal industries in term of LSP customers and also from the suggestions from the academia, government, and other participants by using snowball sampling. Figure 9-1 shows the types of participants in Phase Three. It was seen that the proportion of participants from each type was similar and covered all stakeholders playing roles in the logistics industry in the context of Thailand.

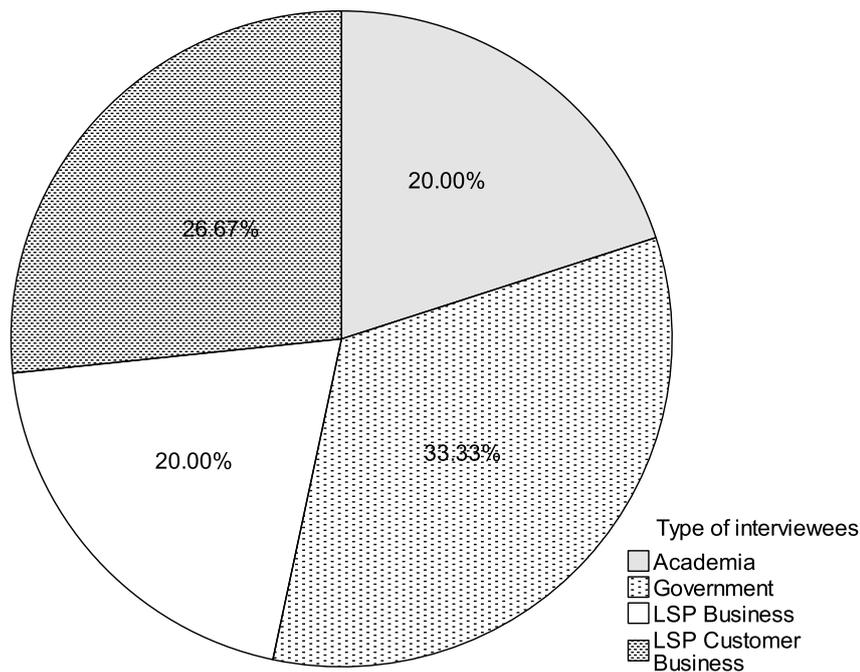


Figure 9-1: Types of Interviewees in Phase Three

9.2.2. Using SI-2 to answer RQ1

Regarding the first primary research question:

RQ1: *What are the LSP's LSQ competencies?*

Participants were asked to choose the LSQ variables which they thought LSPs should have in Thailand and also rated all the chosen variables from 1 to 10, with 10 being the most important. The 24 LSQ variables from the existing theory and interviews in the Phase One were in a list for choosing. After coding the answers of the participants to question 1, the data was transformed into four levels as: score 0 was 0 meaning 'not important', score 1 to 4 was 1

meaning 'less important', score 5 to 6 was 2 meaning 'somewhat important', and score 7 to 10 was 3 meaning 'very important', as shown in Table 9-2.

Table 9-2 presents the percentage, mean, and standard deviation of the importance of each LSQ variable. It found that some LSQ variables were seen as not important for LSPs in Thailand, while some variables seemed very important overall in the respondents' perceptions. The percentage of 'very important' responses was considered as the most important for each LSQ variable in this phase. Sixty percent at the 'very important' level was set as a benchmark index due to the small group of respondents in this phase, only 15 persons, so two-thirds of the total could represent the strong importance of the LSQ variables.

	Not important (%)	Less important (%)	Somewhat important (%)	Very important (%)	Mean	Std Deviation
LS-1	20.0	-	6.7	73.3	2.33	1.234
LS-2	26.7	-	6.7	66.7	2.13	1.356
LS-3	13.3	-	-	86.7	2.60	1.056
LS-4	20.0	-	-	80.0	2.40	1.242
LS-5	40.0	13.3	20.0	26.7	1.33	1.291
LS-6	33.3	13.3	6.7	46.7	1.67	1.397
LS-7	26.7	-	6.7	66.7	2.13	1.356
LS-8	20.0	6.7	6.7	66.7	2.20	1.265
LS-9	20.0	6.7	6.7	66.7	2.20	1.265
LS-10	6.7	6.7	20.0	66.7	2.47	.915
LS-11	13.3	-	13.3	73.3	2.47	1.060
LS-12	26.7	6.7	6.7	60.0	2.00	1.363
LS-13	-	13.3	-	86.7	2.73	.704
LS-14	20.0	13.3	-	66.7	2.13	1.302
LS-15	20.0	13.3	-	66.7	2.13	1.302
LS-16	20.0	13.3	6.7	60.0	2.07	1.280
LS-17	20.0	6.7	-	73.3	2.27	1.280
LS-18	20.0	6.7	-	73.3	2.27	1.280
LS-19	13.3	6.7	6.7	73.3	2.40	1.121
LS-20	20.0	13.3	6.7	60.0	2.07	1.280
LS-21	40.0	13.3	6.7	40.0	1.47	1.407
LS-22	-	-	-	100.0	3.00	0.000
LS-23	13.3	6.7	6.7	73.3	2.40	1.121
LS-24	33.3	6.7	6.7	53.3	1.80	1.424

Table 9-2: Descriptive Analysis of LSQ Variables

To indicate the variables were very important, the percentage of 'very important' level in the respondents' perceptions should be more than 60 percent of the total respondents. That meant there were four LSQ variables chosen by the respondents were not very important competencies for LSPs. These were (LS-5) 'right items substituted', (LS-6) 'order quality - substitute items', (LS-21) 'satisfaction on the quality reports', and (LS-24) 'back-order is short' and all had been rated at the 'very important' level by less than 60 percent of the total participants. On the other hand, considering the means and the percentages of these variables, it was found that the figures also indicated that participants thought these variables were not important competencies for LSPs in Thailand. Interestingly, (LS-22) 'arrive on the date promised' was indicated 100 percent with 'very important' level or it was said that all respondents strongly agreed that LSP should have delivered services or goods at the time they promised.

9.2.3. Using SI-2 to answer RQ2

Regarding the second primary research question:

RQ2: *What are the LSP's GSQ competencies?*

Participants were asked to choose the GSQ variables which they thought LSPs should have in Thailand and also rated all the chosen variables from 1 to 10, with 10 being the most important. The 28 GSQ variables from the existing theory and interviews in Phase One were put in a list for choosing. After coding the answers of the respondents in question 1, the data was transformed into four levels as: score 0 was 0 meaning 'not important', score 1 to 4 was 1 meaning 'less important', score 5 to 6 was 2 meaning 'somewhat important', and score 7 to 10 was 3 meaning 'very important', the same as the LSQ transformation in the previous section.

Table 9-3 presents the percentage, mean, and standard deviation of the importance of each GSQ variable. It found that some GSQ variables were seen as not important for LSPs in Thailand, while some variables seemed very important overall among the respondents' perceptions. To indicate the variables were very important, the level of the percentage of 'very important' level was set at more than 60 percent as the standard level. That meant there were 20 GSQ variables which were chosen by the respondents as not very important competencies for LSPs. These were (GS-1) 'fuel cost by alternative fuel', (GS-2) 'corporate image by alternative fuel', (GS-4) 'CO₂ emissions by vehicle technology', (GS-5) 'technology innovation', (GS-6) 'fixed cost by vehicle technology', (GS-7) 'product availability by transport modal choice', (GS-8) 'product size flexibility by transport modal choice', (GS-9) 'transport modal choice - transport cost', (GS-11) 'accident rate reduction', (GS-14) 'lead times reduction by logistics system', (GS-15) 'product availability by logistics system', (GS-16) 'high fill rates by

transport management', (GS-17) 'product consolidation by transport management', (GS-18) 'back haul reduction by transport management', (GS-19) 'knowledge sharing on environmental', (GS-20) 'environmental targets achievement', (GS-21) 'environmental collaboration enhancement', (GS-22) 'back haul reduction by collaboration', (GS-26) 'CO₂ emission from awareness of LSP stakeholders', and (GS-28) 'LSP stakeholders' green awareness'; and all had the percentage level of 'very important' at less than 60 percent of the total respondents.

	No important (%)	Less important (%)	Somewhat important (%)	Very important (%)	Mean	Std Deviation
GS-1	46.7	6.7	13.3	33.3	1.33	1.397
GS-2	46.7	13.3	13.3	26.7	1.20	1.320
GS-3	26.7	-	13.3	60.0	2.07	1.335
GS-4	40.0	-	20.0	40.0	1.60	1.404
GS-5	33.3	-	13.3	53.3	1.87	1.407
GS-6	40.0	6.7	6.7	46.7	1.60	1.454
GS-7	53.3	-	6.7	40.0	1.33	1.496
GS-8	40.0	-	13.3	46.7	1.67	1.447
GS-9	26.7	6.7	13.3	53.3	1.93	1.335
GS-10	20.0	-	13.3	66.7	2.27	1.223
GS-11	46.7	-	13.3	40.0	1.47	1.457
GS-12	40.0	-	-	60.0	1.80	1.521
GS-13	26.7	-	-	73.3	2.20	1.373
GS-14	40.0	6.7	13.3	40.0	1.53	1.407
GS-15	33.3	6.7	13.3	46.7	1.73	1.387
GS-16	26.7	13.3	13.3	46.7	1.80	1.320
GS-17	40.0	13.3	-	46.7	1.53	1.457
GS-18	40.0	13.3	-	46.7	1.53	1.457
GS-19	46.7	6.7	-	46.7	1.47	1.506
GS-20	40.0	6.7	6.7	46.7	1.60	1.454
GS-21	33.3	13.3	6.7	46.7	1.67	1.397
GS-22	40.0	20.0	6.7	33.3	1.33	1.345
GS-23	13.3	-	6.7	80.0	2.53	1.060
GS-24	26.7	6.7	-	66.7	2.07	1.387
GS-25	26.7	6.7	6.7	60.0	2.00	1.363
GS-26	33.3	-	26.7	40.0	1.73	1.335
GS-27	26.7	13.3	-	60.0	1.93	1.387
GS-28	46.7	6.7	13.3	33.3	1.33	1.397

Table 9-3: Descriptive Analysis of GSQ Variables

On the other hand, considering the means and the percentages of these variables, it was found that the figures also indicated that respondents thought only eight GSQ variables were important competencies for LSPs in Thailand. This might be because most respondents perceived GSQ competencies were a further target for service quality for LSPs, whereas LSQ competencies were a standard target for service quality. All LSPs then should focus and improve the LSQ competencies as the first priority. Discussion on the LSQ and GSQ competencies which were important to LSPs' performance in Thailand will be discussed in section 9.3.

9.2.4. Using SI-2 to answer RQ3

Regarding the last primary research question:

RQ3: *How important are GSQ competencies relative to TLPI through LSQ competencies?*

Question 4 from the structured interview protocol was set up as a question for RQ3. Participants were asked to consider the direction and to rate the strength of relationship from 1 to 10, with 10 being the strongest relationship. After coding the answer of the respondents to question, the data was transformed into four levels the same as the database that came from questions 1 and 2 at the same level. To consider the direction between GSQ and LSQ, the findings of two direct effects were shown in Figures 9-2 and 9-3.

Figure 9-2 presents the percentage of the importance of GSQ variables when related to LSQ variables. It was found that respondents claimed the importance level of this relationship was quite good. When considering the importance level, almost 75 percent agreed that GSQ variables were relative to LSQ variables. Only 20 percent answered it was 'less important' and about 7 percent answered 'no important'.

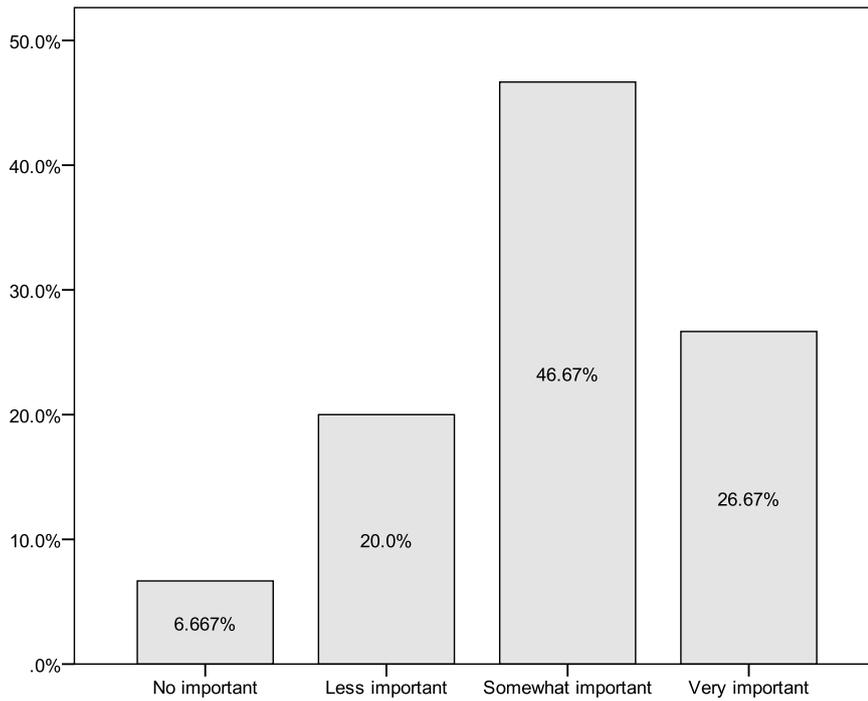


Figure 9-2: Percentage of the Importance of GSQ Variables Related to LSQ Variables

On the other hand, the importance of LSQ variables related to GSQ variables was shown in Figure 9-3. Though the percentage of the levels of 'somewhat important' and 'very important' in this relationship do not appear far from the levels in the GSQ-LSQ relationship, the percentage of the level of 'not important' was quite different between these relationships. This might be an issue for the effect of LSQ-GSQ analysis. One-third of the figure in Figure 9-3 represented the level of 'not important', whereas the majority indicated the level of 'somewhat important'. In conclusion, it can be said that there were two-way relationships among the GSQ and LSQ variables even though the strength of the importance of GSQ variables related to LSQ variables was significantly higher than the importance of LSQ variables related to GSQ variables.

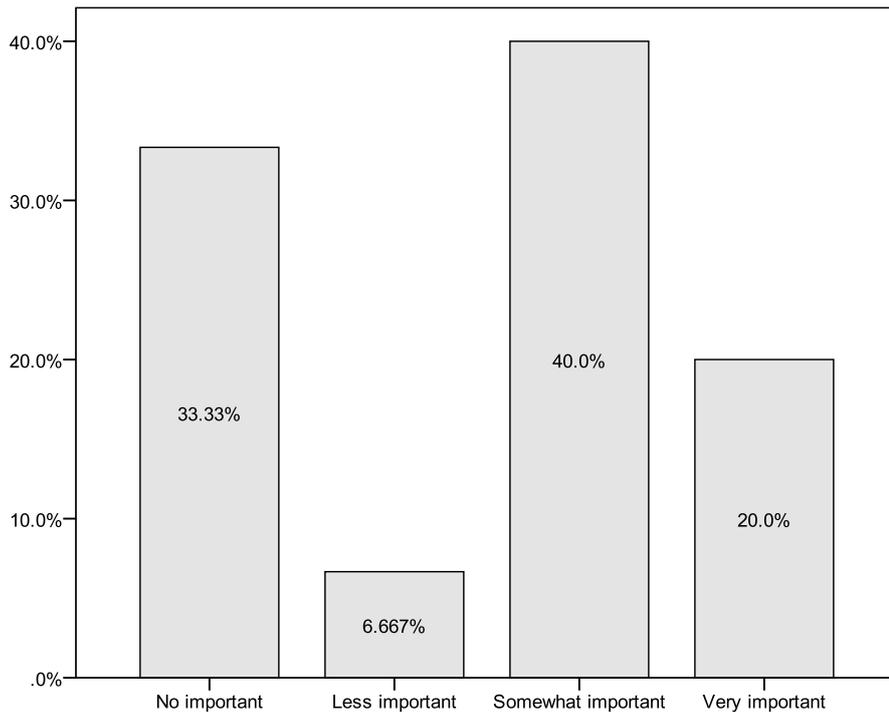


Figure 9-3: Percentage of Importance of LSQ Variables Related to GSQ Variables

9.3. Overall Results

9.3.1. GSQ, LSQ, and TLPIs

Participants were also asked to rank the five most important variables from the five TLPI variables provided in the survey. Table 9.4 shows the rankings from the mean scores of the Likert responses, weighted respondent importance scores, and an overall average of the two rankings. The weighting was based on a rank frequency of 1 being multiplied by 5, a rank frequency of 2 being multiplied by 4, and so on. Five variables scored 31 or greater in weighted average scoring and had means greater than 2.07.

These variables were ordered respectively as shown in Table 9-4: order cycle time; returned rates; delivery cycle time; transport cost per sale ratio; and DIFOT. Considering the TLPI variables derived from the existing theory in Chapter Three, TLPI variables that came from the dimension of time were the most important, followed by TLPI variables from the dimension of reliability, and the last one involving TLPI from the dimension of cost, in line with the service quality and customer service theories that had indicated time as the early priority.

TLPIs	Mean Ranking (Mean)	Importance Ranking (Weighted Score)	Overall Ranking (Average)
P-2 Order cycle time	1 (3.53)	1 (53)	1
P-5 Returned rates	2 (3.4)	2 (51)	2
P-3 Delivery cycle time	3 (3.27)	3 (49)	3
P-1 Transport costs per sales ratio	4 (2.73)	4 (41)	4
P-4 Delivered in-full on-time (DIFOT)	5 (2.07)	5 (31)	5

Table 9-4: Ranking of TLPI Variables

The 5 TLPI variables from the existing theory and interviews in Phase One were in a list for choosing. After coding the answers from the respondents to question 3, the data was transformed into four levels as: score 0 was 0 meaning 'not important', score 1 to 4 was 1 meaning 'less important', score 5 to 6 was 2 meaning 'somewhat important', and score 7 to 10 was 3 meaning 'very important', as shown in Table 9-5.

Table 9-5 presents the percentage of the importance of each TLPI variable, rating with a ten-point Likert scale, with 10 being the most important. It found that the 'very important' level across all five LPI variables had more than 60 percent of the total (or two-thirds). However, considering the mean of each variable, it was found that the means of all variables were higher than score 7. It was said that all five LPI variables had the 'very important' level in the perceptions of the respondents either by the ranking or rating of the TLPI variables.

	Less important (%)	Somewhat important (%)	Very important (%)	Mean	Std. Deviation
P-1	-	13.3	86.7	9.00	1.464
P-2	13.3	26.7	60.0	7.00	2.104
P-3	0.0	20.0	80.0	7.93	1.335
P-4	6.7	6.7	86.7	8.93	1.831
P-5	13.3	26.7	60.0	7.73	2.604

Table 9-5: Descriptive Analysis of TLPI Variables in Phase III

Regarding the previous sections, the findings of this survey in Phase Three had been shown the LSQ and GSQ competencies, including the importance of the relationship among GSQ and LSQ variables. The discussion on the relationships between GSQ, LSQ, and TLPI variables could not be avoided because these two relationships also represented how important the GSQ and/or LSQ variables are relative to TLPI variables. Figure 9-4 and 9-5 explained the detail of these relationships.

Figure 9-4 presents the percentage of the importance of LSQ variables related to TLPIs. Participants were asked to indicate the importance of LSQ-TLPIs relationships on a ten-point Likert scale as to how strong they rate the relationship. After coding the answers of the participants in question 5, the data was transformed into four levels as: score 0 was 0 meaning 'no important', score 1 to 4 was 1 meaning 'less important', score 5 to 6 was 2 meaning 'somewhat important', and score 7 to 10 was 3 meaning 'very important'. It appeared that about 93 percent of the total participants agreed the LSQ variables were 'very important' to LPI variables, while only 7 percent of the total participants thought the LSQ variables were 'somewhat important' to LPI variables.

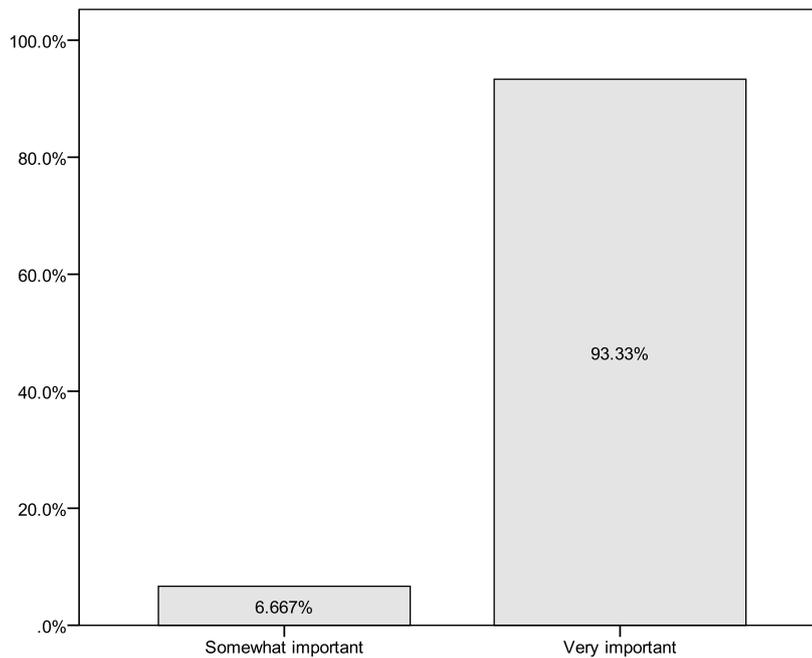


Figure 9-4: Percentages of the Importance of LSQ Variables Related to TLPIs

On the other hand, Figure 9-5 presents the percentage of the importance of GSQ variables related to TLPIs. Respondents were asked to indicate the direction of the importance of GSQ-TLPIs relationships on a ten-point Likert scale to indicate how strong they think the relationship. After coding the answer of the participants to question 6, the data was transformed into four levels the same as for the GLSQ-TLPI relationship. It appeared that about 27 percent of the total participants agreed that GSQ variables were 'very important' to TLPI variables, while approximately 47 percent of the total participants thought the GSQ variables were 'somewhat important' to TLPI variables. Approximately 20 percent of the total participants thought the 'less important' GSQ variables related to TLPI variables and only 6 percent of the total participants thought it was 'no important'.

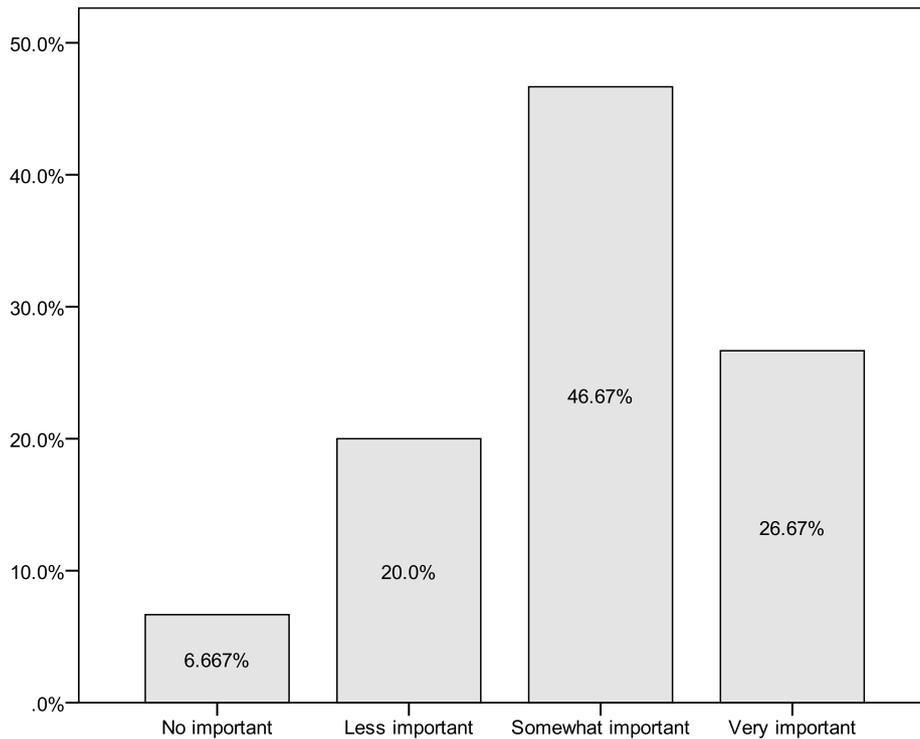


Figure 9-5: Percentages of the Importance of GSQ Variables Related to TLPIs

9.3.2. Issues for Supporting GSQ-LSQ-TLPI Relationships

Looking at the causes behind the participants' answers, there were three main causes derived from the participants' thoughts. These causes were as follows:

- 1) Most LSPs and LSP customers focused on efficiency and cost
- 2) LSQ variables were standard of service quality in the perceptions of respondents while GSQ variables were focused on a higher standard of service quality
- 3) MNCs had a strong GSQ-LSQ relationship whereas the SMEs or local customers companies did not.

These causes came from creating a mind map from the 15 interview sessions in Phase Three in August 2014. Figure 9-6 presents the three causes derived from the participants' thoughts.

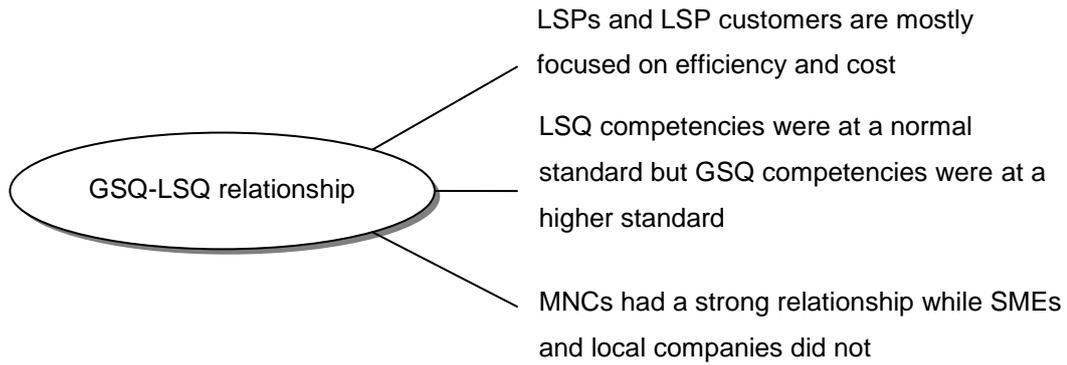


Figure 9-6: Issues of the GSQ-LSQ Relations on the Perceptions of Participants

9.3.2.1. Efficiency and cost focused

One of the causes derived from the participants' thoughts was that efficiency and cost came from the increase in service quality. From the perspective of LSP companies, they often focused on the efficiency of the operation, which was the same as the customers' views (A-31, 2014; C-34, 2014; L-31, 2014). Efficiency should start at any little begin of the operation processes and might not had much effect. This thought brought to the actions of LSPs on the green operation improvement by themselves.

On the other hand, implementing the green service quality initiatives in LSP activity depended on the customers' needs and their willingness to pay. For examples, LSPs could implement logistics activities to reduce CO₂ emissions if their customers were willing to pay for the cost occurred (A-31, 2014; L-11, 2014; L-12, 2014; L-13, 2014; L-31, 2014). This thought brought to the actions of LSPs on the green service quality which were driven by the customers. These could explain the findings of the GSQ-LSQ-TLPI relationships in the previous section.

9.3.2.2. LSQ as normal standard but GSQ as higher standard

Considering GSQ and LSQ variables, it was found that most of the LSQ variables came from the LSPs' own key performance index (KPIs), and these KPIs were driven from the top management level into the operational functions. LSQ variables appeared as a part of LSP staff's KPIs; most of the LSQ variables then were indicated in the high scores as opposed to the GSQ variables, which were not relevant to the LSP's KPIs. The GSQ variables that got the high score were based on the customers' needs (L-31, 2014; L-32, 2014). This was shown in Tables 9-2 and 9-3. It was found that when LSPs could provide a high quality logistics service,

which was like the LSP's own standard, the green service quality was focused later on that (L-31, 2014; L-32, 2014). It was not only explained by Tables 9-2 and 9-3, but also present in Figures 9-4 and 9-5 in section 9.3.1. The percentage of the importance of the LSQ-TLPI relationship was mostly at the 'very important' level, while the percentage of the importance of the GSQ-TLPI relationship was mostly at the 'somewhat important' level.

9.3.2.3. Strength of the GSQ-LSQ relationship from the perspectives of MNCs and SMEs

To provide the right service to customers, LSPs needed to segment their customers into different groups, depending on the customers' needs and other requirements. They could be divided in terms of the size of company or the company's nationality (or the company's ownership structure). Considering the criteria of the customer company's size, they were classified into two groups: large companies and small and medium companies (SMEs), whereas considering the criteria of the company's ownership structure, there were two groups: multi-national corporations (MNCs), and local companies. It could be said that most MNCs in Thailand were large LSP customer companies, whereas most of the local companies were SME customer companies.

The trend of globalisation around the green issue drives most businesses concerns about green issues. This includes all the operational functions. Logistics activities, as a part of the outbound functions, are affected by green issues, particularly in green service quality. However, if a subsidiary company located in Thailand, MNCs seem to follow the mission, vision and strategies from the headquarters of the companies, with regard to the green or sustainability concerns which are driven from the customer end; one of their strategies is to become a green supply chain. To achieve this target strategy, the requirements or needs which MNCs ask of LSPs when they deliver their goods or products include reducing CO₂ emissions or increasing the efficiency of the transportation activity. Some participants said that their companies had a good standard of logistics service quality at the global level, but to achieve the higher level of service quality locally the reduction of CO₂ emissions had to be done across the supply chain or at least there needed to be some activities or projects representing the progress of the green supply chain implementation. This could be a trade-off with the increase in cost, such as using alternative fuel or using vehicle technology to reduce the CO₂ emission.

On the other hand, SMEs or local LSP customer companies had their concerns about green or sustainability issues, but they implement a small project rather than a big project which might cost a great deal of money. This project could involve any small changes in the operational function or transport function to increase a company's efficiency.

9.3.3. Validation of the GSQ and LSQ Competencies

RQ1: *What are the LSP's LSQ competencies?*

Starting with the results of the top ten ranking of the importance of the LSQ variables from Phase Three as a base, and then comparing the results of the LSQ competencies from Phase Two, it was found that there were four LSQ variables in the top ten ranking of the importance of LSQ variables (Phase Three), which did not match to the LSQ competencies in Phase Two. The rest of them were indicated as LSQ competencies in Phase Two. These four LSQ variables were (LS-1) 'flexibility to deliver', (LS-10) 'knowledge/experience of personnel contact', (LS-17) 'undamaged product from warehouse', and (LS-13) 'information quality – complete'. The first three variables were categorised under the LSQ attributes: 'Order Release Quantity', 'Personnel Contact Quality', and 'Order Condition', which were not found in the results from Phase Two. Some participants gave interesting ideas as to how to rate the importance of the LSQ competencies saying that they rate LSQ competencies in relation to their personal KPIs, which followed the company's performance measurement (C-32, 2014; C-33, 2014; L-31, 2014). Moreover, the majority of LSP respondents from Phase Two were local and SME companies. This might be one reason that why these three LSQ variables were not the same as the LSQ competencies in Phase Two. However, the six LSQ variables are: (LS-3) 'right items', (LS-4) 'right quantities', (LS-11) 'information quality – accurate', (LS-19) 'order discrepancy handling – satisfactory', (LS-22) 'arrive on the date promised', and (LS-23) 'placing & receiving time shortly'. These were confirmed as the LSQ competencies in both Phases Two and Three.

RQ2: *What are the LSP's GSQ competencies?*

Starting with the results of the top ten ratings of the importance of GSQ variables from Phase Three as a base, and then comparing them with the results of the GSQ competencies from Phase Two, it was found that there were three GSQ variables from the top ten of the most important GSQ variables (Phase Three), which did not match the GSQ competencies in Phase Two. In addition, two of three GSQ variables, (GS-1) 'fuel cost by alternative fuel' and (GS-6) 'fixed cost by vehicle technology', were included in the 'Green Cost and In-process Waste' (GCW) and the 'Green Technology and Transport Management' (GTMM) constructs respectively. These two GSQ variables were in the top ten for the importance of GSQ variables (Phase Three) because of the efficiency and costs focus mentioned previously. The rest of them were (GS-4) 'CO₂ emissions by vehicle technology', (GS-10) 'staff fully trained on environment and safety', (GS-11) 'accident rate reduction', (GS-24) 'environmental regulations', (GS-25) 'operational efficiency', (GS-26) 'CO₂ emission from awareness of LSP

stakeholders', and (GS-28) 'LSP stakeholders' green awareness', which were confirmed as the GSQ competencies in both Phases Two and Three.

RQ3: *How important are GSQ competencies relative to TLPI through LSQ competencies?*

It was seen that most participants in Phase Three agreed that the importance level of GSQ competencies related to LSQ competencies were at the 'somewhat important' level. There were four importance levels the participants should use to rate and assuming that each importance level was 25 percent of the total importance, then the 'somewhat important' level would be 75 percent or the effect of GSQ competencies on LSQ competencies would be .75. Compared with the effect of GSQ competencies on LSQ competencies from Phase Two, which was .75, the respondents from these two phases agreed that the effect of GSQ competencies on LSQ competencies was about .75, a quite high importance level.

9.4. Conclusions

This chapter has presented the results from Phase Three of this research design, which completed the methodological triangulation process for this thesis. The three phases of the research have generated seven GSQ and LSQ constructs and 38 variables, which were the most important GSQ and LSQ competencies for LSPs in Thailand. These 38 variables combined twenty LSQ variables and eight GSQ variables.

The importance of the GSQ variables related to the LSQ variables seemed to be a stronger relationship than the importance of the LSQ variables related to the GSQ variables. Moreover, the relationship among LSQ-TLPI variables appeared stronger in importance than the relationship among GSQ-LPI variables. These effects on relations could be explained by three main causes of the respondents' thoughts: 1) most LSPs and LSP customers focused on the efficiency and cost; 2) LSQ variables were of standard service quality in the perceptions of respondents, while GSQ variables were of a higher standard of service quality; and 3) MNCs seems to have had a strong GSQ-LSQ relationship, whereas SMEs or local customers companies do not.

The next chapter (Chapter Ten) will now discuss the findings of the research among these three phases (Phases One, Two, and Three) before the overall conclusion and implications for further research will be drawn in Chapter Eleven.

10. Discussion of Findings

10.1. Introduction

The purpose of this thesis chapter is to discuss and summarise the key empirical findings from all three phases of the study in an integrated and holistic way to enable conclusions to be drawn. This three-phased research approach (methodological triangulation) has enabled the researcher to alternate between inductive, deductive and inductive thought, thus generating an extensive and in-depth view of GSQ-LSQ development as shown in Figure 10-1.

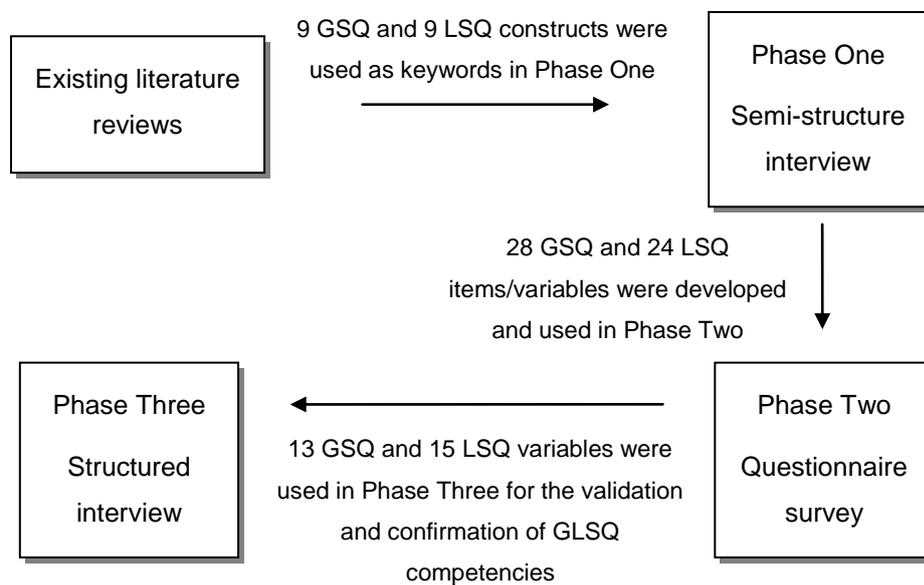


Figure 10-1: Three-phased Research Approach

This chapter draws together the key findings across all three phases of the thesis to propose an analysis of GSQ-LSQ variables and the reporting gap that LSPs can use to reduce the gap in service quality and increase the quality level, and which can be used as a source of competitive advantage and will help to guide future policy decisions. LPI industry benchmarking is also included in this chapter so that government can use this part as a guide to develop logistics performance and increase Thailand's overall competitiveness. This is a core contribution and output of this thesis.

10.2. Key Empirical Findings in RQ 1 to RQ 3

This thesis has identified an initial total of 52 GSQ-LSQ variables and five LPI variables into 13 GSQ variables and 15 LSQ variables which were empirically tested by exploratory factor analysis and confirmatory factor analysis in the survey in Phase Two. The next section will now discuss the findings in relation to each research question (RQ1-RQ3).

10.2.1. RQ 1: What are the LSP's LSQ competencies?

RQ1 was concerned with understanding which LSP's LSQ variables were currently being used by practitioners. This helped with understanding which LSQ variables were important for logistics providers and their customers. The researcher used semi-structured interview research (inductive) to explore and examine which LSQ variables were to be used for survey testing.

Twenty-four LSQ variables were tested across all three phases of the research but only 15 LSQ variables were identified as important for this research. The resultant LSQ variables and constructs from Phase Three, including mean ranking, were present in Table 10-1. It was found that OSQ was indicated as the early mean priority, followed by TS and OP respectively.

Construct	Initial Variable	New Variable	Variable Name	Mean Rank
Time and Services (TS)	LS-23	TS1	Placing & receiving time shortly	11
	LS-21	TS2	Satisfaction on the quality reports	10
	LS-24	TS3	Back-order is short	13
	LS-22	TS4	Arrive on the date promised	1
	LS-20	TS5	Reporting process adequately	7
	LS-19	TS6	Order discrepancy handling - satisfactory	5
	LS-11	IQ1	Information quality – accurate	9
	LS-12	IQ2	Information quality – adequate	15
Order Service Quality (OSQ)	LS-4	OSQ1	Right quantities	4
	LS-3	OSQ2	Right items	8
	LS-6	OSQ3	Order quality - substitute items	14
	LS-5	OSQ4	Right items on substituted	6
	LS-2	OSQ5	Failure to deliver required quantities	3
Order Procedures (OP)	LS-15	OP1	Ordering procedures - easy to use	12
	LS-16	OP2	Ordering procedures - flexible	16
	LS-14	OP3	Ordering procedures - effective	2

Table 10-1: Resultant LSQ Variables and Constructs from Phase Two

Comparing of LSQ variables from Phase Two with Phase Three, there were the differences between the LSQ variables addressed as important (see Figure 10-2). Four LSQ variables from Phase Two were found to be 'not important' in Phase Three, but they were still indicated as at a 'very important' level by about 30-50 percent of total respondents, which was an acceptable proportion for statistics analysis. Nevertheless, this percentage could not absolutely confirm the importance of these four LSQ variables; it could not be denied that these variables did not have the importance of the GSQ-LSQ relationship. Therefore, it was concluded that the LSP's LSQ competencies included 15 variables with three constructs.

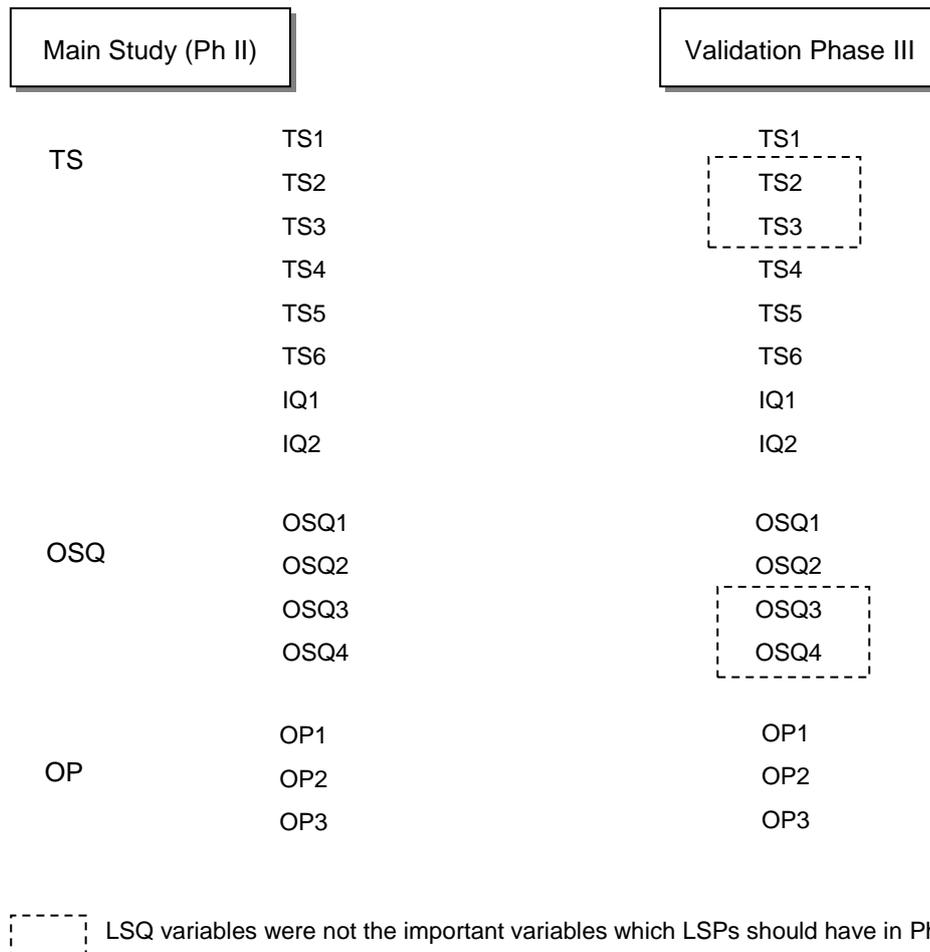


Figure 10-2: Comparison of the LSQ Competencies in Phases Two and Three

Banomyong and Supatn (2011) compared the dimensions of the SERVQUAL model with the freight logistics service quality attributes. Regarding this comparison, the 15 LSP's LSQ competencies were classified into the SERVQUAL dimensions and logistics service quality attributes, as presented in Table 10-2. For example, there were five LSQ competencies, which were divided into three logistics service quality attributes within the reliability dimensions. Interestingly, there was no LSQ competency in the dimensions of empathy and

responsiveness, in opposition to the study of Gil-Saura et al. (2008), which stated that logistics service quality is mainly determined by two factors: empathy and reliability. The three LSQ constructs were discussed as below:

SERVQUAL	Explanation	Logistics Service Quality Attributes	LSQ Competencies (Phase Two)
Reliability	The ability of a service provider to perform the promised service dependably and accurately	Order quality Order release quantity Timeliness	OSQ3 --- TS1 / TS3 / TS4
Assurance	Knowledge and courtesy of service providers and their ability to convey trust and confidence	Personnel contact quality Order procedure Order accuracy	--- OP1 / OP2 / OP3 OSQ1 / OSQ2 / OSQ4
Tangible	The appearance of physical facilities, equipment, personnel, and communication materials	Information quality Order discrepancy handling	IQ1 / IQ2 TS2 / TS5 / TS6
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	---

Table 10-2: Logistics Service Quality Attributes and LSQ Competencies by the SERVQUAL
Sources: Adapted from Banomyong and Supatn (2011: p.426)

9.2.1.1. Time and Services (TS)

Considering the 'Time and Services' (TS) construct, there were eight LSQ variables in this construct. Each LSQ variable represented the logistics service quality attributes and it appeared that the TS construct combined with three variables in the timeliness attribute with the reliability dimension; three variables in the order discrepancy handling attribute with the tangible dimension; and two variables in the information quality attribute with the tangible dimension. Therefore, this construct would present parts of the tangible and reliability dimensions with the explanation of these dimensions shown in Table 10-2.

Regarding the results from the structural model in section 8.5, Chapter Eight, it can be found that the TS construct positively affects TLPIs. One of reasons that can explain this effect quite well is that two of the five TLPIs used in this research came from the dimension of time: average order cycle time (P2) and average delivery cycle time (P3). The rest of TLPIs used in this research are: transport cost per sales ratio (P1) from the dimension of costs; and delivered

in-full on-time: DIFOT (P4) and returned rates (P5) from the dimension of reliability. With the opposite way that respondents rated the importance of LSQ variables affecting the logistics service that they (LSPs) provided or they (LSP customers) perceived by selecting a point on a seven-point Likert scale with 1 as 'not at all important' and 7 as 'very important', while respondents were asked to rate the perception of the performance (TLPIs) they (LSPs) provided or they (LSP customers) perceived by selecting a point on a seven-point Likert scale with 1 as 'highest score of performance' and 7 as 'lowest score of performance', the direction of the TS-LPI relationship, therefore, is positively affected.

According to Table 10-2, the TS construct that directly affected TLPIs comprises timeliness, information quality, and order discrepancy handling from logistics service quality (LSQ) values according to the study of Mentzer et al. (2001). These three LSQ attributes were grouped at the first level which provided an impact on the logistics performance. The relationships among these three LSQ attributes and the customer satisfaction have been proved by many studies (Bienstock et al., 1997; Grant, 2004; Mentzer et al., 2001; Pholsuwanachai, 2011; Rafiq and Jaafar, 2007). It is seen that the service performance has a positive relationship to the customer's satisfaction. The improvements in service operational performance yield higher levels of customer satisfaction. Timeliness, or the delivery time attribute, is an important component that affects the customer's satisfaction (Bienstock et al., 1997; Mentzer et al., 2001; Hult, 1998). Moreover, the effect of the timeliness attribute on TLPIs in this research study is also supported by the studies of Agatz et al. (2008), Bouzaabia et al. (2013), Cho et al. (2008), Davis-Sramek et al. (2008), and Esper et al. (2003) stated that physical delivery is a very important factor and that logistics capability is positively associated with firm performance.

Order discrepancy handling and information quality (IQ) attributes are the last two attributes in the TS construct with impact on the logistics performance following to timeliness attribute. It was seen that IQ variables presented its effect on LPI since the exploratory factor analysis in Chapter Eight and continuing to the confirmation factor analysis and the structural model under the TS construct. Gil-Saura et al. (2010) stated that a company can increase the value offered to the customer by applying technologies to increase more efficient information management, facilitating information distribution and connection between departments and companies the same as many studies (Novack et al., 1995; Flint and Mentzer, 2000; Narasimhan and Kim, 2001; Zhao et al., 2001). Novack et al. (1995) stated that the degree in which service provider deals with any discrepancies upon the arrival of orders reflects the order discrepancy handling dimension (Rinehart et al., 1989). Considering the information quality attribute, it is not only supported by many studies that they are of importance to the customer satisfaction and service providers' performance, but it is also stated in the studies of Jaafar (2006) and Mentzer et al. (2001) that the information quality attribute indirectly affects the order discrepancy handling attribute through order accuracy attributes. It can be concluded that the 'Time and

Services' construct directly affects the tangible dimension of the SERVQUAL (Parasuraman et al., 1988).

9.2.1.2. Order Service Quality (OSQ)

Considering the 'Order Service Quality' (OSQ) construct, there were four variables in this construct. It appeared that the OSQ construct combined with three variables in the order accuracy attribute with the assurance dimension and one variable in order quality attribute with the reliability dimension. Therefore, this construct would present parts of assurance and reliability dimensions and their explanations were presented.

Mentzer et al. (2001) stated that the three attributes the customers are concerned about when they rate the order as complete are order accuracy, order condition and order quality. The order accuracy attribute represents the ability of the service providers to deliver the right product in the required quantity, as ordered, and with none of the orders being substituted with other products (Bienstock et al., 1997; Mentzer et al., 2001, 1999, 1989; Novack et al., 1995; Rinehart et al., 1989). On the other hand, the order quality attribute refers to the degree to which the services provided by the service providers meet the service specifications set by the customers (Novack et al., 1995).

There are many studies which support the premise that the order accuracy and order quality attributes are important for customer satisfaction and service provider performance. The studies of Grant (2003), Jaafar (2006), and Mentzer et al. (2001) stated that the order accuracy and order quality attributes directly affect the order discrepancy handling attribute, which falls under the 'Time and Services' (TS) construct. It can be concluded that the 'Order Service Quality' construct directly affects only the assurance and reliability dimensions of the SERVQUAL, but also indirectly affects the tangible dimension through the 'Order Discrepancy Handling' attribute (Parasuraman et al., 1988).

9.2.1.3. Order Procedures (OP)

Considering the 'Order Procedures' (OP) construct, there were three LSQ variables in this construct. It appeared that the OP construct combined with three variables in the order procedures attribute within the assurance dimension. Therefore, this construct would represent a part of the assurance dimension. It found that the relationship between logistics service quality, including 'quality of information', 'order procedure', and 'quality of the contact staff and punctuality', and logistics value has high significance (Jaafar, 2006; Mentzer et al., 1999,

2001). Moreover, some studies stated that customers are concerned with effective and simple procedures from the service providers (Bienstock et al., 1997; Mentzer et al., 2001, 1997, 1989; Rinehart et al., 1989). Therefore, 'Order Procedures' is viewed as the efficient and effective procedure for ordering products as part of the service providers' processes.

'Order Procedures' is discussed and confirmed by the studies of Jaafar (2006) and Mentzer et al. (2001), which state that the 'order procedures' attribute directly affects the timeliness attribute, which lies under the 'Time and Services' (TS) construct. It can be concluded that the 'Order Procedures' construct directly affects only the assurance dimension of the SERVQUAL, but also indirectly affects the reliability dimension (Parasuraman et al., 1988).

In conclusion, there were 15 logistics service quality competencies which affected the Thai LSP's logistics performance index. These 15 competencies were classified by the dimensions of SERVQUAL into three dimensions, reliability, tangible, and assurance, which have an effect on the Thai government's logistics performance index (TLPI) for the logistics sector, whereas the responsiveness and empathy dimensions have no effect on TLPIs. The results are supported by the study of Stank et al. (1999), which used the SERVQUAL dimensions as a starting point for producing a more generic conceptualization of logistics service performance in the industry. Stank et al. (1999) stated that the reliability and tangible dimensions are performed as operational performance, whereas the responsiveness, assurance, and empathy dimensions are encompassed in relational performance. However, considering logistics service quality attributes overall, all results of the effects of 'Time and Services', 'Order Service Quality', and 'Order Procedures' on the Thai government's logistics performance index (TLPIs) are similar and supported by the studies of Grant (2003), Jaafar (2006), and Mentzer et al. (2001).

10.2.2. RQ 2: What are the LSP's GSQ competencies?

RQ2 was concerned with understanding which LSP GSQ variables were currently being used by practitioners. This helped in understanding which GSQ variables were important for logistics providers and their customers. The researcher used semi-structured interview research (inductive) to explore and examine which GSQ variables were being used for survey testing.

There were 28 GSQ variables tested across all three phases of the thesis, but only 13 GSQ variables were identified as important for this research. Results of the GSQ variables and constructs from Phase Two, including mean ranking, are presented in Table 10-3.

Construct	Initial Variable	New Variable	Variable Name	Mean Rank
Green Safety, Regulations and Collaboration (GSRC)	GS-27	GSRC1	Environmental aspects changes	14
	GS-28	GSRC2	LSP stakeholders' green awareness	8
	GS-12	GSRC3	CO ₂ emission by behavioural aspects	13
	GS-26	GSRC4	CO ₂ emission from awareness of LSP stakeholders	19
	GS-4	GSRC5	CO ₂ emissions by vehicle technology	9
	GS-20	GSRC6	Environmental targets achievement	12
	GS-25	GSRC7	Operational efficiency	6
	GS-10	GSRC8	Staff fully trained on environment and safety	10
	GS-21	GSRC9	Environmental collaboration enhancement	11
	GS-11	GSRC10	Accident rate reduction	4
	GS-13	GSRC11	Distribution network improvement	17
	GS-19	GSRC12	Knowledge sharing on environmental	21
	GS-24	GSRC13	Environmental regulations	1

Table 10-3: Resultant GSQ Variables and Constructs from Phase Two

In comparison with the GSQ variables from Phases Two and Three, there were differences between the GSQ variables referred to as important (seen in Figure 10-3). These 13 GSQ variables from Phase Two were found as 'not important' in Phase Three, but they were still addressed at a 'very important' level of about 30-50 percent of total respondents, which was the acceptable proportion for statistics analysis (seen in Table 9-3, Chapter Nine). Although this percentage could not absolutely confirm the importance of these 13 GSQ variables, it could not deny that these GSQ variables had some influence over the GSQ-LSQ relationship. Therefore, it was concluded that the 13 GSQ competencies with one GSRC construct found in Phase Two were confirmed by the result from Phase Three.

Construct	Main Study (Ph II)	Phase III Validation
GSRC	GSRC1	GSRC1
	GSRC2	GSRC2
	GSRC3	GSRC3
	GSRC4	GSRC4
	GSRC5	GSRC5
	GSRC6	GSRC6
	GSRC7	GSRC7
	GSRC8	GSRC8
	GSRC9	GSRC9
	GSRC10	GSRC10
	GSRC11	GSRC11
	GSRC12	GSRC12
	GSRC13	GSRC13

 GSQ variables were not important variables which LSPs should have in the phase III

Figure 10-3: Comparison of Main Study and Phase Validation on GSQ constructs

Regarding Table 10-3 and the resultant GSQ variables and constructs from Phase Two, 13 variables with one GSRC construct was discussed as:

Green Safety, Regulations and Collaboration (GSRC)

The ‘Green Safety, Regulations and Collaboration’ (GSRC) construct combined 13 variables. Considering each variable in this construct, it can be found that there were four main issues affecting the GSRC construct, including: firm collaboration; sustainability; green regulation and standardisation; and vehicle technology and logistics design. It was found from the literature in Chapter Two, Three, and Four that the collaboration among LSPs and LSP customers could affect the service quality, in particular, to environmental issue.

Collaboration activities focus not only on information sharing and coordination, but also include responsibility sharing, technological readiness, and training (Grzybowska et al., 2014). Gil-

Saura et al. (2010) stated that there is a direct relationship between the benefits of intensifying the relationship and the logistics value, which is similar to the studies of Bonner and Calantone (2005) and Bovel and Martha (1995), which stated that the benefits are derived from intensifying the supplier–customer relationship and increase the logistics service quality. Value is perceived more intensely in the aspects than affecting trust, commitment, and personal relationships. Awasthi et al. (2010) said that specific environmental performance criteria is applied by all the supply chain partners in their collaboration through promotion of responsible corporate environmental behaviour which has to be encouraged (Lu et al., 2007). Moreover, LSP customers help LSPs to recognise the importance of resolving environmental issues and support them in implementing their own improvement initiatives, which is a major issue that companies have yet to address (Ageron et al., 2012). Thus, long-term relationships are essential for sustainable partnerships and the great contribution to the customers' value creation and overall performance (Carter and Dresner, 2001; Handfield et al., 2002).

Following on from the sustainability, Elkington (1998) and Grant et al. (2013) addressed the issue that sustainability defines only three aspects: people; social and economic; but also includes the staff's health and safety. The goal of sustainability is to increase economic value while reducing the company's environmental impact and improving the quality of life for humans (Elkington, 2004; Grant et al., 2013; Wichaisri and Sopadang, 2013). Martinsen and Hüge-Brodin (2014) stated that customers can choose to pay (a low price) for the service provider to invest in CO₂ reduction programmes of offering types. These programmes may indicate some environmental education of the personnel in general, other than purely eco-driving from LSPs.

Regulatory pressures can play a major role in operational processes as they oblige companies to adopt sustainable supply chain practices. According to Bjorklund (2005), one of the most commonly applied environmental demands in Sweden is the ISO 14001 certificate. This is also discussed by Hervani et al. (2005) and Shaw et al. (2010) as one of the environmental performance evaluation indicators. Environmental management systems (EMS) have been implemented in some companies to help manage the four categories (emission to air; emission to land; emission to water; and resources used) including the International Standards Organisation's ISO 14031:1999; which is "an environmental performance evaluation tool, which is not a standard for certification but provides organisations with specific guidance on the design and use of environmental performance evaluation and on the identification and selection of environmental performance indicators" (Shaw et al., 2010: p. 326). Green regulation and standardisation then lead directly to service quality.

Enarsson (1998) suggested that the key criteria for considering when purchasing transportation services are the amount of return loads, choice of transportation mode, and load optimising. Aronsson and Hüge-Brodin (2006) confirmed that the logistics system design

affects the environmental impact of transportation just as the studies of McKinnon et al. (2010) stated that vehicle characteristics show potential for decreased environmental impact. Furthermore, Martinsen and Bjorklund (2012) noted that logistics providers could offer logistics system design as part of an environmental offering more often than the demands of the market. In conclusion, no matter whether collaboration, sustainability, green regulation and standardisation; and vehicle technology and logistics design are involved, the effects of these GSRC competencies would occur in the long term.

Regarding the deletion of the 'Green Technology and Transport Management' (GTTM) and 'Green Cost and In-process Waste' (GCW) constructs in Phase Two as they were not statistically robust, this did not mean that these constructs did not affect LPI but rather might only have a low importance level in the GSQ-LPI relationship. However, it was found that there were three GSQ variables from the top ten ranking of importance of GSQ variables in Phase Three. These two GSQ variables, which were (GS-1) 'fuel cost by alternative fuel' and (GS-6) 'fixed cost by vehicle technology', were included in the GCW and the GTMM constructs respectively. The reasons why these two GSQ variables were in the top ten of the importance of GSQ variables (Phase Three) include the efficiency and costs focus that was mentioned in section 9.3.2. Moreover, Browne et al. (2014) reported that the amount of energy used for vans is clearly related to the vehicle size and the fuel source. Diesel engines became increasingly popular among van operators since 1998 and this rose to 95 percent in the industry in 2011. Logistics service providers can provide services for whatever the customer needs. As an alternative fuel to diesel, bio-diesel produces few CO₂ emissions; however, it is not cost effective because of the cost of the additional equipment required, the limited refuelling infrastructure, and the lower fuel efficiency compared to diesel (Browne et al., 2014). These might explain why the GTTM and GCW constructs were deleted when considering the 'big picture'.

10.2.3. RQ 3: How important are GSQ competencies relative to TLPI through LSQ competencies?

RQ3 was concerned with the direction of the GSQ-LSQ relationships, and with regard to the findings in Chapters Eight and Nine, it appeared that only GSQ competencies had an important relationship to LSQ competencies. It was found that there was an important relation between LSQ competencies and GSQ competencies but it could not indicate how strong the relationship is. Figure 10-4 and Table 10-4 presented the importance of the GSQ competencies in relation to LSQ competencies from the findings in Phases Two and Three respectively.

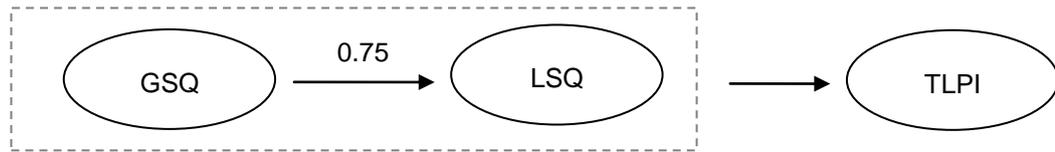


Figure 10-4: Indirect Effect of GSQ and LSQ in Phase 2

It appeared that the effect of GSQ related to LSQ was approximately 0.75 from the findings in Phase Two (see Chapter Eight). Moreover, considering the findings in Phase Three, about 27 percent of the total respondents agreed on rating it at a ‘very important’ level while approximately 47 percent of the total respondents agreed at a ‘somewhat important’ level, as shown in Table 10-4. This could be explained by the fact that some of respondents from Phase Three thought that if companies had their own LSQ competencies as a normal standard, the effect of GSQ related to LSQ would not affect the companies much. On the other hand, with a LSQ normal standard it could influence GSQ to achieve more green competencies as with the company’s competitive advantage.

	Somewhat important (Score 5-6)	Very important (Score 9-10)
Importance of GSQ relate to TLPI through LSQ	46.67%	26.67%

Table 10-4: Percentages of the Importance of GSQ Relative to TLPI through LSQ in Phase Three

10.3. GSQ and LSQ among Eastern-Western Business Philosophy

Regarding section 7.4.2 in Chapter Seven, issues for supporting GSQ-LSQ-TLPI relationships include GSQ and LSQ variables from the perspective of MNCs and total Thai-owned companies. The findings of the survey in Phase Two showed the differences of ownership structure among LSPs and LSP customers. It appeared that most LSP respondents came from ‘totally Thai-owned companies’, whereas most of the LSP customer respondents came from ‘MNCs’. Differences between LSPs and LSP customers might explain the differences of organisational culture just like the business ethics among LSP ‘totally Thai-owned companies’ and LSP MNCs.

Organisations in different industrialised countries and cultures seem to become more alike and adopt universal practices about work and corporate culture (Naor et al., 2010). Therefore, organisations can alter people’s behaviours and undermine the national culture’s effects. Naor et al. (2009) noted that the organisational cultural dimensions of power distance, future

orientation, and performance orientation differed between Eastern and Western countries. The organisations' structures and strategic policies are strongly influenced by performance, such as hierarchy or bureaucracy. Moreover, incentives, compensations, and awards for outstanding achievements influence the cultural dimension of performance orientation.

Koehn (1999) discusses the Eastern and Western business philosophies and how they affect business ethics. There are three key differences between Eastern and Western business philosophies: 1) the meaning of trust; 2) relations for life; and 3) ethics beyond rights. Starting with the meaning of trust, trust exists in a variety of relationships such as those between parents and children, and employees and supervisors. Trust cannot be calculated in the results of some cost-benefit analysis. Following on with the relations for life, this is addressed from Watsujian and Confucian perspectives, whereby the commercial relationships are long-term relationships, like a friendship. It is found in Japanese and Chinese businesses that no matter how the new generation runs the business, manufacturers continue to buy from suppliers with whom they have done business in the past. Lastly, looking at the ethics beyond rights, Japanese and Chinese cultures, which represent the Eastern culture, are duty-based, while Western cultures are rights-based. However, it appears that if the ethics of the Japanese and Chinese have no idea of rights, they equally have no idea of duty. Duties are the correlatives of rights and there could not be one without the other.

Regarding the findings from the three phases, most of the LSP 'totally Thai-owned' companies ran their own businesses with the Eastern philosophy, whereas some of the LSP MNCs ran their business with the Western philosophy. Interestingly, there were differences in the organisational cultures and the way they ran the businesses, including the beginning of green project initiatives; the deployment of strategies; and the way to control and punish. One of the case interviewees from Phase One, an executive officer from a 'totally Thai-owned' LSP company, explained how to deploy the company's strategies into the operational function, and in particular to initiate a green project. He started explaining this project to staff and let them know what the benefits were to the company and staff. Sometimes, the initiative process improvement might come from the operational function in which specialists had worked. In this case, the key successes were trust, relations for life, ethics beyond rights (Koehn, 1999), and a family business approach to the organisational culture as per the Eastern philosophy (Naor et al., 2010). With these key successes, the green service in LSP 'totally Thai-owned' companies always came from a small project with not much cost-benefit calculation.

On the other hand, one of the interviewees, who had working in LSP MNCs, from Phase Three, explained the way in which a company implements green service; most of the green projects came from the company headquarters and the green strategies would then be launched across the subsidiary companies. The projects often had the objectives either to implement the green concept through the supply chain or mainly to focus on the cost-benefit

from the outcomes of projects. It was seen that staff did not necessarily know the reasons they had to change activities to conform to the green projects. Therefore, it was quite hard to implement a new green project. Due to the Western cultures being rights-based, as stated by Koehn (1999), most of the green project initiatives were not explained, but staff were expected to follow. There was some opposition to the initiatives from staff during the implementation.

However, there were advantages from the Eastern business philosophy; LSP 'total Thai-owned' companies could not deny that some advantages from the Western business philosophy might help them to improve or set the standard of service quality. Moreover, there were many best practices from LSP MNCs that LSP 'totally Thai-owned' companies could bring in and apply the LSP MNCs' lessons learned in order to increase their competitiveness and compete with national and international rivals in the future.

In the line with the argument above, the results from Phase Two represented the differences in the importance of GSQ variables from the perceptions of the 'totally Thai-owned' companies and MNCs (as shown in Table 7-9, Chapter Seven). There were two different GSQ variables according to the perceptions of the 'totally Thai-owned' companies and MNCs, the (GS-2) 'corporate image by alternative fuel' and (GS-26/GSRC4) 'CO₂ emission from awareness of LSP stakeholders' variables, but only the 'CO₂ emission from awareness of LSP stakeholders' variable was a variable which MNCs' perceptions of importance exceeded those of the 'totally Thai-owned' companies. In this point, it can be said that the differences in Eastern and Western business philosophies presented by the ownership structures of the companies can lead to a particular way of thinking and influence the perceptions of the company of the importance of the green service quality issues.

Bouzaabia et al. (2013) stated that the expectations of customer service quality from the service providers may be affected by cultural dimensions. That means customers from the culture which is characterised by a high power distance index probably set a low level of quality expectations for the services they purchase. In line with this context, customers from a culture characterised by a high uncertainty avoidance index tend to engage in extensive decision making processes for service choices, take time in collecting information, and evaluating alternative options of action without rushing to the decision making (Lee et al., 2007). Several studies have shown that customers from different countries and cultural backgrounds have different expectations, react differently to service encounters, and reveal different behavioural intentions (Zhang et al., 2008). In addition, Sultan and Simpson (2000) stated that the nationality of customers influenced the expectations and perceived performance of customers.

Regarding the ownership structure in companies from Phase Two, it is assumed that 'totally Thai-owned' companies run their business using the methods of developing countries (or the

Eastern business philosophy) and MNCs run their business using the methods of developed countries (or the Western business philosophy). There were six GSQ-LSQ variables which were perceived differently among MNCs and 'totally Thai-owned' companies and also identified as among the GSQ-LSQ competencies: the variables (GS-26) 'CO₂ emissions from awareness of LSP stakeholders', (GS-28) 'LSP stakeholders' green awareness', (GS-12) 'CO₂ emission by behavioural aspects', (GS-11) 'accident rate reduction', (GS-13), 'distribution network improvement', and (LS-6) 'order quality - substitute items'.

Malhotra et al. (2005) stated that "due to cultural and environmental differences, consumers of services in different countries may have different perceptions of the service quality". The perceptions of service quality vary by nationality due to differences in economic, social, and cultural environments (Malhotra et al., 2005). While the studies of Alden et al. (1999) and Witkowski and Wolfinbarger (2001) present that there is a growing 'international consumer culture' that shares values, norms, and beliefs across cultures and political boundaries, it can be concluded that the ownership structure of the company run by Eastern-Western business philosophies will affect the importance level of green service quality competencies.

10.4. Size of Company and GLSQ Competencies

From 19 GSQ-LSQ variables in Table 7-8, Chapter Seven, the overall levels of these variables are statistically different among these six pair groups; for instance, micro-sized firms and small-sized firms, etc. It was found that large companies (with more than 200 employees) exceeded perceptions for these variables and respondents rated highly the overall importance level of these variables. Interestingly, considering two groups of small and large-size companies, and medium and large-size companies, there was an association between the company size of these two groups and the importance of green and logistics service quality, focused on the variables 'high fill rates by transport management', 'back haul reduction by transport management', 'CO₂ emission from awareness of LSP stakeholders', 'information quality – complete', 'ordering procedures – effective', and 'arrive on the date promised'. Only three GSQ-LSQ variables, (GS-26) 'CO₂ emission from awareness of LSP stakeholders', (LS-14) 'ordering procedures – effective', and (LS-22) 'arrive on the date promised', were among the GSQ-LSQ competencies. It can be concluded that the company size affects the importance of green logistics service quality competencies.

Nonetheless, considering the effects of the ownership structure as presented in section 10.3 and of the company size as presented in this section in terms of the GLSQ competencies, it was found that 'CO₂ emission from awareness of LSP stakeholders' was the only variable from all the GLSQ competencies which was affected by both the ownership structure and the

company size. Table 10-5 presents the differences in the perceptions between the company size and the ownership structure on the 'CO₂ emissions from awareness of LSP stakeholders' variable. Large 'totally Thai-owned' companies exceeded perception for this competency, whereas any size of MNC companies perceived this competency slightly at a similar level.

Average employees in company	Total Thai-owned company Mean	MNCs Mean	F	Sig.
1 to 30 (Micro)	4.55	6.00	1.435	.244
31 to 50 (Small)	5.45	5.75	.386	.681
51 to 200 (Medium)	5.49	5.74	2.385	.095
more than 200 (Large)	6.30	5.76	2.880	.060

Table 10-5: Difference of the Perceptions between the Company Size and the Ownership Structure on the 'CO₂ emission from awareness of LSP stakeholders' Variable

10.5. Gap Analysis and TLPI Benchmarking

Grant (2012) mentioned a service quality model that includes the positions of customers and the firm (or supplier). The expectations and perceptions gap is related to a supplier's customer service and service qualities. The service quality gap can help a supplier (or LSP in this study) to understand and reduce the gap and/or increase their service quality.

10.5.1. Gap Analysis

10.5.1.1. *Green logistics service quality competencies gap*

According to section 7.4.6, Chapter Seven, two from seven GSQ variables were identified as GSRC competencies that affected TLPs. These two GSRC competencies were (GS-20) 'environmental targets achievement', and (GS-21) 'environmental collaboration enhancement'. It seemed the LSPs perceived these two competencies as more influential than the LSP customers perceived with means of about 5.9 and 5.68 respectively. It is supported by Wolf and Seuring (2010) who suggested that LSPs' green supply exceeds the shippers' green demands. Moreover, Martinsen and Björlund (2012) proposed that there are five gaps for green categories in the different actors' perceptions, but considering the fourth gap, the shippers (or service providers) seem to give their green demands a higher score than the LSPs (or customers). Nonetheless, the categories of fuel, eco driving and energy data indicate that there are gaps between what the shippers (or service providers) demand and how the

LSPs (or customers) perceive these demands. This could indicate that shippers (or service providers) are more successful in communicating their green demands than the LSPs (or customers) are in communicating their green offers. It can be concluded that there are the gaps between the services provided by LSPs and the services perceived by LSP customers on the 'environmental targets achievement', and 'environmental collaboration enhancement' competencies.

10.5.1.2. Thai government's logistics performance index gap

Perception of LSPs is assumed to a level of LSP's service, while perception of LSP Customers is assumed to a level of LSP customers' service perceived. Five TLPIs were the measurement for LSPs to measure their service quality in the dimensions of cost, time, and reliability respectively. Regarding the findings from Tables 7-9 to 7-10 and Appendix 5, which presented the boxplots of 5 TLPIS (see Chapter Seven), a transformation of the boxplot score into the TLPI score was completed using a coding of the questionnaire protocol (in Appendix 5). Table 10-6 presents the five TLPI scores in the perceptions of LSPs and LSP customers.

It appeared that the perception of LSP customers of their three LSP performance aspects (TLPIs) were similar to the perception of LSPs of their own performance. These three TLPIs were transportation cost per sales ratio, DIFOT, and returned rates. Only two TLPIs, order cycle time and delivery cycle time, were different. With the order cycle time, LSP customers perceived that it took longer than the amount of time that LSP spent on this TLPI, as was the case of the delivery cycle time. Regarding the service quality gap from Chapter Two, it could be said that there was a service quality gap on the order cycle time and delivery cycle time. LSP customers perceived the number of days on the order cycle time and delivery cycle time as higher than the LSPs perceived.

	Boxplot Score		LPI Score	
	LSPs	LSP Customer	LSPs	LSP Customer
P-1 Transport cost per sales ratio	3 – 4	3 – 4	3.1 – 5.0	3.1 – 5.0
P-2 Order cycle time	1 – 2	1 – 3	0 – 10	0 – 15
P-3 Delivery cycle time	2 – 3	2 – 4	1 – 4	1 – 6
P-4 DIFOT	5 – 6	5 – 6	91 – 99	91 – 99
P-5 Returned rates	1 – 3	1 – 3	0 – 2.5	0 – 2.5

Table 10-6: Transformation of the Boxplot Score to the LPI Score – the Perceptions of LSPs and LSP Customers

According to Table 7-12, Chapter Seven, the effects of the company size on the order cycle time (P-2) and delivery cycle time (P-3) in the perceptions of LSPs and LSP customers suggested that large companies perceived longer order cycle times and delivery cycle times than SMEs. However, it found that the average delivery cycle time of the SMEs was smaller than those of the large companies. This is supported by Banomyong and Supatn (2011), who presented that SMEs have superiority in the delivery cycle time due to many of the SMEs providing the milk-run services with deliveries every four to six hours, whereas the major Thai LSP companies deal with bulkier and less time-sensitive products.

10.5.2. TLPI Benchmarking

Benchmarking becomes one of the competitive techniques used by many companies to improve their productivities and help meet the customers' needs. In the Thai logistics area, the Bureau of Logistics at the Thailand Ministry of Industry has conducted research which measured and established a set of TLPIs based on five industries. All 200 selected samples in this project were best-in-class companies within five industries: food, textiles, electronics, automotives, and plastics. There were 27 measurements which were selected from nine logistics activities and three dimensions, as discussed in Chapter Three. Only nine TLPIs were selected for use in the research study and the details on how the relevance of each TLPI was calculated was presented in Appendix 5

Regarding the findings from Table 7-11 and Appendix 5, which presented the boxplots of five TLPIs in the perceptions of LSP customers by industry, a transformation of the boxplot score to LPI score was done using a coding of the questionnaire protocol (Appendix 5). Table 10-7 presents the LPI scores from the perceptions of LSP customers by industry. The score in each LPI was put using the same measurement as the TLPI benchmarking scores. However, the limitations of comparison between TLPIs in the survey study and TLPIs benchmarking scores were as follows:

- Definition of each LPI in the survey seemed a sub-set of the TLPI benchmarking scores because the survey TLPIs were measured only between the perceptions of LSPs and LSP customers on the LSP performance
- All databases were from the perception, not the actual data

		Industry				
		Food	Textiles	Plastics	Automotives	Electronics
P-1 Transport cost per sales ratio	Boxplot score	3 – 5	3 – 5	3 – 4	3 – 4	3 - 4
	Score (%)	3.1 - 6.0	3.1 - 6.0	3.1 – 5.0	3.1 – 5.0	3.1 – 5.0
P-2 Order cycle time	Boxplot score	1 – 2.5	1 – 2	2 – 3	2 – 3	2 - 3
	Score (days)	0 – 7	0 – 10	5 – 15	5 – 15	5 - 15
P-3 Delivery cycle time	Boxplot score	2 – 3.5	2 – 3	2 – 4	2 – 4.5	2 - 4
	Score (days)	1 – 3.5	1 – 4	1 – 6	1 – 7.5	1 - 6
P-4 DIFOT	Boxplot score	5 – 6.5	5 – 6	5 – 6	5 – 6	5 - 6
	Score (%)	91 – 99	91 – 99	91 – 99	91 – 99	91 – 99
P-5 Returned rates	Boxplot score	1 – 3.5	1 – 2.5	1 – 3	2 – 3	1.5 - 3
	Score (%)	0 – 2.8	0 – 2.3	0 – 2.5	1.1 – 2.5	1.05 – 2.5

Table 10-7: Transformation of the Boxplot Score to the Score of TLPIs – the Perception of LSP Customers by Industry

Even though there were limitations on the comparison, the similarities and differences among the survey TLPI score and LPI benchmarking score could give a guide to improve the productivity, in particularly in the logistics industry. A comparison of the TLPI benchmarking score and the survey TLPI scores perceived by five LSP customers industries is presented in Table 10-8.

Considering the comparison base in Table 10-8, there were two issues on which the survey LPI scores were outliers of the LPI benchmarking scores. These were transportation cost per sale ratio (P-1) in the electronics industry and the order cycle time (P-2) in the plastics industry. The rest of them were inliers of the LPI benchmarking scores, though the definitions of these survey TLPI scores seemed a sub-set of the TLPI benchmarking scores.

		Industry				
		Food	Textiles	Plastics	Automotive	Electronics
P-1 Transport cost per sales ratio	Benchmark	3.6	3.6	4.8	5.6	1.0
	Survey	3.1 - 6.0	3.1 - 6.0	3.1 - 5.0	3.1 - 5.0	3.1 - 5.0
P-2 Order cycle time	Benchmark	11	4	4	29	6
	Survey	0 - 7	0 - 10	5 - 15	5 - 15	5 - 15
P-3 Delivery cycle time	Benchmark	2	1	2	1	2
	Survey	1 - 3.5	1 - 4	1 - 6	1 - 7.5	1 - 6
P-4 DIFOT	Benchmark	91	88	89	89	92
	Survey	91 - 99	91 - 99	91 - 99	91 - 99	91 - 99
P-5 Returned rates	Benchmark	4	2.13	1.93	2.26	2.04
	Survey	0 - 2.8	0 - 2.3	0 - 2.5	1.1 - 2.5	1.05 - 2.5

Table 10-8: Comparison the TLPI Benchmarking Score and the Survey TLPI Scores Perceived by Five LSP Customer Industries

Looking at the equation on how to calculate transport cost per sale ratio and order cycle time, the Bureau of Logistics at the Thailand Ministry of Industry had set up two TLPIs:

$$\text{Transport cost per sales ratio} = \left(\frac{\text{Inbound transport cost} + \text{Outbound transport cost}}{\text{Sales}} \right) \times 100$$

Order cycle time = Average cycle time since LSP customers receive an order from its customer to it deliver the goods or products to its customers

Note: Unit - Days

In conclusion, the findings of the research survey can be considered a guide for the Thai government to focus on how to make a decision on the policies and strategies of logistics to improve the logistics activities and to achieve a reduction of logistics cost per GDP ratio overall. This might come from the service quality gap in the previous section as per the discussion in this section.

10.6. Green Logistics Service Quality (GLSQ) in Thailand

A core contribution of this thesis is to draw together the key empirical findings from the research and propose a set of green logistics service quality (GLSQ) variables and reporting

tools which can be used by LSPs to understand the LSP's GLSQ competencies in Thailand and use these competencies to reduce a service quality gap or increase their quality level for competing with rivals. This will not only provide LSPs with a source of competitive advantage but it will also help government to guide the development of logistics performance and increase the overall competitiveness in Thailand. The effect of LSP's GLSQ competencies on TLPs is presented in Figure 8-6, Chapter Eight. Generally, there are 13 GSQ competencies and 15 LSQ competencies for Thai logistics service providers. These 28 GLSQ competencies came from four main constructs: namely, GSRC, TS, OSQ, and OP. However, they can be classified into three main options where Thai LSPs are to respond to customers' needs or compete with their rivals: 1) act as normal LSPs providing services to customers; 2) act as SME LSPs competing with large LSPs; and 3) act as local LSPs competing with MNC LSPs.

Firstly, If LSPs act as normal LSPs providing services to customers, there are two GSQ-LSQ competencies differences between the LSPs' and LSP customers' perceptions, which are 'environmental targets achievement' and 'environmental collaboration enhancement' competencies. LSPs exceeded perceptions for these competencies and highly rated the importance level of GSQ competencies. That means LSPs can provide the excess level of green service quality, particularly from the green collaboration between LSPs and their customers. These competencies cannot only increase customer satisfaction but also help LSPs and their customers to reduce costs. It is supported by Sandberg (2007) and Spekman et al. (1998), who stated that the most important reasons to engage the collaboration within the supply chain come from issues related to cost reduction as with service.

Secondly, if LSPs act as SME LSPs competing with large LSPs, there are seven GSQ competencies and five LSQ competencies with differences in the perceptions of SMEs and large companies, which are 'CO₂ emissions by vehicle technology', 'staff fully trained on environment and safety', 'environmental regulations', 'operational efficiency', 'CO₂ emission from awareness of LSP stakeholders', 'environmental aspects changes', and 'LSP stakeholders' green awareness', 'order quality - substitute items', 'ordering procedures – effective', 'order discrepancy handling – satisfactory', 'reporting process adequately', and 'satisfaction on the quality reports'. It is seen that these GSQ and LSQ competencies generally cover the GSRC, TS, OSQ, and OP constructs. That means large LSPs can provide the excess level of green service quality and logistics service quality. Most large LSP companies register with the environmental measurements such as the ISO 14000 series. To achieve the ISO certificate, the company should follow the process of the environmental standard. This may be a reason why large companies pay attention to the GSRC construct. It is supported by Sambasivan and Ng (2008), who stated that some perceived benefits from implementing ISO 14001 can be illustrated by four main factors in line with Tab (2005), such as: company reputation and image improvement; increases of staff morale and motivation; performance and opportunity; and customer loyalty and trust.

Lastly, if LSPs act as local LSPs competing with MNC LSPs, there are three GSQ competencies and one LSQ competency with differences in the perceptions of SMEs and large companies, which are 'accident rate reduction', 'CO₂ emission by behavioural aspects', 'CO₂ emission from awareness of LSP stakeholders' competencies. It is seen that these GSQ and LSQ competencies focus on behavioural aspects, and the reliability dimension of the SEVQUAL. That means MNC companies pay more attention to the sustainability of health and safety in particular than the local companies. That means cultures influent to the health and safety aspect as supported by Shane (1993) and Tse et al. (1988) addressed the importance of cultural values in explaining the differences in an organisation's overall performance. Moreover, Bouzaabia et al. (2013) stated that the expectation of customer service quality from the service providers may be affected by the cultural dimensions.

These LSP GLSQ competencies in Thailand could mainly benefit logistics providers who deliver goods or products to customers of LSP customers. To improve LSP performance, in particular the TLPs, LSPs could consider not just one main construct from part of the green service quality, but also focus on three constructs from the logistics service quality part. Though the green service part indirectly affects LSP performance (meaning TLPs), the globalisation trend and green concerns from customers would be directly influential to LSP's competitiveness, in particular for this niche market.

10.7. Conclusions

This chapter has explored and summarised the key empirical findings from this research in a holistic and integrated way. It has compared and contrasted the key findings from each of the three primary research questions to the existing GSQ-LSQ literature and proposed conceptual model. This has enabled a final assessment of the key gaps, disparities and similarities in the existing body of knowledge and has drawn together the key findings across all the three phases of the research to propose GSQ-LSQ variables and their constructs.

The three-phased research approach (methodological triangulation) has enabled an extensive and in-depth view of the world of GSQ-LSQ development and enhanced the researcher's knowledge and confidence in the empirical findings, assertions and recommendations.

Chapter Eleven will now go on to summarise the main contributions of this thesis, the impact of these contributions on the existing body of knowledge, and discuss the key implications for practitioners and academics.

11. Conclusions and Implications

11.1. Thesis Summary

This thesis investigated and tested the importance of existing constructs of green service quality and logistics service quality into the logistics performance index in the transport function of logistics service providers (LSPs) and LSP customers from selected industries in Thailand. This chapter concludes the thesis by first providing a summary, and then discussing its contribution and implications for management and future research.

The literatures of this study and the nature of customer service and logistics service quality are reviewed in the first section of Chapter Two. The interface between logistics and marketing mix variables is presented so that logistics activities might play a role as services and also can lead to an increase in customer satisfaction. The service quality model by Parasuraman et al. (1988) has been categorised into five dimensions as tangible, reliability, responsiveness, assurance, and empathy. The continuous rise in the use of SEVQUAL and SERVPERF has been arguably attributed to a practical usefulness in diagnostic analysis for improving service quality. Grant (2003) adopted the concepts of Parasuraman et al. (1988) to test the importance and sufficiency of existing constructs of customer service, customer satisfaction and service quality in the logistics function of the UK food processing industry.

However, the logistics service quality scale proposed by Mentzer et al. (1989) which comprised nine dimensions - information quality, order procedures, order release quantity, timeliness, order accuracy, order quality, order condition, order discrepancy handling, and personal contact quality - is one of the most popular instruments applied to conduct research studies. Rafiq and Jaafar (2007) tested the LSQ instruments suggested by Mentzer et al. (1989) in their cross-sectional survey research into customers' perceptions of service providers by third-party logistics service providers in the UK. Thus, this research has adopted the concept of logistics service quality from Grant (2003) and Jaafar (2006) for the part of logistics service quality.

Moreover, the roles that LSPs in Europe and Asia play seem similar, in particular, as one of key players in the supply chain to deliver the goods/services to the customer. In line with the increase in the amount of LSP in Europe and Asia, CO₂ emissions released by road traffic is the highest when compared with other modes of transport such as rail and air. In Asia and the Pacific, the energy consumption and CO₂ emissions by road are at the highest amount when compared with the energy consumption and CO₂ emissions from rail and air transport during the years 2001 to 2012. It can be concluded that the relationship between the level of energy

consumption and CO₂ emissions by road and rail transport play a much more important role and in line with the growth of trade exports among developing countries though the transport connections between these countries.

Green service quality and the logistics performance index are also discussed as one of the keywords in the research as well as the issues in the context of Thailand, such as policies relating to green service quality, business and performance in Thailand. Green issues have emerged continuously in the logistics market and there are many research studies applying the green concept using different definitions to conduct the research widely. This thesis defines the definition of green service quality from Lovelock (2000) and Schneider and White (2004) as the environmental initiatives crucial to operational service quality, particularly in logistics service provision. To conform to the GSQ definition, nine GSQ items have been reviewed from the literature.

This thesis investigated these issues and adopted conceptual models of logistics service quality from Grant (2003) and Jaafar (2006), and that of green service quality from Elkington (1998) and Martinsen and Bjorklund (2012). The investigation considered a dyadic exchange between a LSP and LSP customer, with customer needs and customer service features to fulfil these needs, and was conducted from the perspectives of LSPs and LSP customers. Three research questions were proposed for this study: what are the LSP's LSQ competencies or KPIs; what are the LSP's GSQ competencies or KPIs; how important are GSQ KPIs relative to LSQ KPIs. A three-phase methodology framework developed by Churchill (1979), Churchill and Iacobucci (2010), Dunn et al. (1994), and Malhotra et al. (2012) was used in this thesis as a rigorous approach for development of measurement scales and constructs and corresponding issues of reliability and validity.

The empirical study comprised three phases: Phase One was an inductive phase that involved conducting semi-structured interviews with eight leading logistics/supply chain managers and executive officers to explore the three research questions, identify current and/or required practices employed in the industry, and generate a battery of variables and constructs; Phase Two was a deductive phase that consisted of a self-completion questionnaire survey of LSPs and LSP customers in Thailand to test and validate the variables and constructs emerging in Phase One; and Phase Three was a final inductive phase that consisted of conducting a structured interview with 15 leading logistics/supply chain managers, executive officers, and academic professionals to verify the overall research findings.

Phase One (the literature review and semi-structured interview) collectively identified 28 GSQ variables and 24 LSQ variables for further investigation and survey testing. Given the application and robust process applied to the eight leading logistics/supply chain managers and executive officers in Phase One, the results were considered substantive, internally valid

and rigorous enough to proceed to the next phase for testing. Judgmental sampling and snowball sampling techniques were used for selecting the samples in Phase One.

In Phase Two, the samples in this phase were taken from four databases of LSPs and LSP customers. The list of LSPs sampled was prepared from two databases: the database of Thai Transportation and Logistics Association; and that of the Export-Import Transportation Guide. The amount of LSPs in the transport industry from two databases was 441 companies. In addition, the list of LSP customers was prepared from two databases: the database of the Thailand Office of Board of Investment, Eastern Region Investment and Economic Centre; and that of the Federation of Thai Industries, Central and Eastern regions. The amount of companies in five major industries from two databases was 1,313. The total amount of LSPs and LSP customers was 1,754 companies.

Descriptive statistics, including data frequencies, means, standard deviations and cross-tabulations, were performed for all data from both LSP and LSP customer perspectives. In addition, exploratory factor analysis (EFA) was used to examine the data sets from the self-completion questionnaire survey of LSPs and LSP customers in Thailand (Phase Two) using principle component analysis (PCA). 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 (Hair et al., 2010; Loehlin, 1998).

Confirmatory factor analysis (CFA) and structural equation modelling (SEM) were used to determine the validity, reliability and relationships amongst remaining variables and latent constructs. CFA is different from EFA in that it attempts to confirm or test a priori hypotheses about the possible factor structures by fitting variables to them (Hair et al., 2010; Loehlin, 1998). SEM is also a multivariate analysis technique that examines a set of dependence relationships simultaneously using regression and covariance analysis amongst latent constructs (Hair et al., 2010; Loehlin, 1998). The resulting measurement model possessed 28 variables and four constructs, which came from 13 GSQ variables with one construct and 15 LSQ variables with three constructs, that were unidimensional, reliable and exhibited convergent and discriminant validity. The goodness-of-fit indices were acceptable in the structural model, i.e. CFI, GFI.

The purpose of Phase Three was to validate the overall research findings to ensure theory saturation had been met. Phase Three concluded that theory saturation had been met and revealed no new underlying GSQ-LSQ constructs. In summary, the list of 52 GSQ-LSQ variables was identified from the literature and Phase One. The list of 28 GSQ-LSQ variables were empirically tested and confirmed in Phase Two and were validated in Phase Three as part of this exploratory study. There were 15 LSQ variables and 13 GSQ variables are considered important to practitioners. These 15 LSQ competencies from three constructs were

drawn in seven logistics service quality attributes (Banomyong and Supatn, 2011; Bienstock et al., 1997; Grant, 2004; Mentzer et al., 2001; Pholsuwanachai, 2011; Novack et al., 1995; Rafiq and Jaafar, 2007; Rinehart et al., 1989) within the three dimensions of service quality - reliability, assurance, and tangible (Banomyong and Supatn, 2011; Gil-Saura et al., 2008).

11.2. Conclusion Regarding the Research Questions

RQ1: What are the LSP's LSQ competencies?

Fifteen key LSQ competencies were identified across all three phases of this thesis. Empirically, the most important of the LSQ competencies from all three phases are: 1) arrive on the date promised; 2) ordering procedures – effective; 3) right quantities; 4) right items substituted; and 5) reporting process adequately. Thus, the most important of the LSQ competencies constructs are: 'Time and Services', 'Order Procedures', and 'Order Service Quality'. 'Time and Services' is a significant construct for RQ1, with four of the top ten most important LSQ variables, followed by the 'Order Procedures' construct with one of the top ten most important LSQ variables, and the 'Order Service Quality' construct with three of the top ten most important LSQ variables.

Considering the classification of 15 variables divided into the SERVQUAL dimensions and logistics service quality attributes, three SERVQUAL dimensions and seven logistics service quality attributes by Mentzer et al. (1989) were specified. These three SERVQUAL dimensions were reliability, assurance, and tangible, which are supported by Agatz et al. (2008), Bouzaabia et al. (2013), Cho et al. (2008), and Esper et al. (2003) stating that physical delivery is a very important factor and that logistics capability is positively associated with firm performance. The dimensions of empathy and responsiveness were not identified and neither were the logistics service quality attributes of personnel contact quality and order condition. Thus, the five key LSP customers in Thailand expect LSPs to provide a battery of logistics service quality features that include these variables.

In the line with company size, the large companies exceeded perceptions and rated the importance levels of 'Time and Services', 'Order Service Quality', and 'Order Procedures' higher than the SMEs. 'Time and Services' is the most important of the LSQ competencies. Moreover, these LSQ competencies highly affect the order cycle time and delivery cycle time from the perceptions of SMEs and large companies. This is supported by Schramm-Klein and Morschett (2006), who stated there are two main dimensions in logistics performance, which are 'logistics quality' and 'logistics costs'. Logistics quality relates to the customer's need, the extent to which the right products can be delivered to the right destinations at the right time

and in the right quantities (Mollenkopf et al., 2000; Novack et al., 1995; Wisner, 2003), while the relevant logistics costs are transport and inventory costs.

Generally, these three dimensions of service quality, tangible, reliability, and assurance, are at a similar importance level with LSQ competencies, but it is found that MNCs or companies running their business in the Western style perceive the importance of reliability dimension seriously, more than those using the Eastern philosophy business style. It can be said that LSPs (or the Western philosophy business style) are more effective and efficient in their processes in terms of reliability than the Thai-owned LSP companies (or the Eastern philosophy business style). It is supported by Brecka (1994), Najmi and Kehoe (2000), and Terziovski et al. (2003), who discussed that many organisations that follow ISO 9000 certification willingly and positively across objectives are more likely to report improved organisational performance. In conclusion, 15 key LSQ competencies from three service quality dimensions have the similar importance level and directly affect the company performance.

RQ2: What are the LSP's GSQ competencies?

Thirteen key GSQ competencies were identified across all three phases of this thesis. Empirically, the most important of the GSQ competencies from all three phases are: 1) environmental regulations; 2) accident rate reduction; 3) operational efficiency; and 4) LSP stakeholders' green awareness. 'Green Safety, Regulations and Collaboration', as the only construct from the GSQ competencies, is a significant construct for RQ2, with four of the top ten most important GSQ variables.

Considering the classification of the 13 variables, these were organised into one construct as 'Green Safety, Regulations and Collaboration' (GSRC), which comprised four main issues affecting the GSRC construct: firm's collaboration; sustainability; green regulation and standardisation; and vehicle technology and logistics design. The four main green issues are supported by Aronsson and Hüge-Brodin (2006), Awasthi et al. (2010), Bjorklund (2005), Elkington (1998), Gil-Saura et al. (2010), Grant et al. (2013), Martinsen and Bjorklund (2012), Martinsen and Hüge-Brodin (2014), McKinnon et al. (2010), and Shaw et al. (2010). Large LSP and LSP customer companies seem broadly to indicate the GSQ competencies covering all four parts: collaboration; sustainability; green regulation and standardisation; and vehicle technology and logistics design. Interestingly, LSPs focus on the environmental issues due to companies' collaborations with their customers. One of benefits which LSPs can perceive from environmental collaboration is cost reduction due to sharing information and resources, including learning their customers' best practices. This is supported by Sandberg (2007) and

Spekman et al. (1998), who stated that the most important reasons to engage the collaboration within the supply chain come from issues related to cost reduction as well as service.

On the other hand, MNC companies, representing the developed countries or companies run in the Western business style, pay more attention to sustainability, in particular health and safety, compared with the local companies, representing the developing countries or companies run in the Eastern business style. Elkington (1998) explained that the triple bottom line comprised of three major points: economic, environmental, and social bottom lines. It can be seen that health and safety is under the social perspective. Most companies in the developing countries are concerned with the quality of products and services, and so they have registered for many ISO certificates such as the ISO 9000 or ISO 14000 series. These certificates have their own protocol and processes including formal measurement and report. Sambasivan and Ng (2008) mentioned some perceived benefits from implementing ISO 14001, which can be illustrated with four main factors in line with Tan (2005), such as: company reputation and image improvement; increases in staff morale and motivation; performance and opportunity; and customer loyalty and trust. Bouzaabia et al. (2013) stated that the expectation of customer service quality from the service providers may be affected by cultural dimensions. That means MNC companies who represent the Western culture pay more attention to sustainability than the local companies who represent the Eastern culture. It is supported by the ethics of the Eastern cultures where rights and duty are equally important, whereas the Western cultures are rights-based (Koehn, 1999; Naor et al., 2010; Ralston et al., 1997). There are several studies suggesting the importance of cultural values in explaining the differences in an organisation's overall performance (Shane, 1993; Tse et al., 1988).

RQ3: How important are GSQ competencies relative to TLPIs through LSQ competencies?

Both the findings from CFA and SEM in Phase Two and the findings from the percentage of the importance of GSQ relate to LSQ in Phase Three show the same result: that the effect of the GSQ-LSQ relationship was quite strong. The GSQ-LSQ relationship was about 0.75 in Phase Two while approximately 47 percent and 27 percent of the perceptions of the respondents in Phase Three were rated as 'somewhat important' and 'very important' respectively.

Moreover, analysing the differences between the perceptions of LSPs and LSP customers of the importance of GSQ-LSQ relationship, both LSPs and LSP customers perceive the importance of these two main competencies. LSP customers, more than LSPs, perceive GSQ as important to LSP performance. However, both similarly perceive the importance of LSQ to LSP performance. Nevertheless, there is no significant difference between the means of LSP

and LSP groups. Considering the question deeply in terms of types of industries for each group, there are some interesting points.

Nevertheless, classifying only the LSP group by logistics activities, all types of LSP group perceived the importance of GSQ related to LSQ because the percentages of the 'important' and 'very important' levels were more than 50 percent. Others related to transport perceived the importance of GSQ-LSQ at the highest score, followed by packaging, logistics, and transport with the same score as warehouse with 80 percent, 75 percent, 65 percent, and 54 percent respectively. In addition, classifying only the LSP customers group by industrial sector, the percentages of the 'important' and 'very important' levels were at a similar level in every industrial sector. Electronics and parts perceived the importance of GSQ-LSQ at the highest score, followed by food, plastics, automotives and parts, and textiles with about 74 percent, 71 percent, 70 percent, 68 percent, and 50 percent respectively. Thus, it can be concluded that either analysing the effect of GSQ-LSQ relationship or the difference and similarity of LSPs and LSP customers, the results from both sides confirm the strong importance of the GSQ-LSQ relationship.

A core contribution of this thesis is to draw together the key empirical findings from the research and propose a set of GLSQ variables and reporting tools which can be used by LSPs to understand the LSP's GLSQ competencies in Thailand, and use these competencies to reduce a service quality gap or increase their quality level for competing with rivals. These proposed LSP GLSQ competencies in Thailand could mainly benefit logistics providers who deliver goods or products to customers of LSP customers. One 'Green Safety, Regulations and Collaboration' (GSRC) construct can indirectly affect the logistics performance index (TLPIs) through logistics service quality (LSQ).

11.3. Contributions of the Research

The contribution to the body of knowledge is achieved by exploring an area of the effects of green logistics service quality on the LSP's performance that was previously under-researched. Though there are many research studies on these three topics from the last two decades, studies conducted by linking these green service quality, logistic service quality, and logistics performance topics together are quite rare. It was found that only two of these keyword researches have been done. There is a wide range of literature concerning green policies or sustainability in the logistics industry, particularly in Europe and the United States, but there are few studies focusing in Asia (Björklund and Forslund, 2013; Ferguson, 2011; Isaksson and Hüge-Brodin, 2013; Lieb, and Lieb, 2010; Martinsen and Björklund, 2012; Martinsen and Hüge-Brodin, 2014; Shaw et al., 2010; Tacke et al., 2014; Wolf and Seuring,

2010). However, there has been less investigation into green service quality in the logistics industry, particularly the views from both service providers and their customers (Thai, 2013). Literature and research on green logistics service quality in connection with LSP performance is rare.

This research starts with four key empirical studies (Grant, 2003; Martinsen and Björklund, 2012; Martinsen and Hüge-Brodin, 2014; Rafiq and Jaafar, 2007) and the definitions of logistics service quality (LSQ) and green logistics service quality in order to review the literature and identify the relevant items. Semi-structured interviews were conducted with eight participants in the top management level of both LSP and LSP customer companies to understand and confirm the green service quality items which are used in the next phase for the main study.

Thirteen GSQ competencies and 15 LSQ competencies are confirmed. These 13 GSRC competencies indirectly affect LPI through the LSQ competencies, which represent the tangible and reliability dimensions of the service quality (Parasuraman et al., 1988). The size and the ownership structure (or the Western and Eastern business philosophies) of the company also affect the importance level of GLSQ competencies for the LSP's performance. The local companies running their business in the ways of Eastern business philosophy represent the developing countries and MNCs running their business in the ways of Western business philosophy represent the developed countries. Different business philosophies can affect to the importance level of the four GLSQ competencies 'CO₂ emission from awareness of LSP stakeholders', 'CO₂ emission by behavioural aspects', 'accident rate reduction', and 'order quality - substitute items'. MNC companies pay more attention to sustainability, in particular health and safety, than the local companies do. That means cultures influence the health and safety aspect, as supported by Shane (1993) and Tse et al. (1988) which addressed the importance of cultural values in explaining the differences in an organisation's overall performance. On the other hand, the company size can affect the importance level of 12 GLSQ competencies that comprise seven GSQ competencies and five LSQ competencies. In conclusion, there are 28 green logistics service quality competencies that affect the logistics performance index from both the perspectives of LSPs and LSP customers.

11.4. Managerial Implications

The academic and practitioner literature is replete with discussions about added-value benefits for service providers from serving with superior customer service. Customers who are satisfied when their needs are met develop loyalty to their service providers that translates into additional revenue and profit. However, the cost of providing extra customer service features,

in particular green issues, not desired by customers can outweigh the benefits received by providers. The findings of this thesis confirm service providers should first determine which green service competencies and logistics service competency features their customers require, and then provide only these service competency features. This process should enhance an LSP's ability to satisfactorily manage cost trade-off with service quality. The managerial contributions from business' perspective will be discussed in the next section and then following that, the implications for policy makers will be discussed.

11.4.1. Business' Perspective

1. Considering the green issue effects, some MNC customers may have the green target derived through the supply chain. To achieve the proposed green targets, they probably focus on the early priority of green issues and the findings of the research show that there is only one main construct, 'Green Safety, Regulations and Collaboration' (GSRC), indirectly affecting TLPs through the time and services construct. This finding is supported by the perceptions of MNCs and totally Thai-owned logistics companies. The main reasons for enhancing or starting the green project within the companies came from the ideas to increase efficiency and reduce costs.

2. Considering the logistics service effects, the findings of this research present that 'Time and Services' (TS) has the greatest effect on LSP's LPI, followed by 'Order Service Quality' (OSQ) and 'Order Procedures' (OP) respectively. As discussed in Chapter Ten, the TS construct combines three logistics service quality attributes: timeliness, information quality, and order discrepancy handling. However, most of the LSQ competencies in TS came from the timeliness attribute. Thus, LSPs should focus on the timeliness attributes if they would prefer to increase their logistics performance.

3. As discussed in Chapter Eight, there was a gap in the perceptions of LSPs and LSP customers of the order cycle time and delivery cycle time. LSP customers perceived the average order cycle time spent is longer than LSPs perceive it as well as the perceptions of LSPs and LSP customers on the average delivery cycle time. To reduce this gap, LSPs could focus on the logistics service quality or green logistics service quality. This could be targeted on GCW for the GSQ side or OSQ for the LSQ side, as discussed previously. Reduction of a service quality gap could not only increase LSP customer satisfaction but also increase their capabilities to achieve higher customer satisfaction.

4. LSP customers seem to pay attention to the order service quality more than LSPs do, or it can be said that LSP customers, the majority of which are MNC companies, consider the reliability dimension of service quality as the most important of the LSQ competencies. Thus, if LSPs, the majority of which are local companies, want to compete with rivals, in

particular LSP MCNs, local LSPs have to target the reliability dimension or order quality attribute as the first priority of LSQ competencies.

11.4.2. Policy Makers' Perspective

There are 27 TLPIs developed by the Bureau of Logistics at the Thailand Ministry of Industry from the survey database of the 200 best-in-class companies within five industries: food, textiles, electronics and parts, automotives and parts, and plastics. Nine TLPIs relating to the research were selected in three dimensions: cost, time, and reliability. The findings of this research could be analysed by two types of classification. The first type of classification was by groups of respondents between LSPs and LSP customers and the findings from this classification could bring managerial implications for the business's perspective, as discussed in the previous section. Another type of classification was by industrial sectors and the findings from this classification could bring managerial implications for the policy makers' perspective.

According to the comparison, the TLPIs benchmarking score and the survey TLPI scores perceived by the five LSP customers industries, there were differences between the benchmarking score as the standard and the survey score, in particular the transport cost per sales ratio in the electronics and parts industry and the order cycle time in the plastics industry. Even though the definition of each LPI from the research might be not the same as the TLPIs from the Bureau of Logistics, which were the standard TLPIs, the definitions of the survey TLPIs seem a sub-set of the definitions of the standard TLPIs.

From the findings of the research, there was an issue with the difference of transport cost per sales ratio between the survey LPI score and the standard LPI. The standard transport cost per sales ratio was about 1 percent, but the survey transport cost per sales ratio was about 3.1 to 5 percent. That means electronics respondent companies in this research seemed to face a problem with this performance index. In addition, the survey average order cycle time from this research was higher than the standard average order cycle time in the plastics industry. Thus, the findings of this research could provide guidance to the Bureau of Logistics at the Thailand Ministry of Industry to help understand the interaction of green service quality, logistics service quality, and the Thai logistics service providers' performance.

This research study recommends that the Bureau of Logistics at the Thailand Ministry of Industry targets any gaps that occur between the survey TLPIs and the standard TLPIs, which are the transportation cost per sales ratio gap in electronics and parts, and the average order cycle time gap in the plastics industry, as the first priority. Later, the decision making on these policies and strategies on logistics may help other industries to achieve a reduction in logistics cost per GDP ratio overall. As discussed, there are two options for Thai LSPs to take when

their customers ask them to provide green services: 1) asking for the extra cost from customers; and 2) customer-driven reaction. It was found that there were some SMEs, the majority of which is Thai local companies, that registered the ISO 14001. The environmental issue tends to be one of the non-trade barriers for global market competition. Thus, increasing the awareness of environmental issues in local LSPs plays an important role in local companies gaining the competitive advantage and avoiding this non-trade barrier. However, there is another option which is building the green service quality in Thailand as compulsory by law. This research therefore recommends that the Thailand Ministry of Industry build a Thai ISO 14001 “Lite” to help local, and small and medium LSP companies to compete in the ASEAN logistics market.

11.5. Thesis Limitations and Suggestions for Further Research

As discussed above, this study should be replicated in other industrial sectors and ASEAN countries to determine the generalisability of the findings and the model. The findings are directly applicable to logistics service providers and the five main industrial sectors in Thailand as their customers; however, there are wider implications based on any generalisability of the study to other industrial and national contexts.

There are several limitations to this thesis which leave scope for future research. The most notable limitations are documented below:

Limitations

1. The literature on GSQ and LSQ are continuously published and added to. Thus, there could be journals published in this field since the research was completed and the thesis written up.

2. In the qualitative sampling, a judgmental sampling and snowball sampling approach were used in Phases One and Three. With the limitation of only the researcher’s experiences and some advice from practitioners, there may be bias at the beginning of the snowball approach. It could be argued that this judgmental sampling approach should come from the name of the first person who was suggested by at least three professionals in logistics.

3. The numbers of case interviews in Phase One is small with only eight interviewees and most of them, either from LSPs or LSP customers, are from totally Thai-owned companies. Only a few interviewees represented MNCs companies. This might be a limitation

of the research not to cover the view of MNCs, though most of them were in the top management level. To leverage the views from both MNCs and totally Thai-owned companies' perspectives, the findings of the research might present different views.

4. Although the research was derived from logistics studies across many contexts and the findings considered valid and reliable for the five industrial sectors, their external validity or generalisability cannot be determined. Future research should replicate this study across other industrial sectors and ASEAN countries, as discussed above, to confirm the external validity and reliability of the scales and constructs. This cross-validation would also provide the validity of the nomological net that is the last step in the three-phase methodology for the items and constructs developed by the Churchill (1979), Churchill and Iacobucci (2010), Dunn et al. (1994), and Malhotra et al. (2012) framework.

5. The thesis LSP sample was heavily represented by small to medium-sized companies while the LSP customer sample was largely represented by medium to large-sized companies. The difference between the size of the LSP and LSP customer samples could mean that the results and findings were biased towards the views and company's strategies of companies from these two groups.

6. The Likert-scale type survey can also be considered as a limitation of this research. The findings of the research will relate to the questions only. The survey methodology is used to gain data related to items of a latent construct. The options for Likert-type questions are captured from managers' responses. Therefore, any additional information that relates to another phenomenon under investigation cannot be highlighted.

7. TLPIs measured by the Likert-scale type survey were an assumed measurement scale. Thus, these TLPIs might not be the same as the actual scale. The findings of the research related to TLPIs might be assumed in that they were from the perceptions of LSP and LSP customer respondents but they were not the actual TLPIs of the respondents' companies.

8. With the scope of this research focused on inland freight transport activities, some GSQ and LSQ variables were not important, either directly or indirectly, to TLPIs but they might be important when the context of the research's scope was enhanced more widely to other transport or logistics activities. This could include the TLPIs, which were measured widely in the dimensions of cost, time, and reliability.

9. The findings of this research show that there is an effect of GLSQ competencies on TLPIs. With the definitions of TLPIs representing the performance index in the dimensions of cost, time, and reliability, there is an opportunity to develop the framework of the GLSQ competencies on the LPIs developed by the World Bank. With the same measurement levels for LPIs by the World Bank, a framework of GLSQ competencies for LPIs would represent the macro views of the countries' LPIs in the context of green service quality.

Bibliography

- Aastrup, J. and Halldorsson, A. (2008) Epistemological role of case studies in logistics: A critical realist perspective. *International Journal of Physical Distribution and Logistics Management*, 38(10), 746-763.
- Agatz, N., Fleischmann, M. and Van Nunen, J. A. (2008) E-fulfillment and multi-channel distribution: A review. *European Journal of Operational Research*, 187, 339-356.
- Ageron, B., Gunasekaran, A. and Spalanzani, A. (2012) Sustainable supply management: An empirical study. *International Journal of Production Economics*, 140(2012), 168-182.
- Aktas, E. and Ulengin, F. (2005) Outsourcing logistics activities in Turkey. *Journal of Enterprise Information Management*, 18(3), 316-329.
- Alden, D. L., Steenkamp, J.-B. E. M. and Batra, R. (1999) Brand positioning through advertising in Asia, North America, and Europe: The role of global consumer culture. *Journal of Marketing*, 63(1), 75-87.
- Aldridge, A. and Levine, K. (2001) *Surveying the social world: Principles and practice in survey research*. Buckingham: Open University Press.
- Amaratunga, D., Baldry, D., Sarshar, M. and Newton, R. (2002) Quantitative and qualitative research in the built environment: Application of "mixed" research approach. *Work Study*, 51(1), 17-31.
- Anderson, E. J., Coltman, T., Devinney, T. M. and Keating, B. (2011) What drives the choice of a third-party logistics provider? *Journal of Supply Chain Management: a global review of purchasing and supply*, 47(2), 97-115.
- Anderson, J. C. and Gerbing, D. W. (1988) Structural equation modelling in practice: A review and recommended two-step approach. *Psychologica Bulletin*, 103(3), 411-423.
- Andreassen, T. W., Lervik-Olsen, L. and Calabretta, G. (2015) Trend spotting and service innovation. *Journal of Service Theory and Practice*, 25(1), 10-30.
- Ann, G. E., Zailani, S. and Wahid, N. A. (2006) A study on the impact of environmental management system (EMS) certification towards firms' performance in Malaysia. *International Journal of Management of Environmental Quality*, 17(1), 73-93.
- Anuroj, B. (2014) Global value chains: Opportunities and challenges: Thailand's experiences, *the Regional Conference on Trade in Value-Added, Global Value Chains and Development Strategy*. Singapore 6-8 May 2014. Asian Development Bank Institute.

- Armstrong, S. and Overton, T. (1977) Estimating nonresponse bias in mail surveys. *Journal of Marketing Research*, 14(3), 396-402.
- Aronsson, H. and Huge-Brodin, M. (2006) The environmental impact of changing logistics structures. *International Journal of Logistics Management*, 17(3), 394-415.
- Asian Development Bank (2011) *Climate change vulnerability, adaptation and mitigation in the Greater Mekong Subregion*. Bangkok.
- Asian Development Bank (2014), *The workshop on Green Freight and Logistics in Asia: Delivering the Goods, Protecting the Environment*.
- Asian Development Bank (2014) *Asian Development Outlook 2014: Update Asian in Global Value Chains*. Philippines.
- Asian Development Bank (2014) *Greater Mekong Subregion Economic Cooperation Program: Overview*. Philippines.
- Asian Development Bank (2014) *Key Indicators for Asia and the Pacific 2014*. Philippines.
- Awasthi, A., Chauhan, S. S. and Goyal, S. K. (2010) A fuzzy multi-criteria approach for evaluating environmental performance of suppliers. *International Journal of Production Economics*, 126, 370-378.
- Ayyagari, M., Beck, T. and Demircug-Kunt, A. (2007) Small and medium enterprises across the globe. *Small Business Economics*, 29, 415-434.
- Babakri, K. A., Bennett, R. A., Rao, S. and Franchetti, W. (2004) Recycling performance of firms before and after adoption of the ISO 14001 standard. *Journal of Cleaner Production*, 12, 633-637.
- Bagheri, S. and Oppenheim, D. V. (2011) Optimizing cross enterprise collaboration using a coordination hub, *2011 Annual SRII Global Conference*.
- Banister, D., Crist, P. and Perkins, S. (2015) *Land Transport and How to Unlock Investment in Support of "Green Growth"*. Paris: OECD Publishing.
- Bank of Thailand (2015) *Thai Economy 2014* Bangkok
- Banomyong, R. (2010) *Supply Chain Dynamics in Asia*. Tokyo.
- Banomyong, R. (2012) Critical logistics and supply chain management issues in Asia. *International Journal of Physical Distribution and Logistics Management*, 42(7).
- Banomyong, R. (2012) The Future of logistics and transport in ASEAN in 2025, *World Bank seminar on "Improving ASEAN trade logistics and corridors to build the ASEAN Economic Community"*. Phnom Penh 13-14 December 2012. World Bank.
- Banomyong, R. and Supatn, N. (2011) Developing a supply chain performance tool for SMEs in Thailand. *International Journal of Supply Chain Management*, 16(1), 20-31.

- Banomyong, R. and Supatn, N. (2011) Selecting logistics providers in Thailand: a shippers' perspective. *European Journal of Marketing*, 45(3), 419-437.
- Beadle, I. and Searstone, K. (1995) An investigation into the use of benchmarking within quality programmes, *Total Quality Management: Proceedings of the First World Congress*. London: Chapman and Hall.
- Beamon, B. (1999) Designing the green supply chain. *Logistics Information Management*, 12, 332-342.
- Behling, O. and Law, K. (2000) *Translating Questionnaires and Other Research Instruments: Problems and Solutions*. California: SAGE Publications, Inc.
- Berglund, M., van Laarhoven, P., Sharman, G. and Wandel, S. (1999) Third-party logistics: is there a future? *International Journal of Logistics Management*, 10(1), 59-69.
- Berry, Zeithaml and Parasuraman (1990) Five imperatives for improving service quality. *Sloan Management Review*, Summer 1990, 29-38.
- Bharati, P. and Berg, D. (2003) Managing information systems for service quality: a study from the other side. *Information Technology and People*, 16(2), 183-202.
- Bhatnagar, R., Sohal, A. and Millen, R. (1999) Third party logistics services: A Singapore perspective. *International Journal of Physical Distribution and Logistics Management*, 29(9), 569-587.
- Bhatnagar, R. and Teo, C.-C. (2009) Role of logistics in enhancing competitive advantage: A value chain framework for global supply chains. *International Journal of Physical Distribution and Logistics Management*, 39(3), 202-226.
- Bhatti, R. S., Kumar, P. and Kumar, D. (2010) Analytical modeling of third party service provider selection in lead logistics provider environments. *Journal of Modelling in Management*, 5(3), 275-286.
- Bienstock, C., Mentzer, J. and Bird, M. (1997) Measuring physical distribution service quality. *Journal of Academy of Marketing Science*, 25(1), 31-44.
- Bienstock, C. C. and Royne, M. B. (2010) Technology acceptance and satisfaction with logistics services. *International Journal of Logistics Management*, 21(2), 271 - 292.
- Bienstocka, C. C., Royneb, M. B., Sherrellb, D. and Staffordc, T. F. (2008) An expanded model of logistics service quality: Incorporating logistics information technology. *International Journal of Production Economics*, 113(1), 205-222.
- Bitner, M. (1990) Evaluating service encounters: The effects of physical surroundings and employee responses. *Journal of Marketing*, 54(2), 69-82.
- Bitner, M. J., Booms, B. H. and Mohr, L. A. (1994) Critical service encounters: The employee's view. *Journal of Marketing*, 58(October), 95-106.

- Björklund, M. (2005) *Purchasing Practices of Environmentally Preferable Transport Services: Guidance to Increased Shipper Considerations*. Doctoral thesis Lund University.
- Björklund, M. and Forslund, H. (2013) The inclusion of environmental performance in transport contracts. *International Journal of Management of Environmental Quality*, 24(2), 214-227.
- Björklund, M. and Forslund, H. (2013) The purpose and focus of environmental performance measurement systems in logistics. *International Journal of Productivity and Performance Management*, 62(3), 230-249.
- Björklund, M., Martinsen, U. and Abrahamsson, M. (2012) Performance measurements in the greening of supply chains. *International Journal of Supply Chain Management*, 17(1), 29-39.
- Blombäck, A. and Wigren, C. (2009) Challenging the importance of size as determinant for CSR activities. *International Journal of Management of Environmental Quality*, 20(3), 255-270.
- Bollen, K. A. and Hoyle, R. H. (2012) *Handbook of Structural Equation Modeling*. Translated from English by Guilford Press.
- Bolumole, Y. (2001) The supply chain role of third-party logistics providers. *International Journal of Logistics Management*, 12(2), 87-102.
- Bonner, J. M. and Calantone, R. J. (2005) Buyer attentiveness in buyer–supplier relationships *Industrial Marketing Management*, 34, 53–61.
- Bottani, E. and Rizzi, A. (2006) A fuzzy TOPSIS methodology to support outsourcing of logistics services. *International Journal of Supply Chain Management*, 11(4), 294-308.
- Bourlakis, M. and Melewar, T. C. (2011) Marketing perspectives of logistics service providers. *European Journal of Marketing*, 45(3), 300-310.
- Bouzaabia, O., van Riel, A. C. R. and Semeijn, J. (2013) Managing in-store logistics: A fresh perspective on retail service. *Journal of Service Management*, 24(2), 112 - 129.
- Bouzaabia, R., Bouzaabia, O. and Capatina, A. (2013) Retail logistics service quality: A cross-cultural survey on customer perceptions. *International Journal of Retail and Distribution Management*, 41(8), 627-647.
- Bovel, D. and Martha, J. (1995) From supply chain to value net. *Journal of Business Strategy*, 21(4), 24–28.
- Bowen, N. K. and Guo, S. (2011) Evaluating and Improving CFA and General Structural Models, *Structural Equation Modelling* Oxford University Press.
- Bowen, N. K. and Guo, S. (2011) Structural Equation Modelling, *Pocket Guides to Social Work Research Methods* Oxford University Press, 240.
- Boyer, K. K., Prud'homme, A. M. and Chung, W. (2009) The last mile challenge: Evaluating the effects of customer density and delivery window patterns. *Journal of Business Logistics*,

30(1), 185-201.

Brace, I. (2009) *Questionnaire Design: How to Plan, Structure and Write Survey Material for Effective Market Research*, 2nd edition. London: Kogan Page.

Brady, M. and Croning, J. (2001) Some new thoughts on conceptualizing perceived service quality: A hierarchical approach. *Journal of Marketing*, 65(1), 34-49.

Brecka, J. (1994) Study finds gains with ISO 9000 registration increase over time. *Quality Progress*, May, 18-20.

British Quality Foundation (2015) *Benchmarking*, 2015. Available online:

<https://www.bqf.org.uk/sustainable-excellence/benchmarking> [Accessed: 12 August 2015].

Brown, J. R. and Guiffrida, A. L. (2014) Carbon emissions comparison of last mile delivery versus customer pickup. *International Journal of Logistics: Research and Applications*, 17(6), 503-521.

Brown, T., Churchill, G. and Peter, J. (1993) Research Note: Improving the measurement of service quality. *Journal of Retailing*, 69(1), 127-139.

Browne, M., Allen, J., Nemoto, T., Patier, D. and Visser, J. (2012) Reducing social and environmental impacts of urban freight transport: A review of some major cities 7th *International Conference on City Logistics*. *Procedia - Social and Behavioral Sciences*, 19-33.

Browne, M., Rizetb, C. and Allen, J. (2014) A comparative assessment of the light goods vehicle fleet and the scope to reduce its CO₂ emissions in the UK and France. *Procedia - Social and Behavioral Sciences*, 125, 334-344.

Bryman, A. (2006) Integrating quantitative and qualitative research: how is it done? *Journal of Qualitative Research*, 6(1), 97-113.

Bryman, A. and Bell, E. (2011) *Business research methods*, 3rd edition. Oxford: Oxford University Press.

Byju, K. and Srinivasulu, Y. (2014) Service quality measurement and its relation with overall customer satisfaction in health care. *International Journal of Business and Administration Research Review*, 1(3 (Jan-March 2014)), 176-183.

Cambridge Dictionaries Online (2015).

Caniato, F., Caridi, M. and Moretto, A. (2013) Dynamic capabilities for fashion-luxury supply chain innovation. *International Journal of Retail and Distribution Management*, 41(11/12), 940-960.

Carrillat, F., Jaramillo, F. and Mulki, J. (2007) The validity of the SERVQUAL and SERVPERF scales. *International Journal of Service Industry Management*, 18(5), 472-490.

- Carter, C. and Rogers, D. (2008) A framework of sustainable supply chain management: moving toward new theory. *International Journal of Physical Distribution and Logistics Management*, 38(5), 360-387.
- Carter, C. R. and Dresner, M. (2001) Environmental purchasing and supply chain management: cross-functional development of grounded theory. *Journal of Supply Chain Management*, 37(3), 12-27.
- Çerri, S. (2012) The impact of the quality of logistics activities on customer commitment, loyalty and firm's performance. *Journal of Advanced Research in Management*, 3(2 (6) Winter 2012), 79-89.
- Chaisurayakarn, S., Grant, D. and Talas, R. (2013) Investigating green logistics service quality competencies in Thailand, *18th Logistics Research Network (LRN) Conference*. Birmingham: Aston University, 5-6 September 2013.
- Chaisurayakarn, S., Grant, D. and Talas, R. (2014) Green logistics service quality and logistics service provider performance, *6th International Conference on Logistics and Transport 2014*. Kuala Lumpur, Malaysia, 26-29 August 2014.
- Chaisurayakarn, S., Grant, D. and Talas, R. (2014) The impact of green logistics service quality on logistics service provider performance, *19th Logistics Research Network (LRN) Conference*. Huddersfield: University of Huddersfield, 3-5 September 2014.
- Chakraborty, A. and Mandal, P. (2014) Understanding challenges of supply chain sustainability in Asia. *International Journal of Process Management and Benchmarking*, 4(1), 51-68.
- Chang, T. and Chen, S. (1998) Market orientation, service quality and business profitability: a conceptual model and empirical evidence. *Journal of Services Marketing*, 12(4), 246-264.
- Chen, K.-K., Chang, C.-T. and Lai, C.-S. (2009) Service quality gaps of business customers in the shipping industry. *Transportation Research Part E* 45 (2009), 222-237.
- Cho, J. J. K., Ozment, J. and Sink, H. (2008) Logistics capability, logistics outsourcing and firm performance in an e-commerce market. *International Journal of Physical Distribution and Logistics Management*, 38(5), 336-359.
- Chopra, S. (2003) Designing the distribution network in a supply chain. *Transportation Research Part E*, 39, 123-140.
- Choy, K. L., Gunasekaran, A., Lam, H. Y., Chow, K. H., Tsim, Y. C., Ng, T. W., Tse, Y. K. and Lu, X. A. (2014) Impact of information technology on the performance of logistics industry: the case of Hong Kong and Pearl Delta region. *Journal of the Operational Research Society* 65, 904-916.
- Chunyu, R., Shiwei, L. and Huayang, W. (2009) Research on evaluation of service quality about distribution centre for electronic commerce, *Service Systems and Service*

- Management, 2009. ICSSSM '09. 6th International Conference on. 8-10 June 2009.*
- Churchill, G. (1979) A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, 15(February), 64-73.
- Churchill, G. and Iacobucci, D. (2010) *Marketing Research: Methodological Foundations*. Ohio: South Western Educational Publishing.
- Churchill, G. A. and Surprenant, C. (1981) An investigation into the determinants of customer satisfaction. *Journal of Marketing Research*, 19 (1981), 491-504.
- Clottey, T. A. and Grawe, S. J. (2014) Non-response bias assessment in logistics survey research: Use fewer tests? *International Journal of Physical Distribution and Logistics Management*, 44(5), 412-426.
- Codling, S. (1995) *Best Practice Benchmarking: A Management Guide*. Aldershot: Gower Publishing Limited.
- Colicchia, C., Marchet, G., Melacini, M. and Perotti, S. (2013) Building environmental sustainability: Empirical evidence from Logistics Service Providers. *Journal of Cleaner Production*, 59, 197-209.
- Collins, K. M. T., Onwuegbuzie, A. J. and Jiao, Q. G. (2007) A mixed methods investigation of mixed methods sampling designs in social and health science research. *Journal of Mixed Methods Research*, 1(3), 267-294.
- Collis, J. and Hussey, R. (2003) *Business Research: A Practical Guide for Undergraduate and Postgraduate Students*, 2nd Edn edition. Houndmills Palgrave: Macmillan.
- Constantinides, E. (2006) The marketing mix revisited: Towards the 21st century marketing. *Journal of Marketing Management*, 22(3-4), 407-438.
- Cooper, D. and Schindler, P. (2003) *Business Research Methods*, 8th edition. New York: McGraw-Hill.
- Council of Supply Chain Management Professionals (CSCMP) (2013) *Glossary of Terms*, 2013. Available online: <http://www.cscmp.org/resources-research/glossary-terms/> [Accessed: 5 January 2015].
- Creswell, J., Lynn, V. and Clark, P. (2011) *Designing and Conducting Mixed Methods Research*, 2nd edition. California: SAGE Publications Inc.
- Creswell, J. W. (2014) *Research design: Qualitative, quantitative, and mixed method approaches* 2nd edition. California: SAGE Publications Inc.
- Cronbach, L. J., Rajaratnman, N. and Gleser, G. C. (1963) Theory of generalizability: A liberalization of reliability theory. *British Journal of Statistical Psychology*, 16, 137-163.
- Cronbach, L. J. and Meehl, P. E. (1955) Construct validity in psychological tests. *Psychol*

- Bulletin*, 52(4), 281-302.
- Cronin, J. (2003) Looking back to see forward in services marketing: some ideas to consider. *International Journal of Managing Service Quality*, 13(5), 332-337.
- Cronin, J. and Taylor, S. (1992) Measuring service quality: A re-examination and extension. *Journal of Marketing*, 56, 55-68.
- Cronin, J. and Taylor, S. (1994) SERVPERF versus SERVQUAL: Reconciling performance based and perceptions minus expectations measurement of service quality. *Journal of Marketing*, 58(1), 125-131.
- Cui, L. and Hertz, S. (2011) Networks and capabilities as characteristics of logistics firms. *Industrial Marketing Management*, 40, 1004-1011.
- Cuthbertson, R. and Piotrowicz, W. (2008) Supply chain best practices – identification and categorisation of measures and benefits. *International Journal of Productivity and Performance Management*, 57(5), 389-404.
- Daugherty, P., Chen, H., Mattioda, D. and Grawe, S. (2009) Marketing/logistics relationships: Influence on capabilities and performance. *Journal of Business Logistics*, 30(1), 1-18.
- Daugherty, P., Stank, T. and Ellinger, A. (1998) Leveraging logistics/distribution capabilities: The effect of logistics service on market share. *Journal of Business Logistics*, 19(2), 35-51.
- Defra (2006) *Environmental Key Performance Indicators*. London.
- Department of Industrial Works (2015) *Industrail Statistics 2015*. Available online: <http://www.diw.go.th/hawk/content.php?mode=spss58> [Accessed: 5 March 2015].
- Douglas, S. P. and Craig, C. S. (2007) Collaborative and iterative translation: An alternative approach to back translation. *Journal of International Marketing*, 15(1), 30-43.
- Duff, X. G. A. and Hair, M. (2008) Service quality measurement in the Chinese corporate banking market *International Journal of Bank Marketing*, 26(5), 305-327.
- Dunn, S. C., Seaker, R. F. and Waller, M. A. (1994) Latent variables in business logistocs research: Scale development and validation. *Journal of Business Logistics*, 15(2), 145-172.
- Easterby-Smith, M., Thorpe, R. and Lowe, A. (1991) *Management Research: An Introduction*, 2nd edition. London Sage Publications.
- Edwards, J. B., McKinnon, A. C. and Cullinane, S. L. (2010) Comparative analysis of the carbon footprints of conventional and online retailing. *International Journal of Physical Distribution and Logistics Management Research Review*, 40(1/2), 103-123.
- Elkington, J. (1998) Accounting for the triple bottom line. *Measuring Business Excellence*, 2 (3), 18-22.
- Elkington, J. (2004) Enter the triple bottom line, in Henriques, A. and Richardson, J. (eds), *The*

- Triple Bottom Line: Does It All Add Up? Does It All Add Up? - Assessing the Sustainability of Business and CSR*. London: Earthscan, 1-16.
- Ellram, L. (1996) The use of case study method in logistics research. *Journal of Business Logistics*, 17(2), 93-138.
- Emerson, C. and Grimm, C. (1996) Logistics and marketing components of customer service: An empirical test of the Mentzer, Gomes and Krapfel model. *International Journal of Physical Distribution and Logistics Management*, 26(8), 29-42.
- Enarsson, L. (1998) Evaluation of suppliers: how to consider the environment. *International Journal of Physical Distribution and Logistics Management*, 28(1), 5-17.
- Eng-Larsson, F. and Norrman, A. (2014) Modal shift for greener logistics - exploring the role of the contract. *International Journal of Physical Distribution and Logistics Management*, 44(10), 721-743.
- Ernst, R., Kamrad, B. and Ord, K. (2007) Delivery performance in vendor selection decisions. *European Journal of Operational Research* 176, 534-541.
- Esper, T. L., Jensen, T. D., Turnipseed, F. L. and Burton, S. (2003) The last mile: An examination of effects of online retail delivery strategies on consumers. *Journal of Business Logistics*, 24(2), 177-203.
- European Commission (2013) *EU Transport in figure: Statistical pocket book 2013*. Luxembourg: European Commission.
- European Commission (2015) *The definition of micro, small and medium-sized enterprises*, 2015. Available online: http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm [Accessed: 7 August 2015].
- Fan, X. and Sivo, S. A. (2007) Sensitivity of fit indices to model misspecification and model types. *Multivariate Behavioral Research*, 42(3), 509-529.
- Fawcett, S. E. and Cooper, M. B. (1998) Logistics performance measurement and customer success. *Industrial Marketing Management*, 27, 341-357.
- Ferguson, D. (2011) CSR in Asian logistics: Operationalisation within DHL (Thailand). *Journal of Management Development*, 30(10), 985-999.
- Flint, D. J. and Mentzer, J. T. (2000) Logisticians as marketers: Their role when customers' desired value changes. *Journal of Business Logistics*, 21(2), 19-46.
- Fong, S. W., Cheng, E. W. L. and Ho, D. C. K. (1998) Benchmarking: A general reading for management practitioners. *Management Decision*, 36(6), 407-418.
- Fornell, C. and Larcker, D. F. (1981) Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(February), 39-50.

- Forslund, H. and Jonsson, P. (2007) Dyadic integration of the performance management process: A delivery service case study. *International Journal of Physical Distribution and Logistics Management*, 37(7), 546-567.
- Forslund, H., Jonsson, P. and Mattsson, S.-A. (2008) Order-to-delivery process performance in delivery scheduling environments. *International Journal of Productivity and Performance Management*, 58(1), 41-53.
- Franke, R., Hofstede, G. and Bond, M. (1991) Cultural roots of economic performance: A research note. *Strategic Management Journal*, 12, 165-73.
- Gammelgaard, B. (2004) Schools in logistics research? *International Journal of Physical Distribution and Logistics Management*, 34(6), 479-491.
- Garengo, P., Biazzo, S. and Bititci, U. S. (2005) Performance measurement systems in SMEs: A review for a research agenda. *International Journal of Management Reviews*, 7(1), 25-47.
- Ghuri, P. and Gronhaug, K. (2002) *Research Methods in Business Studies: A Practical Guide*, 2nd Ed. edition. Essex: Pearson Education Limited.
- Gil Saura, I., Servera Francés, D., Berenguer Contrí, G. and Fuentes Blasco, M. (2008) Logistics service quality: A new way to loyalty. *Industrial Management and Data Systems*, 108(5), 650-668.
- Gilmore, A. (2010) *Service Marketing Management*. New delhi: Response books.
- Gilmour, P., Borg, G., Duffy, P. A., Johnston, N. D., Limbek, B. E. and Shaw, M. R. (1994) Customer service: Differentiating by market segment. *International Journal of Physical Distribution and Logistics Management*, 24(4), 18-23.
- Gil-Saura, I. and Ruiz-Molina, M.-E. (2009) Logistics service quality and technology investment in retailing *European Retail Research*, 23(1), 69-82.
- Gil-Saura, I. and Ruiz-Molina, M. E. (2011) Logistics service quality and buyer–customer relationships: the moderating role of technology in B2B and B2C contexts. *The Service Industries Journal*, 31(7), 1109-1123.
- Gil-Saura, I., Servera-Francés, D. and Fuentes-Blasco, M. (2010) Antecedents and consequences of logistics value: An empirical investigation in the Spanish market. *Industrial Marketing Management*, 39, 493-506.
- Gimenez, C., Sierra, V. and Rodon, J. (2012) Sustainable operations: Their impact on the triple bottom line. *International Journal of Production Economics* 140(2012), 149-159.
- Gokay, B. (2009) *The 2008 World Economic Crisis: Global Shifts and Faultlines*, 2009. Available online: <http://www.globalresearch.ca/the-2008-world-economic-crisis-global-shifts-and-faultlines/12283> [Accessed].

- Gonza'lez-Benito, J. and Gonza'lez-Benito, O. (2005) An analysis of the relationship between environmental motivations and ISO14001 certification. *British Journal of Management*, 16, 133-148.
- Grant, D. (2003) *A Study of Customer Service, Customer Satisfaction and Service Quality in the Logistics Function of the UK Food Processing Industry*. Doctoral thesis The University of Edinburgh.
- Grant, D. (2004) UK and US management styles in logistics: Different strokes for different folks? *International Journal of Logistics: Research and Applications*, 7(3), 181-197.
- Grant, D. (2012) *Logistics Management*. Essex: Pearson Education Limited.
- Grant, D., Juntunen, J., Juga, J. and Juntunen, M. (2014) Investigating brand equity of third-party service providers. *Journal of Services Marketing*, 28(3), 214-222.
- Grant, D., Lambert, D., Stock, J. and Ellram, L. (2006) *Fundamentals of Logistics Management* Maidenhead: McGraw-Hill.
- Grant, D., Trautrim, A. and Wong, C. (2013) *Sustainable Logistics and Supply Chain Management: Principles and Practices for Sustainable Operations and Management*. London: Kogan Page Limited.
- Grbich, C. (2007) *Qualitative Data Analysis: An Introduction*. London: SAGE Publications Ltd.
- Green, K. W. J., Whitten, D. and Inman, R. A. (2008) The impact of logistics performance on organizational performance in a supply chain context. *An International Journal of Supply Chain Management*, 13(4), 317-327.
- Griffis, S. E., Goldsby, T. J. and Cooper, M. (2003) Web-based and mail surveys: A comparison of response, data, and cost. *Journal of Business Logistics*, 24(2), 237-258.
- Grönroos, C. (1984) A service quality model and its marketing implications. *European Journal of Marketing*, 18(4), 36-44.
- Grzybowska, K., Awasthi, A. and Hussain, M. (2014) Modeling enablers for sustainable logistics collaboration integrating – Canadian and Polish perspectives, *2014 Federated Conference on Computer Science and Information Systems*. Warsaw: IEEE.
- Guba, E. and Lincoln, Y. S. (2005) Paradigmatic Controversies, Contradictions, and Emerging Confluences, in Denzin, N. K. and Lincoln, Y. S. (eds), *Handbook of qualitative research*, 3rd edition. Thousand Oaks: Sage, 191-215.
- Gupta, S., Goh, M., Desouza, R. and Garg, M. (2011) Assessing trade friendliness of logistics services in ASEAN. *Asia Pacific Journal of Marketing and Logistics*, 23(5), 773-792.
- Hacking, T. and Guthrie, P. (2008) A framework for clarifying the meaning of triple bottom-line, integrated, and sustainability assessment. *Environmental Impact Assessment Review*, 28(2008), 73-89.

- Hair, J. F., Black, W. C., Babin, B. J. and Anderson, R. E. (2010) *Multivariate Data Analysis: A Global Perspective*, 7 Ed. edition. New Jersey: Pearson Education Inc.
- Handfield, R., Walton, S., Sroufe, R. and Melnyk, S. (2002) Applying environmental criteria to supplier assessment: a study in the application of the AHP process. *European Journal of Operational Research*, 141, 70-87.
- Hannabuss, S. (1996) Research interviews. *New Library World*, 97(112), 22-30.
- Hanson, D. and Grimmer, M. (2007) The mix of qualitative and quantitative research in major marketing journals, 1993-2002. *European Journal of Marketing*, 41(1/2), 58-70.
- Harrison, R. L. and Reilly, T. M. (2011) Mixed methods designs in marketing research. *International Journal Qualitative Market Research*, 14(1), 7-26.
- Hartline, M. D. and Ferrell, O. C. (1996) The management of customer-contact service employees: An empirical investigation. *Journal of Marketing*, 60(4), 52-70.
- Harvey, J. (1998) Service quality: A tutorial. *Journal of Operations Management*, 16(5), 583-597.
- Hatachote, J. (2012) Green growth policy in Thailand, *Third High-Level Policy Roundtable on International Investment Policies in Asia: Responsibility and Sustainability*. Shanghai, P.R. China: Asian Development Bank.
- Healy, M. and Perry, C. (2000) Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm. *International Journal of Qualitative Market Research*, 3(3), 118-126.
- Heron, J. (1996) *Co-operative Inquiry: Research into the Human Condition*. London: Sage.
- Hervani, A., Helms, M. and Sarkis, J. (2005) Performance measurement for green supply chain management. *Benchmarking*, 12(4), 330-353.
- Hisano, D., Marcel, B. and Musetti, A. (2010) Logistics information systems adoption: An empirical investigation in Brazil. *Industrial Management and Data Systems*, 110(6), 787-804.
- Hofstede, G. (1983) The cultural relativity of organizational practices and theories. *Journal of International Business Studies*, 14(2), 75-89.
- Hofstede, G. and Bond, M. H. (1988) The confucius connection: From cultural roots to economic growth. *Organizational Dynamics*, 16(4), 5-21.
- Holcomb, M. (1994) Customer service measurement: A methodology for increasing customer value through utilization of the Taguchi strategy. *Journal of Business Logistics*, 15(1), 29-52.
- Holt, D. and Ghobadian, A. (2009) An empirical study of green supply chain management practices amongst UK manufacturers. *Journal of Manufacturing Technology Management*, 20(7), 933-956.

- Hong, J., Chin, A. and Liu, B. (2007) Logistics service providers in China: Current status and future prospects. *Asia Pacific Journal of Marketing and Logistics*, 19(2), 168-181.
- Hsieh, J.-K., Chiu, H.-C., Wei, C.-P., Yen, H. R. and Cheng, Y.-C. (2013) A practical perspective on the classification of service innovations. *Journal of Services Marketing*, 27(5), 371 - 384.
- Huang , B., Wang, T. and Xue, X. (2012) Service-selecting approach based on domain-specified 'Quality of Service' model and its application in logistics *The Service Industries Journal*, 32(9), 1571-1588.
- Hult, G. T. M. (1998) Managing the international strategic sourcing process as a market-driven organisational learning system. *Decision Science* 29(1), 193-216.
- Huo, B., Selen, W., Yeung, J. H. Y. and Zhao, X. (2008) Understanding drivers of performance in the 3PL industry in Hong Kong. *International Journal of Operations and Production Management*, 28(8), 722-800.
- Hussein, M. M. (2010) Corporate social responsibility: Finding the middle ground. *Social Responsibility Journal*, 6(3), 420-432.
- Hussey, J. and Hussey, R. (1997) *Business Research: A Practical Guide for Undergraduate and Postgraduate Students*. Basingstoke: Macmillan.
- Inglis, P. (2008) Logistics service quality: A new way to loyalty. *Industrial Management + Data Systems*, 108(5), 650-668.
- Inglis, P. F. (1992) Quality logistics: A key competitive advantage. *Canadian Business Review*, 19(2), 29-32.
- Innis, D. E. and La Londe, B. J. (1994) Customer service: The key to customer satisfaction, customer loyalty, and market share. *Journal of Business Logistics*, 15(1), 1-27.
- International Organisation for Standardisation (2009) *Environmental Management - The ISO 14000 Family of International Standards*. Geneva.
- Isaksson, K. and Hüge-Brodin, M. (2013) Understanding efficiencies behind logistics service providers' green offerings. *Management Research Review*, 36(3).
- Israel, G. (1992) *Sampling The Evidence Of Extension Program Impact*. Florida.
- Jaafar, H. (2006) *Logistics Service Quality and Relationship Quality in Third Party Relationships*. Doctoral thesis Loughborough University.
- Jarvis, C. B., MacKenzie, S. B. and Podsakoff, P. M. (2003) A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research*, 30(2), 199-218.

- Jennings, G. R. (2005) Interviewing: Qualitative Techniques, in Ritchie, B. W., Burns, P. and Palmer, C. (eds), *Tourism Research Methods: Integrating theory with practices*. Oxfordshire: CABI Publishing, 99-118.
- Jensen, A. (2007) Designing Intermodal Transport Systems: A Conceptual and Methodological Framework, in Konings, R., Priemus, H. and Nijkamp, P. (eds), *The Future of Intermodal Freight Transport - Operations, Design and Implementation*. Cheltenham: Edward Elgar.
- Juga, J., Juntunen, J. and Grant, D. B. (2010) Service quality and its relation to satisfaction and loyalty in logistics outsourcing relationships. *International Journal of Managing Service Quality*, 20(6), 496-510.
- Kallio, J., Saarinen, T., Tinnilä, M. and Vepsäläinen, A. (2000) Measuring delivery process performance. *International Journal of Logistics Management*, 11(1), 75-87.
- Kang, G. (2006) The hierarchical structure of service quality: integration of technical and functional quality. *Managing Service Quality*, 16(1), 37-50.
- Kang, G.-d. and Kim, Y.-d. An analysis of the measurement of the shipping service quality. *Asian Journal of Shipping and Logistics*, 25(1 (June 2009)), 41-55.
- Kersten, W. and Koch, J. (2010) The effect of quality management on the service quality and business success of logistics service providers. *International Journal of Quality and Reliability Management*, 27(2), 185-200.
- Khan, M., Dutt, V. and Bansal, S. Customer perceptions, expectations and gaps in service quality: An Empirical study of civil aviation industry in india, [Lecture].unpublished.
- Khan, O. and Burnes, B. (2007) Risk and supply chain management: Creating a research agenda. *International Journal of Logistics Management*, 18(2), 197-216.
- Kilibarda, M., Zečević, S. and Vidović, M. (2012) Measuring the quality of logistic service as an element of the logistics provider offering. *Total Quality Management and Business Excellence*, 23(11-12), 1345-1361.
- Kim, I. and Min, H. (2011) Measuring supply chain efficiency from a green perspective *Management Research Review*, 34(11), 1169-1189.
- Koehn, D. (1999) What Can Eastern Philosophy Teach Us About Business Ethics? *Journal of Business Ethics*, 19, 71-79.
- Kohn, C. (2008) *Towards CO2 Efficient Centralized Distribution*. PhD Linköping University, .
- Kohn, C. and Brodin, M. H. (2008) Centralised distribution systems and the environment: how increased transport work can decrease the environmental impact of logistics. *International Journal of Logistics Research and Applications*, 11(3), 229-245.
- Krauss, S. E. (2005) Research paradigms and meaning making: A primer. *The Qualitative Report*, 10(4), 758-770.

- Kremic, T., Tukul, O. I. and Rom, W. O. (2006) Outsourcing decision support: A survey of benefits, risks, and decision factors. *International Journal of Supply Chain Management*, 11(6), 467-82.
- Kristensen, K., Martensen, A. and Gronholdt, L. (2000) Customer satisfaction measurement at Post Denmark: Results of application of the European customer satisfaction index methodology. *Total Quality Management and Business Excellence*, 11(7), 1007-1015.
- Kuhn, T. (1996) *The Structure of Scientific Revolutions*, 3rd Ed. edition. Chicago: The University of Chicago Press.
- Kvale, S. (1996) *Interviews: An Introduction to Qualitative Research Interviewing*. Thousand Oaks, CA: SAGE.
- La Londe, B. and Zinszer, P. (1976) *Customer Service Meaning and Measurement*. Chicago: National Council of Physical Distribution Management.
- Ladhari, R. (2009) A review of twenty years of SERVQUAL research. *International Journal of Quality and Service Sciences*, 1(2), 172-198.
- Laforet, S. (2009) Effects of size, market and strategic orientation on innovation in non-high-tech manufacturing SMEs. *European Journal of Marketing*, 43(1/2), 188-212.
- Lai, K. (2004) Service capability and performance of logistics service providers. *Transportation Research: Part E*, 40, 385-399.
- Lam, J. S. L. and Zhang, L. (2014) Enhanced logistics service provider framework for higher integration and efficiency in maritime logistics. *International Journal of Logistics Research and Applications*, 17(2), 89-113.
- Lammgård, C. (2007) *Environmental perspectives on marketing of freight transports: the intermodal road-rail case*. doctoral thesis Goteborg University.
- Lammgård, C. and Andersson, D. (2014) Environmental considerations and trade-offs in purchasing of transportation services. *Research in Transportation Business and Management*, 10, 45-52.
- Laosirihongthong, T., Adebajo, D. and Tan, K. C. (2013) Green supply chain management practices and performance. *Industrial Management and Data Systems*, 113(8), 1088 - 1109.
- Large, R. O., Kramer, N. and Hartmann, R. K. (2011) Customer-specific adaptation by providers and their perception of 3PL-relationship success. *International Journal of Physical Distribution and Logistics Management*, 41(9), 822-838.
- Larson, P. D. (2005) A note on mail surveys and response rates in logistics research. *Journal of Business Logistics*, 26(2), 211-222.
- Lassar, W., Manolis, C. and Winsor, R. (2000) Service quality perspectives and satisfaction in private banking. *Journal of Service Marketing*, 14(3), 244-271.

- Lau, K. (2011) Benchmarking green logistics performance with a composite index. *International Journal of Benchmarking*, 18(6), 873-896.
- Lee, J., Anantharaman, S. and Jones, B. (2007) A critical review of the impact of cultural factors on service quality expectations. *Review of Business Research*, 7(5), 87-98.
- Leonardi, J., Browne, M., Allen, J., Bohne, S. and Ruesch, M. (2014) Best practice factory for freight transport in Europe: Demonstrating how 'good' urban freight cases are improving business profit and public sectors benefits, 8th *International Conference on City Logistics*. Procedia - Social and Behavioral Sciences, 84 - 98.
- Leonardi, J., Browne, M., Allen, J., Zunder, T. and Aditjandra, P. T. (2014) Increase urban freight efficiency with delivery and servicing plan. *Research in Transportation Business and Management*, 12, 73-79.
- Lieb, K. and Lieb, R. (2010) Environmental sustainability in the third-party logistics (3PL) industry. *International Journal of Physical Distribution and Logistics Management*, 40(7), 524-533.
- Lieb, R. (2008) The year 2007 survey: Provider CEO perspectives on the current status and future prospects of the third party logistics industry in the Asia-Pacific region. *International Journal of Physical Distribution and Logistics Management*, 38(6), 495-512.
- Light, E. (2002) A green supply chain. *NZ Business*, 16(3), 46-46.
- Lincoln, Y. and Guba, E. (2000) Paradigmatic Controversies, Contradictions and Emerging Confluences, in Denzin, N. K. and Lincoln, Y. S. (eds), *Handbook of Qualitative Research*, 2nd edition. Thousand Oaks, CA: Sage Publications, Inc.
- Liu, X., Grant, D., McKinnon, A. and Feng, Y. (2010) An empirical examination of the contribution of capabilities to the competitiveness of logistics service providers: A perspective from China. *International Journal of Physical Distribution and Logistics Management*, 40(10), 847-866.
- Liu, X., McKinnon, A. C., Grant, D. B. and Feng, Y. (2010) Sources of competitiveness for logistics service providers: A UK industry perspective. *Logistics Research*, 2(1), 23-32.
- Liu, X., Yang, J., Qu, S., Wang, L., Shishime, T. and Bao, C. (2012) Sustainable production: Practices and determinant factors of green supply chain management of Chinese companies. *Business Strategy and the Environment*, 21, 1-16.
- Loehlin, J. C. (1998) *Latent Variable Models: An Introduction to Factor, Path, and Structural Analysis*, 3rd edition. New Jersey: Lawrence Erlbaum Associates, Inc.
- Lopez-Fernandez, O. and Molina-Azorin, J. F. (2011) The use of mixed methods research in interdisciplinary educational journals. *International Journal of Multiple Research Approaches*, 5(2), 269-283.

- Lovelock, C. (2000) Functional Integration in Service: Understanding the Links between Marketing, Operations, and Human Resources, in Swartz, T. A. and Iacobucci, D. (eds), *Handbook of Marketing and Management*. Thousand Oaks, CA.: Sage.
- Lu, L. Y. Y., Wu, C. H. and Kuo, T. C. (2007) Environmental principles applicable to green supplier evaluation by using multi-objective decision analysis. *International Journal of Production Research*, 45(18-19), 4317-4331.
- Lund, T. (2012) Combining qualitative and quantitative approaches: Some arguments for mixed methods research. *Scandinavian Journal of Educational Research*, 56(2), 155-165.
- Malhotra, N. K., Birks, D. F. and Wills, P. A. (2012) *Marketing Research: An Applied Approach*, 4th edition. Essex: Pearson Education Limited.
- Malhotra, N. K., Ulgado, F. M., Agarwal, J., Shainesh, G. and Wu, L. (2005) Dimensions of service quality in developed and developing economies: Multi-country cross-cultural comparisons. *International Marketing Review*, 22(3), 256-278.
- Mangan, J., Lalwani, C. and Gardner, B. (2004) Combining quantitative and qualitative methodologies in logistics research. *International Journal of Physical Distribution and Logistics Management*, 34(7), 565-578.
- Marasco, A. (2008) Third-party logistics: A literature review. *International Journal of Production Economics* 113, 127-147.
- Marshall, C. and Rossman, G. B. (2011) *Designing Qualitative Research*, 5th edition. California: SAGE Publications Inc.
- Martinsen, U. and Björlund, M. (2012) Matches and gaps in the green logistics market. *International Journal of Physical Distribution and Logistics Management*, 42(6), 562-583.
- Martinsen, U. and Huge-Brodin, M. (2014) Environmental practices as offerings and requirements on the logistics market. *Logistics Research*, 7(115), 1-22.
- Mason, J. (2002) *Qualitative Researching*, 2nd Ed. edition. London: SAGE Publications.
- Maxwell, J. A. (2005) *Qualitative Research Design: An Interactive Approach*, Applied Social Research Method Series, 42. Thousand Oaks, CA,: SAGE.
- Maylor, H. and Blackmon, K. (2005) *Researching Business and Management: A Roadmap for Success*. Basingstoke: Palgrave Macmillan.
- McGinnis, M. A. (1990) The relative importance of cost and service in freight transportation choice: Before and after deregulation. *Transportation Journal*, 30(1), 12-19.
- McGivern, Y. (2003) *The Practice of Market and Social Research*. Essex: Pearson Education Limited.

- McGorry, S. Y. (2000) Measurement in a cross-cultural environment: Survey translation issues. *International Journal of Qualitative Market Research*, 3(2), 74-81.
- McIntyre, K. and Smith, H. (1998) Logistics performance measurement and greening supply chains: Diverging mindsets. *International Journal of Logistics Management*, 9(1), 57-67.
- McKinnon, A. (2003) Logistics and the Environment, in Hensher, D. A. a. B., K.J. (ed), *Handbook of Transport and the Environment*. Oxford: Elsevier.
- McKinnon, A. (2007) *CO2 Emissions from Freight Transport in the UK*. London.
- McKinnon, A., Cullinane, S., Browne, M. and Whiteing, A. (2010) *Green Logistics: Improving the Environmental Sustainability of Logistics*. London: Kogan Page Limited.
- McKinnon, A. C. (2009) Benchmarking road freight transport. *International Journal of Benchmarking*, 16(5), 640-656.
- Meade, L. and Sarkis, J. (2002) A Conceptual model for selecting and evaluating third-party logistics service providers. *International Journal of Supply Chain Management*, 7(5), 283-295.
- Meidutė-Kavaliauskienė, I., Aranskisa, A. and Litvinenko, M. (2014) Consumer satisfaction with the quality of logistics services. *Procedia - Social and Behavioral Sciences* 110 (2014), 330-340.
- Meixell, M. J. and Norbis, M. (2008) A review of the transportation mode choice and carrier selection literature. *International Journal of Logistics Management*, 19(2), 183 - 211.
- Mellat-Parast, M. and Spillan, J. E. (2014) Logistics and supply chain process integration as a source of competitive advantage. *International Journal of Logistics Management*, 25(2), 289-314.
- Mentzer, J., Flint, D. and Hult, T. (2001) Logistics service quality as a segment-customized process. *Journal of Marketing*, 65(4), 82-104.
- Mentzer, J., Flint, D. and Kent, J. (1999) Developing a logistics service quality scale. *Journal of Business Logistics*, 20(1), 9-32.
- Mentzer, J., Gomes, R. and Krapfel, R. (1989) Physical distribution service: A fundamental marketing concept? *Journal of the Academy of Marketing Science*, 17(1), 53-62.
- Mentzer, J. and Kahn, K. (1995) A framework of logistics research. *Journal of Business Logistics*, 16(1), 231-250.
- Mentzer, J., Min, S. and Bobbitt, M. (2004) Toward a unified theory of logistics. *International Journal of Physical Distribution and Logistics Management*, 34(8), 606-627.
- Mentzer, J. T. (2008) Rigor versus relevance: Why would we choose only one? *Journal of Supply Chain Management*, 44(2), 72-77.

- Mentzer, J. T. and Flint, D. J. (1997) Validity in logistics research. *Journal of Business Logistics*, 18(1), 199-216.
- Mentzer, J. T., Myers, M. B. and Cheung, M.-S. (2004) Global market segmentation for logistics services. *Industrial Marketing Management*, 33, 15–20.
- Miguel, P., Salomi, G. and Abackerli, A. (2006) Assessing internal service by measuring quality dimensions in a manufacturing company, *Third International Conference on Production Research – Americas' Region 2006*.
- Miles, N. and Huberman, A. (1994) *Qualitative Data Analysis: A Source Book of New Methods*, 2nd edition. London: Sage.
- Millen, R., Sohal, A., Dapiran, P., Lieb, R. and Van Wassenhove, L. (1997) Benchmarking Australian firms' usage of contract logistics services: A comparison with American and Western European practices. *Benchmarking for Quality Management and Technology*, 4(1), 34-46.
- Milliken, J. (2001) Qualitative research and marketing management. *Management Decision*, 39(1), 71-78.
- Molina-Azorín, J. F., López-Gamero, M. D., PereiraMoliner, J. and Pertusa-Ortega, E. M. (2012) Mixed methods studies in entrepreneurship research: Applications and contributions. *International Journal of Entrepreneurship and Regional Development*, 24(5-6), 425-456
- Mollenkopf, D., Gibson, A. and Ozanne, L. (2000) The integration of marketing and logistics functions: an empirical examination of New Zealand firms. *Journal of Business Logistics*, 21(2), 89-112.
- Multaharju, S. and Hallikas, J. (2015) Logistics service capabilities of logistics service provider. *International Journal Logistics Systems and Management*, 20(1), 103-121.
- Murphy, P. (1999) Service performance measurement using simple techniques actually works. *Journal of Marketing Practice: Applied Marketing Science*, 5(2), 56-73.
- Murphy, P. and Poist, R. (2003) Green perspectives practices: A "comparative logistics" study. *International Journal of Supply Chain Management*, 8(2), 122-131.
- Najmi, M. and Kehoe, D. F. (2000) An integrated framework for post-ISO 9000 quality development. *International Journal of Quality and Reliability Management* 17(3), 226-258.
- Naor, M., Linderman, K. and Schroeder, R. (2010) The globalization of operations in Eastern and Western countries: Unpacking the relationship between national and organizational culture and its impact on manufacturing performance. *Journal of Operations Management*, 28, 194-205.

- Narasimhan, R. and Kim, S. W. (2001) Information system utilization strategy for supply chain integration. *Journal of Logistics Business*, 22(3), 51–75.
- Näslund, D. (2002) Logistics needs qualitative research – especially action research. *International Journal of Physical Distribution and Logistics Management*, 32(5), 321-338.
- Nee, G. Y. and Wahid, N. A. (2010) The effect of ISO 14001 environmental management system implementation on SMEs performance: An empirical study in Malaysia. *Journal of Sustainable Development*, 3(2), 215-220.
- Newman, K. (2001) Interrogating SERVQUAL: A critical assessment of service quality measurement in a high street retail bank. *International Journal of Bank Marketing*, 19(3), 126-139.
- Niraj, R., Gupta, M. and Narasimhan, C. (2001) Customer profitability in a supply chain. *Journal of Marketing*, 65(3), 1-16.
- Novack, R. A., Langley, C. J. and Rinehart, L. M. (1995) *Creating Logistics Value: Themes for the Future*. Oak Brook Illinois: Council of Logistics Management.
- Núñez-Carballosa, A. and Guitart-Tarrés, L. (2011) Third-party logistics providers in Spain. *Industrial Management and Data Systems*, 111(8), 1156-1172.
- Oberhofer, P. and Dieplinger, M. (2014) Sustainability in the transport and logistics sector: Lacking environmental measures. *Business Strategy and the Environment*, 23, 236-253.
- OECD (2005) *Glossary of Statistical Terms*, 2005. Available online: <http://stats.oecd.org/glossary/detail.asp?ID=6673> [Accessed: 4 March 2015].
- Office of Green Industry Promotion and Development (2013) *Green Industry Project*. Bangkok: Ministry of Industry.
- Office of National Research and Environmental Policy and Planning (2011) *Thailand Climate Change Master Plan (2011-2050)*. Bangkok: Office of National Research and Environmental Policy and Planning.
- Office of Small and Medium Enterprises Promotion (2014) *Small and Medium Enterprises Classification*, 2014. Available online: <http://www.sme.go.th/Pages/Define/Define.aspx> [Accessed: 19 May 2014].
- Office of the National Economic and Social Development Board (NESDB) (2007) *The First Thailand's Logistics Development Strategy (2007-2011)*. Bangkok: Office of the National Economic and Social Development Board.
- Office of the National Economic and Social Development Board (NESDB) (2011) *Thailand's Logistics 2011*. Bangkok.
- Office of the National Economic and Social Development Board (NESDB) (2012) *The 11 Thailand National Development Plan*. Bangkok.

- Oliver, R. (1980) A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, 17, 460-469.
- Oliver, R. (1993) A conceptual model of service quality and service satisfaction: compatible goals, different concepts. *Advances in Services Marketing and Management*, 2, 65-85.
- Oppenheim, A. N. (1996) *Questionnaire Design, Interviewing and Attitude Measurement*. London: Continuum.
- Padma, P., Rajendran, C. and Lokachari, P. S. (2010) Service quality and its impact on customer satisfaction in Indian hospitals. *Journal of Healthcare Marketing* 807 - 841.
- Pagell, M., Katz, J. P. and Sheu, C. (2005) The importance of national culture in operations management research. *International Journal of Operations and Production Management*, 25(4), 371-394.
- Paijitrapapon, A. (2013) Thailand's manufacturing logistics and supply chain management development plan, *the Regional Conference on Integrating Domestic Industries with Global Production Networks and Supply Chains*. Singapore 8-10 May 2013. Asian Development Bank Institute.
- Panayides, P. and So, M. (2005) The impact of integrated logistics relationships on third-party logistics service quality and performance. *Maritime Economics and Logistics*, 7(1), 36-55.
- Parasuraman, A., Berry, L. and Zeithaml, V. (1988) SERVQUAL: A multiple-item scale for measuring customer perceptions of service quality. *Journal of Retailing*, 64(1), 12-40.
- Parasuraman, A., Grewal, D. and Krishnan, R. (2004) *Marketing Research*. New York: Houghton-Mifflin.
- Parasuraman, A., Zeithaml, V. and Berry, L. (1985) A conceptual model of service quality and its implications for future research. *Journal of Marketing*, 49 (Fall 1985), 41-50.
- Pazirandeh, A. and Jafari, H. (2013) Making sense of green logistics. *International Journal of Productivity and Performance Management*, 62(8), 889 - 904.
- Perotti, S., Zorzini, M., Cagno, E. and Micheli, G. J. L. (2012) Green supply chain practices and company performance: The case of 3PLs in Italy. *International Journal of Physical Distribution and Logistics Management*, 42(7), 640-672.
- Pholsuwanachai, K. (2011) A Courier company's service performance and customer satisfaction. *Journal of Supply Chain Management: Research and Practice*, 5(1), 75-93.
- Phusavat, K. and Kanchana, R. (2008) Future competitiveness: Viewpoints from manufacturers and service providers. *Industrial Management and Data Systems*, 108(2), 191-207.
- Piboonrunroj, P. (2009) Methodological implications of the research design in tourism supply chain collaboration, *18th EDAMBA Summer Academy*. Sorèze, France.

- Pisharodi, R. and Langley, C. (1991) Internet association between measures of customer service and market response. *International Journal of Physical Distribution and Logistics Management*, 21(2), 32-47.
- Pongcharnchavalit, S. and Fongsuwan, W. (2014) Structural equation model of customer perception of service and product quality factors that affects Thai information technology customer loyalty. *Research Journal of Business Management*, 8(4), 412-426.
- Porter, M. (1980) *Competitive Strategy*. New York: Free Press.
- Qureshi, M., Kumar, D. and Kumar, P. (2007) Modeling the logistics outsourcing relationship variables to enhance shippers' productivity and competitiveness in logistical supply chain. *International Journal of Productivity and Performance Management*, 56(8), 689-714.
- Qureshi, M., Kumar, D. and Kumar, P. (2008) An integrated model to identify and classify the key criteria and their role in the assessment of 3PL services providers. *Asia Pacific Journal of Marketing and Logistics*, 20(2), 227-249.
- Rafele, C. (2004) Logistics service measurement: A reference framework. *Journal of Manufacturing Technology Management*, 15(3), 280-290.
- Rafiq, M. and Jaafar, H. (2007) Measuring customers' perceptions of logistics service quality of 3PL service providers. *Journal of Business Logistics*, 28(2), 159-175.
- Rahman, S. and Laosirihongthrong, T. (2008) Quality management practices in logistics services in Thailand. *International Journal of Integrated Supply Management*, 4(1), 49-59.
- Ralston, D. A., Holt, D. H., Terpstra, R. H. and Kai-Cheng, Y. (1997) The Impact of national culture and economic ideology on managerial work values: A study of the United States, Russia, Japan, and China. *Journal of International Business Studies*, 28(1), 177-207.
- Ralston, P. M., Grawe, S. J. and Daugherty, P. J. (2013) Logistics salience impact on logistics capabilities and performance. *International Journal of Logistics Management*, 24(2), 136 - 152.
- Ranaweera, C. and Sigala, M. (2015) From service quality to service theory and practice. *Journal of Service Theory and Practice*, 25(1), 2-9.
- Ranchhod, A. and Zhou, F. (2001) Comparing respondents of e-mail and mail surveys: Understanding the implications of technology. *Marketing Intelligence and Planning*, 19(4), 254-262.
- Randolph, K. A. and Myers, L. L. (2013) Path analysis. *Basic Statistics in Multivariate Analysis*.
- Rao, P. (2002) Greening the supply chain: A new initiative in South East Asia. *International Journal of Operations and Production Management*, 22(6), 632-655.
- Rao, P. (2004) Greening production: A South-East Asian experience. *International Journal of Operations and Production Management*, 24, 289-320.

- Rao, P. and Holt, D. (2005) Do green supply chains lead to competitiveness and economic performance? *International Journal of Operations and Production Management*, 25(9), 898-916.
- Reichardt, C. S. and Rallis, S. F. (1994) *The Qualitative-Quantitative Debate: New Perspectives*, 61. California: Jossey-Bass Inc.
- Ren, C., Li, S. and Wu, H. (2009) Research on evaluation of service quality about distribution centre for electronic commerce, *6th International Conference on Service Systems and Service Management, 2009*. Xiamen: IEEE, 79-84.
- Renko, S. and Ficko, D. (2010) New logistics technologies in improving customer value in retailing service. *Journal of Retailing and Consumer Services*, 17, 216-223.
- Renukappa, S., Akintoye, A., Egbu, C. and Goulding, J. (2013) Carbon emission reduction strategies in the UK industrial sectors: An empirical study. *International Journal of Climate Change Strategies and Management*, 5(3), 304 - 323.
- Rhoades, D. and Blaise, W. (2008) Twenty years of service quality performance in the US airline industry. *Managing Service Quality*, 18(1), 20-33.
- Rigot-Muller, P., Lalwani, C., Mangan, J., Gregory, O. and Gibbs, D. (2013) Optimising end-to-end maritime supply chains: A carbon footprint perspective. *International Journal of Logistics Management*, 24(3), 407-425.
- Rinehart, I. M., Cooper, M. B. and Wagenheim, G. D. (1989) Furthering the integration of marketing and logistics through customer service. *Journal of the Academy of Marketing Science*, 7(Winter), 63-72.
- Rodrigues, L. L. R., Barkur, G., Varambally, K. V. M. and Motlagh, F. G. (2011) Comparison of SERVQUAL and SERVPERF metrics: An empirical study. *The TQM Journal*, 23(6), 629-643.
- Rossi, S., Colicchia, C., Cozzolino, A. and Christopher, M. (2013) The logistics service providers in eco-efficiency innovation: An empirical study. *International Journal of Supply Chain Management* 18(6), 583-603.
- Rushton, A., Croucher, P. and Baker, P. (2010) *The Handbook of Logistics and Distribution Management*. London: Kogan Page Limited.
- Sachan, A. and Datta, S. (2005) Review of supply chain management and logistics research. *International Journal of Physical Distribution and Logistics Management*, 35(9/10), 664-705.
- Sambasivan, M. and Ng, Y. F. (2008) Evaluation of critical success factors of implementation of ISO 14001 using analytic hierarchy process (AHP): A case study from Malaysia. *Journal of Cleaner Production*, 16, 1424-1433.
- Sandberg, E. (2007) Logistics collaboration in supply chains: Practice vs. theory. *The International Journal of Logistics Management*, 18(2), 274-293.

- Saunders, M., Lewis, P. and Thornhill, A. (2007) *Research Methods for Business Students*, 4th edition. Harlow Pearson Education.
- Saunders, S. G. (2008) Measuring and applying the PAKSERV service quality construct. *An International Journal of Managing Service Quality*, 18(5), 442-456.
- Sayer, A. (2000) *Realism and Social Science*. London: Sage.
- Schneider, B. and White, S. (2004) *Service Quality: Research Perspectives*. Thousand Oaks, CA.: Sage Publications.
- Schramm-Klein, H. and Morschett, D. (2006) The relationship between marketing performance, logistics performance and company performance for retail companies. *International Review of Retail, Distribution and Consumer Research*, 16(2), 277-296.
- Sekaran, U. (2007) *Research Methods for Business: A Skill Building Approach*, 4th edition. New Delhi: Wiley.
- Selviaridis, K. and Spring, M. (2007) Third party logistics: A literature review and research agenda. *International Journal of Logistics Management*, 18(1), 125-150.
- Senge, P. M., Lichtenstein, B. B., Kaeufer, K., Bradbury, H. and Carroll, J. S. (2007) Collaborating for systemic change. *MIT Sloan Management Review*, 48(2), 44-53.
- Seth, N., Deshmukh, S. and Vrat, P. (2006) A conceptual model for quality of service in the supply chain. *International Journal of Physical Distribution and Logistics Management*, 36(7), 547-575.
- Shah, S. K. and Corley, K. G. (2006) Building better theory by bridging the quantitative-qualitative divide. *Journal of Management Studies*, 43(8), 1821-1835.
- Shan, L. (2012) Research on green logistics service providers selection based on intuitionistic language fuzzy entropy. *Journal of Computers*, 7(2 (February 2012)), 540-546.
- Shane, S. (1993) Cultural influences on national rates of innovation. *Journal of Business Venturing*, 8(1), 59-73.
- Shapiro, R. (1984) Get leverage from logistics. *Harvard Business Review*, 62, 119-126.
- Sharabi, M. and Davidow, M. (2010) Service quality implementation: Problems and solutions. *International Journal of Quality and Service Sciences*, 2(2), 189-205.
- Shaw, S. (2013) *Developing and Testing Green Performance Measures for the Supply Chain*. Doctor of Philosophy University of Hull, June 2013.
- Shaw, S., Grant, D. and Mangan, J. (2010) Developing environmental supply chain performance measures. *Benchmarking: An International Journal*, 17(3), 320-339.
- Singh, R. K. (2011) Developing the framework for coordination in supply chain of SMEs. *Business Process Management Journal*, 17, 619-638.

- Sinha, R. K. and Babu, A. S. (1998) Quality of customer service in supply chain system: A diagnostic study. *International Journal of Quality and Reliability Management*, 15(8/9), 844-859.
- Sink, D. S. (1991) The role of measurement in achieving world-class quality and productivity management. *Industrial Engineering*, 23(6), 23-39.
- Sink, H. L., Langley, C. J. J. and Gibson, B. J. (1996) Buyer observations of the US third-party logistics market. *International Journal of Physical Distribution and Logistics Management*, 26(3), 38-46.
- Smith, A. (1995) Measuring service quality: is SERVQUAL now redundant? *Journal of Marketing Management*, 11, 257-276.
- Sobh, R. and Perry, C. (2006) Research design and data analysis in realism research. *European Journal of Marketing*, 40(11/12), 1194-1209.
- Sohail, S., Bhatnagar, R. and Sohal, A. (2006) A comparative study on the use of third party logistics services by Singaporean and Malaysian firms. *International Journal of Physical Distribution and Logistics Management*, 36(9), 690-701.
- Solem, O. (2003) Epistemology and logistics: A critical overview. *Systems Practice and Action Research*, 16(6), 437-454.
- Spector, P. E. (1992) *Summated Rating Scale Construction: An introduction*. Newbury Park, CA: Sage.
- Spekman, R. E., Kamauff Jr, J. W. and Myhr, N. (1998) An empirical investigation into supply chain management: A perspective on partnerships. *International Journal of Physical Distribution and Logistics Management*, 28(8), 630-650.
- Stank, T. P., Goldsby, T. J. and Vickery, S. K. (1999) Effect of service supplier performance on satisfaction and loyalty of store managers in the Fast Food industry. *Journal of Operations Management*, 17(2), 429-447.
- Stank, T. P., Goldsby, T. J., Vickery, S. K. and Savitskie, K. (2003) Logistics service performance: Estimating its influence on market share. *Journal of Business Logistics*, 24(1), 27-55.
- Sterling, J. and Lambert, D. (1989) Customer service research: Past, present and future. *International Journal of Physical Distribution and Logistics Management*, 19(2), 3-23.
- Stokes, D. and Wilson, N. (2006) *Small Business Management and Entrepreneurship*. London: Thomson Learning.
- Stonebraker, P. and Liao, J. (2006) Supply chain integration: Exploring product and environmental contingencies. *International Journal of Supply Chain Management*, 11(1), 34-43.
- Storey, D. (1994) *Understanding the Small Business Sector*. London: Routledge.

- Stuart, J., Bonawi-tan, W., Loehr, S. and Gates, J. (2005) Reducing costs through improved returns processing. *International Journal of Physical Distribution and Logistics Management*, 35(7), 468-480.
- Sultan, F. and Simpson, M. J. (2000) International service variants: Airline passenger expectations and perceptions of service quality. *Journal of Services Marketing*, 14(3), 188-216.
- Swatman, P., Krueger, C. and Beek, K. v. d. (2006) The changing digital content landscape: An evaluation of e-business model development in European online news and music. *Internet Research*, 16(1), 53-80.
- Tacken, J., Sanchez Rodrigues, V. and Mason, R. (2014) Examining CO2e reduction within the German logistics sector. *International Journal of Logistics Management*, 25(1), 54-84.
- Tan, L. P. (2005) Implementing ISO 14001: Is it beneficial for firms in newly industrialized Malaysia? *Journal of Cleaner Production*, 13, 397-404.
- Tashakkori, A. and Teddlie, C. (1998) *Mixed Methodology: Combining Qualitative and Quantitative Approaches*. California: SAGE Publications Inc.
- Teas, R. (1993) Expectations, performance, evaluation, and consumers' perceptions of quality. *Journal of Retailing*, 57(October 1993), 18-34.
- Teas, R. (1994) Expectations as a comparison standard in measuring service quality: An assessment of a reassessment. *Journal of Marketing*, 58(January 1994), 132-139.
- Tedlie, C. and Tashakkori, A. (2009) *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioural Sciences*. London: SAGE Publications, Inc.
- Terziovski, M., Power, D. and Sohal, A. S. (2003) The longitudinal effects of the ISO 9000 certification process on business performance. *European Journal of Operational Research*, 146, 580-595.
- Thai, V. V. (2013) Logistics service quality: Conceptual model and empirical evidence *International Journal of Logistics Research and Application*, 16(2), 114-131.
- Thailand Energy Policy and Planning Office (2011) *Statistics of Thailand's energy*. Bangkok.
- Thailand Ministry of Commerce (2009) *GMS Economic Corridors*. In *Corridors*, G. E. Bangkok: Thailand Ministry of Commerce.
- Thailand Ministry of Foreign Affairs' Department of Trade Negotiation (2012) *Logistics Services*. Bangkok: Thailand Ministry of Foreign Affairs' Department of Trade Negotiation.
- Thailand Ministry of Industry's Department of Primary Industries and Mines (2010) *Thailand Logistics Performance Index*. Bangkok.

- Thailand Ministry of Industry's Department of Primary Industries and Mines (2012) 2nd *Manufacturing Logistics Development Master Plan (2012-2016)*. Bangkok:
- Thailand Ministry of Industry's Department of Primary Industries and Mines (2012) *Logistics Strategy, 2012*. Available online: <http://logistics.dpim.go.th/> [Accessed.
- Thailand National Statistic Office (2013) *2013 Executive Summary: The Real Sector in Thailand*. Bangkok.
- Thomas, A. B. (2004) *Research Skills for Management Studies*. U.S: Routledge.
- Tian, Y., Ellinger, A. and Chen, H. (2010) Third-party logistics provider customer orientation and customer firm logistics improvement in China. *International Journal of Physical Distribution and Logistics Management*, 40(5), 356-376.
- Tse, D., Lee, K., Vertinsky, I. and Wehrung, D. (1988) Does culture matter? A cross-cultural study of executives' choice, decisiveness, and risk adjustment in international marketing. *Journal of Marketing*, 52(1), 81-95.
- UNESCAP (2014) *Transport - Statistics Yearbook for Asia and the Pacific 2014*. Bangkok: UNESCAP.
- United Nations (2013) Country Analysis Paper : Thailand, *Fourth Regional 3R Forum in Asia "3Rs in the Context of Rio+20 Outcomes – The Future We Want"*. Ha Noi, Viet Nam, 18-20 March 2013 United Nations.
- Urban, W. (2013) Perceived quality versus quality of processes: A meta concept of service quality measurement *Service Industries Journal*, 33(2), 200-217.
- US Department of Transportation Federal Highway Administration Freight Facts and Figures (2013), 2013. Available online: http://www.ops.fhwa.dot.gov/Freight/freight_analysis/nat_freight_stats/docs/13factsfigures/index.htm [Accessed: 4 January 2015].
- Van Hoek, R. (1999) From reversed logistics to green supply chains. *International Journal of Supply Chain Management*, 4(3), 129-134.
- Van Maanen, J. (1979) *Qualitative Methodology*. The University of Michigan, USA: Sage Publications.
- Varathorn, P. and Plubcharoensuk, P. (2013) *Thailand Country Report - Regional Workshop on Eco-Industry Cluster*. Tokyo: ADBI.
- Vargo, S. and Lusch, R. (2004) Evolving to a new dominant logic of marketing. *Journal of Marketing*, 68(January), 1-17.
- Vaziri, H. K. (1992) Using competitive benchmarking to set goals. *Quality Progress*, 25(10), 81-85.

- Vorhies, D. W. and Morgan, N. A. (2005) Benchmarking marketing capabilities for sustainable competitive advantage. *Journal of Marketing*, 69(January 2005), 80-94.
- Voss, D., Calantone, R. and Keller, S. (2005) Internal service quality: Determinants of distribution center performance. *International Journal of Physical Distribution and Logistics Management*, 35(3), 161-176.
- Wagner, S. M. and Kemmerling, R. (2010) Handling nonresponse in logistics research. *Journal of Business Logistics*, 31(2), 357-381.
- Wang, L. (2011) Analyze about network businessmen development approaches under new business civilization, *International Conference of Information Technology, Computer Engineering and Management Sciences*. IEEE, 21-24.
- Wang, Q., Huo, B., Lai, F. and Chu, Z. (2010) Understanding performance drivers of third-party logistics providers in mainland China. *Industrial Management and Data Systems*, 110(9), 1273-1296.
- Weber, M. (1947) *The Theory of Social and Economic Organization* Henderson, A. M. and Parsons, T. New York: Free Press.
- Wichaisri, S. and Sopadang, A. (2013) Sustainable logistics system: A framework and case study, *IEEE International Conference on Industrial Engineering and Engineering Management*. Bangkok, 10-13 December 2013. IEEM, 1017-1021.
- Wilding, R. and Juriado, R. (2004) Customer perceptions on logistics outsourcing in the European consumer goods industry. *International Journal of Physical Distribution and Logistics Management*, 34(8), 628-644.
- Wisner, J. D. (2003) A structural equation model of supply chain management and firm performance. *Journal of Business Logistics*, 24(1), 1-26.
- Witell, L. and Löfgren, M. (2007) Classification of quality attributes. *Managing Service Quality*, 17(1), 54-73.
- Witkowski, T. H. and Wolfinbarger, M. F. (2001) The formality dimension of service quality in Thailand and Japan, *the 2000 Annual Conferences of the Association for Consumer Research*. Salt Lake City, UT.
- Wolf, C. and Seuring, S. (2010) Environmental impacts as buying criteria for third party logistical services. *International Journal of Physical Distribution and Logistics Management*, 40(1), 84-102.
- Woodburn, A., Allen, J., Browne, M., Leonardi, J. and Essen, H. v. (2010) International Road and Rail Freight Transport: The Impact of Globalisation on Activity Levels, *OECD: Globalisation, Transport and the Environment*. Paris: OECD Publishing.

- World Bank (2014) *Connecting to Compete 2014 Trade Logistics in the Global Economy: The Logistics Performance Index and its Indicators*. Washington DC: World Bank.
- World Economic Forum (2014) *The Global Competitiveness Report 2014-2015*. Geneva.
- World Trade Organisation (WTO) (2014) *International Trade Statistics 2014*.
- Wright, L. A., Kemp, S. and Williams, I. (2011) 'Carbon footprinting': Towards a universally accepted definition. *Carbon Management*, 2(1), 61-72.
- Wright, L. T. (1996) Exploring the in-depth interview as a qualitative research technique with American and Japanese firms. *Marketing Intelligence and Planning*, 14(6), 59-64.
- Wu, H.-J. and Dunn, S. (1995) Environmentally responsible logistics systems. *International Journal of Physical Distribution and Logistics Management*, 25(2), 20-38.
- Xiu, X. and Zheng, J. (2010) Study of integrated information platform of 4PL based on collaborative environment *2nd Conference on Environmental Science and Information Application Technology*
- Yang, H. and Chen, K. (2000) A performance index approach to managing service quality. *Managing Service Quality*, 10(5), 273-278.
- Yardpaga, T. (2014) *Supply Chain Management Practices in Thai SMEs: Antecedents and Outcomes*. Doctor of Philosophy Plymouth University.
- Yin, R. K. (2009) *Case Study Research: Design and Methods*, 4th edition. London: Sage.
- Yuan, K.-H. and Bentler, P. M. (2004) On chi-Square difference and z tests in mean and covariance structure analysis when the base model is misspecified. *Educational and Psychological Measurement*, 64(October 2004), 737-757.
- Zhang, J., Beatty, S. E. and Walsh, G. (2008) Review and future directions of cross-cultural consumer services research. *Journal of Business Research*, 61(21), 211-224.
- Zhao, M., Dröge, C. and Stank, T. P. (2001) The effects of logistics capabilities on firm performance: Customer-focused versus information-focused capabilities. *Journal of Logistics Management*, 22(2), 91-107.
- Zhou, L. (2004) A dimension-specific analysis of performance - only measurement of service quality and satisfaction in China's retail banking. *Journal of Service Marketing*, 18(7), 534-546.
- Zhu, Q., Sarkis, J. and Geng, Y. (2005) Green supply chain management in China: Pressures, practices and performance. *International Journal of Operations and Production Management*, 25(5), 449-468.
- Zikmund, W. (2003) *Business Research Methods*, 7th edition. Ohio: South-Western.
- Zineldin, M. (2004) Total relationship and logistics management. *International Journal of Physical Distribution and Logistics Management*, 34(3/4), 286-301.

Appendix 1: Existing Literature Reviews of Green and Logistics Service Quality

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(1) Lieb et al. (1993) “Third party logistics services: a comparison of experienced American and European manufacturers”	This study focused on a comparison of the experiences of the US and European manufacturers in using 3PLs.	It was found that European companies were significantly more committed and allocated a bigger share of overall logistics budget to their 3PLs. Organisations from both regions agreed on a mix of internal and external logistics services. These services provided better control and balance to ensure consistency and flexibility.		X		U.S & Europe	International Journal of Physical Distribution & Logistics Management
(2) Dapiran et al. (1996) “Third party logistics services usage by large Australian firms”	The study focused on an overview of the 3PL usage by large Australian companies.	It was found that more than one-fifth of the Australian firms characterise their commitment to 3PLs as extensive, and one-quarter of firms allocated more than 50 percent of their total logistics budget when compared with US firms.		X		Australia	International Journal of Physical Distribution & Logistics Management

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(3) Hong et al. (2007) “Logistics service providers in China: Current status and future prospects”	This research not only studies the current status and future prospects of logistics providers in a Chinese city (Tianjin) but also reveal the disparities between China and Tianjin.	Chinese logistics providers depend heavily on transportation and warehousing businesses but lack value-added services and logistics information management. Moreover, there are significant regional differences in logistics.		X		Asia (China)	Asia Pacific Journal of Marketing and Logistics
(4) Núñez-Carballosa and Guitart-Tarrés (2011) “Third-party logistics providers in Spain”	To analyse logistics outsourcing in Spain from the viewpoint of 3PLs.	– The main reasons for a company to outsource its logistics functions are to boost flexibility, focus on the core business, free up resources, and gain access to the know-how (skills and capabilities) of a specialised logistics provider		X		Europe (Spain)	Industrial Management & Data Systems

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(5) Kersten and Koch (2010) “The effect of quality management on the service quality and business success of logistics service providers”	To analyse empirically the causal relationships between quality management, service quality and business success in German logistics companies.	<ul style="list-style-type: none"> – 3PLs providers and their clients build long-term, close-knit relationships based on mutual trust (partnerships). <p>By managing a larger portion of the logistics chain, 3PLs providers can provide greater value-added to their clients.</p> <p>It was found that there were effects of quality management on service quality constructs and also positive effects of service quality on business success too.</p>	X	X		Europe (Germany)	International Journal of Quality & Reliability Management

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(6) Mentzer et al. (2001) "Logistics service quality as a segment-customized process"	The main objective of this study was to investigate the relationship between the different customer segmentation values and the aspects and level of logistics service quality.	Nine factors of LSQ: Personnel contact; Order release quantities; Information quality; Ordering procedures; Order accuracy; Order condition; Order quality; Timeliness; and Order discrepancy handling There was a logistics service quality across the customer segmentation, but the relative parameters estimated differ for each segment.	X			U.S	Journal of Marketing
(7) Wolf and Seuring (2010) "Environmental impacts as buying criteria for third party logistical services"	To analyse environmental issues from a selection criteria of companies when outsourcing the activities to 3PLs.	Traditional criteria such as price, quality, and timely delivery were the most important factors for making the decision though 3PLs, reporting an increasing interest in the environmental issues.		X	X	Europe & United Kingdom	International Journal of Physical Distribution & Logistics Management

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(8) Tacken et al. (2014) "Examining CO ₂ emissions reduction within the German logistics sector"	To assess the measures outlined in frameworks for guiding CO ₂ emission reduction in road freight transport at a practical level.	The framework used to categorised CO ₂ emission reduction initiatives in logistics provision was confirmed but also refined. There was strong evidence that the options identified in theory were valid for the German LSPs.		X	X	Europe (Germany)	International Journal of Logistics Management
(9) Rafiq and Jaafar (2007) "Measuring customers' perceptions of logistics service quality of 3PL service"	Testing and validation of Mentzer, Flint, and Kent's LSQ (MFK) instrument in the context of the 3PLs industry in the UK.	MFK describes that technical aspects of service quality are perceived as more important than other factors, whereas this paper shows that the functional quality elements of LSQ are perceived more important than technical ones for customer satisfaction. This study focuses on external customers.	X	X		United Kingdom	Journal of Business Logistics

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(10) Martinsen and Björlund (2012) "Matches and gaps in the green logistics market"	The purpose of this study is to identify the matches and gaps between LSP's green supply chain and the shippers' green demand.	LSPs overachieved when it came to green categories and were also aware of this situation. Conversely, shippers were not aware of this situation and satisfied with services offered by LSPs.		X	X	Europe (Sweden)	International Journal of Physical Distribution & Logistics Management
(11) Lieb and Lieb (2010). "Environmental sustainability in the third-party logistics (3PL) industry"	To examine the sustainability initiatives undertaken by large 3PLs companies and the impact of those initiatives on 3PLs and their customers.	Almost all respondent companies made substantial commitments to environmental sustainability goals over the past seven years. 3PLs customers were also increasingly interested in the environmental sustainability capabilities of 3PLs.		X	X	North America, Europe, and Asia-Pacific	International Journal of Physical Distribution & Logistics Management

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(12) Isaksson and Hüge-Brodin (2013). "Understanding efficiencies behind logistics service providers' green offerings."	To indicate the position of the green-labelled LSPs in their development and seek the rationale in their development of green service offerings.	As the case study approach, it was found that some companies were working towards a green integration but others still offered green alternatives to the original service offering.		X	X	Europe (Sweden)	Management Research Review
(13) Björklund and Forslund (2013). "The inclusion of environmental performance in transport contracts."	To investigate the inclusion of environmental performance in transport contracts and to identify whether differences in inclusion can be explained by managerial involvement.	Companies including the environmental performance in transport contracts do not consider a way to measure the environmental performance and also its way to handle non-complaints.		X	X	Europe (Sweden)	International Journal of Management of Environmental Quality

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(14) Björklund and Forslund (2013). "The purpose and focus of environmental performance measurement systems in logistics."	To investigate the purposes of implementing and environmental performance measurement system in logistics.	The respondents had several reasons to implement an environmental performance measurement system but the most common purpose was the internal-organisation. Respondents seemed to design their environmental performance measurement system mainly out of internal management purpose.		X	X	Europe (Sweden)	International Journal of Productivity and Performance Management
(15) Pazirandeh and Jafari (2013) "Making sense of green logistics."	To evaluate greening efforts depends on a higher level company-wide sustainability strategy.	It was found that the purchasing and operations perspectives to improve the environmental performance were the reasons why companies with a sustainability strategy focused on greening their transportation.			X	Europe (Sweden)	International Journal of Productivity and Performance Management

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(16) Shaw et al. (2010) “Developing environmental supply chain performance measures.”	To review the extant literature and propose a research agenda to examine whether environmental measures can be integrated within a supply chain performance framework.	An opportunity to investigate the relationship between environment logistics and environmental supply chain performance measurement was found to enable businesses to be more effective.		X	X	N/A	International Journal of Benchmarking
(17) Thai (2013) “Logistics service quality: conceptual model and empirical evidence”	To investigate the definition of the quality in logistics service and its dimensions on both perceptions of LSPs and LSP customers.	The results from this study shown that there were five dimensions as order fulfilment, corporate image, information quality, timeliness, customer focus.	X	X		Asia (Singapore)	International Journal of Logistics Research and Application
(18) Liu et al. (2010) “Sources of competitiveness for logistics service providers: a UK industry perspective”	To examine the perceptions of the sources of competitiveness for logistics service providers in United Kingdom.	It is found that the most critical aspect of LSP capabilities was the service quality capability much like operations management.		X		United Kingdom	Logistics Research

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(19) Emerson and Grimm (1996) “Logistics and marketing components of customer service: an empirical test of the Mentzer, Gomes and Krapfel model”	To investigate logistics (availability, timeliness, delivery quality, communication) and marketing components (pricing policy, product support-sales representative, product support-customer service, quality) of customer services.	Seven logistics and marketing constructs have been addressed in this study such as availability, delivery quality, communication, pricing policy, product support-sales representative, product support-customer service, quality.	X			U.S.	International Journal of Physical Distribution & Logistics Management
(20) Ferguson (2011) “CSR in Asian logistics: operationalisation within DHL (Thailand)”	To provide an insight around operational CSR and sustainability activities within an Asian-Pacific subsidiary of DHL as a leading CSR global third-party logistics company.	It was found that activities and issues about the subsidiary’s internationalisation of CSR, by selecting and highlighting local initiatives and solutions which contribute to the global CSR strategic objectives. This would address the aspects of social, cultural and business management model, context and limitations of the subsidiary’s CSR.		X	X	Asia (Thailand)	Journal of Management Development

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(21) Eng-Larsson and Norrman (2014) "Modal shift for greener logistics - exploring the role of the contract"	To examine the contracts of the intermodal transport market and the incentives for a modal shift including the financial and environmental efficiency of freight transport.	It is shown that intermodal rail operators had a strong production focus for transferring the capacity risk to the service providers. This study suggested a risk-share contract to support the use of modal shift.			X	Europe	International Journal of Physical Distribution & Logistics Management
(22) Large et al. (2011) "Customer-specific adaptation by providers and their perception of 3PL-relationship success"	To examine the impact, from a provider's perspective, of customer-specific adaptations by 3PL on the success of 3PL-relationships.	There was strong evidence to suggest that customer-specific adaptation by providers was an important prerequisite to 3PL performance. This study also suggested that 3PLs should adjust their system and procedures to customers' requirements.		X		Europe (Germany)	International Journal of Physical Distribution & Logistics Management

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(23) Wichaisri and Sopadang (2013) “Sustainable logistics system: A framework and case study”	To address a framework of sustainable logistics system and apply this framework as a basis to analyse a case study.	Regarding the three dimensions of sustainability: economics, environment, and social, it was found that the economic dimension was the highest priority.			X	Asia (Thailand)	International Conference on Industrial Engineering and Engineering Management
(24) Laosirihongthong et al. (2013) “Green supply chain management practices and performance”	To examine the deployment of pro-active and re-active practices in the implementation of green supply chain management including the impacts on environmental, economic, and intangible performance by considering business strategy as organizational focus.	The enhancement of business’ environmental, economic, and intangible performance came from the threat of legislation and regulation which were re-active practices. Furthermore, pro-active practices such as reverse logistics practices had a low level of adoption and did not have a significant impact on the performance.			X	Asia (Thailand)	Industrial Management & Data Systems

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(25) Kilibarda et al. (2012) "Measuring the quality of logistic service as an element of the logistics provider offering"	To present a new approach and model to measure service quality for creating an offering of logistics providers.	A case study is used to test a validation and how fit of the model. Logistics providers can create an offering based on the customers' requirements and also measure and assess to what extent offerings meet the customers' requirements and expectations.	X	X		United Kingdom	Total Quality Management & Business Excellence
(26) Meidutė-Kavaliauskienė et al. (2014) "Consumer satisfaction with the quality of logistics services"	To determine how customers evaluate logistics service quality and what the index of their satisfaction with these services is.	Logistics providers' customers had the needs for the basic logistical activities, in particular transportation and storage. A lack of technology innovation in logistics processes at the different stages of customer service still occurs.	X	X		Europe (Lithuania)	Procedia - Social and Behavioural Sciences

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(27) Phusavat and Kanchana (2008) “Future competitiveness: viewpoints from manufacturers and service providers”	To compare and evaluate competitive priorities between manufacturers and service providers.	It was found that top management from manufacturing and service provider companies agreed delivery/service provision and quality were the most important competitiveness priority.		X		Asia (Thailand)	Industrial Management & Data Systems
(28) Lau (2011) “Benchmarking green logistics performance with a composite index.”	To discuss the development and use of a green logistics performance index, developed based on World Bank LPI, for easy comparison of performance among industries and countries.	The comparison findings of green logistics performance index from two groups are similar. China is a distance behind Japan in green logistics implementation particularly in the upstream of supply chain.		X	X	Asia (China & Japan)	International Journal of Benchmarking

Author (s)	Description	Findings & Contributions	Keyword (s) found from study / paper				Journal / Conference
			LSQ	LSPs	GSQ	Area context	
(29) Rahman and Laosirihongthrong (2008) "Quality management practices in logistics services in Thailand"	To examine the extent to which quality management practices are adopted, and impediments to implementation of quality improvement processes in logistics services of manufacturing and logistics companies.	The results show respondents had successfully implemented quality programs in logistics functions. It suggested that companies should focus on integrating quality programs with corporate strategy and acquiring quality management skills through training and education.	X	X		Asia (Thailand)	International Journal of Integrated Supply Management
(30) Çerri (2012) "The impact of the quality of logistics activities on customer commitment, loyalty and firm's performance"	To analyze the logistics service quality, commitment, loyalty and performance in a supply chain context.	This study, based on a personal survey was conducted among retail customers of a wholesale company in Albania. Logistics service quality related indirectly to organisation's performance while loyalty and commitment was related directly to performance.	X			Europe (Albania)	Journal of Advanced Research in Management

Appendix 2: Semi-structured Interviews

Request for Informational Interview Letter

..... May 2013

« Name »

« Company Address »

Dear « Name »,

I am a lecturer at Kasetsart University and I am now doing a PhD study at University of Hull. I am conducting a research on the topic of “Green logistics service quality competencies in Thailand”.

In a recent conversation with _____, s/he suggested I contact you about your practice because of your extensive experience and outstanding reputation in your field. I am not approaching you to obtain a position with your organisation; I would simply appreciate any general advice or information you could offer me as I explore the green and logistics service quality competencies of logistics providers in Thailand.

Since I will be in Thailand for the data collection between ___ and ___ dates, I know your time is valuable, so I plan to limit this conversation to no longer than an hour that time period. Alternatively, if you are unable to meet with me in person, I hoped you would be willing to correspond with me by phone or email in the near future.

Thank you for your time. I look forward to meeting you!

Yours sincerely,

Siriwan Chaisurayakarn

Researcher, Hull University Business School

Mobile phone: (66) 84 6389980

E-mail: S.Chaisurayakarn@2011.hull.ac.uk

Green Logistics Service Quality Competencies in Thailand

To be read to Interviewees

Confidentiality:

Interviewees are assured of complete confidentiality. No organisation or individual will be identified within the research output. Interviews are numbered for control purposes only for confirming or validating the variables and constructs found in the literature review. Please confirm that you are happy to proceed with this interview.

Objectives of the research:

This research complements previous studies to examine the importance of green service quality (GSQ) and logistics service quality (LSQ) to a Thai's Logistics Service Provider's overall performance. Interviewees are being asked to provide responses about GSQ competencies, LSQ competencies and the importance of GSQ competencies to a LSP's performance.

Definition:

Green service quality (GSQ) is defined as the environmental initiatives crucial to operational service quality, particularly in logistics service provision.

Logistics service quality (LSQ) is defined as the components of order release quantities; ordering procedures; order accuracy; order condition; order quality; timeliness; personnel contact quality, information quality, and order discrepancy handling.

Semi-Structured Interview Protocol for LSPs

1. In your opinion, are the following green service quality competencies important to an LSP's service quality? If so, how? Why?

Green service quality	Explanation
Alternative fuels	Bio fuels and renewable energy
Vehicle technologies	Replace existing fleets with modern vehicles that cause less emissions
Modal choice	Shift from road to rail; intermodal solutions
Behavioural aspects	Eco driving; driving behaviour which focuses on decreasing fuel consumption
Logistics system design	More direct transport; continuous improvement of distribution networks; decrease average handling factor and average length of haul
Transport management	Well planned routes; high fill-rates
Choice of partners	Cooperation with customers to help them reach their own environmental targets; choosing environmentally conscious transport providers
Environmental management system	ISO14001, EMS certification
Externalities	CO ₂ reports; energy consumption from external transports; energy consumption in warehouse; greenhouse gas emissions; safety for both driver/staff and other people

2. In your opinion, are there any other GSQ important competencies to an LSP's service quality?

3. Please rank in order all these GSQ competencies most important. Why? How?

Semi-Structured Interview Protocol for LSP Customers

1. In your opinion, are following green service quality competencies important to an LSP's service quality? If so, how? Why?

Green service quality	Explanation
Alternative fuels	Bio fuels and renewable energy
Vehicle technologies	Replace existing fleets with modern vehicles that cause less emissions
Modal choice	Shift from road to rail; intermodal solutions
Behavioural aspects	Eco driving; driving behaviour which focuses on decreasing fuel consumption
Logistics system design	More direct transport; continuous improvement of distribution networks; decrease average handling factor and average length of haul
Transport management	Well planned routes; high fill-rates
Choice of partners	Cooperation with customers to help them reach their own environmental targets; choosing environmentally conscious transport providers
Environmental management system	ISO14001, EMS certification
Externalities	CO ₂ reports; energy consumption from external transports; energy consumption in warehouse; greenhouse gas emissions; safety for both driver/staff and other people

2. In your opinion, are there any other GSQ important competencies that an LSP should have for making a differentiation on its service?

3. Please rank in order all these GSQ competencies most important. Why? How?

Appendix 3: Questionnaire Survey

Telephone Script for Contacting Survey Respondents

Hello, Mr **[contact last name]**. I'm Siriwan Chaisurayakarn from Kasetsart University and I am now doing a PhD study at the University of Hull Business School. May I have a few minutes of your time?

I want to speak to the person in your company that looks after the logistics or transport department. Is that you?

[If Yes, continue. If No, ask them who that person is and ask to be transferred; start again.]

I'm researching green and logistics service quality of the logistics service in Thailand and I am doing on the perceptions of LSPs and LSP customers where your company is in target industry of this research.

[choose] industry.

I think the results of this research will be of interest to you. Would you be kind enough to help me with it by completing a simple questionnaire?

[If Yes, continue. If No, probe "May I ask why?" to alleviate any concerns. If still No, then thank them and ring off.]

Great! Which distribution channels will you prefer to receive the survey such as email attachment, fax, email with embedded link, and postal? I will post the questionnaire by the middle of next week with complete instructions, and if you prefer the postal channel, I will include a self addressed, stamped envelope for your convenience.

Thanks for your help. Good-bye.

Kasetsart University's Cover Letter (English Version)



0513.30301/0067

Faculty of Management Sciences

Kasetsart University, Sriracha Campus

Chonburi 20230

..... Month 2014

Topic Request for participating in the research

Dear << Name >>

<< Position, and Company's name >>

Regarding to Miss Siriwan Chaisurayakarn, a lecturer, who has got a scholarship from the Faculty of Management Sciences, Kasetsart University, Sriracha campus and is now collecting the data of her thesis in Thailand. This research study is examining the importance of green service quality (GSQ) and logistics service quality (LSQ) to a Thai's Logistics Service Provider's overall performance.

We would like to ask for your assistance to participate in this research as a target group. We think the results of this research will be of interest to you. Your response will be treated in the strictest confidence and will be released only as summaries and in such a manner that no individual or company's answers can be identified.

Thank you very much for helping this important study.

Yours sincerely,

Mr. Toemsak Sukhvibul

Dean, Faculty of Management Sciences

Kasetsart University, Sriracha Campus

Telephone: 038-352380-1

Fax: 038-352380-1

Kasetsart University's Cover Letter (Thai Version)



ที่ ศธ ๐๕๑๓.๓๐๓๐๑/๐๐๖๗

คณะวิทยาการจัดการ

มหาวิทยาลัยเกษตรศาสตร์

๑๙๙ หมู่ ๖ ตำบลทุ่งสุขลา

อำเภอศรีราชา จังหวัดชลบุรี ๒๐๒๓๐

..... เดือน พ.ศ. ๒๕๕๗

เรื่อง ขอความอนุเคราะห์ข้อมูล

เรียน << ชื่อ นามสกุล >>

<< ตำแหน่ง บริษัท >>

สิ่งที่ส่งมาด้วย แบบสอบถามเรื่อง “ความสามารถด้านคุณภาพการให้บริการด้านโลจิสติกส์เพื่อสิ่งแวดล้อมในประเทศไทย (Green logistics service quality competencies in Thailand)”

ตามที่ นางสาวศิริวรรณ ไชยสุรยกานต์ อาจารย์ประจำคณะวิทยาการจัดการ มหาวิทยาลัยเกษตรศาสตร์ วิทยาเขต ศรีราชา ได้รับทุนพัฒนาบุคลากรของทางคณะฯ เพื่อศึกษาต่อในระดับปริญญาเอก ณ University of Hull ประเทศสหราชอาณาจักร และในขณะนี้อยู่ในระหว่างการดำเนินการเก็บข้อมูลจากแบบสอบถาม สำหรับงานวิจัย เรื่อง ความสามารถด้านคุณภาพการให้บริการด้านโลจิสติกส์เพื่อสิ่งแวดล้อมในประเทศไทย นั้น

ในการนี้ คณะฯ มีความประสงค์จะขอความอนุเคราะห์จากท่านในการตอบแบบสอบถาม ในด้านการรับรู้เกี่ยวกับประเด็นด้านความสำคัญของสิ่งแวดล้อม และคุณภาพการให้บริการด้านโลจิสติกส์ในอันที่จะส่งผลกระทบต่อผลการดำเนินงานของผู้ให้บริการโลจิสติกส์ ในฐานะที่ท่านเป็นผู้ให้บริการโลจิสติกส์ หรือในฐานะที่ท่านเป็นผู้รับบริการฯ อนึ่ง ข้อมูลที่ได้จากการตอบแบบสอบถามนี้ จะถูกเก็บไว้เป็นความลับและนำไปใช้สำหรับงานวิจัยในระดับปริญญาเอกของนางสาวศิริวรรณ ไชยสุรยกานต์ เท่านั้น

จึงเรียนมาเพื่อโปรดพิจารณาให้ความอนุเคราะห์ จักขอบพระคุณยิ่ง

ขอแสดงความนับถือ

(อาจารย์เต็มศักดิ์ สุขวิบูลย์)

คณบดีคณะวิทยาการจัดการ

คณะวิทยาการจัดการ มหาวิทยาลัยเกษตรศาสตร์

โทรศัพท์ ๐๓๘-๓๕๒๓๘๐-๑

โทรสาร ๐๓๘-๓๕๒๓๘๐-๑

Researcher Personnel Cover Letter (English Version)

..... January 2014

Topic Request for participating in the research

Dear << Name >>

<< Position, and Company's name >>

I am writing to you to invite your participation in a wholly independent study supported by the Business School, University of Hull, UK and Faculty of Management Science, Kasetsart University. This research study is examining the importance of green service quality (GSQ) and logistics service quality (LSQ) to a Thai's Logistics Service Provider's overall performance. Your answers will enable the LSP to design the services according to the customers' needs.

As discussed, I have prepared a questionnaire that I will be sending out to LSP and LSP customer companies in Thailand. I appreciate your assistance in helping me ensure that the questionnaire has no obvious errors and is sound in content and meaning. Your response will be treated in the strictest confidence and will be released only as summaries and in such a manner that no individual or company's answers can be identified.

Thank you very much for helping this important study.

Yours sincerely,

Siriwan Chaisurayakarn

Logistics Institute, Hull University Business School

Mobile phone: (66) 84 6389980

E-mail: fmssrc@src.ku.ac.th or chsiriwan@yahoo.com

Researcher Personnel Cover Letter (Thai Version)

วันที่ มกราคม พ.ศ. ๒๕๕๗

เรื่อง ขอความอนุเคราะห์ข้อมูล

เรียน ประธานบริษัท / กรรมการผู้จัดการ

สิ่งที่ส่งมาด้วย แบบสอบถามเรื่อง “ความสามารถด้านคุณภาพการให้บริการด้านโลจิสติกส์เพื่อสิ่งแวดล้อมในประเทศไทย (Green logistics service quality competencies in Thailand)”

ตามที่ ดิฉัน นางสาวศิริวรรณ ไชยสุรยกานต์ อาจารย์ประจำคณะวิทยาการจัดการ มหาวิทยาลัยเกษตรศาสตร์ วิทยาเขตศรีราชา ได้รับทุนสนับสนุนในการทำวิจัย เรื่อง ความสามารถด้านคุณภาพการให้บริการด้านโลจิสติกส์เพื่อสิ่งแวดล้อมในประเทศไทย โดยงานวิจัยชิ้นนี้ได้รับความร่วมมือจากมหาวิทยาลัยเกษตรศาสตร์ และมหาวิทยาลัยฮัลล์ (University of Hull) ประเทศสหราชอาณาจักร นั้น

อนึ่ง วัตถุประสงค์ในการศึกษาครั้งนี้ เพื่อศึกษาความสำคัญของคุณภาพการให้บริการโดยคำนึงถึงสิ่งแวดล้อม (Green service quality: GSQ) และคุณภาพการให้บริการด้านโลจิสติกส์ (Logistics service quality: LSQ) ที่มีผลต่อผลการดำเนินการโดยรวมของผู้ให้บริการโลจิสติกส์ในประเทศไทย

ดังนั้น ดิฉันจึงมีความประสงค์จะขอความอนุเคราะห์จากท่านในการตอบแบบสอบถาม ในด้านการรับรู้เกี่ยวกับประเด็นด้านความสำคัญของสิ่งแวดล้อม และคุณภาพการให้บริการด้านโลจิสติกส์ในอันที่จะส่งผลต่อผลการดำเนินงานของผู้ให้บริการโลจิสติกส์ ในฐานะที่ท่านเป็นผู้ให้บริการโลจิสติกส์ หรือในฐานะที่ท่านเป็นผู้รับบริการฯ อนึ่ง ข้อมูลที่ได้จากการตอบแบบสอบถามนี้ จะถูกเก็บไว้เป็นความลับและนำไปใช้สำหรับงานวิจัยชิ้นนี้เท่านั้น จึงเรียนมาเพื่อโปรดพิจารณาให้ความอนุเคราะห์ จักขอบพระคุณยิ่ง

ขอแสดงความนับถือ



(นางสาวศิริวรรณ ไชยสุรยกานต์)

Logistics Institute, Hull University Business School

โทรศัพท์ ๐๘๔ ๖๓๘๙๙๘๐

อีเมล fmssrc@src.ku.ac.th หรือ chsiriwan@yahoo.com

**Capability of Green Logistics Service Quality
in Thailand Perspective**

This research supported by

The University of Hull



and

Kasetsart University



Capability of Green Logistics Service Quality in Thailand Perspective

General Information

1. Your responses will be kept **strictly confidential and anonymous**.
2. This research work is to seek the important impact of green service quality (GSQ) and logistics service quality (LSQ) on a Thai's Logistics Service Provider's overall performance.
3. Definitions:
 - Green service quality (GSQ) is the environmental issue which is crucial to operational service quality, particularly in logistics service provision.
 - Logistics service quality (LSQ) is the component of service quality which is crucial to operational service quality, particularly in logistics service provision.
4. According to your experience, please provide your opinion as a logistics service provider.
5. If you think you are not the right person to answer the questionnaire, please pass it to the person who you think might be knowledgeable to answer it.
6. This survey takes approximately 10-15 minutes to complete.

If you would like to receive a summary of results, please write your e-mail address below.

E-mail:

Please return the completed questionnaire by 2014.

Thank you for your co-operation!


UNIVERSITY OF Hull



SECTION 1: GREEN SERVICE QUALITY

This section seeks your perceptions of the importance of environmental or green factors affecting your logistics services to your customers. By using the following the 7-point scale, please identify the importance of the following statements.

	Not at all Very Important							Important
	1	2	3	4	5	6	7	
1. Fuel costs decreased by alternative fuels (e.g. bio-diesel, hybrid energy, NGV)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Improving the corporate image of your customers and your company's reputation from using alternative fuels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Decreasing product availability from using alternative fuels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Decreasing CO ₂ emissions from using environmentally-friendly vehicle technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Your company's technological innovation increased by implementing vehicle technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Your company's fixed-costs increased by implementing vehicle technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Increasing product availability from alternative transportation modes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Increasing the flexibility of product size from alternative transportation modes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Transportation costs decreased by alternative transportation modes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Your staff is fully trained on environmental and safety issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. Reduction of accident rates due to staff trained on environmental and safety issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12. CO ₂ emissions reduced by staff trained on environmental and safety issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13. Distribution network improved by implementing green logistics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14. Lead times reduced by implementing a design of green logistics system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15. Increasing product availability from implementing a design of green logistics system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16. Availability increased by implementing green logistics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17. Effective transportation affecting consolidation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
18. Back haul is reduced by effective transportation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
19. Enhancing environmental knowledge sharing between your company and your customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
20. Achieving Environmental targets between your company and your customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

	1	2	3	4	5	6	7
21. Increasing environmental issues collaborate with your customers	<input type="checkbox"/>						
22. Back haul is reduced by collaboration with your customers	<input type="checkbox"/>						
23. Decreasing waste within your operations and processes	<input type="checkbox"/>						
24. Complying with environmental regulations	<input type="checkbox"/>						
25. Operational efficiency increased by implementing environmental management system	<input type="checkbox"/>						
26. CO ₂ emissions reduced by awareness of your stakeholders	<input type="checkbox"/>						
27. Environmental impacts in your company changed, particularly staff's environmental education and safety	<input type="checkbox"/>						
28. Increasing awareness of your stakeholders' green impact	<input type="checkbox"/>						

SECTION 2: LOGISTICS SERVICE QUALITY

This section seeks your perceptions of the importance of logistics services that you provide to your customers. By using the following the 7-point scale, please identify the importance of the following statements.

	Not at all Very Important							Important
	1	2	3	4	5	6	7	
29. Flexible delivery according to customer's demand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
30. Mistake of delivery in terms of required quantities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
31. Rare case of wrong shipment in terms of items	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
32. Rare case of wrong shipment in terms of quantities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
33. Rare case of wrong shipment in terms of substituted items	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
34. Substituted items sent to their customers work fine due to damages from your customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
35. Products ordered from their customers meet their product specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
36. Our key contact personnel make an effort to understand the situation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
37. Problems are resolved by our key contact personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
38. The knowledge/experience of our key contact personnel is adequate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
39. Your customer of customer received accurate information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
40. Your customer of customer received adequate information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
41. Your customer of customer received complete information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
42. Your receipt procedures are effective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
43. Your receipt procedures are easy to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
44. Your receipt procedure are flexible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

	1	2	3	4	5	6	7
45. Products received from our warehouse are undamaged	<input type="checkbox"/>						
46. The transportation or carrier does not make product damage	<input type="checkbox"/>						
47. Correction of wrong delivery is satisfactory	<input type="checkbox"/>						
48. Our reporting process of mistake is adequate	<input type="checkbox"/>						
49. Response to quality of mistake reports is satisfactory	<input type="checkbox"/>						
50. Delivery on the promised date	<input type="checkbox"/>						
51. Time between receiving and delivery is short	<input type="checkbox"/>						
52. The amount of receiving time on back-order is short	<input type="checkbox"/>						

SECTION 3: OVERALL VIEW OF LSP'S PERFORMANCE

The questions below concern your perception of your company's performance.

53. What is your company's *transport costs per sales ratio (%)*?

- 0 – 2.0 2.1 – 3.0 3.1 – 4.0 4.1 – 5.0
 5.1 – 6.0 6.1 – 7.0 higher than 7.0

54. What is your company's *order cycle time (days)*?

- 0 - 4 5 - 10 11 - 15 16 - 20
 21 - 25 26 - 30 more than 30

55. What is your company's *delivery cycle time (days)*?

- less than 1 1 - 2 3 – 4 5– 6 7 - 8 9 – 10
 more than 10

56. What is your company's *delivered in-full on-time (%)*?

- less than 75 75 - 80 81 - 85 86 – 90
 91 - 95 96 - 99 100

57. What is your company's *returned rates (%)*?

- 0 – 1.0 1.1 – 2.0 2.1 – 2.5 2.6 – 3.0
 3.1 – 3.5 3.6 – 4.0 higher than 4.0

58. How important are green service quality competencies for your logistics service quality?

- Not at all Important Unimportant Somewhat Unimportant
 Neither Unimportant nor Important Somewhat Important Important Very Important

SECTION 4: RESPONDENT INFORMATION

The following set of questions relate to your company. Please respond with an answer that best reflect your own perceptions.

59. Type of business?

- Transport Warehouse Logistics Packaging
 other related to transport

60. Number of years in business in Thailand? Years

61. Average number of your company's employees? (please tick an appropriate box)
- 1 to 30 31 to 50 51 to 200 more than 200
62. Your company's average fixed assets?
- less than 30 million baht 31 to 50 million baht 51 to 200 million baht
- more than 200 million baht
63. Ownership structure of your company?
- Total Thai-owned company Multi-national company Other (please specify)
64. What is your current position in the company?
- Chief Executive/Owner/Partner Director/Board Member Manager
- Supervisor/Junior/First Line Manager Other (please specify)
65. How many years have you been in your current position? years

Thank you for taking the time to complete this questionnaire. Your assistance in providing this information is very much appreciated. If there is anything else you would like to tell us about this survey or other comments you wish to make that you think may help us to understand your needs as a LSP, please do so in the space provided below.

Please return your completed questionnaire **by** **2014** in the envelope provided to:

Siriwan Chaisurayakarn
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Thung-Sukla, Sriracha
Chonburi 20230
Mobile: (66) 846389980 email: chsiriwan@yahoo.com

Thank you for your co-operation!

Capability of Green Logistics Service Quality in Thailand Perspective

General Information

7. Your responses will be kept **strictly confidential and anonymous**.
8. This research work is to seek the important impact of green service quality (GSQ) and logistics service quality (LSQ) on a Thai's Logistics Service Provider's overall performance.
9. Definitions:
 - Green service quality (GSQ) is the environmental issue which is crucial to operational service quality, particularly in logistics service provision.
 - Logistics service quality (LSQ) is the component of service quality which is crucial to operational service quality, particularly in logistics service provision.
10. According to your experience, please provide your opinion as a logistics service provider's customer.
11. If you think you are not the right person to answer the questionnaire, please pass it to the person who you think might be knowledgeable to answer it.
12. This survey takes approximately 10-15 minutes to complete.

If you would like to receive a summary of results, please write your e-mail address below.

E-mail:

Please return the completed questionnaire by 2014.

Thank you for your co-operation!

SECTION 1: GREEN SERVICE QUALITY

This section seeks your perceptions of the importance of environmental or green factors affecting your LSP logistics services to your company. By using the following the 7-point scale, please identify the importance of the following statements.

	Not at all						
	Very Important			Important			
	1	2	3	4	5	6	7
1. Fuel costs decreased by alternative fuels (e.g. bio-diesel, hybrid energy, NGV)	<input type="checkbox"/>						
2. Improving the corporate image of your company and your LSP's reputation from using alternative fuels	<input type="checkbox"/>						
3. Decreasing your product availability from using alternative fuels	<input type="checkbox"/>						
4. Decreasing CO ₂ emissions from your LSP using environmentally-friendly vehicle technologies	<input type="checkbox"/>						
5. Your LSP's technological innovation increased by implementing vehicle technologies	<input type="checkbox"/>						
6. Your LSP's fixed-costs increased by implementing vehicle technologies	<input type="checkbox"/>						
7. Increasing your product availability from your LSP's alternative transportation modes	<input type="checkbox"/>						
8. Increasing the flexibility of your product size from your LSP's alternative transportation modes	<input type="checkbox"/>						
9. Transportation costs decreased by your LSP's alternative transportation modes	<input type="checkbox"/>						
10. Your LSP staff is fully trained on environmental and safety issues	<input type="checkbox"/>						
11. Reduction of accident rates due to your LSP staff trained on environmental and safety issues	<input type="checkbox"/>						
12. CO ₂ emissions reduced by your LSP staff trained on environmental and safety issues	<input type="checkbox"/>						
13. Distribution network improved by your LSP implementing green logistics	<input type="checkbox"/>						
14. Lead times reduced by your LSP implementing a design of green logistics system	<input type="checkbox"/>						
15. Increasing your product availability from your LSP implementing a design of green logistics system	<input type="checkbox"/>						
16. Availability increased by your LSP implementing green logistics	<input type="checkbox"/>						
17. Your LSP effective transportation affecting consolidation	<input type="checkbox"/>						
18. Your LSP's back haul is reduced by effective transportation	<input type="checkbox"/>						
19. Enhancing environmental knowledge sharing between your company and your LSP	<input type="checkbox"/>						
20. Achieving Environmental targets between your company and your LSP	<input type="checkbox"/>						

	1	2	3	4	5	6	7
21. Increasing your LSP environmental issues collaborate with your company	<input type="checkbox"/>						
22. Your LSP's back haul is reduced by collaboration with your company and their other customers	<input type="checkbox"/>						
23. Decreasing waste within your LSP's operations and processes	<input type="checkbox"/>						
24. Complying with environmental regulations	<input type="checkbox"/>						
25. Your LSP operational efficiency increased by implementing environmental management system	<input type="checkbox"/>						
26. CO ₂ emissions reduced by awareness of your LSP stakeholders	<input type="checkbox"/>						
27. Environmental impacts in your LSP changed, particularly staff's environmental education and safety	<input type="checkbox"/>						
28. Increasing awareness of your LSP stakeholders' green impact	<input type="checkbox"/>						

SECTION 2: LOGISTICS SERVICE QUALITY

This section seeks your perceptions of the importance of logistics services that your LSP provides to your company. By using the following the 7-point scale, please identify the importance of the following statements.

	Not at all Very Important							Important						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
29. Flexible delivery according to your demand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Mistake of delivery in terms of required quantities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Rare case of wrong shipment in terms of items	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Rare case of wrong shipment in terms of quantities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Rare case of wrong shipment in terms of substituted items	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Substituted items sent to your customers work fine due to damages from your company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Products ordered from your customers meet your product specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Your LSP key contact personnel make an effort to understand the situation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Problems are resolved by your LSP key contact personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. The knowledge/experience of your LSP key contact personnel is adequate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Your customer received accurate information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Your customer received adequate information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Your customer received complete information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Your LSP receipt procedures are effective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Your LSP receipt procedures are easy to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Your LSP receipt procedure are flexible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	1	2	3	4	5	6	7
45. Products received from your LSP's warehouse are undamaged	<input type="checkbox"/>						
46. The transportation or carrier does not make product damage	<input type="checkbox"/>						
47. Correction of wrong delivery is satisfactory	<input type="checkbox"/>						
48. Your LSP reporting process of mistake is adequate	<input type="checkbox"/>						
49. Response to quality of mistake reports is satisfactory	<input type="checkbox"/>						
50. Delivery on the promised date	<input type="checkbox"/>						
51. Time between receiving and delivery is short	<input type="checkbox"/>						
52. The amount of receiving time on back-order is short	<input type="checkbox"/>						

SECTION 3: OVERALL VIEW OF LSP'S PERFORMANCE

The questions below concern your perception of your LSP's performance.

53. What is your LSP's *transport costs per sales ratio (%)*?

- 0 – 2.0 2.1 – 3.0 3.1 – 4.0 4.1 – 5.0
 5.1 – 6.0 6.1 – 7.0 higher than 7.0

54. What is your LSP's *order cycle time (days)*?

- 0 - 4 5 - 10 11 - 15 16 - 20
 21 - 25 26 - 30 more than 30

55. What is your LSP's *delivery cycle time (days)*?

- less than 1 1 - 2 3 – 4 5 – 6 7 - 8
 9 – 10 more than 10

56. What is your LSP's *delivered in-full on-time (%)*?

- less than 75 75 - 80 81 - 85 86 – 90
 91 - 95 96 - 99 100

57. What is your LSP's *returned rates (%)*?

- 0 – 1.0 1.1 – 2.0 2.1 – 2.5 2.6 – 3.0
 3.1 – 3.5 3.6 – 4.0 higher than 4.0

58. How important are green service quality competencies for your logistics service quality?

- Not at all Important Unimportant Somewhat Unimportant
 Neither Unimportant nor Important Somewhat Important Important Very Important

SECTION 4: RESPONDENT INFORMATION

The following set of questions relate to your company. Please respond with an answer that best reflect your own perceptions.

59. Type of business?

- Food industry Textile industry Plastic industry
 Automobile and Parts industry Electronics & Parts industry
 Others (please specify)

60. Number of years in business in Thailand? Years
61. Average number of your company's employees? (please tick an appropriate box)
- 1 to 30 31 to 50 51 to 200 more than 200
62. Your company's average fixed assets?
- less than 30 million baht 31 to 50 million baht 51 to 200 million baht
- more than 200 million baht
63. Ownership structure of your company?
- Total Thai-owned company Multi-national company Other (please specify)
64. What is your current position in the company?
- Chief Executive/Owner/Partner Director/Board Member Manager
- Supervisor/Junior/First Line Manager Other (please specify)
65. How many years have you been in your current position? years

Thank you for taking the time to complete this questionnaire. Your assistance in providing this information is very much appreciated. If there is anything else you would like to tell us about this survey or other comments you wish to make that you think may help us to understand your needs as a LSP, please do so in the space provided below.

Please return your completed questionnaire **by** **2014** in the envelope provided to:

Siriwan Chaisurayakarn
Faculty of Management Science, Kasetsart University, Sriracha Campus
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Thung-Sukla, Sriracha
Chonburi 20230
Mobile: (66) 846389980 email: chsiriwan@yahoo.com

Thank you for your co-operation!

Appendix 4: Structured Interviews

Green Logistics Service Quality Competencies in Thailand

To be read to Interviewees

Confidentiality:

Interviewees are assured of complete confidentiality and recording is for researcher's purposes only instead of notes. No organisation or individual will be identified within the research output. Please confirm that you are happy to proceed with this interview on that basis.

Objectives of the research:

This research complements previous studies to examine the importance of green service quality (GSQ) and logistics service quality (LSQ) on a Thai's Logistics Service Provider's overall performance. Interviewees are being asked to provide responses about GSQ competencies, LSQ competencies and the importance of these competencies to an LSP's performance.

Definition:

Green service quality (GSQ) is defined as the environmental initiatives crucial to operational service quality, particularly in logistics service provision.

Logistics service quality (LSQ) is defined as the components of order release quantities; ordering procedures; order accuracy; order condition; order quality; timeliness; personnel contact quality, information quality, and order discrepancy handling.

Structured Interview Protocol

1. In your opinion, what are the most important LSQ competencies firms, particularly LSPs should have in Thailand? Why?
 - a. From the list in table 1, which one (s) do you think is (are) the most important LSQ competencies by ?
 - b. Please rate the importance of each checked LSQ competency from 1 to 10, with 1 being the most important. Why?

Table 1: List of LSQ competencies from the existing theory & interviews in Ph 1 for Q 1.1 & Q 1.2

1. Flexibility to deliver depending on customer demand	<input type="checkbox"/>	13. Information communicated to LSP customers is complete	<input type="checkbox"/>
2. Failure to deliver required quantities to LSP customers	<input type="checkbox"/>	14. Collection procedures are effective	<input type="checkbox"/>
3. Shipments rarely contain incorrect or wrong items	<input type="checkbox"/>	15. Collection procedures are easy to use	<input type="checkbox"/>
4. Shipments rarely contain incorrect or wrong quantities	<input type="checkbox"/>	16. Collection procedure are flexible	<input type="checkbox"/>
5. Shipments rarely contain substituted items	<input type="checkbox"/>	17. Products received from LSP's warehouse are undamaged	<input type="checkbox"/>
6. Substituted items sent to their customers work fine due to damages from LSP customers	<input type="checkbox"/>	18. Damage rarely occurs as a result of the transport mode or carrier	<input type="checkbox"/>
7. Products ordered from their customers meet their product specifications	<input type="checkbox"/>	19. Correction of delivered quality discrepancies is satisfactory	<input type="checkbox"/>
8. LSP designated key contact personnel make an effort to understand the situation	<input type="checkbox"/>	20. LSP's reporting process of the discrepancy is adequate	<input type="checkbox"/>
9. Problems are resolved by LSP designated key contact personnel	<input type="checkbox"/>	21. Responding to quality discrepancy reports is satisfactory	<input type="checkbox"/>
10. Knowledge/experience of LSP key contact personnel is adequate	<input type="checkbox"/>	22. Deliveries arrive on the date promised	<input type="checkbox"/>
11. Information communicated to LSP customers is accurate	<input type="checkbox"/>	23. Time between placing collection and receiving delivery is short	<input type="checkbox"/>
12. Information communicated to LSP customers is adequate	<input type="checkbox"/>	24. The amount of time a collection is on back-order is short	<input type="checkbox"/>

2. In your opinion, what are the most important GSQ competencies firms, particularly LSPs should have in Thailand? Why?
 - a. From the list in table 2, which one (s) do you think is (are) the most important GSQ competencies by ?
 - b. Please rate the importance of each checked GSQ competency from 1 to 10, with 1 being the most important. Why?

Table 2: List of GSQ competencies from the existing theory & interviews in Ph 1 before Q 2.1 & Q 2.2

1. Reduce fuel cost from using alternative fuel	<input type="checkbox"/>	15.Product availability increase from LSP implementing logistics system design	<input type="checkbox"/>
2. Corporate image improvement from using alternative fuel	<input type="checkbox"/>	16.Higher fill-rates from LSP implementing green logistics	<input type="checkbox"/>
3. Product availability reduction due to use alternative fuel	<input type="checkbox"/>	17.Product consolidation from LSP's transport management	<input type="checkbox"/>
4. CO ₂ emissions reduction by implementing vehicle technologies	<input type="checkbox"/>	18.Back haul reduction by effective transportation	<input type="checkbox"/>
5. Technology innovation increase	<input type="checkbox"/>	19.Environmental knowledge sharing enhancement between LSP and its customers	<input type="checkbox"/>
6. Fixed-costs increase by implementing vehicle technologies	<input type="checkbox"/>	20.Environmental targets achieved between LSP and its customers	<input type="checkbox"/>
7. Product availability increase due to transport modal choice	<input type="checkbox"/>	21.Enhancing LSP environmental issues collaborate with its customers	<input type="checkbox"/>
8. Flexibility of product size increase due to transport modal choice	<input type="checkbox"/>	22.Back haul reduction by collaboration	<input type="checkbox"/>
9. Transportation costs decrease due to transport modal choice	<input type="checkbox"/>	23.Waste reduction within LSP's operations and processes	<input type="checkbox"/>
10.LSP's Staff are fully trained on environmental and safety issues	<input type="checkbox"/>	24.Complying with environmental regulations	<input type="checkbox"/>
11.Accident rates reduction due to LSP's staff training on environmental and safety issues	<input type="checkbox"/>	25.Increasing LSP's overall operational efficiency - implementing Environmental Management System	<input type="checkbox"/>
12.CO ₂ emissions reduction due to LSP's staff training on environmental and safety issues	<input type="checkbox"/>	26.CO ₂ emissions reduction from awareness of LSP stakeholders	<input type="checkbox"/>
13.Distribution network improvements from LSP implementing green logistics	<input type="checkbox"/>	27.Environmental aspects changes particularly LSP's staff's environmental education and safety	<input type="checkbox"/>
14.Lead times reduction from LSP implementing logistics system design	<input type="checkbox"/>	28.Green awareness increase of LSP stakeholders	<input type="checkbox"/>

3. From the Thai Logistics Performance Index (LPI) developed by the Thailand Ministry of Industry, Please you rate the importance of the following TLPIs from 1 to 5, with 1 being the most important. Why?

		rate	rank
P1	Transport costs per sale ratio (%)	.....	.....
P2	Order cycle time (days)	.....	.....
P3	Delivery cycle time (days)	.....	.....
P4	Delivery in-full on-time (%)	.....	.....
P5	Returned rates (%)	.....	.....

4. What do you think about the relationships between GSQ and LSQ? What is the direction of the relationships? Please rate the strength of relationships from 1 to 10, with 10 being the strongest. Why?

5. What do you think about the relationships between LSQ and TLPs? What is the direction of the relationships? Please rate the strength of relationships from 1 to 10, with 10 being the strongest. Why?
6. What do you think about the relationships between GSQ and TLPs? What is the direction of the relationships? Please rate the strength of relationships from 1 to 10, with 10 being the strongest. Why?
7. Have I missed anything, do you have any comments/suggestions?

Thank you for your participation.

Appendix 5: Findings from Phase Two

Coding for the questionnaire survey

Question 1 – 52	1 = Not at all important
Importance level of GSQ and LSQ competencies	2 = Unimportant
	3 = Somewhat unimportant
	4 = Neither Unimportant nor Important
	5 = Somewhat Important
	6 = Important
	7 = Very Important
Question 53	7 = 0 – 2.0
Transport cost per sales ratio (%)	6 = 2.1 – 3.0
	5 = 3.1 – 4.0
	4 = 4.1 – 5.0
	3 = 5.1 – 6.0
	2 = 6.1 – 7.0
	1 = higher than 7.0
Question 54	7 = 0 - 4
Order cycle time (days)	6 = 5 - 10
	5 = 11 - 15
	4 = 16 - 20
	3 = 21 - 25
	2 = 26 - 30
	1 = more than 30

Question 55

Delivery cycle time (days)

7 = less than 1

6 = 1 - 2

5 = 3 - 4

4 = 5 - 6

3 = 7 - 8

2 = 9 - 10

1 = more than 10

Question 56

DIFOT (%)

1 = less than 75

2 = 75 - 80

3 = 81 - 85

4 = 86 - 90

5 = 91 - 95

6 = 96 - 99

7 = 100

Question 57

Returned rates (%)

7 = 0 - 1.0

6 = 1.1 - 2.0

5 = 2.1 - 2.5

4 = 2.6 - 3.0

3 = 3.1 - 3.5

2 = 3.6 - 4.0

1 = higher than 4.0

Question 58

Importance of GSQ competencies relate to LSQ competencies

1 = Not at all important

2 = Unimportant

3 = Somewhat unimportant

4 = Neither Unimportant nor Important

5 = Somewhat Important

6 = Important

7 = Very Important

Question 59 – LSPs

Type of business

- 1 = Transport
- 2 = Warehouse
- 3 = Logistics
- 4 = Packaging
- 5 = other related to transport

Question 59 – LSPs customers

Type of business

- 1 = Food industry
- 2 = Textile industry
- 3 = Plastic industry
- 4 = Automobile and Parts industry
- 5 = Electronics & Parts industry
- 6 = Others (please specify)

Question 60: Number of years in business in Thailand

..... Years

Question 61: Average number of employees

- 1 = 1 to 30
- 2 = 31 to 50
- 3 = 51 to 200
- 4 = more than 200

Question 62: Average fixed assets

- 1 = less than 30 million baht
- 2 = 31 to 50 million baht
- 3 = 51 to 200 million baht
- 4 = more than 200 million baht

Question 63: Ownership of structure company

- 1 = Total Thai-owned company
- 2 = Multi-national company
- 3 = Other (please specify)

Question 64: Current position

- 1 = Chief Executive/Owner/Partner
- 2 = Director/Board Member
- 3 = Manager
- 4 = Supervisor/Junior Line Manager
- 5 = Other (please specify)

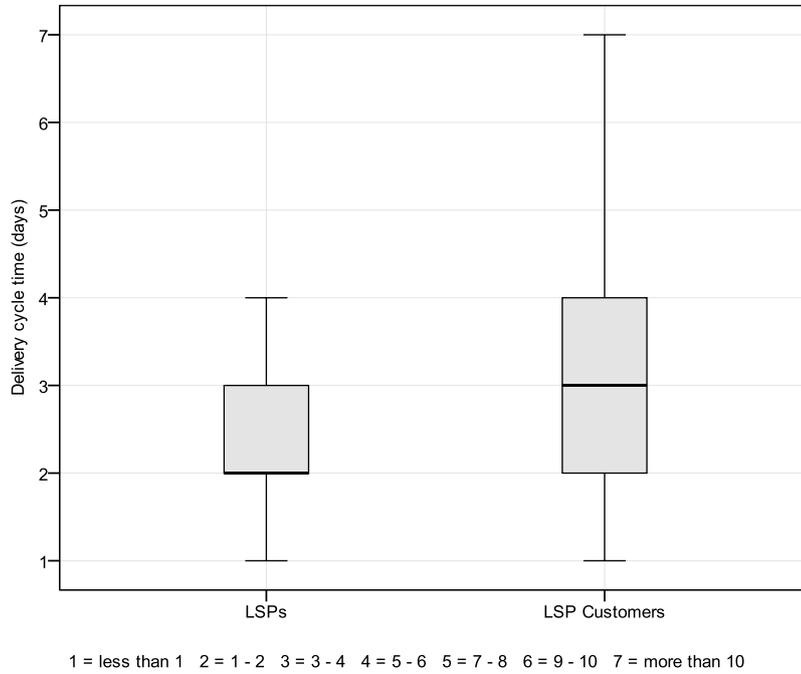
Question 65: Years in current position

..... Years

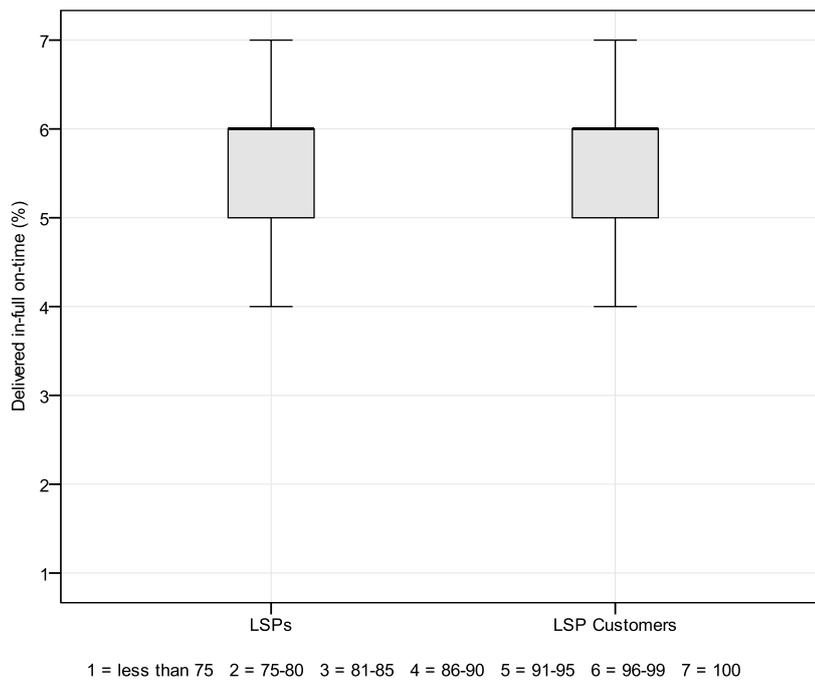
Boxplot: TLPis

Section 7.4.6.1: Differences of the Perceptions of LSPs and LSP Customers on TLPis

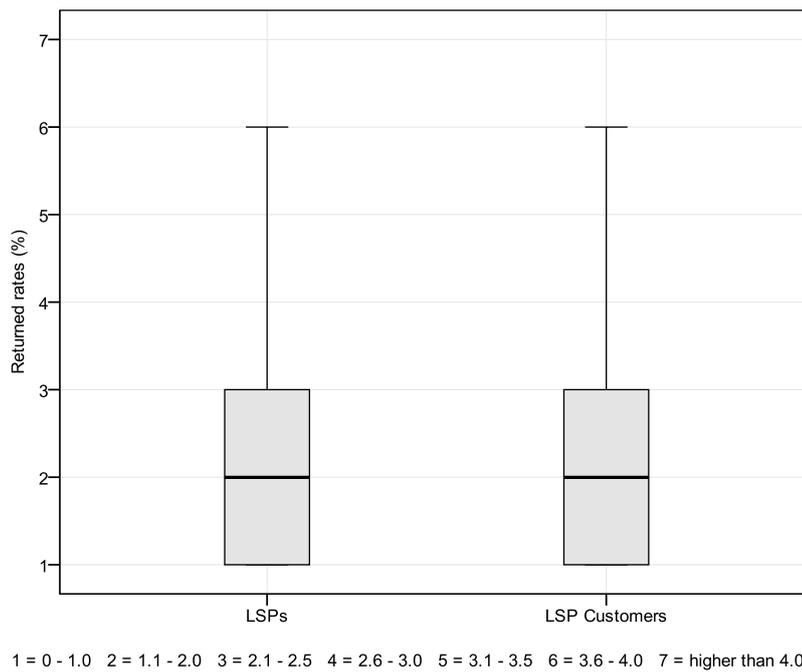
Delivery cycle time



DIFOT

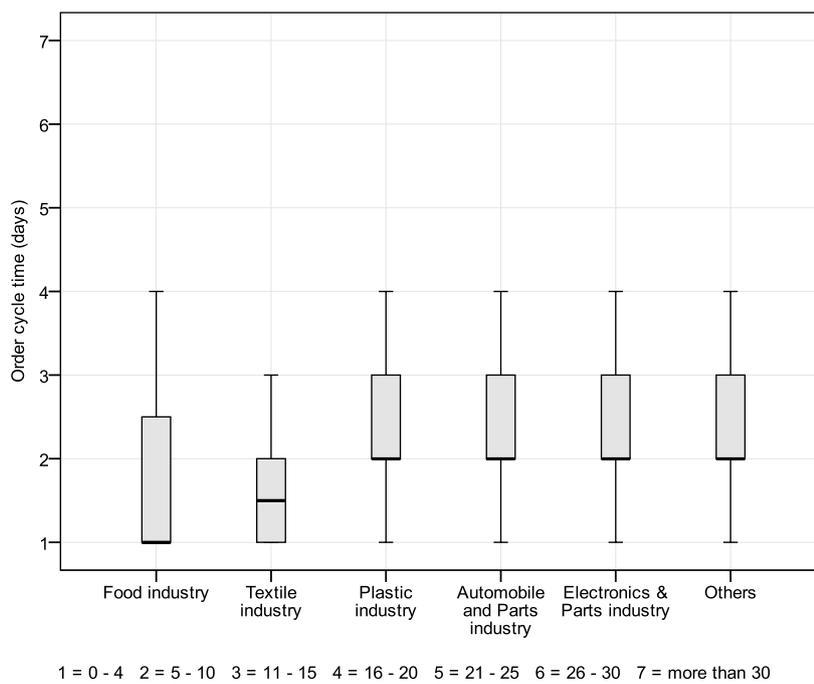


Returned rates

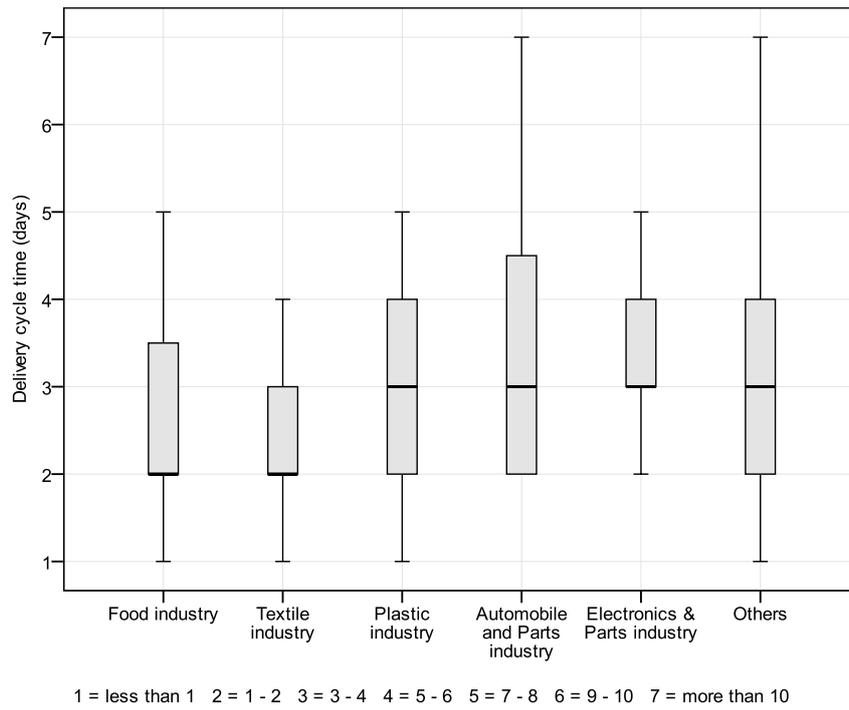


Section 7.4.6.2: Differences of the Perceptions of LSP Customers by Industry

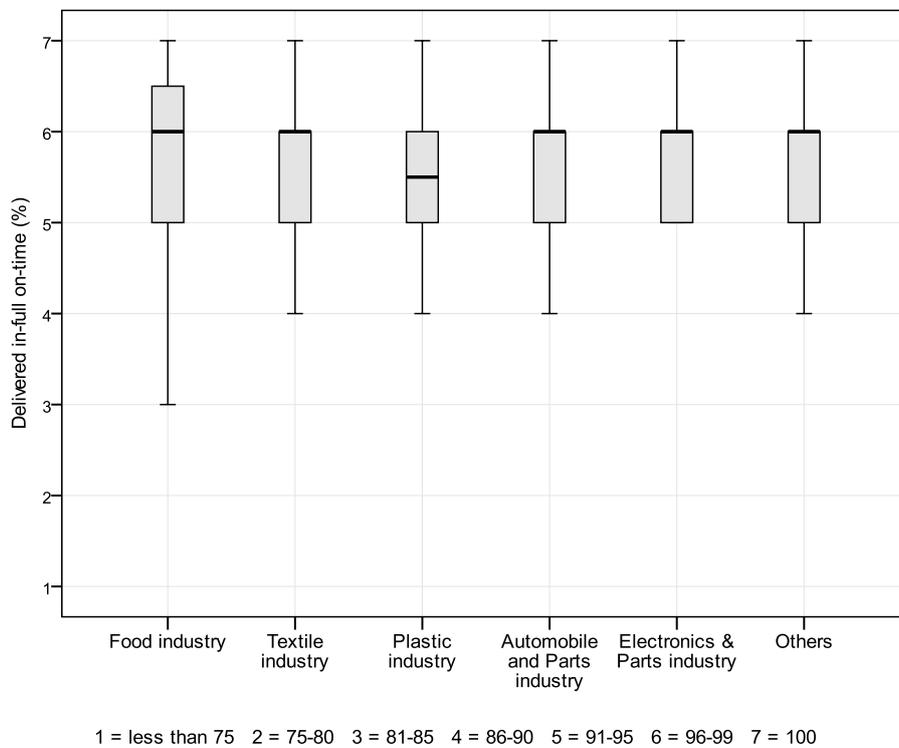
Order cycle time



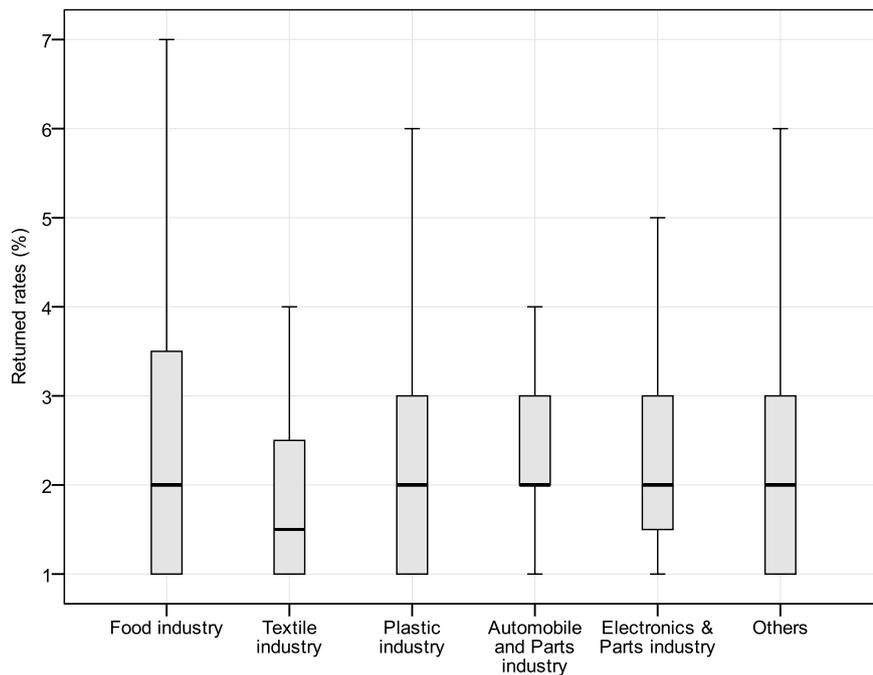
Delivery cycle time



DIFOT



Returned rates



1 = 0 - 1.0 2 = 1.1 - 2.0 3 = 2.1 - 2.5 4 = 2.6 - 3.0 5 = 3.1 - 3.5 6 = 3.6 - 4.0 7 = higher than 4.0

Section 10.5.2: TLPI Benchmarking

Delivery cycle time = Average delivery time since logistics providers loading and transport goods till LSP customers of customers receive the goods

Note: Unit - Days

$$\text{DIFOT} = \left[\frac{\text{Number of delivery in-full per month} \times \text{Number of delivery on-time}}{\text{Total number of delivery to lead customers}} \right] \times 100$$

Returned rates = (The amount of goods returned due to damages from transport, repair, expiration etc.) divided by total amount of goods delivered and multiply with 100

Appendix 6: Conference Papers Resulting from the Thesis

- Chaisurayakarn, S., Grant, D. and Talas, R. (2013) Investigating green logistics service quality competencies in Thailand, 18th Logistics Research Network (LRN) Conference. Birmingham: Aston University, 5th - 6th September 2013.
- Chaisurayakarn, S., Grant, D. and Talas, R. (2014) Green logistics service quality and logistics service provider performance, 6th International Conference on Logistics and Transport 2014. Kuala Lumpur, Malaysia, 26th – 29th August 2014.
- Chaisurayakarn, S., Grant, D. and Talas, R. (2014) The impact of green logistics service quality on Logistics service provider performance, 19th Logistics Research Network (LRN) Conference. Huddersfield: University of Huddersfield, 3rd – 5th September 2014.