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**DEVELOPING A CONCEPTUAL
MODEL OF INTERMODAL FREIGHT
TRANSPORT CHOICE:
A CASE STUDY OF
THAI RUBBER EXPORTERS**

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PhD

2016

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MODEL OF INTERMODAL FREIGHT
TRANSPORT CHOICE:
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THAI RUBBER EXPORTERS**

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A thesis submitted in partial fulfilment
of the requirements of the
University of Northumbria at Newcastle
for the degree of
Doctor of Philosophy

Research undertaken in the
Faculty of Business and Law

July 2016

Abstract

Freight transport decisions are nowadays affected by the impact of the external environment, particularly within commodity markets like the natural rubber industry. Consequently, shipping managers are confronted with uncertain circumstances such as economic changes causing high price volatility, economic crises and emerging new markets. As China becomes the worlds' largest rubber consumer and has introduced a mixture of rubber buyers to the market, the level of complexity in transportation has now increased substantially. This study considers freight transport mode choice. Despite the fact that mode choice selection is not exactly a new subject, the majority of existing studies conducted have been based only on surveys or secondary data, that have mainly sought to identify an optimized solution or the prioritisation of operational factors such as cost and transit time.

The purpose of this study is to investigate factors influencing decision makers when it comes to choosing the transportation alternatives currently available, or that might be used, by natural rubber exporters in Thailand. This research used a preliminarily conceptual framework derived from the combination of the Organisational Buying Behaviour (OBB) model in terms of contextual factors, with relevant literature in relation to operational factors. These include organisation, business environment, individual perceptions and past experience, and operational factors in order to assess primary qualitative data gathered as part of the research fieldwork.

This research has adopted a qualitative approach and methodology based on the interpretivist paradigm. The research was conducted using two methods: questionnaires and follow-up semi-structured interviews. To explore the background of the natural rubber industry, identifying its key demographic characteristics and the current situation with regard to freight transport usage, a questionnaire survey was conducted using a sample of 73 shipping managers. Fifty individuals completed and returned the questionnaires. In support of a substantive study, in-depth interviews of the managers of 21 companies were used to investigate what factors influence the selection of transport modes and how they impact on their decisions. The interviewed transcripts were analysed using template analysis.

The conceptual model data gave a clearer picture of linkages and relationships between five dimensions: environmental characteristics, organisational characteristics, customer characteristics, transport decision making in the natural rubber industry and operational factors. This model can provide a deeper understanding of freight transport choice decisions in terms of a combination of operational and behavioural factors. The developed model also enhances the power of explanation of those various factors feeding into the decisions of freight transport mode choice and will be disseminated to shipping managers within the commodity market sector.

Keywords: transport mode choice; decision-making; natural rubber industry; sectoral case study

Table of contents

Abstract	i
Table of contents	ii
List of tables	ix
List of figures	xi
Acknowledgements	xiv
Declaration	xv
Chapter 1 : Introduction	1
1.1 Introduction	1
1.2 Project description.....	3
1.2.1 Research question	3
1.2.2 Research aims	3
1.2.3 Research objectives	3
1.2.4 The Potential value of the research	4
1.3 The Research design framework of this research.....	4
1.3.1 Epistemological stance.....	6
1.3.2 Theoretical perspective	6
1.3.3 Methodology.....	7
1.3.4 Methods	7
1.4 Structure of the Thesis	8
Chapter 2 : Literature review	11
2.1 Introduction	11
2.2 Logistics and supply chain management: its evolution and definitions.....	11
2.2.1 Definition of supply chain management	12
2.2.2 Definition of logistics.....	13
2.2.3 Definition of freight transport	16
2.2.4 Global logistics	21
2.3 Mode choice.....	24
2.3.1 Modelling approaches for the study of freight transport mode choice ..	25

2.3.2	The decision variables with regard to freight transport mode choice and carrier selection	27
2.3.3	Summary.....	34
2.4	The concepts and theories involving decision making processes	37
2.4.1	Decision-making approaches in organisations.....	37
2.4.2	Models of Organisational Buying Behaviour (OBB)	46
2.5	The identified research gap	64
2.6	Theoretical framework for this study	67
2.7	Frame of reference.....	71
2.7.1	Intermodal transport chain approach in this study.....	71
2.7.2	Taking a position in terms of modelling approach for this study.....	73
2.7.3	Identifying/categorising factors	74
2.7.4	The preliminary conceptual framework.....	77
Chapter 3	: Research methodology and methods.....	79
3.1	Introduction	79
3.2	Research Questions	79
3.3	Research Design Framework	80
3.3.1	Research (Philosophy) Paradigms/Theoretical Perspectives.....	80
3.3.2	Methodology.....	84
3.3.3	Methods	88
3.3.4	The Research Design Framework of this Research.....	90
3.4	The Research Process in this Study.....	92
3.5	Methods of Data Collection and Analysis - Phase I	94
3.5.1	Survey Questionnaires	94
3.5.2	The Questionnaire Survey Data Analysis	100
3.6	Methods of Data Collection and Analysis - Phase II	101
3.6.1	Semi-structured Interviews	101
3.6.2	Qualitative Data analysis.....	107
3.7	Ethical Considerations.....	114
3.7.1	Recruiting Participants and Gaining Access	115
3.7.2	Informed Consent.....	116

3.7.3	Data Security and Storage	117
3.8	Trustworthiness in Qualitative Research	118
3.8.1	Credibility	118
3.8.2	Transferability.....	120
3.8.3	Dependability	121
3.8.4	Confirmability	122
3.9	Limitation of the study	122
3.10	Summary.....	123
Chapter 4 : Findings I – Current freight transport practice: the shippers’ perspectives		124
4.1	Introduction	124
4.2	Demographic profile of the surveyed respondents.....	124
4.3	Survey findings.....	125
4.3.1	The current practice for freight transport in rubber industry	126
4.3.2	The sequence of decision making among three elements of freight transportation	130
4.3.3	Determinant factors influencing the selection of intermodal freight transport regarding inland transport modes and loading ports	132
4.4	The alternative intermodal freight transport choices	138
4.5	Summary.....	139
Chapter 5 : Findings II – Factors influencing selection of intermodal freight transport		141
5.1	Introduction	141
5.2	Environmental characteristics.....	143
5.2.1	Situation factors	144
5.2.2	Nature of natural rubber industry trading	148
5.3	Organisational characteristics.....	155
5.3.1	The organisation hierarchical structure.....	156
5.3.2	Existing delivery system within the organisation	158
5.3.3	Logistics strategy and policies	160
5.4	Customer characteristics	164
5.4.1	Customer purchasing behaviours	165

5.4.2	Customer importance	169
5.4.3	Customer service requirements.....	172
5.5	Transport decision-making in the natural rubber industry	174
5.5.1	Perceptions of a certain transport mode	174
5.5.2	Vision on freight transport management.....	179
5.6	Operational factors	183
5.6.1	Ease of access.....	183
5.6.2	Delivery operations.....	186
5.6.3	Image - carrier (carrier or haulier) selection.....	191
5.6.4	Costs.....	194
5.7	Summary of factors influencing the choice of transport modes	198
Chapter 6 : Discussion –5 Forces influencing the choice of freight transport in the natural rubber industry in Thailand		207
6.1	Introduction	207
6.2	Transport decision-making in the natural rubber industry	208
6.2.1	Perception of a certain transport mode and transport providers.....	209
6.2.2	Visions of freight transport management	214
6.3	Organisational characteristics.....	217
6.3.1	The organisation hierarchical structure.....	218
6.3.2	Existing delivery system within the organisation	221
6.3.3	Logistics policies	224
6.4	Operational factors	228
6.4.1	Ease of access.....	229
6.4.2	Delivery operation	232
6.4.3	Image – carrier (carrier or haulier) selection	236
6.4.4	Costs.....	237
6.5	Environmental characteristics.....	240
6.5.1	Situational factors.....	242
6.5.2	The nature of rubber industry trading.....	246
6.6	Customer characteristics	253
6.6.1	Customer purchasing behaviours	253

6.6.2	Customer importance	255
6.6.3	Customer service requirements.....	257
6.7	Towards an understanding of how managers make decisions on freight transport mode choice in the Thai rubber sector	259
Chapter 7	: Conclusions	262
7.1	Introduction	262
7.2	Main findings.....	262
7.2.1	Research objective 1.....	263
7.2.2	Research objective 2.....	264
7.2.3	Research objective 3.....	265
7.2.4	Research objective 4.....	267
7.2.5	Research objective 5.....	268
7.3	Contributions and implications of the research	271
7.3.1	Academic contribution.....	271
7.3.2	Practical contribution.....	275
7.4	Limitations of this research.....	276
7.5	Recommendations for the Thai natural rubber industry	278
7.5.1	Natural Rubber exporters	278
7.5.2	Transport providers for exporting natural rubber.....	278
7.5.3	Policymakers in relation to the natural rubber sector	278
7.6	Recommendations for further research	279
7.6.1	Further research in the natural rubber Industry.....	279
7.6.2	Further research in other mode choice selection	279
7.6.3	Further research on the Conceptual Framework	279
Appendix A:	Context of the study.....	280
A.1	Thailand's geography and economy	281
A.1.1	Thailand's geography	281
A.1.2	Thailand's economy	283
A.2	The use of freight transport in Thailand.....	284
A.3	The natural rubber industry.....	286
A.3.1	The rubber market: its concept and definitions	287

A.3.2	Background to the Thailand's natural rubber industry.....	288
A.3.3	Rubber plantations in Thailand.....	289
A.3.4	Structure of Thailand's rubber supply chain.....	290
	Appendix B: Global transportation process	292
	Appendix C: The three modelling approaches for the study of freight transport mode choice	295
C.1	Input-oriented models.....	297
C.2	Outcome-oriented models	298
C.3	Process-oriented models	301
	Appendix D: Questionnaire	304
	Appendix E: A brief guide to the analysis of open-ended survey questions ...	310
	Appendix F: The list of interview questions	312
	Appendix G: Mapping of interview questions to the literature	315
	Appendix H: Map of Thailand.....	322
	Appendix I: The chronology with details of duration and dates of interviews	324
	Appendix J: Snapshot of NVivo	326
	Appendix K: An example of data translation	328
	Appendix L: An example of a coding tree.....	333
	Appendix M: The CEIS Research Ethics Sub-Committee CONSENT FORM – C335	335
	Appendix N: A project information sheet.....	337
	Appendix O: A formal letter asking for permission from the owners of the rubber companies to take part in this research	340
	Appendix P: Demographic profile of the surveyed respondents	342
P.1	Summary of the surveyed respondents' profile	343
P.2	Summary of the surveyed companies' profile.....	344
	Appendix Q: Quotations in Chapter Five.....	347
Q.1	Quotations from interview transcripts for Section 5.2, environmental characteristics.....	348
Q.2	Quotations from interview transcripts for Section 5.3, organisational characteristics.....	355
Q.3	Quotations from interview transcripts for Section 5.4, customer characteristics	362

Q.4 Quotations from interview transcripts for Section 5.5, transport decision-making in the natural rubber industry	369
Q.5 Quotations from interview transcripts for Section 5.6, operational factors...	374
Appendix R: Final template	381
Glossary	384
List of references.....	385

List of tables

Table 2.1: Evolution of logistics definitions (Source: Kent & Flint, 1997)	14
Table 2.2: Factors influencing the choice of mode (Source: Jeffs & Hills, 1990).....	27
Table 2.3: Six factors influencing freight transport choice after the 1980s (Source: McGinnis, 1990)	28
Table 2.4: Variables affecting freight transportation choice (Source: Murphy & Hall, 1995).....	30
Table 2.5: Selection criteria for transportation modes (Source: Punakivi & Hinkka, 2006).....	32
Table 2.6: The determinants of freight transport choice in Greece (Source: Moschovou & Giannopoulos, 2010).....	33
Table 2.7: An exhaustive list of factors affecting goods movements (Source: Adapted from Ortúzar & Willumsen, 2011, p. 462).....	33
Table 2.8: Summary of factors in the selection of freight transport modes (Compiled from the Literature Review)	35
Table 2.9: Types of Intuition (Source: Miller & Ireland, 2005, p. 22)	45
Table 2.10: Buygrid Framework: Major stages (Buyphases) of the industrial buying process in relation to major buying situations (Buyclasses) (Source: Kotler & Keller, 2016, p. 220)	48
Table 2.11: Characteristics of the freight transport choice process (Source: Lehmusvaara <i>et al.</i> , 1999, p. 6)	49
Table 2.12: Classification and examples of variables influencing organisational buying decisions (Source: Webster & Wind, 1996, p. 53).....	54
Table 2.13: Five potential sources of uncertainty that can affect transport operations (Source: Sanchez-Rodrigues <i>et al.</i> , 2010, p. 49)	59
Table 3.1: Matching the Research Objectives with Research Methods	80
Table 3.2: A summary of the two “ <i>continuums</i> ” of positivist and interpretivist paradigms (Source: Adapted from Gray, 2009, p. 23).....	83
Table 3.3: Main process in the Survey	99
Table 3.4: Data analysis methods used in the survey questionnaire	100
Table 3.5: Details of the interview participants	105
Table 3.6: A priori codes based upon literature and interview guides.....	112
Table 3.7: Criteria of Guba’s trustworthiness concept in a qualitative approach, mapped with quantitative research (Source: Adapted from Cohen, Manion & Morrison, 2011; Lincoln & Guba, 1985)	118

Table 4.1: Results of the sequence of decision making on two elements of freight transportation between shipping lines and ports.	130
Table 4.2: Results concerning the sequence of decision making involving two of the main elements of freight transportation including ports and transport modes.	131
Table 4.3: The important factors influencing inland transport mode selection.	134
Table 4.4: The possible reasons influencing the selection of inland freight transportation (Road, Rail, or Sea/Inland waterways).	137
Table 4.5: Rubber export routes to international consumers.	138
Table 5.1: Summary of factors influencing the choice of transport pathway for rubber products.	199
Table 6.1: Reasons for running and not running an own-account fleet for shippers' perspectives in the rubber industry	222

List of figures

Figure 1.1: A framework of research design – the interconnection of epistemology, theoretical perspective, methodology and methods of inquiry (Source: Adapted from Crotty, 1998).....	5
Figure 1.2: The outline of the thesis.....	10
Figure 2.1: Frame of reference in relation to literature review	11
Figure 2.2: Four SCM/logistics perspectives (Source: Larson & Halldorsson, 2004, p. 19).....	15
Figure 2.3: Freight transport activities in global supply chains (Source: Banomyong, 2000; Murphy, 2004 cited in Arunotayanun, 2009)	16
Figure 2.4: Comparing freight transport activities in global supply chains between Banomyong and Murphy	18
Figure 2.5: Five different aspects of intuition (Source: Dane and Pratt cited in Robbins & Coulter, 2012)	43
Figure 2.6: Comparing four process models of organisational buying.....	51
Figure 2.7: Sheth’s model (Source: Adapted from Lau <i>et al.</i> , 1999).....	53
Figure 2.8: An integrated model of organisational buying behaviour (Source: Adapted from Johnston & Lewin, 1996)	56
Figure 2.9: Factors in industrial buying decisions (Source: Lysons & Farrington, 2012, p. 408).....	57
Figure 2.10: A pyramid model of freight buyers’ needs (Hierarchy of needs) (Source: Lillie & Sparks, 1993).....	63
Figure 2.11: The interconnections among the three components of the conceptual frameworks for this study.....	70
Figure 2.12: Shipper’s perspective on intermodal transport; (Source: Adapted from Henstra & Woxenius, 1999 cited in Banomyong, 2000)	71
Figure 2.13: Intermodal transport chain (Source: Woxenius, 2007)	72
Figure 2.14: Intermodal transport chain approach in this study.....	73
Figure 2.15: Preliminary conceptual framework for selecting freight transport modes according to the literature	78
Figure 3.1: The relationship between epistemology, theoretical perspectives, methodology and research methods of Crotty’s framework (Source: Adapted from Crotty, 1998, p. 4).....	81
Figure 3.2: A framework of research design—the interconnection of epistemology, theoretical perspective, methodology and methods of inquiry (Source: Adapted from Crotty, 1998).....	91

Figure 3.3: The research process in this study	93
Figure 3.4: Timeline of the research tasks/activities.....	94
Figure 3.5: Step by step guide for developing a questionnaire (Source: Adapted from Churchill & Lacobucci, 2005)	95
Figure 3.6: A conceptual framework of the survey questionnaire	97
Figure 3.7: Qualitative data analysis and translation process of this research	110
Figure 3.8: The process of developing a template	111
Figure 3.9: The initial template for this study.....	113
Figure 4.1: Number of people involved in selecting freight transport modes.	126
Figure 4.2: The most common transport modes used for transit of the goods from the company location to the loading port.	127
Figure 4.3(a): The type of transportation management used for the transit of the goods from the companies to ports of loading; (b): The type of container loading used by the companies; and (c): INCOTERMS used in buyer-seller agreement.	128
Figure 4.4: The major ports of loading or custom houses used as export gateways.	129
Figure 4.5: The three main elements along the whole rubber transportation chain.	130
Figure 4.6: Inland transport modes' usage as a part of intermodal transport.....	136
Figure 5.1: The influence of environmental characteristics	144
Figure 5.2: Showing situational factors	144
Figure 5.3: The nature of natural rubber industry trading	148
Figure 5.4: Rubber export procedure; adapted from: http://www.rubberthai.com/service/export/export_index.html	149
Figure 5.5: Product characteristics	151
Figure 5.6: The influence of organisational characteristics.....	155
Figure 5.7: The influence of customer characteristics	165
Figure 5.8: The influence of transport decision-making in the natural rubber industry	174
Figure 5.9: The influence of operational factors	183
Figure 6.1: Five key areas influencing the choice of transport pathway in the natural rubber industry in Thailand	207
Figure 6.2: Diagram showing the basic model composed of three elements of transport activities (Source: Adapted from Magala & Sammons, 2008)	215
Figure 6.3: Summary of Transport decision making in the natural rubber industry (including links with organisational characteristics)	217
Figure 6.4: Summary of Organisational Characteristics	228
Figure 6.5: Summary of Operational factors	240

Figure 6.6: Summary of environmental characteristics (including link with operational factors)	253
Figure 6.7: Summary of customer characteristics (including link with environmental characteristics)	259
Figure 6.8: 5 Forces influencing the choice of intermodal freight transport in the natural rubber industry in Thailand	261
Figure 7.1: Alternative intermodal freight transport choices	266
Figure 7.2: Five forces influencing the choice of intermodal freight transport in the natural rubber industry in Thailand	269

Acknowledgements

I would like to offer my heartfelt thanks to the following people for supporting me throughout my PhD study, an achievement which would not have been possible without all of them. I would also like to acknowledge and thank the Suratthani Rajabhat University, Thailand, for their financial support towards my study.

To my supervisors Professor David Wainwright and Dr Andrew Robson, thank you for your guidance, encouragement and patience; for creating opportunities for me; and for continuing to make time for me in your very busy schedules.

Thank you to my Mum and Dad for inspiring me to continue my PhD, especially during the difficult times; and for your on-going support, both emotional and financial. Thank you also to my aunt, and to my two wonderful sisters, for your encouragement and support when I needed it.

Thank you to all my information management innovation research group friends for providing a good working environment.

Thank you to all the participants in the research; without your willingness to take time out to complete my surveys and interviews, this research would not have been possible.

Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the University Ethics Committee.

I declare that the Word Count of this Thesis is 84,587 words.

Name: Sangrawee Witoonpan

Signature:

Date:

Chapter 1: Introduction

1.1 Introduction

This introduction offers an explanation of why this study is necessary. Then in Section 1.2, the purposes, research questions and objectives of the study are described in detail, followed by a brief overview in Section 1.3 of the research design framework, including epistemology, theoretical perspective, methodology and methods of inquiry used in this study. Finally, the structure of the thesis is addressed.

Freight mode choice plays a significant role in freight purchase decisions for a majority of export companies (Emmett, 2009). Shipping managers have to handle multiple conflicting criteria to meet their requirements, particularly where the service criteria and cost constraints are a primary consideration, so that the movement of goods from one location to another can be completed in a cost-effective way. Meixell and Norbis (2008) note that decision making in the selection of transport modes and routes are intricate tasks because today's business environment is becoming increasingly complicated and competitive (Ng, 2010) and a single decision may determine whether or not a company can survive (Turban, Sharda & Delen, 2011). Making transportation decisions play a crucial role in export businesses.

Economic changes including the economic crisis and the growth of international trade and emerging markets, all lead to high price volatility and a mixture of rubber buyers involved in any given market. This has resulted in Thailand's exporters facing a more complicated situation than they have done in the past. For example, a recent study by Sainidis, Robson & Heron (2013) points out that "*delivery performance*" is still a primary consideration as it is an essential issue that causes problems such as "*lack of supply chain control*." The study also notes that the impact of this problem often results in "*delivery deadline failures*" and, consequently leading to customer dissatisfaction. For this reason, mode selection is one of the input sectors that results in the economic performance of manufacturing companies.

A detailed survey of freight transport management research from the angle of transport mode choice, indicates that studying transport mode selection is not new. Since the 1980s, there have been a number of research studies that have been conducted on transport selection determinants (Cullinane & Toy, 2000; Kim, 2014; Lu, 2003; Mitra & Leon, 2014; Moschovou & Giannopoulos, 2010; Punakivi & Hinkka,

2006; Tongzon, 2009; Ugboma, Ugboma & Ogwude, 2006). These studies vary broadly in terms of methodology, the type of industry studied, geographical limitations, the type of transport modes studied and the different perspectives of users and service providers. However, the majority of research studies into the topic are related to transportation mode choice and carrier selection. Traditionally, these merely study operational factors. In particular, cost and transit times are the main concerns of such studies. In addition, Meixell and Norbis (2008) point out that only a limited amount of research has adopted case studies or interview methodologies. Therefore, these methodologies would be useful for studying the field of transportation and the shipping industry because this would contribute towards a better understanding of the subject of mode choice selection.

The review of the existing research with regard to the topic studied indicates that the determinants of freight transport selection are diverse, and depend upon the background of the industry, the transport infrastructure and the constraints studied. Interestingly, the majority of the studies have investigated transport mode selection in Europe or the US. There is little research conducted in terms of South-East Asia. Furthermore, Hall and Wagner (1996) argue that the determinants of freight transport selection criteria for one mode may not be appropriate for another mode. Therefore, it is necessary to attempt to understand the more critical factors in a particular setting. As a consequence, this study's emphasis is on the context of the Thai rubber sector.

In the case of the Thai natural rubber processing industry, approximately three million tons of natural rubber products are exported every year, resulting in a huge amount of money spent on logistics. Therefore, it is worth noting that decision making with regard to the choice of transport modes in the context of natural rubber exporters is considered one of the most important areas of transportation management in Thailand. In addition, shipping managers make decisions in different ways, generally because the ways of human thinking vary from individual to individual and from situation to situation. This view is supported by Lillie and Sparks (1993) who write that purchasers are human and consequently are motivated by psychological variables.

Thus, understanding tangible (task) and intangible (non-task) determinants of mode selection is truly useful for logistics managers when it comes to making decisions more efficiently and effectively. Also, Thailand is a developing country that still lacks sufficient information and research in the area of mode choices in terms of freight transport (Goh & Pinaikul, 1998). For such reasons, decision making on transport modes and loading ports is a major component of this study. In order to help shipping

managers when it comes to managing transportation, this study intends to identify the determinant criteria, and understand how these factors may influence logistic and transport management. This research focuses on shipping managers' perspectives with regard to the selection criteria associated with transport mode choice.

1.2 Project description

The research question, aims and objectives of this study, which are relevant to intermodal freight transport mode choice, are defined as follows.

1.2.1 Research question

According to the relatively under-researched phenomenon of transport purchasing in the Rubber sector in Thailand, the study seeks to investigate and answer the research questions presented below:

“What are the determinants of managerial decision-making for inland transport modes, as part of intermodal freight transport and loading port selection in the context of the Thai rubber business sector? How do these factors have an impact on the choice process?”

1.2.2 Research aims

The aim of the research is to investigate factors influencing shipping managers in their choice of intermodal freight transport, and to develop a conceptual model of the factors influencing decision-makers in choosing the transport options currently available, or that might be used, by rubber exporters in southern Thailand. The expected outcome from this research study will contribute towards a better understanding of the factors which have an impact on the choice of intermodal freight transport. This study aims to answer the five objectives presented below in Section 1.2.3

1.2.3 Research objectives

- To evaluate the concepts and theories involving transport modes selection and decision making processes (see Chapter 2 for details);
- To investigate the current practice of freight transport usage in the context of the rubber industry in southern Thailand (see Chapter 4 for details);
- To explore the feasible range of alternatives in terms of intermodal freight transport pathways in southern Thailand (see Chapter 4 for details);

- To examine factors that could affect the choice process with regard to selecting transport modes (see Chapter 5 for details); and
- To propose a conceptual model aimed at providing an understanding of the factors that influence the intermodal freight transport choice from a shipper's perspective (see Chapter 6 for details)

1.2.4 The Potential value of the research

There has been a lack of comprehensive research into freight transport mode choice in Thailand for many years. The research aims to provide an understanding of intermodal freight transport choice based on Shippers' perspectives in the Thai rubber sector. This research will therefore be important to academics, exporters, and policy makers, due to the fact that the study attempts to present a conceptual model of understanding how decisions get made in the choice of transport modes by transport users. Such information could:

- enhance the understanding of freight transport mode choice from an Eastern perspective, which adds to the existing research that is dominated by a Western perspective;
- provide natural rubber exporters as well as transport providers with a feasible range of alternatives so that they can select the most appropriate transport mode;
- support all stakeholders in the entire rubber industry supply chain to allow a greater understanding of the strengths and weaknesses of each main international ports, in order that policy makers will have an awareness of the problems involved; and
- provide added academic value to the field of logistics and supply chain management, with an emphasis on intermodal freight transport research regarding the enhancement of the understanding of factors influencing the freight transport mode choice processes involved.

1.3 The Research design framework of this research

This research design was instrumented by Crotty's framework as presented in Figure 1.1. The framework is composed of the following four elements—epistemology, theoretical perspective, methodology and methods. This research adopted a constructivist epistemology—*“truth and meaning do not exist in some external world, but are created by the subject's interactions with the world. Meaning is constructed not discovered...”* (Gray, 2009, p. 18). This is congruent with the theoretical

perspective of the interpretive philosophical stance. In this respect, my intention was to construct meaning from viewpoints of individual experienced managers across 21 Thai rubber companies, in order to get a better understanding of how these managers make decisions on the selection of intermodal transport.

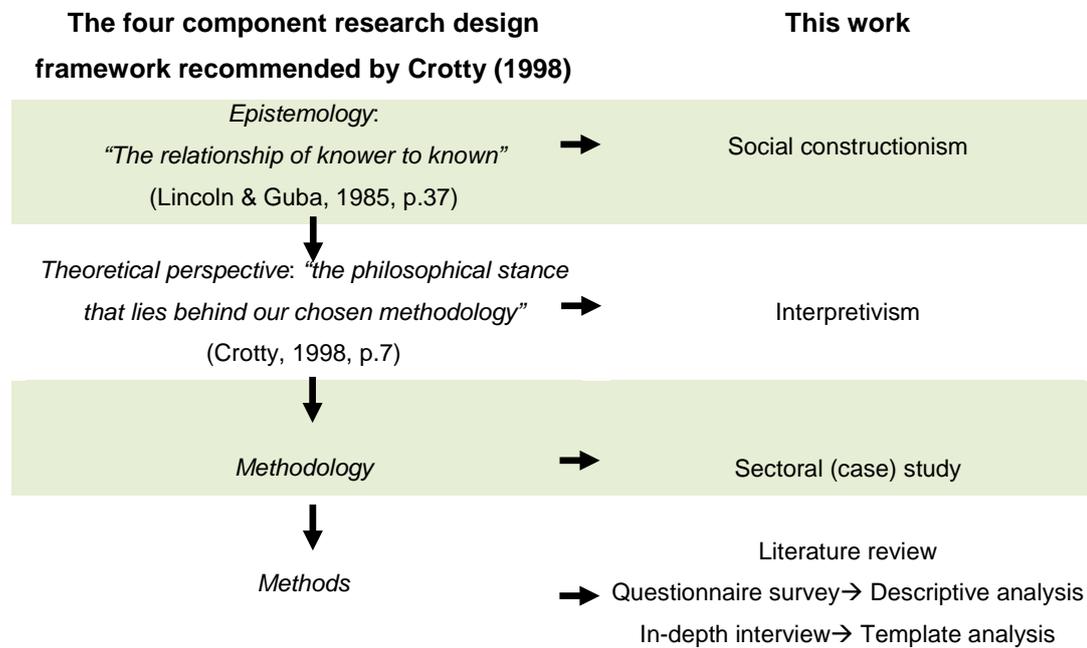


Figure 1.1: A framework of research design – the interconnection of epistemology, theoretical perspective, methodology and methods of inquiry (Source: Adapted from Crotty, 1998)

Therefore, a sectoral case study, with its qualitative emphasis in this study, was adopted as a research methodology – the strategy and the research design was linked to the desired outcomes – which in turn determined the choice of data collection and analysis methods. It is necessary here to clarify exactly what is meant by a sectoral case study approach. Stake (2000, p. 23) states that “...*the case need not be a person or enterprise.*” He argues that a sectoral case study can be viewed as: “...*whatever ‘bound system’ (to use Louis Smith’s term) is of interest. ...the boundaries are kept in focus. What is happening and deemed important within those boundaries (the emic) is considered vital and usually determines what the study is about*” (p. 23). According to a definition of a case provided by Stake (2000), a case does not have to be derived on an organisational level. For this study, a sectoral study is therefore used in its broadest sense to refer to “...*an enquiry that investigates a contemporary phenomenon within a real-life context*” (Yin, 2003, p. 13). This follows a “*bound system*” (Stake, 2000, p. 23), in which the Thai rubber sector can be viewed as a case in order to explore the points of view of a group of senior freight transport

managers, with an emphasis on how decisions get made about the choice of freight transport mode, and how experienced managers make these decisions. An additional clarification of the sectoral case study approach adopted in this study will be further provided in Section 3.3.2 dealing with research methodology.

Data was gathered using multi methods, including the use of survey questionnaires (Research Phase I) and in-depth interviews (Research Phase II), whereas descriptive analysis and template analysis were used as methods of data analysis in this study.

As this research involves a sectoral case study of the Thai rubber sector, an understanding of the Thai rubber context and freight transport in the country is essential. Consequently, the context background of the study provides an overview of Thailand's geography and its economy. Details of the use of freight transport in Thailand and the importance of the natural rubber industry to the country are provided in Appendix A: Description of the context of the study.

1.3.1 Epistemological stance

The intention of this research is to achieve a comprehensive understanding of experienced managers in their selection of intermodal freight transport, within a case study of the Thai rubber industry. Although managers work in the same industry; this study assumed that these participants construct different viewpoints on the selection of freight transport. Consequently, a constructionist approach was adopted as the epistemological stance for this study.

1.3.2 Theoretical perspective

Johnson and Clark state that in the field of business and management research, there is a *"...need to be aware of the philosophical commitments we make through our choice of research strategy since this has significant impact not only on what we do but we understand what it is we are investigating"* (Johnson and Clark, 2006, cited in Saunders, Lewis & Thornhill, 2009, p. 108). According to Sutrisna (2009) and Collis and Hussey (2009), there are two different continuums of major perspectives behind each piece of research: positivism and interpretivism (Collis & Hussey, 2009; Sutrisna, 2009). Interpretivism is mainly concerned with *"the systematic analysis of socially meaningful action through the direct detailed observation of people in natural settings in order to arrive at understandings and interpretations of how people create and maintain their social worlds"* (Neuman, 2006, p. 88). On the other hand, theoretical perspective can be positivist, in which the researcher focuses on natural science or a belief in a single reality and tends to test hypotheses (Saunders, Lewis &

Thornhill, 2012). In this current study, the researcher's intent was to "*make sense of (or interpret) the meaning others have about the world*" (Creswell, 2009, p. 8), and not to test any hypothesis. The inquiry adopted for this piece of research was based on an interpretive perspective.

1.3.3 Methodology

In this research, a sectoral case study has been chosen the most appropriate as the research methodology, as it is beneficial facilitates the understanding of soft or complex problems. Oates (2006, p. 142) notes that a case study is characterised by a "*focus on depth rather than breadth,*" a "*natural setting,*" a "*holistic study*" or a "*wide range of data sources.*" These characteristics seem to be reasonable for this research project as they attempt to obtain as much detail as possible about one instance of the phenomenon under investigation. In this respect, a case study enabled me to gain a significant amount of information in a particular context—individual viewpoints of experienced managers regarding their decision-making process in the selection of intermodal freight transport within the Thai rubber sector. In addition, case study based research is being used more and more in operational management research. Instances of social science studies research can be found in the work of Goldbach, Seuring and Back (2003) and Seuring (2001, 2002). Goldbach's intention was to explore and build theories by employing case based research to investigate the case of the Otto company (Goldbach *et al.*, 2003, cited in Seuring, 2005), which could also be seen in the case study of the Steilmann company, that was targeted for theory testing (Seuring, 2001, 2002). Therefore, it seems to make sense for me to adopt the sectoral case study method as my research methodology for this study.

1.3.4 Methods

There were two main primary data collection methods used in this study: a paper-based questionnaire survey and a semi-structured interview. As there was not enough information about freight transport in the rubber sector, this study therefore decided to start gathering survey data as an exploratory stage, so that the context of freight transport usage could be explored as a macro view, and then conduct in-depth interviews as the main stage of data collection.

With regards to the survey method, it is difficult to gather the rich details of all individual Thai rubber companies; therefore, this study decided to take advantage of paper-based questionnaire surveys, in order to enable me find out more about the context of the case under investigation, since not enough information about the usage

of freight transport in the rubber sector is available. Therefore, this research decided to gather data by using survey methods, so that the context of freight transport usage can be explored. This would also be useful for the recruitment of interview participants.

Moving onto the second phase, semi-structured interviews were applied as the main data collection method, which were designed in order to interview experienced managers. The aim of the main phase was to get in-depth and rich data about the viewpoints of experienced managers, to enable the researcher to develop theoretical perspectives or a conceptual model of understanding of how managers make decisions on their choice of intermodal freight transport based upon shipper's perspectives in Thai rubber processing companies. The details of the research methods used in this thesis, in terms of data collection and analysis methods, alongside the justification behind the choice of any tools, will be illustrated in Chapter 3, Sections 3.5 and 3.6.

1.4 Structure of the Thesis

The thesis is structured into seven chapters and the outline is presented in Figure 1.2.

In **Chapter 1** the rationale and essential purpose for conducting this study have been addressed. Additionally, a summary of the research design framework regarding the research methodology and methods used is provided. Furthermore, the background context of the study are also provided (see Appendix A), and composed of a consideration of Thai geography, the current status of the Thai economy, the use of freight transport in the country, together with details of the main loading port used for the export of natural rubber, and the importance of natural rubber for the Thai economy. The scope of this current study has been outlined through a description of the research questions, aims and objectives.

Chapter 2 is devoted to a review of the existing literature relating to four main aspects of the study. Firstly, definitions and the evolution of supply chain management and logistics management, together with the key terms related to freight transport as used in this study are provided. Secondly, reviews of previous studies on the choice of the transport mode in the various contexts are presented in order to demonstrate the existing gaps for this study to address. Thirdly, concepts and theories involving decision making processes are also included. The last three sections are devoted to a discussion of the identified research gap, the theoretical framework underpinning the

current study, and the frame of reference which will involve the primary research aspects of this work.

Chapter 3 provides a description and discussions regarding the adopted methodology and the methods used in this investigation. The research design framework which underpins this study is described in detail — theoretical perspectives, methodology and methods. A detailed description of the data collection and analysis methods are provided. It also describes the rationale behind the choice of the techniques used in the research. Additionally, ethical considerations are stated, and finally the concept of trustworthiness in qualitative research and the strategies employed in this study are explicated to ensure the quality of the research.

In **Chapter 4** the survey results from a descriptive analysis of the data obtained from the exploratory phase of the research, Finding I, are presented, in order to obtain an insight into the big picture and better understand the investigated context. A brief overview of the overall picture of freight transport movements in the Southern Thai rubber industry is provided, including demographic profiles of the surveyed respondents, company profiles, followed by a description of current practices in terms of intermodal freight transport within the Thai rubber sector. Additionally, managers' viewpoints on the factors which are recognised to have an impact on the selection of logistic pathways are considered. The final section of this chapter addresses the possible alternatives that either currently exist, or that might exist in terms of future freight transportation in the case of the Thai rubber industry.

In **Chapter 5**, excerpts obtained from the interviews undertaken as part of this study are presented. The first five sections are based on the final template that resulted from the use of the template analysis technique. The results cover five key areas - environmental characteristics, organisational characteristics, customer characteristics, individual decision managers in the natural rubber industry, and operational factors. The last section then offers a summary of factors from the five previous categories in one table, which are presented in multiple levels and sub-levels.

Chapter 6 contains a discussion of the main results, together with an explanation of the factors employed in the selection of intermodal transport modes. This chapter consists of five sections regarding the five main categories, which have been found to be influential and important determinants of intermodal freight transport choices as a result of the analysis detailed in Chapter 5. All of these factors are discussed comprehensively in relation to the findings of previous studies.

Chapter 7 contains a summary of the main research findings based on the individual research objectives of this study. This is followed by the contributions and limitations of this study. This chapter concludes with recommendations for further research.

Figure 1.2 shows the structure of this study, which highlights the scope of each chapter, its context, and the links between the chapters.

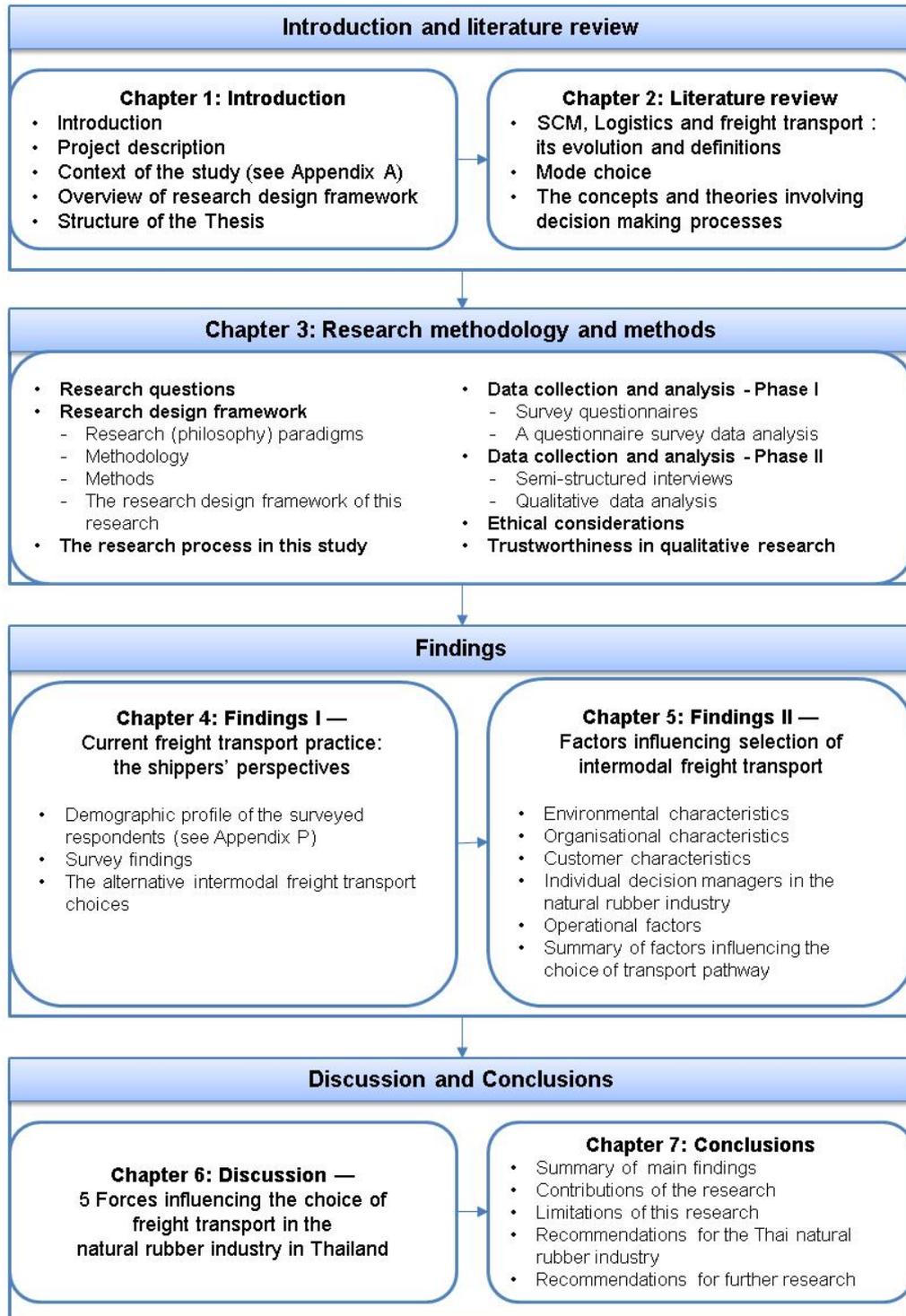


Figure 1.2: The outline of the thesis

Chapter 2: Literature review

2.1 Introduction

The purpose of Chapter 2 is devoted to a review of the existing literature relating to the four main aspects of the study (see Figure 2.1). It begins by providing definitions for and mapping the evolution of supply chain management (SCM) and logistics management, together with the key terms related to freight transport as used in this study. Secondly, reviews of previous studies on the choice of the transport mode in the various contexts are presented in order to demonstrate the existing gaps for this study to address. Thirdly, concepts and theories involving decision making processes are also included. The last three sections are devoted to a discussion of the identified research gap, the theoretical framework underpinning the current study, and the frame of reference which will involve the primary research aspects of this work.

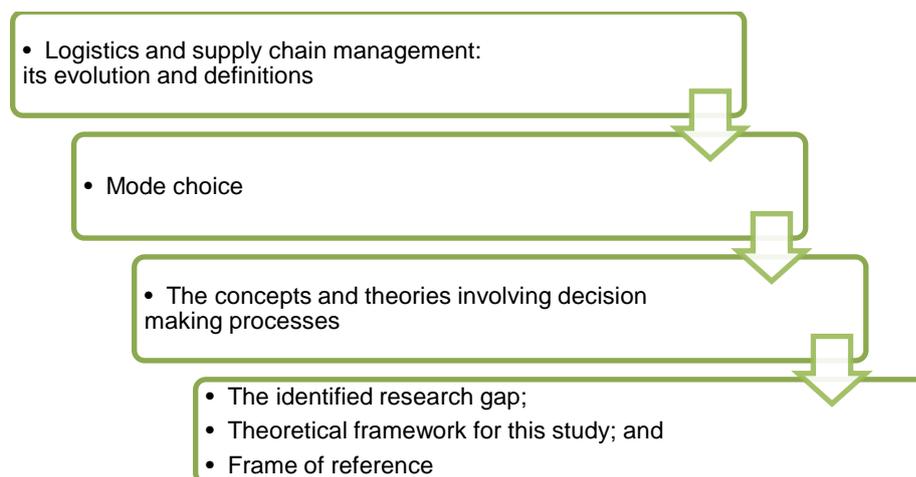


Figure 2.1: Frame of reference in relation to literature review

2.2 Logistics and supply chain management: its evolution and definitions

In the field of logistics and SCM, various definitions of some terms (e.g. logistics, SCM) are found which have been reformed over time with a lack of being universally accepted (Näslund & Williamson, 2010). To ensure clarity and consistency of meaning, this section will therefore provide definitions of certain key terms used throughout this study. First, consideration will be given to what is meant by logistics and SCM, alongside the relationship between these two concepts, before moving on

to focus more closely on the topic of this study, namely *“freight transport”* and the related terminology and definitions used in the thesis. A review of the literature suggests that there is a degree of variability in the definitions of SCM and logistics. In recent years, the relationship between SCM and logistics has been widely discussed (Larson & Halldorsson, 2004; Lummus, Krumwiede & Vokurka, 2001; Niine & Koppel, 2014). Mentzer *et al.* (2001, p. 3) is critical of the conclusions with regard to *“confusion”* and *“ambiguity”* and suggest the need *“...to examine the phenomena of SCM more closely to define the term and concept.”* It seems to the researcher that a generally accepted definition of transport terminology is lacking. Sweeney, Grant and Mangan (2015) point out the need for clear definitional constructs. This raises the question about what is actually meant by the terms SCM, logistics and freight transport. This question will be discussed in the following section of the literature review.

2.2.1 Definition of supply chain management

Aitken's quote in Christopher (2011, p. 4) has provided the following definition of supply chain: *“A network of connected and interdependent organisations mutually and cooperatively working together to control, manage and improve the flow of materials and information from suppliers to end users.”* A further definition is provided by the Council of SCM Professionals (CSCMP), which is one of the professional organisations in this field (Grant, 2012; Mentzer, Stank & Esper, 2008), comprised of industry experts, researchers, and academics. The Council defines SCM as follows:

“Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.”

(CSCMP, 2014)

Christopher (2008) lists five-main movements that are likely to shape SCM in the future as follows:

- The changing balance of power due to increasing consolidation of both the supplier and the customer base.
- Further fragmentation of consumer markets and the demand for customized solutions.

- Customers expect high levels of responsiveness and lower prices at the same time.
- Demographic changes will impact demand pattern and product flows.
- The impact of “*peak oil*” on transport costs will, in turn, affect sourcing and manufacturing location decisions.

(Christopher, 2008, cited in Piecyk, 2010, p. 16)

In addition, Wisner, Tan and Leong (2012) have argued that SCM should be viewed as being balanced upon three pillars: logistics, purchasing and operations. As Wisner *et al.* (2012) stated, logistics is considered to be a key activity of SCM. It has been explained that a significant consequence of logistics is being “...*able to create more economic value*¹ *than the marginal (breakeven) competitor in its product market*” through purchasing, concentrating on supplier selection, and relationships (Peteraf & Barney, 2003, p. 314).

2.2.2 Definition of logistics

According to a definition provided by Collins Dictionary (2014), logistics is “...*the detailed planning and organisation of any large complex operation.*” Kent and Flint (1997) reviewed a number of logistics studies and found that generally, logistics primarily focuses on transportation, and principally costs to be minimized, then later this concept has evolved into the perspective of competitive advantage. This view is supported by Sakchutchawan, Hong, Callaway and Kunnathur (2011, p. 10), who argued that “*logistics is more than an incurred cost, as transportation and distribution can be instrumental in achieving competitive advantage.*”

While a variety of definitions of the term “*logistics*” have been suggested during the last century, Kent and Flint (1997) have shown the chronological change of logistics and pointed out that, as early as 1920, the term “*logistics*” was used to refer to a focus on physical distribution within the marketing domain. Since then, logistics has been recognized as a means of concentrating on the requirements of customers. For Kent and Flint, logistics development relates to six distinct eras of evolution in the different context: 1) farm goods to market; 2) segmented functions; 3) integrated functions;

¹ According to Peteraf and Barney (2003, p. 314), the concept of economic value uses competitive advantage and is defined as “*the economic value created by an enterprise in the course of providing a good or service is the difference between the perceived benefits gained by the purchasers of the good and the economic cost to the enterprise.*”

4) customer focus; 5) logistics as a differentiator; and 6) behaviour and boundary spanning. As Kent and Flint (1997, p. 20) state: six-definitions for logistics exist, as detailed in Table 2.1.

Table 2.1: Evolution of logistics definitions (Source: Kent & Flint, 1997)

Year	Definition
1927	<i>“There are two uses of the word distribution which must be clearly differentiated... first, the use of the word to describe physical distribution such as transportation and storage; second, the use of the word distribution to describe what is better termed marketing.”^a</i>
1967	<i>“A term employed in manufacturing and commerce to describe a broad range of activities concerned with efficient movement of finished products from the end of the production line to the consumer, and in some cases includes the movement of raw materials from the source of supply to the beginning of the production line.”^b</i>
1976	<i>“The integration of two or more activities for the purpose of planning, implementing, and controlling the efficient flow of raw materials, in-process inventory and finished goods from point of origin to point of consumption.”^c</i>
1985	<i>“The process of planning, implementing, and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods, and related information from point-of-origin to point-of-consumption for the purpose of conforming to customer requirements.”^d</i>
1992	<i>“The process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point-of-origin to point-of-consumption for the purpose of conforming to customer requirement.”^e</i>
1998	<i>“Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective flow of storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers’ requirements.”^f</i>

a Ralph Borsodi, *The Distribution Age* (New York, NY: D.Appleton, 1927), p.19.

b National Council of Physical Distribution Management, Chicago IL, 1967

c National Council of Physical Distribution Management, NCPDM Comment 9, Number 6, November- December, 1976, pp.4-5.

d Council of Logistics Management, Oak Brook, IL, 1985.

e *What It’s All About* (Oak Brook: Council of Logistics Management, 1992).

f Council of Logistics Management, Oak Brook, IL, 1998.

After the Twentieth Century, the term logistics has been defined as “*supply chain = suppliers + logistics + customers*” (Rushton, Croucher & Baker, 2010, p. 4). According to a definition provided by Rushton *et al.* (2010), logistics is treated as a subset of SCM, and Larson and Halldorsson also labelled this partial perspective as “*unionist*” (Larson & Halldorsson, 2004). As Larson and Halldorsson suggest, their proposed model explains four conceptual perspectives. These classify the relationship between logistics and SCM in terms of four distinct perspectives: a) traditionalist, b) re-labeling, c) unionist and d) intersectionist as presented in Figure 2.2.

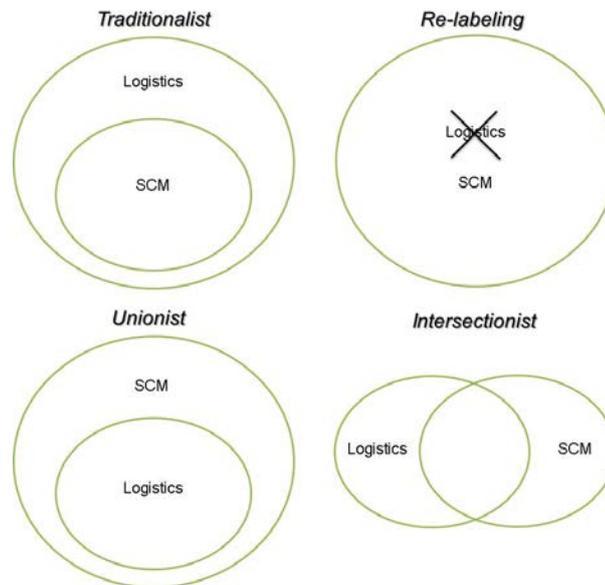


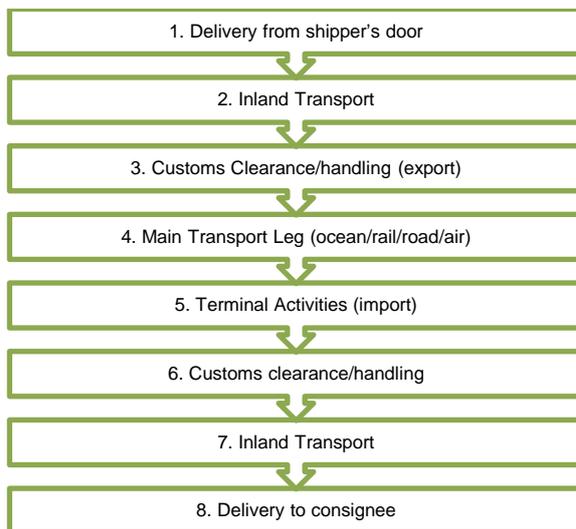
Figure 2.2: Four SCM/logistics perspectives (Source: Larson & Halldorsson, 2004, p. 19).

From 2000 onward, the term logistics is used in its broadest sense and supported the concept of unionist perspective of Larson and Halldorsson (2004). For example, a definition is given by Christopher (2011, p. 2) who describes that: “...the process of strategically managing the procurement, movement and storage of materials, parts and finished inventory (and the related information flows) through the organisation and its marketing channels in such a way that current and future profitability are maximised through the cost-effective fulfilment of orders” (Christopher, 2011, p. 2). Similarly, a further definition provided by CSCMP (2014)² can be matched with the unionist perspective of Larson and Halldorsson (2004). While a variety of definitions of the term logistics and SCM have been suggested, it could be argued that logistics attempts to concentrate on the planning and managing of physical and information flows through a complex organisation, while SCM extends this idea to a network along the supply chain, between upstream and downstream, which involves many parties and places a great deal of emphasis on supplier relationships. Having defined what is meant by logistics (definition of logistics), the following is more closely focused on freight transport terminologies.

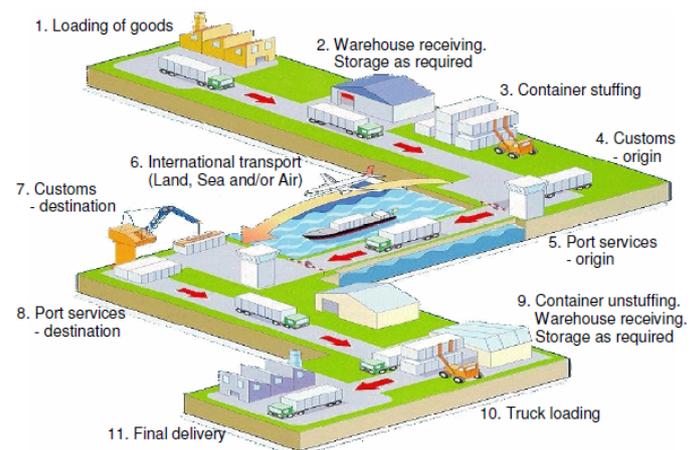
² According to CSCMP (2014), logistics management is defined as “Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirements”

2.2.3 Definition of freight transport

According to a dictionary of transport analysis (Button, Vega & Nijkamp, 2010, p. xiii), “Transport is a complex activity involving numerous interactions between actors both those interested in their own movements but also those affected by the actions of other.” Another definition of freight transport is given by Emmett (2009, p. 1) who describes it as “...the method by which goods (or people) move from one location to another and it is an essential function in product supply chains as it provides the physical movement between the suppliers and customers.” While a variety of definitions of the term have been suggested, this thesis will use the simple, clear and updated definition suggested by Grant (2012, p. 55) who saw it as “...the planning and the undertaking of the movement of goods by a carrier between two points in cost-effective manner that achieves the times and condition specified by the shipper...” (Grant, 2012, p. 55).



(a) Banomyong, 2000



(b) Murphy, 2004 cited in Arunotayanun, 2009

Figure 2.3: Freight transport activities in global supply chains (Source: Banomyong, 2000; Murphy, 2004 cited in Arunotayanun, 2009)

Two authors (see Figure 2.3 (a) and (b)) explain the typical steps associated with the freight transport activities involved in a transport chain. For example, as depicted in Figure 2.3 (a), Banomyong (2000) suggests eight steps in the transport chain associated with managing the movement of a product from the shipper’s door to the consignee’s door. Another study by Murphy (2004) proposes a different framework with contains more detailed activities. He divides these into eleven stages as revealed in the diagram in Figure 2.3 (b). However, the transport activities identified by Murphy is comparable to those of Banomong. Murphy’s diagram depicts the importance of

adding three more steps to the earlier framework suggested by Banomyong (2000). This can be illustrated briefly by comparing these two models in the form of one diagram as presented in Figure 2.4. These general process models of freight transport activities can describe the activities of one and/or combined transport provider(s).

Supply Chain and Transportation's Dictionary provides the definition of mode (of transport) as "...*the vehicle system used for transportation. It is normally classified by the system for propulsion and the methodology of right of way. Carriers moving on highways are referred to as motor transportation mode or highway mode. Mode is a general term that covers all of the carrier classifications based on right of way, propulsion system, etc. Common use of the word mode means rail, motor, water, air, pipe, and sometimes intermodal*" (Cavinato, 2000, p. 184). According to Emmett (2009), five main modes may be categorized –road, rail, water (including deep sea, coastal and inland waterways), pipelines and air.

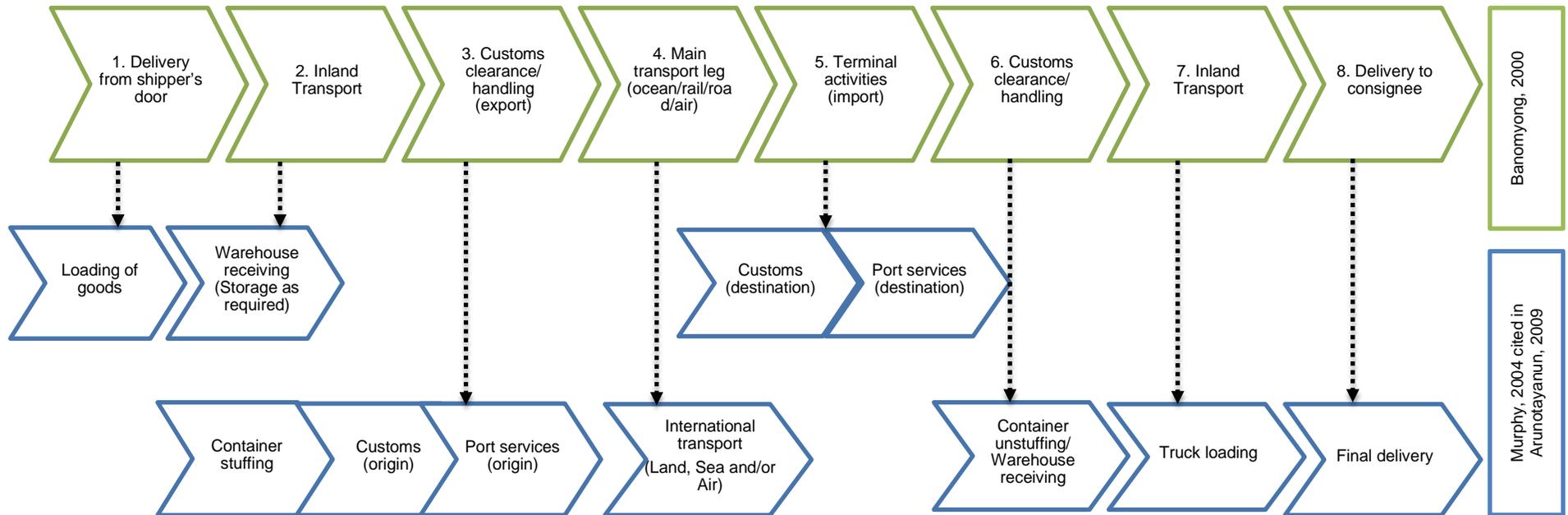


Figure 2.4: Comparing freight transport activities in global supply chains between Banomyong and Murphy

Having defined what is meant by freight transport, this section of that thesis will now move on to discuss transport terminology in the form of “*multimodal transport*,” “*intermodal transport*,” “*combined transport*” and “*unimodal transport*.” These terminologies are somewhat fuzzy and may cover different realities. However, they are generally used in the context of the movement of goods from the point of origin to the point of consumption and these terms differ mainly in terms of the procedure associated with delivering these goods. The clear definitions of transportation terminology can be provided as the following:

Multimodal transport: “*The transportation of goods by a sequence of at least two different modes of transportation. The unit of transportation can be a box, a container, a swap body, a road/rail vehicle, or a vessel.*” (SteadieSeifi, Dellaert, Nuijten, Van Woensel & Raoufi, 2014, p. 2)

Intermodal transport: is defined more restrictively as “*The movement of goods in one and the same loading unit, which uses successively two or more modes of transport, without handling the goods themselves in changing modes*” (Tsamboulas, 2010, p. 216). This definition is extended by Emmett (2009, p. 32) who suggests that intermodal transport is characterised by two basic elements:

- “*The use of more than one mode of transport for the various component legs of a journey from origin to destination; and*
- “*Goods remain in the same load-carrying unit (container, trailer or swap body), throughout the journey, with the transfer of the unit between the modes taking place in terminals or ports.*”

(Emmett, 2009, p. 32)

Combined transport: This is “*A restricted type of intermodal transport, focused on the use of rail or maritime and inland waterway transport for the greater part of the journey and limiting the road leg to the initial pickup and final delivery of the loading unit with journeys as short as possible*” (Tsamboulas, 2010, pp. 216-217). As stated by Zelenika and Toković (2000, p. 191), the key issues characterizing combined transport are:

- “*The transport of goods (usually loose, bulk cargo) is performed by at least two different transport means within two different traffic branches;*
- “*In transport as many transport contracts are usually made as many traffic branches participate in it;*

- *Many transport documents are procured or delivered, as many transport contracts were made; and*
- *The entire transport process can be organized by only one transport entrepreneur (Combined Transport Operator- abbr. CTO) or by several of them.”*

(Zelenika & Toković, 2000, p. 191)

Unimodal transport: *“The transport (conveyance, transfer, moving ...) of a transportation object (for example cargo) from one place to another, using only a means of transport from one transport branch (for example by ship, or wagon or lorry or plane ...).”* (Zelenika & Toković, 2000, p. 190)

Regarding the definitions present above, some distinguish the transport terminology *“intermodal transport”* in different ways. Combined transport, which is a form of intermodal transport whereby the major part of the journey is concentrated on the utilization of the rail or water transport mode, with the road mode being restricted to the initial pickup and the last delivery part of the journey. In contrast, *“unimodal transport”* concentrates more on the utilization of a means of transport throughout the journey. The key issues of intermodal transport are defined as being based on loading units, in that it uses the same loading unit without the transportation company handling of the goods themselves when changing modes (Tsamboulas, 2010). The light of the increasing demand for transport in recent years, the introduction of standardized containers has enabled the fast and efficient handling of goods in intermodal transport chains (Slack, 2010).

Containers have changed the freight transport business, particularly with regard to shipping, and have encouraged world trade to an incredible extent. This concept is in agreement with Levinson (2006), who stated its importance in the subtitle of his book *“The box: how the shipping container made the world smaller and the world economy bigger.”* A standard box enables companies to convey a wide range of cargoes across the world. As noted by Slack (2010) a standardized box has also facilitated intermodal freight transport, as it allows vertical and horizontal movements that allow easy transfer between modes of transport from lorries to trains to river barges to container ships. The evidence presented here suggests that *“the development of containerized transport has been an important technological change in the transport sector during the last decades. Containers have allowed large cost reductions in cargo handling, increasing cargo transshipment, and therefore national and international cabotage”* (Clark, Dollar & Micco, 2004, p. 423).

In the increasing demand for international trade, freight transportation has become increasingly important. In investigating intermodal freight transport, it can be considered as a competing mode and can be used as an alternative to unimodal transport. However, it is still an issue in the case of short-haul transportation (Macharis & Pekin, 2009). In this perspective, if the total distance is no more than the break-even distance, intermodal freight transport cannot compete with unimodal transport in terms of transport costs. By way of illustration, Brooks and Trifts (2008, p. 147) note: *“mode choice has also been found to be a function of distance, with distances under 700 kms dominated by truck and distances over 1400 kms dominated by intermodal.”* However, the market situation is a key determining factor of the break-even distance of the intermodal freight system; so, generalization is not possible (Kim & Van Wee, 2011). In addition, Tsamboulas (2010) points out that the development of intermodal transport has encouraged the distribution of economic activity. In Europe, the requirement for an intermodal transport policy has been strongly advocated as a consequence of environmental concerns, reasons of general productivity and the advantages of the co-ordination of modes in order to increase transport flows (Bontekoning, Macharis & Trip, 2004).

Having defined what is meant by SCM logistics management, and by considering the transport terminology of freight transport, the following section is a review of the literature relating to global logistics.

2.2.4 Global logistics

This section deals with global logistics. It comprises of an introduction to the importance of global logistics, then it offers a definition. Finally, the issues relating to global logistics from the existing literature is reviewed.

2.2.4.1 The importance of global logistics and its definition

As the world has increasingly become well-connected in terms of global trading, the globalization of the supply chain is inescapable (Christopher, 2016; Mangan, 2011). This is because, to gain a competitive advantage, some firms need to adapt to new trading circumstances. Some of them are likely to outsource some management activities to others in different locations in the world to gain advantages in terms of cost and quality. One of the challenges resulting from the competition in global markets is the success in selecting third-party logistics (3PLs) partners who are considered establishing a business alliance and have common, mutual objectives that lead to a win-win business partnership (Hwang, Chen & Lin, 2016). As a

consequence, global logistics play a crucial role in the management of such a set-up and is considered as a part of global supply chain management. This is in the same vein as Wu, Huang, Goh and Hsieh (2013, p. 376) who stated that *“As globalization fosters more cross-border trade and connectivity, global logistics concepts and practices have assumed greater roles to foster efficient and seamless international transactions.”* Therefore, the fact is undeniable that, in today’s business environment, global logistics and procurement play an important role in global trading. This is also in line with Connelly, Ketchen and Hult (2013) who argued that, due to the increase in global competition, there is the growth in the need for supply chain management at the global level. Moreover, the review of the literature in relation to the global transportation process is available in Appendix B.

Prior to critically and analytically reviewing issues in global logistics, it is worthwhile understanding what is actually meant by it. Although there are various definitions in the existing literature (Ibrahim, Zailani & Tan, 2015), this research adopted the definition suggested by Kotabe and Helsen (2008, p. 507).

“The design and management of a system that directs and controls the flows of materials into, through, and out of the firm across national boundaries to achieve its corporate objectives at a minimum total cost.”

The acceptance of this definition is due to the fact that it is in line with the context of this research in that rubber products are produced locally in Thailand, but are exported worldwide.

2.2.4.2 Issues in global logistics

“One of the most significant paradigm shifts of modern business management is that individual businesses no longer compete as solely autonomous entities, but rather as supply chains.” (Lambert & Cooper, 2000, p. 65). In order for firms to gain a trading advantage from reducing costs or increasing the quality of goods available from global sourcing, they tend to be exposed to some kinds of risks associated with global trading (von der Gracht & Darkow, 2013). One of them is the risk relating to logistics since, in global trading, they are likely to get involved with a variety of business partners as well as intermodal transport.

The phenomenon of globalisation has impacted on the way that goods are produced and delivered to customers (Mudambi & Venzin, 2010). This is considered as an external factor that is out of firms’ control and which forces them to adapt to current business circumstances, which are consider to be complex and dynamic (Coyle,

Novack, Gibson & Bardi, 2011). According to Fawcett *et al.* (2008) such factors in relation to business management at the global level can be categorised into four main groups - forces from global markets, technology, global costs, and politics and macroeconomics. However, with proper management of such a global supply chain, it is possible to manage these four factors, in such a way that firms can achieve the advantages of cost minimisation and lead time reduction (Ibrahim *et al.*, 2015). For example, new markets such as African, Chinese and Asian markets, are being explored by some firms as new opportunities for their business. However, such opportunities also bring new logistical challenges to a business (Varzandeh, Farahbod & Zhu, 2016). This is because decision makers in logistics encounter increasingly complex and dynamic environments, which in turn causes their business to face higher risks (von der Gracht & Darkow, 2013). The new challenges resulting from changes of structure on a global scale needs new types of risk management (Varzandeh *et al.*, 2016), as currently the majority of global businesses tends to use 3PLs to deal with such risks.

Regarding customer requirements in the era of globalisation, a firms' ability to respond quickly to customers' demands is considered as a key factor in the success of their business (Talluri & Yoon, 2000; Wu *et al.*, 2013). Fast responses have become a common expectation on the part of customers (Coyle, 2013; von der Gracht & Darkow, 2013). As a consequence, firms need to redesign supply chains in order to meet such a challenge (Finisterra do Paço, Raposo & Filho, 2009). Due to the variety of cultures and degree of development of economies and business environments at the global level, the situation is considered complex (Youngdahl, Ramaswamy & Dash, 2010). Therefore, firms have to align their supply chain structures at the global level in order to become efficient, whereas they also need to deal with a range of other challenging issues (Hasani, Zegordi & Nikbakhsh, 2015).

Another challenging issue in global trading is the 3PL selection as a mean of outsourcing (Langley & Capgemini Consulting, 2015). Outsourcing allows firms to operate their business by building relationships and coordinating with other parties in a network (Hwang *et al.*, 2016). In doing so, firms can reduce costs and, at the same time, can enhance levels of service to their customers, so that they can adapt to constantly changing business environments (Maniu & Pantelescu, 2015). As a result, according to today's business circumstances, a number of firms have increasingly changed from in-house service provision to using 3PLs (Bayazit & Karpak, 2013).

In contrast to an industrial commodity supply chain, the agricultural commodity supply chain tends to become more fragmented when it comes to global trading (Williams, 2012). This is because it is common that such trading involves a number of supply chain players. On the other hand, industrial commodity trading such as petroleum (Lima, Relvas & Barbosa-Póvoa, 2016) or iron ore (Floris, Grant & Cutcher, 2013), is likely to become more integrated and operated by large international corporations. Therefore, their management efficiency and control ability in terms of global logistics are higher than those in the more fragmented agricultural commodity trading. As a result, the issue of global logistics in agricultural commodity markets such as the natural rubber market, is crucial and challenging.

In the section that follows, mode choice will be discussed in detail. The section dealing with mode choice can best be treated under two headings: modelling approaches for the study of freight transport mode choice, and the decision variables with regard to freight transport mode choice and carrier selection.

2.3 Mode choice

Mode choice is a process that designs the means of transport: i.e. by road, rail or water. In accordance with Meixell and Norbis (2008), decision-making in the selection of the transport mode is an intricate task as managers have to deal with various factors and criteria in making their decision. More often than not, these factors and criteria vary from one business to another, from one company to another and even within the same company, by different departments (Kannan, Bose & Kannan, 2011; Rogerson, Andersson & Johansson, 2013). In addition, Simon 's quote in Carter, Kaufmann and Michel (2007, p. 633) state that: *"...the capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behaviour in the real world – or even for a reasonable approximation to such objective rationality."*

There is a growing body of literature that recognises the importance of mode selection in supply chains. Stank and Goldsby (2000) acknowledged that the transport mode choice is an essential component of the supply chain, and its performance influences the supply chain as a whole. Similarly, Benton (2010) notes that an unsuitable transport mode choice potentially results in inefficiency of a company's performance, due to excessive operational costs and a reduced level of service quality. As Carter and Easton pointed out: *"supply chain managers often initiated and managed past projects in a standalone fashion, without a clear, holistic, and more strategic*

understanding of how these pieces of the puzzle fit together to create their organisation's overall sustainability position" (Carter & Easton, 2011, p. 47). Thus, an accurate and deep understanding regarding freight transport mode choice is truly useful for logistics managers to make their decisions more effectively.

This section of the literature review will consider the research conducted on freight transport mode choice. It is divided into two parts: the modelling approaches of freight transport mode choice and the decision variables with regard to freight transport mode choice and carrier selection.

2.3.1 Modelling approaches for the study of freight transport mode choice

There are several techniques used in the study of freight transport mode choice. Most studies that consider transportation mode choice and carrier selection are based on a survey methodology and mathematical models (Meixell & Norbis, 2008). The authors also pointed out that the majority of them are outcome-oriented models, the outcome of which can result in an optimal solution regarding minimum cost in a particular situation. The review of the transportation mode choice by Meixell and Norbis indicated that research that adopted the methodology of "Surveys" and "Math models" was in the majority at 80% (Meixell & Norbis, 2008). However, other authors (see D'Este, 1992; Pisharodi, 1991) question the usefulness of such an approach for the study of transport mode choice. They noted that such an approach is limited in terms of the understanding of transport mode selection in practice based on managers' points of view, especially on the way that managers behave in the selection of freight transport modes. The aim of this section is to clarify several aspects of freight modelling approaches (theoretical approaches), in order to choose modelling approaches for the study of freight transport mode choice.

A number of different approaches have been implemented in the study of freight transport mode choice. According to Gray (1982), there are three broad approaches: "Economic Positivism," "Technological Positivism" and the "Perceptual Approach." The author pointed out that the key unit of analysis is the important dissimilarity amongst the three different approaches: the firm level in the "Economic Positivist" approach, the consignment level in the "Technological Approach," and the decision-maker level in the "Perceptual Approach." The particular descriptions of the assumptions of each individual approach are provided below.

Firstly, “*Economic Positivism*” is the approach where the selection depends on a maximised profit-focus. The process of mode choice is dominated by the factors related to economics in this approach, as its assumption is under “*the neoclassical economic theory of the firm*” (Gray, 1982, p. 165). The neoclassical economic theory of the firm is defined by Gray (1982, p. 165) as “...*the part of microeconomics concerned with the firm in terms of input and output related to price and profit.*” Therefore, the approach focuses more on profit maximisation based on completely available, deterministic information.

Secondly, “*Technological Positivism*” mainly emphasises the physical aspects of transport systems and product characteristics. This approach assumes that the choice is based on physical factors of transport systems, such as delivery speed and time schedule, and product factors, like deterioration rate and the volume of commodity. There has to be a relationship between those two factors in the selection of transport mode in the Technological Positivism approach.

Thirdly, the “*Perceptual Approach*” works on the assumption that the descriptive factors that impact on transport mode selection are measured by the perception of managers instead of using quantitative methods. Moreover, the perceptual approach is based on similar decision-making processes to those used when purchasing other such as goods, applied to transport mode choice.

Gray (1982) argued that most studies in the field have only focused on two theoretical model approaches: “*Economic Positivism*” and “*Technological Positivism,*” rather than the “*Perceptual Approach.*” Gray also noted that the latter approach is required and encouraged further study, because this approach can lead to insight and understanding of how the numerous factors interact. As a result, the Perceptual Approach does not apply complicated mathematical formulas which will usually result in an optimal solution; however, without the ability to explain and understand the decision-making process.

Since then, a range of studies of transport modes or carrier selection decision-making in freight transport from the 1990s and the 2000s have established a further category of model containing three classes: input-oriented models, outcome-oriented models and process-oriented models (D'Este, 1992; Mangan, Lalwani & Gardner, 2001, 2002; Mazzarino, 2003). A review of the literature in terms of the three modelling approaches mentioned above is available in Appendix C.

2.3.2 The decision variables with regard to freight transport mode choice and carrier selection

Many researchers have conducted research into transport selection determinants since the 1990s. These studies vary broadly in terms of methodology, types of industry studied, geographical limitations, types of transport mode, and the difference perspectives of users and service providers. The determinants of freight transport selection criteria are diverse, depending on the context and the constraints studied (Björklund, 2011; Hall & Wagner, 1996; Mangan *et al.*, 2001; Pedersen & Gray, 1998; Rogerson *et al.*, 2013). This section of the literature review aims to consider the key factors that influence the selection of freight transport modes based on the existing transportation literature. In this section, some of the selected models of mode choice and the factors influencing the selection of carriers and transport modes are discussed in detail in a chronological way, from 1990 to 2014, in order to identify the operational factors influencing freight transport mode choice as indicated below.

In the early stage of the research into freight transport mode choice, Jeffs and Hills (1990) conducted research from the viewpoint of the purchasing decision maker within UK industries. Their research aimed to shed light on the determinants of transport choice by using factor analysis techniques as a data analysis method to assess the importance of key attributes, together with an attitudinal rating-scale test. In conclusion, they grouped the factors that influence the choice of mode into six main categories as presented in Table 2.2.

Table 2.2: Factors influencing the choice of mode (Source: Jeffs & Hills, 1990)

Factors influencing the choice of mode into six main categorises
<ul style="list-style-type: none">• customer-requirements (size and frequency of delivery, timing of delivery, urgency of delivery, specification of mode by customer)• product-characteristics (value, volume to weight quotient, product type, handling characteristics, perishability)• company structure/organisation (independence of establishment, number of organisational levels, number of employees engaged in transport function, position of transport function in hierarchy, sphere of operation)• government (transport infrastructure, regulations e.g. drivers' hours)• available transport facilities (ownership of fleet, availability of public modes for delivery operation)• perceptions of the decision-maker him/herself (knowledge of alternatives, level of responsibility in company)

In 1990, McGinnis summed up the empirical research using twelve articles related to freight transportation choice (McGinnis, 1990). The major aim was to determine the relative importance of cost and service factors before and after deregulation in the United States' context. The most significant results explained that service-related factors were more important than cost-related factors. To illustrate, cost was still the foremost factor after shippers were satisfied with a required service. Overall, it is evident that the relative importance of cost and service did not change basically as a result of deregulation. In summary, there are six factors influencing freight transport choice after the 1980s as revealed in Table 2.3.

Table 2.3: Six factors influencing freight transport choice after the 1980s (Source: McGinnis, 1990)

Six factors influencing freight transport choice after the 1980s
<ul style="list-style-type: none"> • freight rates (costs, charges, rates) • reliability (reliability, delivery time) • transit time (time-in-transit, speed, delivery time) • over, short, and damaged (loss, damage, claims processing and tracing) • shipper market considerations (customer service, user satisfaction, market competitiveness, market influences) • carrier considerations (availability, capability, reputation, special equipment, financial stability)

A study by D'Este and Meyrick (1992) explored the attitude and perception of RO/RO ferry users in the Bass Strait market, focusing on cargo movement from Melbourne to Tasmania. The study aimed to determine the service quality factors that impact on decision making for carrier selection. This study investigated the factors influencing the choice of carrier. These factors were composed of three main groups of factors: route, cost, and service.

- route (frequency and transit time, directness and capacity)
- cost (freight rate and other costs)
- service factors (delays and reliability, damage avoidance, loss and theft, fast response to any problems, documentation and tracing capability)

(D'Este & Meyrick, 1992)

The main result showed that shippers placed a great deal of emphasis on service quality, particularly in terms of speed and reliability. In addition, local conditions can affect the relative important of particular decision factors and can vary greatly from one commodity to another traded in the same shipping market. D'Este and Meyrick

(1992) discovered that the majority of shippers were guided by intuitive selection techniques which become increasingly hard to analyse and explain. Moreover, the perception of the decision maker should be considered to be one of the key decision factors in selecting a service provider.

In the study of Matear and Gray (1993) examined different criteria in the selection of freight transport services between shippers and freight suppliers in Ireland. From the viewpoint of shippers, the important results were the existence of a fast response to problems, the avoidance of loss or damage and on-time collection and delivery. These obtained the three highest mean scores in terms of service attributes. They found that service performance, scheduling and price characteristics were the key service factors for freight suppliers when it came to purchasing sea freight transport.

Murphy and Daley (1994) investigated the viewpoint of purchasing managers in the United States. This study aimed to identify significant factors impacting on port selection. A five-point Likert scale questionnaire was used to collect data from 350 selected purchasing managers. This generated a fifteen per cent response rate. However, this study still reveals important findings in the sense that shipment information and loss and damage performance are the significant determinants with regard to port selection.

In Eastern Canada, Brooks (1995) conducted a longitudinal study from the shipper's perspective to investigate whether or not the basic ocean carrier selection criteria changed between 1982 and 1989. From the results, she reported that there has been little evaluation of the selection criteria; however, the deterministic specific criteria have changed through the period. Whereas in 1982 the frequency of sailings and cost of services were the significant service criteria, in 1989, transit time had become the most salient criterion.

The work of Murphy and Hall (1995) pointed out that research conducted from the 1970s until the early 1990s in relation to transport mode or carrier choice ranked the factors that influence decisions as illustrated in Table 2.4. They are reliability of service, freight rates, transit time, considerations of carriers and shipper markets, and over, short and damaged freight. Murphy and Hall added that new factors had emerged which impacted on mode choice, such as negotiations in relation to freight rates and services, responsibility for emergent incidents, and service quality improvement intentions. From the data in Table 2.4, it can be seen that by far the greatest demand is for reliability. Additionally, an interesting point revealed by this

data is that the relative importance of transit time dropped from 2nd ranking to a 5.5 ranking from the 1970s to the 1990s, while that of carrier considerations improved its position, with a rise of four places (from 6th to 2nd ranking) in the later time frame.

The authors Perdersen and Gray (1998), assessed transport selection criteria for Norwegian exporters using a postal questionnaire. They suggested that timing, price, security and service were most significant from shippers' perspectives. This study also pointed out that there is a relationship between International Commercial Terms (INCOTERMS)³ and the size of the company. This project found a significant relationship between large companies which are likely to use D-term, closely followed by C-term, while small companies are subject to using C-term and D-term. Furthermore, price is a more important factor than timing, service and security factors for Norwegian exporters. The majority of products transported are raw materials, which are rather sensitive to transport costs.

Table 2.4: Variables affecting freight transportation choice (Source: Murphy & Hall, 1995)

Category	Rankings		
	1970s	1980s	1990s
Reliability	1	1	1
Freight rates	4.5	2	3.5
Transit time	2	3	5.5
Carrier considerations	6	5	2
Shipper market considerations	4.5	5	3.5
Over, short and damaged	3	5	5.5

For an Eastern European context, Cullinane and Toy (2000) analysed seventy-five articles related to the topic of freight transport decisions (mostly study in the context of Western firms), using a content analysis methodology. The findings of this study stated that *“cost/price/rate”* ranked first, closely followed by *“speed,” “transit time reliability,” “characteristics of the goods”* and *“service.”*

³ According to the International Chamber of Commerce, INCOTERMS 1990 comprises four main groups: E-term means that no carriage is paid by the sellers, F-term means that the main carriage is not paid by the sellers, C-term means that the main carriage is paid by the senders, and D-term means that all the carriage is paid by the sender.

Tuna and Silan (2002) applied factor analysis to define the salient freight transportation selection criteria of Turkish shippers. Reliability and competence were found to be the most important attributes in terms of freight transport selection, followed by personal service, supporting activities, value added service, accurate and on-time documentation, equipment and informing the shipper of changes. This project suggested that responding to complaints quickly, delivering cargos at the promised time, responding to enquiries promptly, issuing accurate price quotations, issuing accurate shipping documentation, willingness of the personnel to help, dependability in handling problems, expert and knowledgeable personnel, transit time, issuing shipping documentation quickly, giving clear and correct information about costs, informing whether goods will be transhipped, responding to urgent deliveries quickly, delivering the cargo without damage, should all be considered by freight transport providers.

Lu (2003) examined service factors including timing, pricing, warehousing and sales services from the shippers' viewpoint, focusing on shipper-carrier partnering relationships. The purpose of this project was to investigate the impact of carriers' service attributes on Taiwanese shippers' satisfaction. Regarding carrier service attributes, the four most important factors were availability of cargo space, low damage or loss record, accurate documentation, and reliability of advertised sailing schedules. This study also ranked the other service factors impacting on shippers' satisfaction as: courtesy of inquiry, on-time pick-up, high frequency of sailing, door-to-door service, service coverage, knowledge of sales personnel, short transit time, ability of sales representatives to handle problems, consolidation service, tariffs simplified and customs clearance service.

One study by Ugboma *et al.* (2006) surveyed the determinants of port selection and the relative importance of each determinant in the case of Nigerian ports. This research applied an analytic hierarchy process approach. In general, the findings suggest that efficiency, frequency of ship visits and adequate infrastructure are the three most important criteria when selecting a port in a Nigerian context, while quick response to port users' needs was identified as being unimportant to them.

Based on the industry perspective, Punakivi and Hinkka (2006) investigate transport mode choice using a case study approach. This study revealed that different industries tend to vary in terms of ranking the level of importance of the factors that influence their decisions in selecting a transport mode. In other words, the criteria for transport choice depends largely on the industrial sector. According to Table 2.5, the

top four criteria with regard to the electronics, pharmaceutical, machinery and construction sectors are commonly, quality, price, speed, reliability, punctuality, scheduling, convenience and safety of service. It is worth noting that service speed is usually the most significant factor in the industrial sector, related to the production of goods with high ratio of value to weight and a short life cycle. As a result, air mode tends to be favoured when it comes to transporting pharmaceutical products across the world. On the other hand, the construction sector relies heavily on road transport.

Table 2.5: Selection criteria for transportation modes (Source: Punakivi & Hinkka, 2006)

	electronics	pharmaceutical	machinery	construction
1. criteria	quality	speed	price	price
2. criteria	speed	convenience	reliability	scheduling
3. criteria	price	safety	punctuality	punctuality
4. criteria	convenience	fluency	speed	convenience

Tongzon (2009) conducted a study of the major factors influencing port choice from the freight forwarders' perspective. He carried out a survey in Southeast Asia to investigate the attitudes of port users in Malaysia and Thailand. The findings showed that efficiency is the most important factor for Malaysia shippers, followed by shipping frequency, adequate infrastructure, location, port charges, quick response to port users' needs, and reputation for cargo damage. Regarding the Thailand shippers, efficiency, location and shipping frequency were ranked as the three most significant, closely followed by quick response to port users' needs and reputation for cargo damage. Interestingly, the survey also indicated that quality of service is more important than price.

Moschovou and Giannopoulos (2010) surveyed freight transport actors in Greece to investigate the determinants of freight transport choice in terms of three-oriented criteria, marketed-related criteria, cost and quality of service-related criteria and the type of freight being transported. They identified the criteria as shown in Table 2.6. The ten most important mode choice criteria emerging from Moschovou and Giannopoulos's study were reliability and quality of transport services, transport costs, probability of load damage or loss, customer service quality, size of load and characteristics of packaging, lifetime of cargo, cargo value, service, capability for tracking and tracing of the shipment and availability.

Table 2.6: The determinants of freight transport choice in Greece (Source: Moschovou & Giannopoulos, 2010)

The determinants of freight transport choice in Greece	
<ul style="list-style-type: none"> • Marketed-related criteria <ul style="list-style-type: none"> – Characteristics of the transport chain (sequence of the actors involved in the chain, number and type of chain stages, volume of freight, frequency of consignment, existence of return load, type of load unification used); – Characteristics of transport markets (type of decision-making firms, i.e., owner of goods, or 3PL, existence of balanced competition between the modes); – Characteristics of freight owners (firm size, geographic position in relation to its accessibility to a specific mode, access to travel-related information, availability of intelligent transportation system-related info and data) • Cost and quality of service-related criteria <ul style="list-style-type: none"> – Quality-related criteria (reliability and quality of service, customer service quality, flexibility of response time, security of loads for wear and tear, total travel time); – Cost -related criteria (the actual transport cost, cost of packing and unification, actual transport cost, intermediate terminal costs including warehousing if necessary, unpacking and sorting costs at destination) • Other criteria <ul style="list-style-type: none"> – Mainly related to the type of freight being transported (shape, size, requirements for handling, etc.), the type of load unification used, the value of freight, the sensitivity or lifespan of the transported goods, load weight, and so on. 	

For a more recent study in transport modelling by Ortúzar and Willumsen (2011), Table 2.7 presents the summarised list of important factors affecting goods movements that would be valuable to consider when making a decision on mode choice.

Table 2.7: An exhaustive list of factors affecting goods movements (Source: Adapted from Ortúzar & Willumsen, 2011, p. 462)

Factors	Effect on freight movements
Locational factors	The levels of freight movement and its origin and destination determined by location of sources for raw materials, inputs to a production process, location of intermediate and final markets for products
Physical factors	The characteristics and nature of raw materials and end products (i.e., bulk, perishable, securable)
Operational factors	The size of the firm, distribution channel, geographic dispersion
Geographical factors	The location and density of population influence the distribution of end product
Dynamic factors	Seasonal variations in demand and changes in consumer's tastes
Pricing factors	Market price for the products are flexible and subject to negotiations and bargaining power

According to Kim (2014), by using a survey research approach based on shippers and other freight transport agents in New Zealand, the results revealed that “*timeliness*,” “*transport cost*,” “*suitability*,” “*mode accessibility/availability*,” “*customer service*” and “*damage*” are ranked in order of importance in terms of the factors that influence transport mode choice, respectively. Moreover, the author highlighted the importance of timeliness and cost based on the New Zealand research respondents’ perspective.

In a more recent study by Mitra and Leon (2014), the decision process with regard to selecting a transport mode on the part of shippers is considered to be a complex one, as many factors are relevant when it comes to keeping transport costs down. However, it is not only shipment costs that impact on transport mode decision in terms of the total logistical cost. It also includes another three determinants in the form of cost of inventory service, transactional costs and the penalty cost of stock-out (back-order and lost sale costs).

2.3.3 Summary

In terms of the factors influencing freight transport mode choice “*Cost/Rate/Price*,” “*Service reliability*,” “*Transit time reliability*,” “*Transit time*,” “*Loss and damage*” and “*Fast response to problems*” are chosen to be elements of a component, namely the operational factor, of the preliminary framework to be proposed at the end of this chapter. This is for the reason that these factors are the ones that appear most frequently in the literature (Cullinane & Toy, 2000; Kim, 2014; Lu, 2003; Mitra & Leon, 2014; Moschovou & Giannopoulos, 2010; Punakivi & Hinkka, 2006; Tongzon, 2009; Tuna & Silan, 2002; Ugboma *et al.*, 2006). Such relevant factors are as presented in Table 2.8, including others factors that were found in the literature review. Table 2.8 offers a summary of the influential factors with regard to the selection of freight transport modes, according to the literature review so far.

Table 2.8: Summary of factors in the selection of freight transport modes (Compiled from the Literature Review)

Factors	Authors													Frequency					
	Jefts and Hills (1990)	McGinnis (1990)	D'Este and Meyrick (1992)	Matear and Gray (1993)	Murphy and Daley (1994)	Brooks (1995)	Murphy and Hall (1995)	Pedersen and Gray (1998)	Cullinane and Toy (2000)	Tuna and Silan (2002)	Lu (2003)	Ugboma et al. (2006)	Punakivi and Hinkka (2006)		Tongzon (2009)	Moschovou and Giannopoulos (2010)	Ortúzar and Willumsen (2011)	Mitra and Leon (2014)	Kim (2014)
Cost/ Rate/Price		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	16
Efficiency												✓		✓					2
Service reliability	✓						✓	✓		✓	✓				✓				6
Transit time reliability	✓	✓	✓	✓					✓				✓		✓			✓	8
Consistent timely pickup and delivery	✓	✓							✓										3
Transit time	✓	✓	✓				✓	✓	✓				✓		✓				8
Frequency of freight delay		✓							✓	✓									3
Frequent departures						✓								✓				✓	3
Density of route			✓																1
Loss and damage	✓	✓	✓	✓	✓		✓	✓		✓		✓	✓	✓	✓			✓	12
Proximity to local depots/ Network/Accessibility	✓		✓										✓		✓				4
Acceptance of small or unusual shipments	✓				✓														2
Frequency of ship visits				✓						✓	✓		✓						4
Fast response to problems			✓	✓			✓		✓				✓						5
Availability of specialist equipment		✓							✓		✓								3
Ready availability of vehicles	✓	✓								✓									3
Expertise and knowledgeability of staff									✓	✓									2
Responding to urgent deliveries quickly									✓	✓									2
Issuing shipping documents quickly									✓										1
Issuing accurate shipping document									✓	✓									2
Issuing accurate price quotations									✓	✓									2
Shipment information	✓				✓			✓						✓					4
Size of the company	✓						✓							✓	✓				4
International commercial terms							✓												1

From the review of the freight transport research literature, it can be argued that the key criteria that influence the choice of transport modes varies with the context and focus of the study. This clarification is in line with that of Brooks and Trifts (2008, p. 146) who state that “...perceptions of a transport service can vary widely from one buyer to another, underscoring the importance of perceptions in understanding freight mode choice decisions.” In addition, the attitudes of different actors, shippers, freight forwarders, carriers versus shippers, and carriers versus exporters, or import shippers, can result in the diversity of the deterministic criteria. This is evidently supported by some recent research e.g. that of Abshire and Premeaux (1991) and Moschovou and Giannopoulos (2012). A study by Abshire and Premeaux (1991) analysed the differences in the importance of motor carrier selection variables between shipper and carrier perspectives in the United States regarding thirty-five motor carriers’ selection criteria. An analysis of variance indicated that the relative importance of 19 out of 35 of carrier selection variables, are significantly different between the two groups (shippers’ and carriers’ perspectives). They also concluded that the “reliability of on-time delivery” and the “reliability of on-time pickup” are the top two most important criteria that shippers consider relevant. Moreover, Moschovou and Giannopoulos (2012) studied the criteria for freight mode choice behaviour by employing a large-scale survey, with data being gathered from many “actors” in the freight transport segment in Greece. The up-to-date study indicated that “shipment life,” “probability for load Loss and Damage,” “availability of loading/unloading equipment” and “reliability of the service relating to travel times” were rated as the most influential factors in the case of the owner firms. On the other hand, “reliability of the service” was the first main concern in the case of the logistics firms, followed by “value of load,” “size of load,” and “frequency of service” respectively. Overall, there seems to be some evidence to indicate that there is a difference in terms of the significant criteria influencing the choice of transport modes from shippers’ and carriers’ perspectives. Therefore, this study focuses only the viewpoint of rubber exporters as users of freight transport services.

As a result of the increasing size and complexity of organisations, the decision-making process is considered to be a core business activity. This demands an increasing in-depth understanding of this process. The expectation on the part of a firm’s management is to arrive at a good decision from a range of choices in an uncertain environment and, at the same time, increase business competitiveness. Consequently, this has stimulated the research community to investigate factors influencing such decisions, as well as to seek solutions in order to improve decision

making performance. Consequently, the following section reviews the concepts and theories with regard to decision making processes.

2.4 The concepts and theories involving decision making processes

In this section, two main concepts relating to the process of decision making are reviewed. These are decision-making approaches in organisations and models of OBB.

2.4.1 Decision-making approaches in organisations

A core activity of a large and complex organisation is to make decisions (Linstead, Fulop & Lilley, 2009). The expectations of managers in terms of making the appropriate choice from a number of available (usually ambiguous) choices, and in doing so cleverly, is to make firms and relevant stakeholders obtain the related benefits. Moreover, as an organisation's activities are considered to be dynamic, managers need to profoundly understand decision making (Nutt & Wilson, 2010). As a consequence, in order to improve the quality of such decisions, it is necessary for them to understand the factors influencing the process of decision making. Therefore, it is clearly seen that the decision-making concept within an organisation involves research.

According to Simon (1997a), in his original study of decision making in organisations, there are rational limitations with regard to managers' decision making. Simon posited that a decision-making activity is considered as the most vital administrative activity in organisations, and that the consequences of decisions is relevant to the decision-making process used. There are several factors that influence complex decision-making processes within organisations (Simon, 1997a). Simon's assertion is that within a range of varying and ambiguous circumstances, human beings rely on their own capability when it comes to making decisions in such circumstances in order to survive. The extent to which the manager is adaptable in such a way as to fit the circumstances, relies heavily on that person's decision making skills in order to achieve good outcomes (Simon, 2005). Moreover, Simon contends that the decision making in organisations is related to social factors, as no one makes organisational decisions alone (Mitchell & Scott, 1988).

This section facilitates an understanding of the concepts relevant to theories of decision making that are potentially important in relation to freight transport mode selection. The section begins with the concept of full rationality in decision making, as

well as investigating the reasons for the challenges in using the model of full rationality to describe decision-making behaviours. After that, the bounded rationality concept is introduced, before the introduction of the concept of intuition.

2.4.1.1 Rational decision making

Prior to providing a review of the literature in relation to behavioural economics, this section facilitates the concept of rational decision making. The process of decision making in a rational way comprises of a range of activities which decision makers need to engage in. This general process is composed of six broad steps: define the problem, identify the criteria, weigh the criteria, generate alternatives, rate each alternative in terms of each criterion, and compute the optimal decision (Bazerman & Moore, 2009). According to Radosevich, Levine and Kong (2009), rational decision making is a process based on the decision maker's consciousness and on systematic rules, while irrationally it relies more on intuitive and emotive feelings. This rational concept is broadly known as neoclassical economic theory. According to a definition provided by Anthony, Helen and Mohamed (2014, p. 505), under neoclassical economic theory any agent is "*...assumed to act in a rational way and options are prioritised according to what the expected utility, or benefits, are.*"

Neoclassical economic theory posit that decision making's key objective is to arrive at a conclusive choice based on rationality, involving a starting activity comparing the collection of all relevant data in relation to the identified problem. After that, the decision maker must explore every potential alternative in order to assess the consequences of each alternative. In the final stage, the decision maker has to choose the alternative amongst them that provides the maximisation of utility (Kalantari, 2010). A rational decision is completely objectively and logically made by the administrators. The main limitation of this theory, however, is only appropriate with regard to clear and unambiguous issues, when the decision makers particular goal is clear, and every alternative and its consequence can be identified and assessed (Anthony *et al.*, 2014).

It is clear that it is impossible that every single issue that a manager confronts can be solved by a programmed decision. It is a fact that several issues related to management in organisations can be classified into an unstructured problem, which are problems that are new or unusual or have unclear or incomplete information (Robbins & Coulter, 2012). Decisions which are classified as a part of the non-programmable group have to depend on managers' intuition, experience and

capacities in terms of making them (Pomerol & Adam, 2004). Such decisions cannot be based only on rationality, as this can solely be applied to decisions following a well-defined procedure or rules.

The information associated with every choice is impossible to acquire and to assess when it comes to designing a transport system, decision makers are unable to make their decisions in a perfectly rational way (Carter *et al.*, 2007; Notteboom, 1998). Therefore, shipping decision makers are likely to base their decisions on potentially sub-optimal criteria in order to choose the mode of transport. Moreover, such decisions may leave some alternatives outside their set of choices, since shipping managers are unlikely to change to potential alternatives in their design (Mangan *et al.*, 2001). Thus, decision making in the selection of transport modes is not likely to be done in a systematic way or involve “*bounded rationality*” (see Section 2.4.1.2.1).

An example of common use of a non-programmable type of decision is in the strategic level as made by senior managers (Anthony *et al.*, 2014). These tend to take place in organisations that have a centralised structure, where top managers have the power and authority to make decisions. However, in small or micro businesses, the non-programmable type of decision is also often made by the business owners/managers (Tolbert & Hall, 2008).

The breakthrough work in relation to the process of decision making was originally the work of Simon (Simon, 1945, cited in Miller, Hickson & Wilson, 1999). His assertion was that the decision-making theories that existed at the time were mainly based on neoclassical economic theory. Simon (1960) is probably the best known critic of neoclassical economic theory. He argues that this theory is inadequate when it comes to explaining decision making in everyday life. His belief was that managers do not make rational decisions, except in the situation in which external factors related to their business can be completely controlled by the managers, and they must have no limit in computational capability (Simon, 1992; Simon, 1997b). Therefore, decision making made by human beings cannot be fully explained by rationality, due to the limitations that exist when it comes to making a flawless decision based on incomplete information and with limited time available (Simon, 1997a).

Kahneman (2003) worked based on the bounded rationality that was originally posited by Simon. He stressed that human beings are unable to make perfect extrapolations based on numerical data and probabilities. Instead, they deal with complex tasks based on their heuristics. Moreover, in the same vein as Simon's notion of satisficing, Gigerenzer developed a decision-making theory, referred to as “*fast and frugal*”

heuristics,” influenced by bounded rationality (Gigerenzer & Goldstein, 1996; Gigerenzer, Todd & the ABC Research Group, 2001). The theory posits that if a human being is bounded in rationality, his heuristics have to be frugal in terms of understanding, he has to be fast in his carrying on and they must fit to the real world (Forster, 1999).

All in all, rationality is inappropriate when it comes to explaining decision making in the real world as it has a major defect in assuming that in the process of decision making, decision makers are considered as observers, instead of as actors. Moreover, rational decision making disregards reality that in order to derive a final decision, the decision maker requires resources such as time and money, to collect relevant information with regard to decisions, and such resources seem to be limited (Kalantari, 2010). The following section explores the behavioural economics’ concepts.

2.4.1.2 An introduction to behavioural economics

In recent years, there has been an increasing amount of literature on behavioural economics (James, 2012; Metcalfe & Dolan, 2012). Additionally, behavioural economics also plays an important part in management, economics and finance studies (Kao & Velupillai, 2015). This is mainly because of its ability to describe decision-making behaviours, particularly at the individual level. This results from the fact that behavioural economics is based on the disciplines of both economics and psychology (Whittle, Davies, Gobey & Simister, 2014). Including psychological factors means that the model based on behavioural economics could capture more with regard to actual decision-making at the individual level. As a result, behavioural economics has been utilised to explain behaviours in various applications; for example, transport-using behaviour (Metcalfe & Dolan, 2012), and investment behaviour (Mokhtar, 2014).

Metcalfe and Dolan (2012) and Mokhtar (2014) revealed that not only various factors in relation to behavioural economics can impact on behaviours in terms of transport use, but they can also change such behaviours. Toma, Stott, Heffernan, Ringrose and Gunn (2013) and Mokhtar (2014) found that the errors relating to cognition and biases due to human emotions are the factors that help to explain why markets deviate in terms of efficiency. Therefore, a model of understanding decision-making behaviours in a live setting can be built based on behavioural economics. This is in line with

Tokar (2010) who argued that logistics research that is conducted based on behavioural economics is appropriate for the purpose of theory building.

Velupillai (2012) noticeably divided behavioural economics into classical and modern aspects. One of main differences between the two is the existence of “*preference order*” in modern behavioural economics, whereas as it absent from classical behavioural economics. Kao and Velupillai (2015) argued that using the modern behavioural economics approach to build decision-making behaviour models enhances its ability to predict (compared to classical behavioural economics) by substituting some contradictory points in neoclassical economic theory. According to Kao and Velupillai (2015), classical behavioural economics enables us to create models that develop an understanding of decision-making behaviours better than does neoclassical economic theory, whilst the modern behavioural economics enhances our ability to create a better predictive decision-making model than is the case with classical behavioural economics. In other words, a model of understanding of decision-making behaviours in an exploratory less-known, potentially fragmented and live setting can be built based on classical behavioural economics. On the other hand, a descriptive or prescriptive model of decision-making behaviours can be created based on modern behavioural economics. The following subsections are the literature reviews in relation to the bounded rationality and intuition concepts.

2.4.1.2.1 Bounded rationality

The behavioural model proposed by Simon asserts that though decision making in organisations has an objective base in rationality, managers are incapable of achieving it. This is because human beings have limitations in terms of their cognitive abilities and because external factors are uncontrollable (Anthony *et al.*, 2014; Kalantari, 2010). Although the bounded rationality theory is set against the neoclassical economic theory (Sent, 2005), the theory of bounded rationality is the alternative theory in describing the actions of decision makers, in that decision-making behaviours vary from that proposed by rationality theory due to environmental factors, rather than claiming that the premises of neoclassical economic theory are wrong (Kalantari, 2010).

Bounded rationality is a more realistic concept with regard to explaining managers’ decision-making behaviours (Hemp, 2009; Simon, 1997a). Bounded rationality theory asserts that decision makers base their decisions on rationality, but they have capability limitations when to comes to processing information (Anthony *et al.*, 2014). Additionally, the decision making outcomes tend to be based on a “*satisficing*”

objective, rather than an optimal objective (Kalantari, 2010; Simon, 1997a). This is because rationality is bounded, as decision makers are unable to know every single alternative, there are external circumstances involving uncertainty (including incomplete information, information acquiring costs, unpredictability with regard to the future, limited time in decision making and the complexity of organisations) and an incapability with regard to the consequent assessment of alternatives (Simon, 1997b). Additionally, decision making potentially varies from rationality due to the existence of emotion or unconsciousness actions on the part of decision makers (Burciu & Hapenciuc, 2010; Simon, 1993).

Simon (1992) also introduced the idea of process in alternative searching, the method by which managers find and select an alternative to be implemented. The process includes “*heuristic search*” and “*stop rule*,” and “*adjustable aspirations*” as “*satisficing*.” Managers’ experience plays a crucial role in setting the level of aspiration in decision making. According to the process, managers set their expectations to be achieved based on their experience, so that they can estimate the degree of effort that the task requires. The expectation to be achieved represents the form of “*aspiration levels*” (Simon, 1992, p. 4). Simon more elaborated on how managers find the final alternative, and proposed the “*stop rule*” to explain it. Moreover, he clarified that decision makers use a “*heuristic search*” to generate alternative choices to be selected in the later stage. Simon asserted that their first choice to meet their requirement of a “*satisfactory*” objective is selected, which in turn leads to no guarantee of optimisation. In the event that decision makers are unable to find a satisficing choice, the level of aspiration will be decreased till the level is met by the choice (Simon, 1997a).

In sum, the neoclassical economic theory was criticised by Simon (1992) in terms of the ignorance of decision makers’ rationality limitations, and the inconsistency to the external environment in the real world that prevent them achieving a “*utility maximisation*.” He asserted that the conditions and available resources with regard to decision making are impacted on by circumstantial factors, such as organisational (environmental) factors. Moreover, if the circumstances are uncertain, then the decision making tends to be uncontrolled.

2.4.1.2.2 Intuition

Intuitive decision making is the process of decision making which lies between rationality and randomness. It involves the subconscious mental processes of thinking, conclusion or selection (Khatri & Ng, 2000). Sadler-Smith and Shefy (2007) asserted that decision making based on both rationality and bounded rationality can be complemented by that based on intuition. A good example is that of a manager who can make a decision quickly based on previous experience, regardless of limited information. This view is supported by Simon (1987, p. 59) who states that “...the analogy of a grandmaster chess player to explain that the player makes his moves very quickly without going through any conscious analysis using his professional judgment of the situation.” This phenomenon in Simon’s view involves intuitive decision making.

Regarding emotion, Seo and Barrett (2007) pointed out that decision makers who have an understanding of their emotions during their decision making have better accuracy in terms of their decisions than those who do not. This view is supported by Anthony *et al.* (2014, p. 505) who write that “...under conditions of stress, our decision-making capability can thus become impaired and so emotional states are as significant as rational capability” Furthermore, Dane and Pratt (2007 cited in Robbins & Coulter, 2012) proposed five different views of intuition, as briefly illustrated in Figure 2.5.

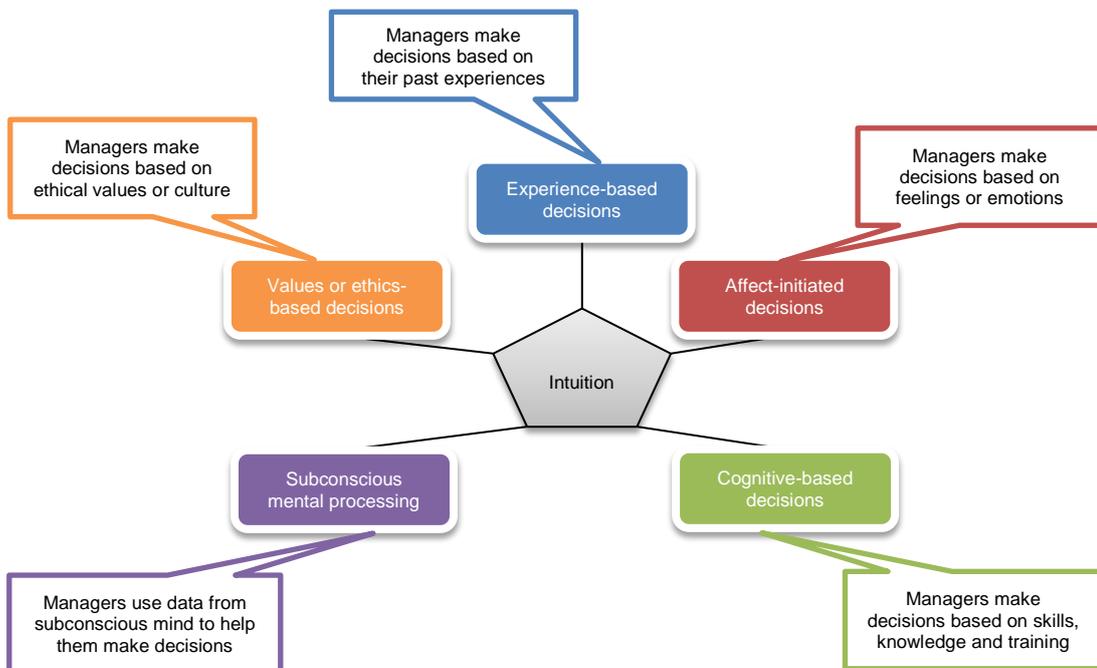


Figure 2.5: Five different aspects of intuition (Source: Dane and Pratt cited in Robbins & Coulter, 2012)

Decision making based on intuition may suit certain situations. There has been an increase in studies involving intuitive decision making in the past few decades. This is partly because of the increase in unstructured problems that lead to decision making relying on intuition instead of rationality (Dane & Pratt, 2007; French, 2013). Moreover, Burke and Miller (1999) claimed that, despite the issue of reliability of intuitive decision making, the benefit to some situations and the low requirement in terms of effort is clear. As a result, there is a potential for using intuition in business nowadays. In an executives' survey, it was unsurprisingly found that the executives who mainly rely on their intuition rather than rationality in decision making account for nearly half of the survey participants (Miller & Ireland, 2005 cited in Robbins & Coulter, 2012).

According to Gigerenzer and Gaissmaier (2011), organisational decision making is commonly based on heuristics as it involves uncertainty in a context in which rationality cannot be applied. Heuristic thinking transforms highly complex information into simple information and allows the individual to make intuitive decisions in dealing with complex problems (Klein & Weiss, 2007). Moreover, Campitelli and Gobet (2010) explain the mechanism used by experts in making decisions in that these individuals have the capability to understand problem situations and make their decisions instantaneously. Such decisions are likely to be accurate, or at a minimum of acceptable risk in routine tasks. Due to the many years of expert practice and training, they achieve the ability to make quick decisions based on their perceptual knowledge (Gobet & Chassy, 2009).

Another study by Miller and Ireland (2005) provided more detail of types of intuition with an explanation that intuitive concepts can be divided into two different aspects: *“holistic hunch”* and *“automated expertise”* (details of these can be seen in Table 2.9). They also point out that the holistic hunch concept of intuition tends to be widely adopted in terms of information synthesised by a subconscious system in order to make a judgement in terms of selecting alternatives and making decisions. These vary, depending on the decision makers' experience. In addition, Seo and Barrett (2007) considered how experts make decisions, and argued that managers' emotions should not be excluded from their decision making.

Table 2.9: Types of Intuition (Source: Miller & Ireland, 2005, p. 22)

Type of Intuition	Definition	Example
Holistic Hunch	Judgment or choice made through a subconscious process involving: a) synthesis of diverse experiences, b) novel combinations of information, and c) strong feelings of being right	Chrysler's decision to develop an automobile very different from others at the company – the Dodge Viper
Automated Expertise	Judgment or choice made through a partially subconscious process involving a) steps borne of past situation-specific experiences, b) a replay of past learning, and c) a feeling of familiarity	Chevy Chase Bank making routine commercial loan decisions for existing large customers

According to Gigerenzer (2008, p. 4), “A heuristic is called ‘fast’ if it can make a decision within little time, and ‘frugal’ if it searches for only little information.” The fast and frugal heuristics theory is elaborated in its definition: “A heuristic is a strategy that ignores part of the information, with the goal of making decisions more quickly frugally, and/or accurately than more complex method” (Gigerenzer & Gaissmaier, 2011, p. 454). This definition extends the original one by asserting that larger decision makers’ errors or biases can result from heuristics. In a context that has incomplete information, where the situation is unpredictable (it is the opposite of rationality), simple heuristics seem to be a better choice in terms of accuracy than a rival statistical approach with similar information. Moreover, the performance resulting from a decision based on heuristics is indecisive; it relies on the environmental structure (Gigerenzer & Gaissmaier, 2011). Additionally, Harvey (1998) suggested that it is the subjective factor that determines decisions using heuristics, rather than the objective factors associated with rationality.

In conclusion, this is in line with the views of Gigerenzer and Gaissmaier (2011) and of Harvey (1998), heuristics drives intuitive decisions when the decisions have been made several times in the past, and potentially obtains positive results. However, based on heuristics, it is unsure that a negative result will be learnt from or corrected by the decision makers. Even though it is inconclusive in terms of heuristics based on science and philosophy, the complexities of modern organisation management will benefit from a knowledge and understanding of management theories (Mullins, 2011).

2.4.2 Models of Organisational Buying Behaviour (OBB)

Two notable people who defined organisational buying were Webster and Wind who wrote:

“Organisational buying is a decision-making process carried out by individuals, in interaction with other people, in the context of a formal organisation. The organisation, in turn, is influenced by a variety of forces in the environment.”

(Webster & Wind, 1996, p. 53)

Kotler and Keller (2016) have provided another similar definition of organisational buying as:

“The decision-making process, in which formal organisations establish the need for purchased products and services and identify, evaluate, and choose among alternative brands and suppliers.”

(Kotler & Keller, 2016, p. 211)

Based on these definitions, it can be clearly seen that there is a close connection between organisational buying and decision making. Although the research in organisational buying has been dominated by physical products, the model of buying can be applied to the context of buying organisational services (Rogerson *et al.*, 2013). Decisions with regard to freight transport modes can be regarded as one particular kind of service buying (Pisharodi, 1991). In addition, Rogerson *et al.* (2013) point out that only particular features of bought service may impact on each stage of the buying process.

Hutt and Speh (2009) classified OBB models into three broad types: task, non-task and complex models. Task models are models in which decisions relate mainly to economic factors such as price. Due to the minimised cost concentration, other factors related to the personal profiles of the decision makers are ignored in these models. Lillie and Sparks (1993) pointed out that such models lack the ability to completely describe the behaviour of organisational buying, as such behaviour does not comply with rational and simplified assumptions.

Unlike task models, non-task models base their decisions on human factors such as emotion, to describe OBB (Webster & Wind, 1996). However, Webster and Wind (1996) make the criticism that models based only on tasks or non-task factors may not be sufficient to explain OBB, because qualities of rationalities in buying decisions might be required at certain levels. As a consequence, *“...ideally our model of the*

organisational buying process would include individual, group and environmental variables and both task and non-task considerations” Webster and Wind's quote from Lillie and Sparks (1993, p. 16). Therefore, the need for a concept involving both task and non-task factors is presented in the subsequent model.

Complex models are the combination of task (e.g. cost) and non-task factors (human related factors). OBB researchers attempted to associate complex models with the behavioural approach. Such models include both cost and human-based variables. In support of complex models, the “*Buygrid model*,” Sheth's model, and Webster and Wind's model are well-known in the study of organisational buying behaviours. The concepts and theories of OBB are borrowed and applied to other disciplines; for example, in the field of purchasing and SCM (e.g. Lysons & Farrington, 2012; Van Weele, 2014), and in the field of marketing (e.g. Hutt & Speh, 2009; Kotler & Keller, 2016; Vitale, Giglierano & Waldemar, 2011). Also, these concepts are applied as a theoretical based knowledge and are considered useful in identifying the scope and key issues for this study. As a result, a preliminary conceptual framework of the thesis is developed based upon the concepts of OBB, emphasising factors affecting organisational buying decisions. In this section, the current literature on the concept of organisational buying pays particular attention to three headings: buying processes; buying centres, and factors influencing the buying decision.

2.4.2.1 Organisational Buying Process

In their literature review of OBB, Sanderson, Lonsdale, Mannion and Matharu (2015) point out that the fundamentals of the concepts in OBB research have been mainly influenced by Robinson, Faris and Wind (1967), Sheth (1996), and Webster and Wind (1996). There is substantial research that is considered as an extension or a testing of these authors' proposed models. It is worth noting that the majority of the proposed processes in organisational buying are in the form of a sequential model. For example, in the early versions of OBB models they were usually regarded as a process model, involving an order of purchasing activities (Tanner, 1999). Those models were summarised and included into the “*Buygrid Framework*,” originally proposed by Robinson *et al.*, the model comprising the two main models of “*Buyphase*” and “*Buyclass*” (Kotler & Keller, 2016). The important activities of the framework were summarised in general terms by Kotler and Keller as illustrated in Table 2.10. Buying tasks in the “*Buygrid model*” are classified based on task repetition (new or rebuy) and similarity to the previous task (the same or altered), into new, modified and straight rebuy.

Table 2.10: Buygrid Framework: Major stages (Buyphases) of the industrial buying process in relation to major buying situations (Buyclasses) (Source: Kotler & Keller, 2016, p. 220)

		Buyclasses		
		New task	Modified rebuy	Straight rebuy
Buyphase	1. Recognition of a problem (need) and a general solution	✓	May be	✗
	2. Determination of characteristics and quantity of needed items	✓	May be	✗
	3. Description of characteristics and quantity of needed item	✓	✓	✓
	4. Search for and qualification of potential sources	✓	May be	✗
	5. Acquisition and analysis of proposals	✓	May be	✗
	6. Evaluation of proposals and selection of suppliers	✓	May be	✗
	7. Selection of an order routine	✓	May be	✗
	8. Performance feedback and evaluation	✓	✓	✓

The Buyclass can be grouped into three types, which in turn influence the number of stages undertaken and the degree of effort when making decisions to buy organisational products or services. As a result, the Buyclass is considered a vital concept of the “*Buygrid Framework*” (Jerrold, 2014). It is commonly found that service buying in the logistics of freight forwarders and shippers is in the form of modified rebuy, except from the first buying (Gul, 2012). The author provides an explanation that it is common to modify some of the service characteristics from the previous one, such as cargo types, shipment destinations or payment types. In addition, if the service is categorised in the group of more expensive, even though it is a modified rebuy, service buyers may regard it to be like a new task buying, by proceeding through every stage of the process (Jerrold, 2014).

The research in relation to the buying process of services in transport is considered vital. According to Bottani and Rizzi (2006), there are five major stages in the selection of logistics services, as stated below.

1. to identify the necessity of logistics outsources;
2. to devise the potential choices (both in-houses and outsources);
3. to assess the choices and choose the logistics service supplier;
4. to use the selected logistics service supplier; and
5. to assess the service for the purposes of performance control, new logistics service supplier choice, relationship enhancement between logistics service users and suppliers

(Bottani & Rizzi, 2006)

In support of this position, Lehmusvaara, Tuominen and Korpela (1999, p. 6) noted that freight transport mode choice process is considered complex and unstructured, since the features of the decision making process are characterised as demonstrated in Table 2.11.

Table 2.11: Characteristics of the freight transport choice process (Source: Lehmusvaara *et al.*, 1999, p. 6)

Characteristics of the decision process in the selection of transport services
<ul style="list-style-type: none">• the objectives of the process conflict to some extent, such as maximising customer service and minimising costs• full information is not available because of the dynamic and uncertain environment• the evaluation of the potential modes and carriers is based on multiple criteria• the evaluation is based on quantifiable data and subjective judgements on the part of the decision makers• several people are usually involved in the decision making process• there is a large number of alternatives to be evaluated in the process

A number of literatures have been published on the purchasing process in organisational buying (e.g. Andersson & Norrman, 2002; Björklund, 2005; Rogerson *et al.*, 2013; Van der Valk & Rozemeijer, 2009). Nevertheless, although proposed models may vary in some details regarding the buying process, they are quite similar (see Figure 2.6). This is because authors of different models may give emphasis on different elements of the models, and describe details in individual models at not the same levels. For example, Andersson and Norrman (2002) investigate the different buying process between purchasing basis and advanced service of logistics, by explaining and comparing the individual process stages, and the differences between them. One of the most significant current discoveries is that the authors further extend the process of logistics services into the contract arrangement stage.

Furthermore, regarding logistics service buying, the model of buying processes in practice, based on environmental friendly logistics service, was developed by Björklund (2005). In his work, Björklund (2005) emphasises more on recognising problems than logistics service choice and purchasing tasks. However, a final stage of Björklund (2005), entitled post-choice management, is comparable to the final three steps of the process model of Van Weele (2014). Another important process model of freight transport service purchasing is introduced by Van der Valk and Rozemeijer (2009). However, unlike Van Weele (2014), Van der Valk and Rozemeijer (2009)

underline that the stages of information request (stage 2) and detailed specification (stage 3) are also essential for logistics service purchasing.

Even though the models of buying process have been defined in several versions (see Figure 2.6), the structure of the organisational buying process has been found to have some common elements. This can be illustrated briefly by the six fundamental stages proposed by Van Weele (2014). The logistics service buying process begins with specification identification. Afterwards, the selection of an appropriate service provider to be contracted is implemented. Consequently, the stage of service monitoring and control is used during the period of using the logistics service. The performance of the service provider is eventually assessed in its provided service.

Contrasting the models of logistics service buying introduced by Andersson and Norrman (2002), Björklund (2005), Bottani and Rizzi (2006), and Van der Valk and Rozemeijer (2009), that of Van Weele (2014) provides the general process rather than separating details into individual stages of the process. It is worth nothing that an individual model, which is considered specific, is consistent with the general model except that it requires full details. Moreover, Van Weele's process model provides the additional stages after the contract has been agreed in detail. Therefore, if the decision in buying logistics services is considered general, the model proposed by Van Weele is more suitable than the others. On the other hand, if the decision needs more particular details in a specific stage, especially between the stages of buying and signing contracts, the model proposed by Björklund (2005) is more supportive.

Furthermore, Turnbull and Leek (2003) found that the stages of the organisational buying process are able to take place concurrently in some specified situations. Töytäri (2015) points out that decision makers are concerned with various issues at a particular stage of the organisational buying process. This depends on search behaviour, the attention of the decision makers, the limitations of a particular industry, the pressure of market competition, and the collaboration of the buying centre. In view of all that has been mentioned so far, one may suppose that the variety of service features, the drivers and patterns of firms' purchasing, can be considered varied.

So far, this section of OBB has focussed on the organisational buying process. The following section will discuss the buying centre.



Figure 2.6: Comparing four process models of organisational buying

2.4.2.2 Buying Centre

The “*buying centre*” or “*decision-making unit*” is considered another main element of the concept of organisational buying. Van Weele (2014, p. 27) defined it as “...*all those individuals and groups who participate in the purchasing decision-making process, who share some common goals and the risks arising from the decisions (identical to decision-making unit).*” The activities of organisational buying are commonly related to more than one manager; therefore, there is a need to establish a buying centre to deal with potential conflicts in terms of the buyers’ objectives, the differences in degree of power, the process and criteria of decision making, and the buyers’ personal knowledge and experience (Lau, Goh & Phua, 1999).

According to Lysons and Farrington (2012), the members of a buying centre comprise the user, the purchaser and the decision making types of members, all of whom are involved in the process of making buying decisions. Moreover, in big organisations, the buying centre may include an influencer type. These are technical information providers who help to evaluate or choose the service, and a gatekeeper type, who controls information flow and contacts decision makers (Van Weele, 2014).

One of the key aspects of the buying centre is the potential risk in relation to the decision to be made. According to Sanderson *et al.* (2015), the higher the risk of exposure in decision making, the greater the number and complexity of decision making stakeholders who get involved. It means if a buying decision is considered to be exposed to high risk, the decision makers will come from different parts of firms, and may have differences of interest. Moreover, such decision makers tend to be experienced and highly qualified, and have a desire to focus on individual steps of the whole buying process.

Buying centre members are professionally responsible for identifying a firm’s requirements and developing the method used to fulfil the identified requirements. The complexity of the buying centre is usually subject to the significance and scarcity of the required products/services. Moreover, the decisions of the buying centre are perhaps made by various participants from many locations. This is because the buying centre concept is only represented by a range of firms’ departments; for example, manufacturing, financial, procurement and engineering departments. It is possible that participants or members of a buying centre in big firms are situated far away (Vitale *et al.*, 2011). Consequently, ranking importance and understanding key factors affecting members of the buying centre, and identifying their roles in making

decisions, are considered a significant task for business marketers. This also includes the identification of factors influencing the key decision makers in the buying centre. According to Vitale *et al.* (2011), the task of the buying centre is complex and challenging, since it needs to bring various factors together, as well fulfilling requirements that might be in conflict.

This raises questions about what factors affect an individual decision maker who makes decisions that need to benefit the whole company, and which will be discussed in the following section.

2.4.2.3 Factors influencing organisational buying decision

The basic principle of OBB is that it is the process of decision making done by decision makers who interact with forces from other stakeholders and environments (Webster & Wind, 1996). According to Sheth (1973), there are four major categories that affect the organisational buying decision: psychological factors, product-specific factors, company-specific factors and situational factors, as presented in Figure 2.7.

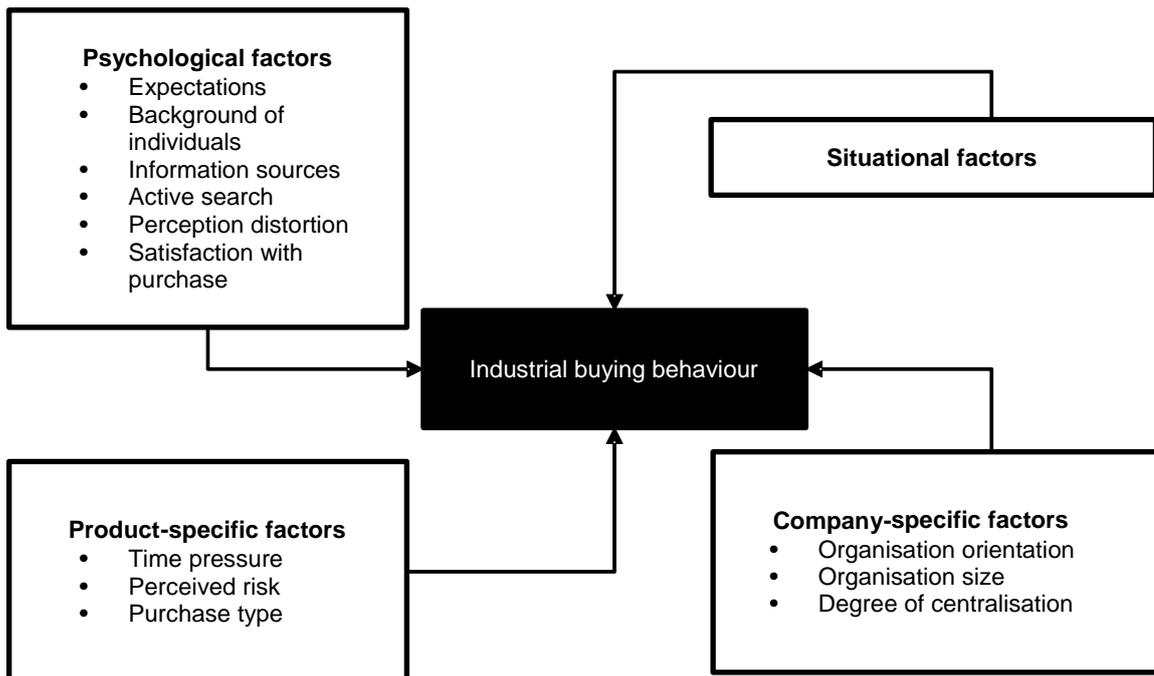


Figure 2.7: Sheth’s model (Source: Adapted from Lau *et al.*, 1999)

It is necessary to clarify what is meant by “*psychological factors.*” To illustrate, there are a number of factors in this element, including, for example, individual background, sources of information, the distortion concept of perception, and previous buying satisfaction. Individual background refers to the demographic characteristics of the individual and is regarded as a vital determinant of buying behaviour. Regarding sources of information, they play a role in searching for and sharing information in relation to organisational purchasing. The third type of determinant in organisational buying is perception distortion. This refers to the degree to which there is a combination of decision makers’ previous knowledge and objective information. Finally, previous buying satisfaction describes the extent to which decision makers have different experiences from different providers, which in turn leads to different levels of satisfaction.

Webster and Wind (1996) categorised the determinants of the organisational buying behaviour into four main components: individual, social (interpersonal), organisational, and environmental, and the details of particular types of factor are demonstrated in Table 2.12 below. Each group of factors is further sub-divided into two broad categories of variables called task and non-task factors. Task variables are the variables that are in relation to the purchasing problem. In contrast, those that do not fall into the task-variable group are non-task variables. These include factors influencing the individual decision maker(s) related to purchasing decisions; for instance, emotional, political factors and personal objectives. Recent evidence about freight transport decisions suggests that decision makers’ personal factors have an impact on their decisions (Samimi, Kawamura & Mohammadian, 2011). The factors that are identical and enable one to gain an understanding of the behaviour of decision making in selecting transport modes are, for example, previous experience and familiarity with them.

Table 2.12: Classification and examples of variables influencing organisational buying decisions (Source: Webster & Wind, 1996, p. 53)

Classification and examples of variables influencing organisational buying decisions		
	Task	Nontask
Individual	desire to obtain lowest prices	personal values and needs
Social (interpersonal)	meetings to set specifications	informal, off-the-job interactions
Organisational	policy regarding local supplier preference	methods of personnel evaluation
Environmental	anticipated changes in prices	political climate in an election year

By illustrating Table 2.12, it is the fact that decisions are made by people. Therefore, such decisions are inevitably related to their thoughts and judgement, and are influenced by their roles from a personal and professional perspective (Webster & Wind, 1996). For example, motives will have two perspectives: lowest prices and personal needs. The personal view of individuals has the potential to affect the quality of a firm's decisions. Moreover, this model highlights the essential of social (interpersonal) factors that impact on purchasing behaviour in organisations. Buying centre members have an aspiration from the goals of organisation and the interaction between individuals. The interpersonal relationships that emerge are considered a complex form of interactions between individuals.

With regard to formal organization, task characteristics, structure of organisations, and individuals and technology can all influence the buying centre. Webster and Wind (1996, p. 55), define the structure of an organisation as comprising of “...*subsystems of communication, authority, status, rewards, and work flow, all of which have important task and non-task dimensions.*” On the other hand, Nontask refers to “*methods of personnel evaluation*” (Webster & Wind, 1996, p. 53). Moreover, Glock and Hochrein (2011) pointed out that decision makers who have more authority in decisions tend to be those who measure their performance using a quantitative method and realise they are responsible for it. Lastly, factors in relation to environments, such as factors based on, politics, law, economics, technology, physics and culture, apply to the entire organization.

In conclusion, this model provides a valuable concept for OBB researchers in gaining an understanding of the fundamental determinants of organisational buying decisions, and to assess the relationships of the particular factors included in the model. Thus, Webster and Wind's model is considered useful in terms of providing a broad picture of comprehensive organisational buying decisions.

It is evident that a variety of contextual variables have an influence on purchasing tasks (Glock & Hochrein, 2011; Sanderson *et al.*, 2015). Its importance was highlighted by Rogerson *et al.* (2013) and the authors provide an example on purchasing strategies that need to be customised into particular conditions. An integrated model of OBB is one important framework of purchasing behaviour within organisations. In this framework, a range of contextual variables are regarded as impacting purchasing decisions (Johnston & Lewin, 1996). A number of both internal and external variables are categorised into eight groups, as shown in Figure 2.8.

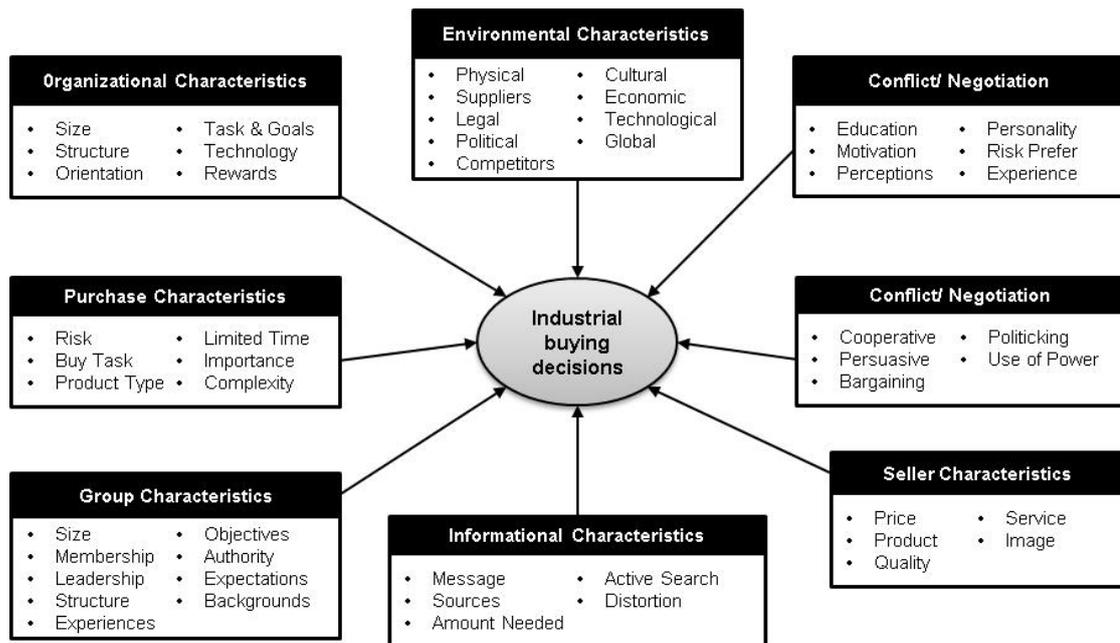


Figure 2.8: An integrated model of organisational buying behaviour (Source: Adapted from Johnston & Lewin, 1996)

It is important to point out that, the models of OBB introduced by Webster and Wind (1996), by Sheth (1973), and by Johnston and Lewin (1996), are considered as foundation models of this research area. The three models of Johnston and Lewin (Johnston & Lewin, 1996), Sheth (Sheth, 1973), and Webster and Wind (Webster & Wind, 1996), have three common essential features. Firstly, the environmental factors are contained in all of these models. Such factors include economic, infrastructure, politics, business partners and rivals, law, culture, technology, and global trade. Secondly, organisational influences appear as one of the key constructs in all three models; these are: structure, size, orientation tasks, goals of the firm, technology used, and reward system. Finally, individual factors are also included in the three models (in the Johnston and Lewin model these are part of the construct named “*conflict/negotiation*”). They comprise factors of motivation, education, risk-taking attitude, experience, personal, and perception.

More recently, in a review of factors affecting buying decision, the framework of Lysons and Farrington (2012), as depicted in Figure 2.9, is considered more closely in the field of logistics and distribution management, and the model placed emphasis on sourcing decisions. The model comprises four major categories, namely: environments, organisations, interpersonal and individuals. It is important to point out that most of these factors are in accordance with the seminal models of Webster and Wind (1996), Sheth (1973), and Johnston and Lewin (1996).

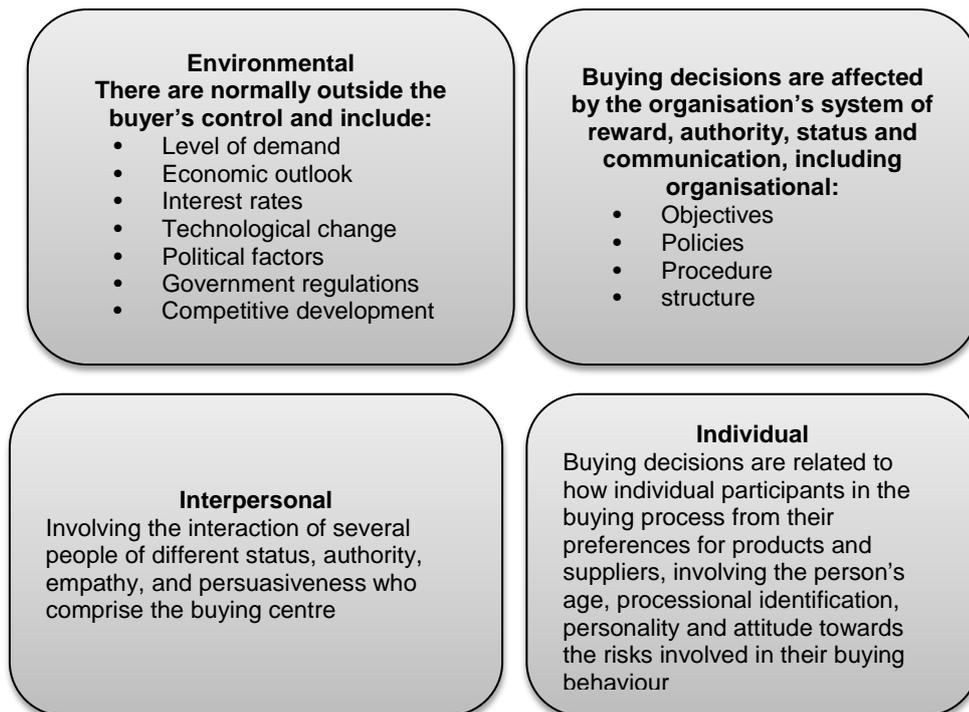


Figure 2.9: Factors in industrial buying decisions (Source: Lysons & Farrington, 2012, p. 408)

According to existing literature, there is a need to gain a better understanding of factors related to the context and background. As a result, there are three main sets of factors that are considered relevant to this research: business environmental factors, organisational factors, and individual factors. These three constructs are ideas inspired by the model of Lysons and Farrington (2012), in which a model that closely connects industry buying behaviours, within a field of study like logistics, as this original framework places emphasis on applying sourcing decisions relating to logistics and distribution. Therefore, the framework should be appropriate for any decision relating to the activities of logistics and distribution.

2.4.2.3.1 Business environmental factors

Shipping managers are highly dependent on economic variables, both in present conditions and future expectations. Such variables are also the focus of other parties, including institutions, business stakeholders, such as business partners and rivals, government, trades unions, members of political parties, trading associations and groups of business professionals (Rushton *et al.*, 2010). The types of institutions depend on the particular country, while the characteristics of an institution play a crucial role in the formation of overseas business relationships (Pfeffer & Salancik, 2003; Rushton *et al.*, 2010).

The impact of external factors shapes the constraints of businesses, products and service availability. Examples of external factors are income levels, interest and tax rates, and government policy. Factors in relation to economics and politics impact on the constraints of business environments. For instance, it can be said that the rubber market in Thailand is quite sensitive to changes in business conditions, and the above-listed economic factors strongly affect a company's willingness to spend money on transport assets. Throughout a period of economic recession or financial crisis, businesses tend to decrease their spending on business investment or operational costs (Sainidis *et al.*, 2013).

In a useful investigation into the study of the choice of transport mode, Rushton *et al.* (2010) also pointed out the importance of external factors that influence many operational factors. This is necessary as it might have a direct influence on distribution-related factors. This is particularly true in the selection of transport in the global market, since such factors differ from one country to another. For instance, in Rushton *et al.* (2010) such factors include individual countries' fundamental infrastructure, control and licence systems for export, the economic situation, legal and tax systems, and communication technology. Mangan *et al.* (2001) also indicate that different variables influence the context of decision making, which in turn means there is a need for a holistic view when selecting the mode of freight transport. Recent evidence suggests that it is important to bear in mind that the business environment may have been an important factor in the purchase of freight transport services, especially for transport infrastructure within an area where a company is located (Rushton *et al.*, 2010).

External variables, like those in relation to economics, law and regulations, politics, society and technology, are uncontrollable when it comes to decision making in terms of organisational buying (Lysons & Farrington, 2012). However, Björklund (2011) points out that the circumstance of business encompasses buying decisions in logistics service. The author also highlights the importance of knowledge, and the acknowledgement of business context in logistics service buying, for good management performance. Evidence from the findings of Björklund (2011) from a company in Sweden, suggest the key factor for success in logistics service buying is the context of business awareness.

Due to the highly complex nature of the circumstances in which global businesses operate, managers have to constantly analyse the capacity of their companies, the behaviour of their customers, the complexity of business tasks in different

circumstances in different markets, changing business environments, competitive markets, and market regulations (Bartlett & Ghoshal, 1991; Björklund, 2011; Ng, 2010). Due to the complexity of global business circumstances, it is considered as an issue that can be categorised in terms of bounded rationality (Anthony *et al.*, 2014; Carter *et al.*, 2007; Notteboom, 1998). Moreover, in a study on the causes of uncertainty in logistics operations, Sanchez-Rodrigues *et al.* (2010) found that the most important problem in logistics, which in turn results in its operational uncertainty, is traffic congestion associated with road transport. In addition, their model of the Logistics Uncertainty Pyramid, as demonstrated in Table 2.13, illustrates the five potential sources of uncertainty impacting on transport management. Such sources are shippers, customers, carriers, control systems and external uncertainty.

Table 2.13: Five potential sources of uncertainty that can affect transport operations (Source: Sanchez-Rodrigues *et al.*, 2010, p. 49)

Five uncertainty sources that can affect transport operations
Shipper: any uncertainty originating from the sender of products in the logistics triad, which directly impacts upon transport performance. These may relate to raw material sourcing, the production process or the activities involved in the despatch process.
Customer: any uncertainty that is produced by the receiver of products. Examples include forecasting and ordering products or any delivery restrictions that the customer imposes.
Carrier: any anomalies that can be originated from the carrier and directly affect the delivery process, such as vehicle failure or a lack of drivers.
Control systems: any problems caused by inadequate and fragmented ICT systems within the logistics triad, or the lack of physical monitoring systems.
External uncertainty: any disruption caused by exogenous factors that are not under the control of the logistics triad, including congestion, labour shortages and volatility of fuel prices.

The Institutional Theory assumes that the adaptability of an organisation towards the external circumstance where it belongs to is essential. The key premise of the theory indicates that “...*external forces pressure firms to behave in certain ways and not behave in others*” (Shook, Adams, Ketchen & Craighead, 2009, p. 4). It means that building a general model to fit all the differences of firms, in terms of time and space, is a challenging task. The firm that is considered highest fitted is the one which has the best adaptability to business environments; as a result, variety in business management requires different organisational types (Rogerson *et al.*, 2013). Thus, it is important to understand the differences in behaviours in logistics service buying decisions in different firms. Moreover, seeking the factors to gain an understanding of why one performs better or worse than another, or why one set of factors are appropriate in an explanation, relies on the business environment.

2.4.2.3.2 Organisational factors

Regarding the individual level, organisational working implies continuously interactive activities within a firm's environment. This working interaction is a quite complex process which controls people's behaviour and, to a certain extent, may have been an important factor in changing individual perception. Generally, the normal environment of a firm facilitates employees to confront each other in a direct face-to-face manner. This concept was extended by Garrido-Samaniego and Gutiérrez-Cillán (2004), and Glock and Hochrein (2011) in terms of organisational factors. Such factors are a firm's size, its position in the market, its management structure, working conditions, its management philosophy, corporate government, behaviour of risk taking, horizontal and vertical integration, and the internal relationship between employees. In addition, variables in relation to organisations, such as the organisation's objectives, policies, procedures, systems and structural characteristics, are also considered as drivers of organisational buying decisions (Vitale *et al.*, 2011). The size of the organisation plays a crucial part in describing the processes of organisational buying decisions (Garrido-Samaniego & Gutiérrez-Cillán, 2004; Robbins & Judge, 2013).

The behaviours of employees in an organisation represent the group interest rather than self-interest. Such behaviours are influenced by the variables previously mentioned. One (a person) is a unit of a system's activity chain, not just a sole individual, and attention should be paid to this (Webster & Wind, 1996). The authors supported the idea by supposing that why employees may behave differently in making decisions on their own, or in different organisations, derives from factors of a particular organisation. Vitale *et al.* (2011) pointed out that the attitude of a firm (organisation) toward its various projects is defined by its objectives, goals and missions. Such objectives and goals are used to introduce a firm's policies and procedures, which in turn form the structure of a particular organisation. Decisions in relation to business management depend on the extent to how flexible, dynamic and risk-taking the organisation is. Overall, there seems to be some evidence to indicate that organisational buying decisions have motivation or impact from the goals of particular firms, resulting from their conditions with regard to technology, human resource and finance.

The organisational structure is another factor worth focusing on, as it influences internal procedures and rules of behaviour. Sanderson *et al.* (2015) indicated that a centralised structure of organisation provide advantages for the organisation in several aspects, such as an attraction to recruit or maintain knowledgeable

employees, increased buying power toward maximisation, and an enrichment of gathering and analysing data. On the other hand, distraction from its main business requirements, overemphasis on bureaucracy, slow responses to the demands of internal clients, and lack of participation at the beginning of the buying stage are considered as disadvantages. Such advantages and disadvantages of decentralised buying structures are mostly opposed to decentralised buying. The evidence presented in this section suggests that organisational structure seems to play a vital role in explaining buying decisions because individual managers make decisions in the best interests for the goals of the organisation.

According to Burgess, Singh and Koroglu (2006), there is no meta theory in the research in SCM. The authors also point out that in SCM, the main explanations in this research field derive from borrowing existing theories from other study fields. This is supported by an argument of Halldorsson, Kotzab, Mikkola and Skjøtt-Larsen (2007) who stated that, in SCM, one of the commonly used theories to explain organisations is the resource-based view theory. This theory's concept is based upon the explanation of differences in performances resulting from different management efficiency (Barney & Clark, 2007; Barney, Wright & Ketchen, 2001; Shook et al., 2009).

According to Handfield and Nichols (2002), management not only consider the costs of the supply chain, but the value it can add as well. Porter (2004) regards the value added in the system as the activities in the network, from the beginning through the supply chain: from producers via market channels to ultimate customers. The author also pointed out that an individual organisation might differ from others in terms of value chain, which may in turn be its competitive advantage. Such competitive advantage will be regarded as sustainable if the organisation occupies rare, valuable resources and they cannot be imitated and substituted (Chicksand, Watson, Walker, Radnor & Johnston, 2012). Similarly, Shook *et al.* (2009, p. 4) summarised the key premise of the theory that "*Unique assets and capabilities are the source of enduring competitive advantages.*" It is the fact that each individual firm defines its own particular policy, objective, process, system and resource components. This theory should be beneficial in explaining the practice of freight transport on intermodal freight transport from the aspect of organisational factors.

2.4.2.3.3 Individual factors

Decision making in the buying centre tends to be conducted by a range of participants. They commonly have various characteristics in terms of individual preferences, perceptions and motivations. As a consequence, such individual factors, especially expertise and attitudes toward risk, inevitably impact on the decisions of the buying centre (Garrido-Samaniego & Gutiérrez-Cillán, 2004).

Bessant and Tidd (2011, p. 129) defined perceived risk as “...*a function of the buyer's level of uncertainty and the seriousness of the consequences [associated with various decision outcomes] of the decision to purchase.*” Some researchers, for example, Sanderson *et al.* (2015), and Lewin and Donthu (2005), have argued that the different features of purchasing decisions potentially result from the risk magnitude in relation to the decision. Moreover, such a decision is influenced by purchase characteristics. It is necessary here to clarify what is meant by purchase characteristics. The term purchase characteristic refers to the importance of a particular purchase, purchase complexity and the degree of uncertainty. This thesis will use the definition suggested by Lewin and Donthu (2005) who saw it as follows:

- **“purchase importance:** frequently is defined as the relative importance of the current purchase to other purchases of similar type and/or the current purchase's perceived impact on the organization
- **Purchase complexity:** often is defined as the technical complexity of the product and/or the complexity of the buying decision or task under consideration
- **Purchase uncertainty:** is often characterized as the uncertainty regarding the information available to make the best decision and/or the ultimate positive (negative) outcome of a purchase decision.”

(Lewin & Donthu, 2005, p. 1383)

According to Garrido-Samaniego and Gutiérrez-Cillán (2004), the rise of perceived risk results in an increase in the size of buying centre. The authors also argued that the increase in the size of a buying centre takes place as it seeks to understand more relevant information and minimise the risk toward buying decisions. Additionally, it is asserted that the decision makers' perception of risk is one of the most important variables in order to understand the process of buying in industries (Cooper, Wakefield & Tanner, 2006). In view of all that has been mentioned so far, risk in relation to buying decisions, in how firms' decision makers perceive risk, is considered

as one of the buying decision's most essential features. Thus, in studying the choice of transport modes, risk perception of a particular transport mode or carrier seems to play a crucial role in explaining decisions for freight transport.

As noted by Lillie and Sparks (1993), Maslow's hierarchical model can be employed in order to describe the motivation of individuals for the buying behaviour of air freight forwarders, as shown in Figure 2.10. It is apparent that the lower first criteria are those that need to be satisfied prior to considering further requirements. Therefore, from this principle, four criteria have to be satisfied before the objective criteria will be considered by purchasers (Lillie & Sparks, 1993). What is interesting in this model is that risk reduction becomes the first priority in the view of freight forwarders; otherwise they will pay no attention to unsatisfied options in terms of risk. Overall, there seems to be some evidence to indicate that perceived risk may have played a vital role in bringing about the preferred transport mode they use. The studies presented thus far provide evidence that, in the context of buying a transport service, the perceived risk of shippers plays a vital role in purchasing a freight transport service. By way of explanation, in the context of transport service buying, shippers rely on their risk perception of the properties of products/services in their decision making behaviour instead of real properties, and this results in a greater difficulty in understanding their needs.

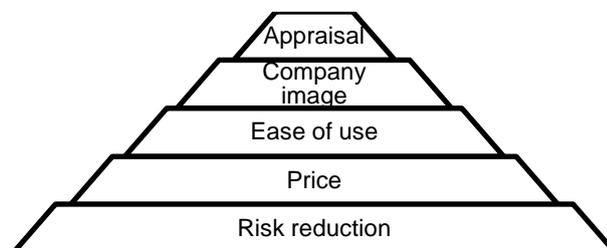


Figure 2.10: A pyramid model of freight buyers' needs (Hierarchy of needs) (Source: Lillie & Sparks, 1993)

According to Samimi *et al.* (2011), the factors influencing decision makers, including previous experience in buying and transport mode familiarity, which impact on the buying decision, are unique and facilitate the understanding of behaviours of transport mode selection. The experience of individuals comes from the relationship between personal knowledge in relation to the various facets of buying decisions, and the extent of familiarity with the decision (Garrido-Samaniego & Gutiérrez-Cillán, 2004). The authors indicated that buying centre members are more participatory and are influenced by those who have more experience. The further study of Glock and

Hochrein (2011) highlighted the need of a fast decision-making process as a solution to those who experienced great stress in regarding time constraints. The authors pointed out that, to increase the speed of such a process, it needs to eliminate official regulations and, instead, establish a specialized unit of firms that has a high hierarchical level and can gain access to the relevant information needed in buying decisions. In view of all that has been mentioned so far, high personal experience and high hierarchical levels enable the reduction of time that firms use in accomplishing buying decisions. In the next section, the author will discuss the gap that has been revealed through the study about the choice of freight transport mode.

2.5 The identified research gap

The literature has disclosed that the set of factors and the relative importance of each factor are considered dynamic relative to time. This is along the same vein as the reviews of the literature in relation to the selection of transport modes and carriers from 1988 – 2007 by Meixell and Norbis (2008), and in relation to the selection of 3PLs from 1994 – 2013 by Aguezzoul (2014). For example, in the comprehensive analysis provided by Punakivi and Hinkka (2006) as presented in Table 2.5, they were able to show that the priority in terms of the importance of determinants are likely to be varied in different industries. Although several previous studies investigating mode choice have been carried out, recent evidence suggests that research on mode choice is relatively new in Thailand, particularly in the natural rubber industry. The majority of mode choice research has been conducted in other countries, and all these studies inform us that the set of chosen criteria vary from one country to another. Examples include:

- the USA (Mitra & Leon, 2014; Samimi *et al.*, 2011; Wang, Ding, Liu & Xie, 2013);
- Australia (Brooks, Puckett, Hensher & Sammons, 2012);
- Taiwan (Hwang *et al.*, 2016; Lu, 2003; Ng, 2010);
- Norway (de Jong & Ben-Akiva, 2007);
- the Eastern European context (Cullinane & Toy, 2000);
- Switzerland (Fries & Patterson, 2008);
- Turkey (Tuna & Silan, 2002);
- Nigeria (Ugboma *et al.*, 2006);
- Greece (Moschovou & Giannopoulos, 2010);
- New Zealand (Kim, 2014).

Moreover, a few previous studies have dealt with freight transport mode choice by employing qualitative modes of enquiry⁴ (Meixell & Norbis, 2008). The authors also argue that previous studies on the topic of transportation choice have not dealt with practical aspects from an industry perspective, and their important findings indicate that “...*what features of the real-world are not well captured*” (Meixell & Norbis, 2008, p. 204). In support of this position, Näslund who argues: “*If all researchers within a certain academic discipline do research within the same methodological approach, how useful will their research be?*” (Näslund, 2002, p. 327). Therefore, based on the literature review, there is an urgent need for qualitative research into the topic of transport mode choice. It is this aspect which has been dealt with in this research.

The evidence presented in the section 2.4.2.3.1 of the literature chapter indicates that not only transport mode choice is considered to be a complex and unstructured decision issue, but also shipping managers need to consider the substantial determinants in their process of making decisions due to the rising complexity of global business circumstances. To understand transport mode selection, instead of only considering it in terms of actual detailed structure, a holistic approach is required (Björklund, 2011; Mangan *et al.*, 2001; Rogerson *et al.*, 2013). Based on the holistic approach, transport selection varies over time, in different markets, involving many stakeholders and is related to the strategies in logistics management employed by shipping managers (Mangan *et al.*, 2002; Rogerson *et al.*, 2013).

In reviewing the literature, many researchers have conducted studies of freight transport by focusing on transport mode choice; but little has been conducted with regard to East Asia. A case in point is that in 2001, Banomyong conducted research involving logistics cost modelling in order to find the most competitive route in terms of time and route for the import/export of garments between Laos and Rotterdam (Banomyong & Beresford, 2001). Further, in 2007, Guo studied the mode and route choice models with regard to a logistics company in order to minimize total distribution and external costs, in the context of China (Guo, 2007). While some research has been carried out on transport mode choice in East Asia, very few studies have employed qualitative techniques for a consideration of the area of the transportation mode choice and carrier selection.

⁴ As indicated by Meixell and Norbis (2008, p. 204), “...*a small share, 18%, of the articles employed the simulation, interview, case study, conceptual and multiple methodologies. What are the challenges to using these methodologies in the transportation choice environment?*”

Although extensive research has been carried out on the topic of mode choice and carrier selection, no single study exists which pays attention to the particular context of the rubber sector in Thailand (see Section 2.3.2). This indicates that little is known about freight transport mode choice in the Thai rubber industry, and it is not clear what contextual factors will have a major influence on managers when making decisions. This indicates a need to understand the factors influencing the selection of transport mode that are relevant to the particular context by providing enriched details of the natural rubber industry. As this study emphasises, an in-depth understanding is necessary with regard to the determinants of decision making on the view point of managers in terms of transport mode choice.

Concerning OBB, very little is known about what contextual characteristics have an impact upon purchasing decisions relating to freight transport services (Johnston & Lewin, 1996; Lysons & Farrington, 2012). This indicates a need to understand the various perceptions of shipping managers within the industry in order to add to our understanding of the factors affecting purchasing decisions with regard to freight transport. This thesis intends to determine the extent to which contextual factors have an impact on freight purchasing decisions, relating to the choice of transport modes in the context of natural rubber exporting. To be more precise, the aim of the thesis is to provide a conceptual theoretical framework based on what contextual factors have affected purchasing decisions for freight transport services, with particular emphasis on the choice of transport mode in the Thai rubber sector.

In supporting this position, Craig and Easton (2011) reviewed empirical research in the area of SCM for the last two decades, and pointed out that most studies in the field of SCM have only focussed on the firm as the unit of analysis. As Craig and Easton (2011) argue: *“While we are beginning to develop an understanding of what drives firm behaviour, we have much less of an understanding of the drivers of individual managers’ behaviour and of their decision-making processes”* (p. 57). In summary, they suggest that further research is required involving employing the individual as the unit of analysis.

Moreover, Pagell and Shevchenko (2014) argued that previous investigations in SCM research have not fully dealt with the supply chain’s impacts; especially social and environmental aspects. The authors support this with the reasons that a major problem is caused by theoretical bias in terms of the fact that most researchers in the field favour profit maximisation. Arguably, there is abundant room for research in determining an understanding of what contextual factors have an impact in practice,

in terms of about how shipping managers in the industrial sector make decisions on freight transport mode choice. Any further studies, which take these contextual variables into account, could contribute to developing more comprehensive and theoretically grounded insights in the area of the research in terms of the choice of freight transport mode. So, the findings should make an important contribution to the research.

In summary, the topic of freight transport mode choice and carrier selection involves a number of complex/dynamic problems which require an understanding of the contextual factors in order to help understanding these problems. The studies reviewed so far however, suffer from the fact that most studies in the field of transportation mode choice and carrier selection have only employed quantitative modes of enquiry. The aim of the majority of these studies is to define variables and measure them in terms of a general metric. Therefore, they do not adequately capture what actually happens in the real transport practice. This has resulted in the exclusion of some clear explanatory variables that influence the decision making process. Little is known about users' perspectives, and it is not yet understood what factors influence freight transport mode choice in the rubber sector. Additionally, there is no single study that has investigated this topic in the context of the Thai rubber sector by employing a qualitative approach. Hence, this study aims to contribute to this growing area of research by exploring the various perspectives of shipping managers in a much-ignored industry by focusing on the Thai natural rubber trade.

2.6 Theoretical framework for this study

The main purpose of this section of the literature chapter is to sketch a map for this current research, influenced by integrated knowledge bases from the current literature. This map will be used as a guide for the data collection and analysis stages.

With regard to the current literature in the areas of logistics management focusing on intermodal freight transport, recent evidence suggests that a multi-disciplinary approach is required for research in the area of intermodal freight transport (Bontekoning *et al.*, 2004; Macharis & Bontekoning, 2004). As Shook *et al.* (2009) argue: viewing through multiple theoretical lenses can result in each offering unique insights. The authors further discuss the value of theories to researchers and managers in the sense that “...*conceptual frames (theories) are a requisite for sensemaking, the more accurate, focused, and verified the frame, the better*

sensemaking is likely to be – for managers and scientists, for everyone” (Lundberg 2004, cited in Shook *et al.*, 2009, p. 3). Moreover, the need for the inclusion of other disciplines into logistics research has also been recommended by Tuna and Silan (2002). They pointed out that logistics researchers typically use the concept of marketing for the evaluation of the value of the logistics discipline. Additionally, this is evident in the case of Porter's value chain (see Porter, 2004), which is a good illustration of applying the principle of marketing to the area of logistics research.

As Stock (1990, p. 5) argued “...*many of the business and non-business disciplines have much to offer logistics in terms of concepts, principles, methodologies and approaches that could be applied to various logistics issues, problems and opportunities.*” It has been suggested that the need to borrow materials from psychology, organisational behaviour, consumer behaviour, economics and management could benefit researchers by providing a better understanding and extension of the theoretical development of logistics research. Other researchers in the same vein (Halldorsson *et al.*, 2007; Ketchen Jr & Hult, 2007), have looked at organisational theories which can be considered to relate to and be useful for an understanding of the field of SCM, and have highlighted the theoretical foundations of those theories.

Organisational buying theory seems to be very useful in the study of mode choice. OBB was chosen because it is founded on the basic assumption that “...*actors have bounded rationality and differing motivations and preferences, and that intraorganisational conflict is inevitable in situations of joint decision-making*” (Sanderson *et al.*, 2015, p. 26). This study provides an exciting opportunity to advance our knowledge of mode choice, especially transportation research in emerging countries such as Thailand. Therefore, a model of OBB which is mainly used in marketing and management research, has been borrowed and applied in the area of intermodal freight transport choice. Organisational buying theory is related to this study in terms of decision-making issues with regard to the stage in which managers make decisions with regard to purchasing transport services from transport providers in terms of different modes of transports. By supporting this viewpoint, the effectiveness of integrated marketing-organisational buying and logistics activities has been exemplified in studies by Gul (2012) and Rogerson *et al.* (2013). So, the model of OBB is employed as a main theoretical base for this study.

There are two principal perspectives as to why decision making is important. First and foremost, managerial decision making has played an important role in business

management since ancient times. This is because there is increasing pressure on businesses for several reasons; strong competition, expanding global markets, increasing information overload and desire for high quality (Turban *et al.*, 2011). This is especially the case because, in today's business environment, the situation is becoming more complicated and competitive (Ng, 2010), and one decision might determine whether or not a company survives (Turban *et al.*, 2011).

Secondly, the ways in which human beings think varies from individual to individual and from situation to situation. Thus, managers make decisions in different ways. For that reason, the managerial decision making process plays a key role in achieving better decisions. For this reason, decision making is considered as one of the major components of this study which refers to the process of managerial decision making in terms of managing the movement of products by using intermodal freight transport. Having defined what is meant by the first component in the conceptual framework for this study - models of decision-making and organisational buying behaviour – it can be seen that it is one of the three components in Figure 2.11. Turning now to discuss the second component in the conceptual framework - the modelling approach applied to this study.

Commenting on modelling approaches in freight mode choice, Mangan *et al.*'s (2002) modelling approaches have been classified into three types: input-oriented models, outcome-oriented models, and process-oriented models. A process-oriented model has been found to differ from the others in terms of “...variables related with the freight transportation selection are determined by the transport user's subjective interpretation” (Tuna & Silan, 2002, p. 2). This approach is considered consistent with the aims and objectives of this study in its attempt to develop a comprehensive understanding of the decision-making behaviour of shippers regarding the determinants of freight intermodal choices, which not only focuses on tangible attributes, but is also interested in intangible attributes, as well as how those factors influence deciders (shipping/logistics managers) in choosing between transport choices. Therefore, the perceptual approach has been considered the most beneficial for the purpose of this study, and is considered as the second component including in the conceptual framework as shown in Figure 2.11. So far this part has focussed on the “*perceptual approach.*” The following section will discuss the final component: the field of logistics and SCM, which lays emphasis on intermodal freight transport research.

Last but not least, intermodal freight transport is an increasingly important area in the logistics and SCM field. The choice of transport mode is the key part of distribution management (Stank and Goldsby, 2000). In the literature that was previously mentioned in Sections 2.3 of this literature review, mode choice is seen as a complicated problem involving qualitative and quantitative criteria (Meixell & Norbis, 2008). According to Matjila (2012, p. 46), many companies state their physical distribution objective as “...getting the right goods to the right places at the right time for the least cost.” Therefore, how managers deal with conflicting objectives between these tangible (e.g. least cost) and intangible factors (e.g. good service) is crucial in selecting transport modes.

Furthermore, as Tokar (2010) argues: “...little research published in logistics and SCM journals focuses on developing knowledge concerning human behaviour, judgment and decision making and integrating that knowledge in to models, processes and tasks” (p. 89). Also, in accordance with Meixell and Norbis (2008), decision making in the selection of transport modes is an intricate task as managers have to deal with various factors and criteria in making their decision. More often than not, these factors and criteria vary from one business to another, from one company to another, and even within the same company but in different department. Thus, a conceptual model of understanding the factors influencing intermodal freight transport choice is truly useful for logistics managers in order to allow them to make their decisions more effectively. For the reasons mentioned above, logistics is the third component that should be included in the conceptual framework used in this study, and all three components need to be combined as depicted in Figure 2.11.

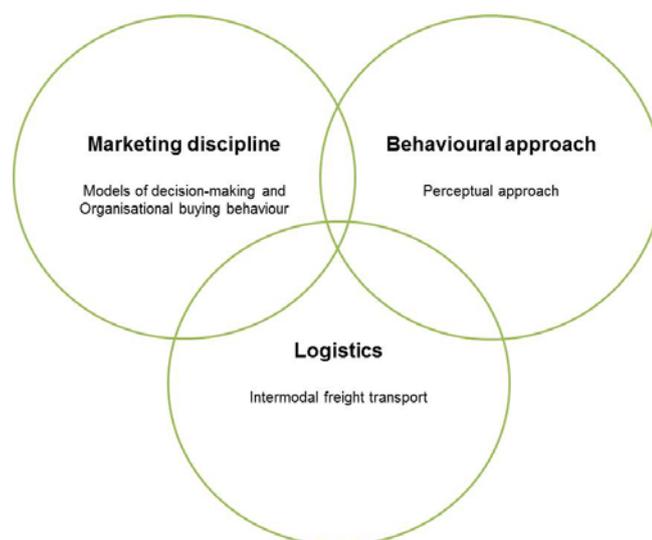


Figure 2.11: The interconnections among the three components of the conceptual frameworks for this study

This section has revised the three key components used for developing a preliminary conceptual framework for this study. These three components will be discussed and justified in relation to the application of each component to this study. Finally, there is a summary of the preliminary conceptual framework at the end of the chapter.

2.7 Frame of reference

This section provides the literature review in relation to the frame of reference. It comprises the intermodal transport chain approach, a position in terms of modelling approaches, identifying/categorising factors, and the preliminary conceptual framework.

2.7.1 *Intermodal transport chain approach in this study*

Throughout this thesis, the author considers logistics as a subset of SCM i.e. the unionist perspective, as discussed in section 2.2.2; Figure 2.2, while transportation is one of the key logistical activities as presented in Figure 2.12. It can be seen from the Figure 2.12 that transport and intermodal transport specifically, is only one of the aspects that play a part in logistics and SCM. Transport-related choices are primarily influenced by transport service requirements such as lead-time, flexibility, reliability, and so on. This implies that the shippers may not particularly request the use of a particular transportation mode, but are more interested in the reliability of using that service. In a highly competitive market, shippers expect to obtain a reliable transport service from transport service providers. Thus, the selection of transportation services, including both the mode choice and the selection of carriers, becomes increasingly important.

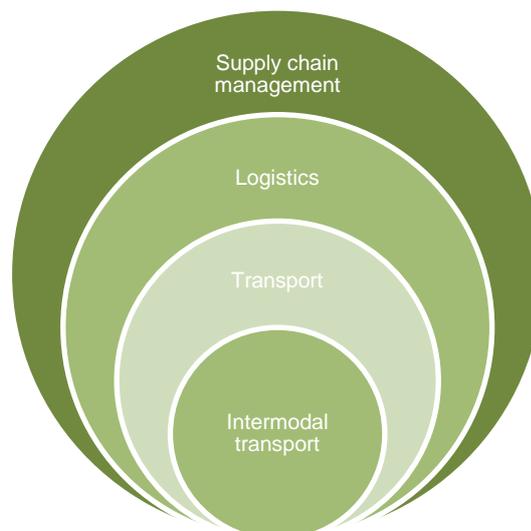


Figure 2.12: Shipper's perspective on intermodal transport; (Source: Adapted from Henstra & Woxenius, 1999 cited in Banomyong, 2000)

Gentry (1996) suggested a need to visualise the actual process of intermodal transport and argued that the transport chain should be viewed as an integrated process rather than as being fragmented. According to the intermodal transport chain suggested by Woxenius (2007), as shown in Figure 2.13, at least two components are required in the intermodal transport chain, in the form of links and nodes. The term links will be used to refer to transport tasks, which have to be performed for the movement of goods between nodes. For the intermodal transport chain, at least two transport modes must be used for transport activities. Then again, node refers to transshipment locations/sites such as terminals, ports and so on, which facilitate the transport activities of freight movement and storage. Further, a broader perspective of a transportation chain has been given by SteadieSeifi *et al.* (2014, p. 1), who argues that “a transportation chain is basically partitioned in three segments: pre-haul (or first mile for the pickup process), long-haul (door-to-door transit of containers), and end-haul (or last mile for the delivery process). In most cases, the pre-haul and end-haul transportation is carried out via road, but for the long-haul transportation, road, rail, air and water modes can be considered.”

This study intends to emphasise transport activities from the node of the shipper's door to the end node at a sea port or custom border in Thailand/Malaysia. This is because this study has tended to focus on understanding how shippers make decisions with regard to the selection of intermodal freight transport modes from various shippers' perspectives across the Thai rubber sector. To avoid any confusion when data gathering, a clear visualisation on the actual process of intermodal transport activities is needed.

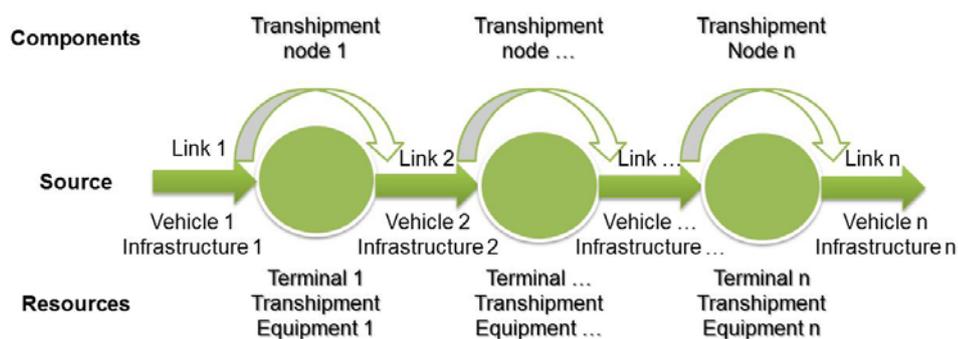


Figure 2.13: Intermodal transport chain (Source: Woxenius, 2007)

This thesis aims to contribute to the growing area of research relating to intermodal freight transport by emphasising the shippers' perspectives. The scope of this study is to investigate the issue of transport activities associated with rubber product delivery, from the initial node at the shipper's door to the end node at a customs border post in

Thailand/Malaysia. Consequently, in the context of this study, a sea port is considered to be the final node in the intermodal chain before containers are transhipped on-board the shipping line for the long-haul leg of the journey. This study then simplifies the intermodal transport chain suggested by Woxenius (2007) in Figure 2.14. The chain consists of three main nodes: Node A (shipper's door), Node B (a port of loading) and Node C (a port of destination).

It is important to note that shipping managers in this industry are typically involved in the choice of transportation between the first two nodes (A and B), while the rest of the journey is usually managed by the buyers. Owing to this study only emphasising the shippers' perspectives, the journey from A to B is the main part of the journey which this study intends to investigate in order to develop a comprehensive understanding of the determinants of choice, and how decisions get made with regard to the selection of transport modes from point A to point B because this study only emphasises the shippers' perspectives.

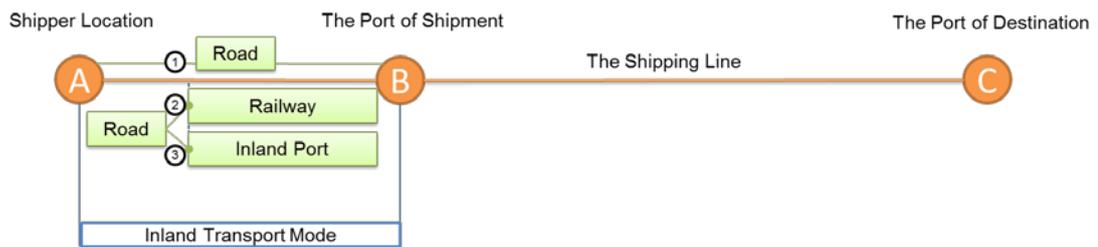


Figure 2.14: Intermodal transport chain approach in this study

2.7.2 Taking a position in terms of modelling approach for this study

For the purpose of this research, which is to extend understanding of factors influencing the freight transport mode choice process, a perceptual (behavioural) approach tends to be the better option among the various approaches that provide comprehensive insight on the freight transport mode choice process. Thus, this study will seek to apply the perceptual approach instead of using more complicated mathematical techniques. This concept is also supported by Mangan *et al.* (2001, p. 289) who criticized that “...a mathematical optimum solution exists may not be true; an analogy is the boundary to the feasible region in linear programming: this boundary typically contains a range of ‘solution points,’ only one of which is usually an optimum, with the other points being satisfactory solutions. Hence, a variety of satisfactory solutions are possible, including an optimum.” This thesis, thus, emphasises the importance of subjective rationality in decision-making in the

selection of transport modes, rather than the neoclassical economic theory or “*economic man*” whose goal is to optimise outcomes. The assumption of this thesis is that managers make decisions based on perceived rather than actual transport tasks.

Although there is literature in relation to some particular models such as “*Economic Positivism*,” “*Technological Positivism*” and the “*Perceptual Approach*,” this study focuses only the Perceptual Approach. In this approach, the unit of analysis is based on individuals’ subjective interpretation of stakeholders (e.g. shipping managers), who is responsible for the selection of freight transport modes. This view is supported by Gray (1982) who writes that the Perceptual Approach agrees with the concept of subjective interpretation rather than quantitative measurements that impact on factors influencing the selection of freight transport modes. Consequently, the behaviour of the shipping manager of a Thai rubber exporter, when making a decision on freight transport mode choice, is of importance to perceptual studies. The underlying idea, therefore, is that this approach is considered to be the most useful for an in-depth understanding of the determining factors behind the choice of intermodal freight transport mode within the real-life context of the Thai rubber sector.

2.7.3 Identifying/categorising factors

In the past three decades, a considerable amount of literature has been published on the decision-making process in terms of freight transport modes or carrier selection in various contexts (see Section 2.3.2). However, lack of comprehensive research into freight mode choice has existed as a means of understanding freight transport mode choice in Thailand for many years. Moreover, mode choice has been seen as a complex decision-making process because of the increasingly dynamic and uncertain environment (Björklund, 2011; Lehmusvaara *et al.*, 1999; Mitra & Leon, 2014). In support of this position, in recent finding by Sanchez-Rodrigues *et al.* (2010), four determinants of operational uncertainty in transport management were highlighted. These include delays in delivery, uncertainty of demand, barriers to delivery and poor coordination. Furthermore, in the literature on logistical uncertainty, Sanchez-Rodrigues *et al.* (2010) point out that there are five major source of logistical uncertainty, in the form of shipper, customer, carrier, control systems and external uncertainty (see Table 2.13 for more details). The studies presented thus far provide us with evidence that not only “*operational factors*” play a crucial role in the choice of freight transport mode. In addition, “*contextual factors*” can result in purchasing decisions in terms of the choice of transport mode.

For the study about the selection of carriers, D'Este (1992) suggested that, any decision must concern about time (implications from the past, currently and in the future) and space (extent of the context of the organisation). He also pointed out that the research should seek to understand the determinants of carrier selection rather than only measure them. According to Brooks' (1995) research, it was found that not only do geographic contexts in terms of shipper' location and customers' destination drive differences in transport mode selection, but also such decisions are relevant to the time of making them and to market segments. Context is therefore too important to be overlooked when building a conceptual model aimed at understanding shipping managers' decision making in terms of mode choice. Therefore this study considers "*contextual factors*" as one of the important components that influence the selection of a particular transport mode.

In support of this position, Harris (2012) argued that no decision is made alone. Any decision in any particular context is usually made in combination with other decisions. Considering historical decision, previous decisions may influence later ones. The findings of the research into factors influencing freight transport mode choice are like to agree that it is risky to assume that such factors are free from their context (Pedersen & Gray, 1998). They also suggest that such context-dependent assumptions should be included, as these will result in a comparison of the contexts of the conducted research. However, Eng-Larsson and Kohn (2012) argued that, although it includes the context as a factor in decision making with regard to the selection of a transport mode, it is no guarantee that the transport mode choice will lead to a successful result.

In view of all that has been mentioned so far, one may suppose that, contextual factors play a critical role for insight understanding in freight transport mode decision to some extent. Therefore, the investigation on decision making with regard to selecting transport mode from shippers' perspectives is not isolated from the context of study, but it is combined with the context in which the decision is made and when the decision take place. So, it is necessary to include contextual factors into this investigation. Based on the literature discussed so far, there are two broad important elements included in this study: contextual factors and operational factors, as indicated below.

For contextual factors, in the literature on OBB, the model presented by Lysons and Farrington (2012) (see Figure 2.9) consisted of a number of contextual factors with are categorised into four groups. These factors take into account the impact of such factors on individual decisions, the aim of which is to make the decision in the best interests of the organisation. Due to practical constraints, it is necessary to select a number of groups from those groups contained in the comprehensive model, in order to benefit from in-depth analysis. Consequently, three constructs that are considering to be highly relevant for the aims of this study have been carefully chosen; namely: business environmental factors, organisational factors and individual factors.

It is important to note that the other category of the model is an *“interpersonal category.”* However, an interpersonal category has been excluded from the preliminary framework for this study. This is because the purpose of the research is to develop an understanding of the drivers of individual managers’ behaviour, rather than what drives firm behaviour. Thus, the interpersonal category is excluded from the scope of this thesis. Otherwise, another potential problem is that the unit of analysis would have to be changed to focus on the firm as the unit of analysis, and this transformation would affect the whole goal of the study. This is because the main goal of the current study is to construct a conceptual model which would facilitate a better understanding of the determining factors behind the choice of freight transportation within the wider sectoral landscape, in the form of the Thai rubber sector, rather than being specific to an individual firm. In addition, the study is able to provide a meaning by investigation the situation in breadth but still providing enough depth.

On the subject of operational factors, there are a large numbers of such factors, as is briefly summarised in Table 2.8 in Section 2.3.2 of the literature review chapter. *“Cost/Rate/Price,” “Service reliability,” “Transit time reliability,” “Transit time,” “Loss and damage”* and *“Fast response to problems”* are chosen to be elements of a component of the preliminary framework. Since these factors most regularly appear as important variables in terms of transportation mode choice and carrier selection research (Cullinane & Toy, 2000; Kim, 2014; Lu, 2003; Mitra & Leon, 2014; Moschovou & Giannopoulos, 2010; Punakivi & Hinkka, 2006; Tongzon, 2009; Ugboma *et al.*, 2006). These factors have been found to influence decisions when it comes to choosing transport modes, and have been explored in several studies.

In summary, the evidence presented in this section in terms of identifying/categorising factors suggests that key factors can be categorised into two main groups: contextual and operational. First, the contextual group comprises of, for example, pressure from

external environments, business policy, the strategy of logistics, and the context of the rubber market. Second, the outcome of a review into the operational aspects as previously presented in Table 2.8. More information from the shippers' perspectives which lays emphasis on these two main concepts would help this study to establish a greater degree of accuracy in terms of understanding the real-life context. It was considered that these two main groups would usefully supplement and extend the knowledge of a new understanding of how shipping managers in the Thai rubber sector make decisions with regard to intermodal freight transport choice. Overall, the preliminary framework of the study was developed based upon the outcome of this literature review. In the next section, the preliminary conceptual framework of the study will be discussed.

2.7.4 The preliminary conceptual framework

It is obvious that there are a number of factors influencing the process of buying decisions in OBB models (see Section 2.4.2.3). These include factors in relation to business circumstances, personality, organisations, and product or service characteristics. Moreover, Johnston and Lewin (1996) argued that the models proposed at the beginning of the period of theory development are commonly offered as factors that influence OBB in broad terms. Most studies in the field of OBB have only focussed on providing a generality of concepts and factors influencing purchasing decisions. However, as Turnbull and Leek (2003, p. 155) argue: *“A universal buying process does not exist and a model's value lies in its application to particular buying situations and organisations.”* As a result, it can be contended that no single model has the capability to capture all the processes associated with organisational buying in every kind of industrial sector and firm. Therefore, it is the requirement of researchers to propose a specific model for a particular industry in order to understand organisational buying, particularly those factors influencing the choice of transport mode.

The framework proposed by Lysons and Farrington (2012) is valuable, as this framework, which embraces the main related determinants and demonstrates their association to decisions in buying, was based upon the perspective of supply chain management. Accordingly, there are three main groups of factors that have been selected as being highly relevant to this research. These three constructs are ideas inspired by the Lysons and Farrington model, which is a model that closely links together industry buying behaviours within a field of study like logistics, as this original framework emphasises strategic sourcing decisions relating to logistics and

distribution. Business environmental factors (below denoted as “*the context variables in terms of the environment*”), organisational factors (below denoted as “*the context variables in terms of the organisation*”), and individual factors (below denoted as “*individual perception and past experiences*”) are shown in Figure 2.15, as the three main constructs of the preliminary framework for this study.

In addition, there is another important construct that should be included in the preliminary conceptual framework. It is entitled “*operational factors.*” This construct is based on the outcome of the current literature on the decision variables associated with freight transport mode choice and carrier selection, as presented in section 2.3.2. The framework will be used for the development of an interview guide. In addition, four key issues in the model were considered very useful for data analysis and for interpretation at the start of the data analysis. However, it is important to note that this study will place emphasis on an in-depth study of shippers’ perspectives, which will be seen in the role of service users, rather than transport providers. Additionally, the author is not interested in measuring the mean scores of the determinants of mode choice, but rather aims to understand how these factors interact.

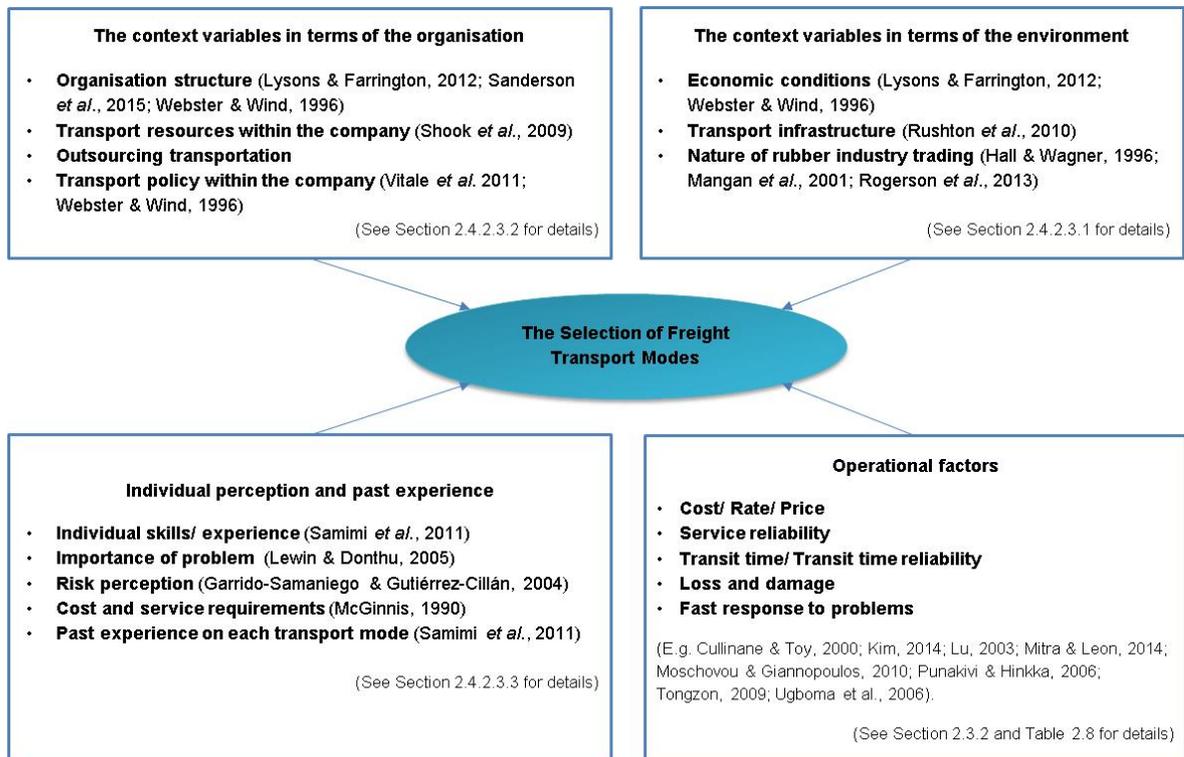


Figure 2.15: Preliminary conceptual framework for selecting freight transport modes according to the literature

Chapter 3: Research methodology and methods

3.1 Introduction

This chapter provides a description and discussions regarding the adopted methodology and the methods used in this investigation. In Section 3.2, entitled research questions, the aims and objectives of the present research are addressed. In Sections 3.3, the research design framework which underpins this study is described in greater detail — theoretical perspectives, methodology (a sectoral case study) and methods. Section 3.4 provides a brief overview of the research process and timeline of research tasks in this study. Sections 3.5 and 3.6 are devoted to a description of the methods of data collection and analysis, also describing the rationale behind the choice of the techniques used in research Phase I and Phase II respectively. Ethical considerations are then presented in Section 3.7. Section 3.8 deals with trustworthiness in qualitative research and the strategies employed in this study to ensure the quality of the research. Finally, the limitations of this study are clarified in Section 3.9.

3.2 Research Questions

By undertaking this research, this study would like to answer the following questions:

“What are the determinants of managerial decision-making for inland transport modes, as part of intermodal freight transport and loading port selection in the context of the Thai rubber business sector? How do these factors have an impact on the choice process?”

The aim of the research is to investigate factors influencing shipping managers in their choice of intermodal freight transport, and to develop a conceptual model of the factors influencing decision-makers in choosing the transport options currently being used, or that might be used, by rubber exporters in southern Thailand. The expected outcome from this research study will contribute towards a better understanding of the factors which have an impact on the choice of intermodal freight transport. This study aimed to answer the five objectives presented below in Table 3.1 and to link the research objectives with the methods adopted for data collection. As Kvale and Flick (2007, p. 35) notes, *“the why and what of the investigation should be clarified before the question of how –method– is posed.”*

Table 3.1: Matching the Research Objectives with Research Methods

Research Objectives	Selected Data Collection Methods
To evaluate the concepts and theories involving transport modes selection and decision making processes	<ul style="list-style-type: none">• Academic Books• Journals• Conferences
To investigate the current practice of freight transport usage in the context of the rubber industry in southern Thailand	<ul style="list-style-type: none">• Questionnaire survey in the form of closed questions• Public/ company documents
To examine factors affecting the choice of selecting transport modes and loading ports	<ul style="list-style-type: none">• Questionnaire survey in the form of open-ended questions• Semi-structured interviews
To explore the feasible range of alternatives in terms of intermodal freight transport pathways	<ul style="list-style-type: none">• Questionnaire Survey• Semi-structured interviews• Public/company documents
To propose a conceptual model aimed at providing an understanding of the factors that influence the intermodal freight transport choice from a shipper's perspective	<ul style="list-style-type: none">• Semi-structured interviews• Public/ company documents

3.3 Research Design Framework

This section aims to provide a clear indicate of the philosophy adopted in this research. It discusses the research paradigms adopted, the methodology employed and the methods used in this study, and finally a summary of the researcher's position is presented in the research design framework of this study.

3.3.1 Research (Philosophy) Paradigms/Theoretical Perspectives

Researchers are typically *"guided by a set of beliefs and feelings about the world and how it should be understood and studied"* (Denzin & Lincoln, 2011, p. 13). As stated by Guba (1990, p. 17), a paradigm is a *"basic set of beliefs that guides action"*; however, others describe the meaning of paradigms in different terms, such as a philosophical worldview (Creswell, 2009) or a theoretical perspective (Crotty, 1998). As Crotty (1998) notes, besides confusing theoretical perspectives and methodologies, the inconsistency of terminology described in methodology texts creates one of a number of problems for novice researchers. This could lead to contradictions and confusion when researching the literature on research philosophies and paradigms. Crotty (1998) notes that it is necessary to be clear and precise on the sense of each expression. Consequently, this study adopted Crotty's research design framework and the following terminology:

- *Epistemology*: the theory of knowledge embedded in the theoretical perspective, and thereby in the methodology.
- *Theoretical perspective*: the philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria.
- *Methodology*: the strategy, plan of action and process or design lying behind the choice and use of particular methods, and linking the choice and use of methods to the desired outcomes.
- *Methods*: the techniques or procedures used to gather and analyse data related to a research question or hypothesis

(Crotty, 1998, p. 3)

Crotty (1998) points out that these four basic terms are interrelated, as shown in Figure 3.1 and each of these part will be referred to in this Chapter of the thesis. For example, the approach and use of methods to collect and analyse the data is impacted by the methodology used, which in turn is based on the theoretical perspective pursued in this work and the researcher’s philosophical stance on the epistemology.

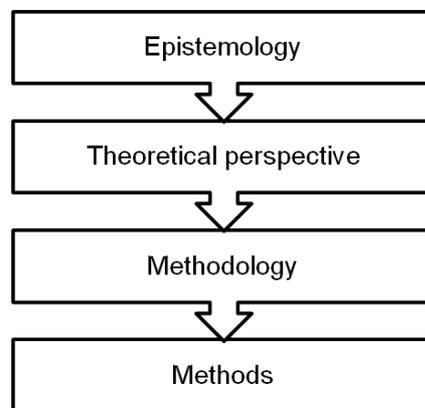


Figure 3.1: The relationship between epistemology, theoretical perspectives, methodology and research methods of Crotty’s framework (Source: Adapted from Crotty, 1998, p. 4)

To ensure more objective and accurate research findings, Ghauri and Grønhaug (2010) argue that all research should be guided by philosophical underpinning of the research, rather than conducting the research based upon an individual’s attitudes and feelings. This suggestion is consistent with Crotty’s recommendation that it is worth putting every effort into answering the following two questions when developing a research proposal (Crotty, 1998, p. 2): “*firstly, what methodologies and methods will we be employed in the research we propose to do? Secondly, how do we justify this*

choice and use of methodologies and methods?” Regarding the second question, Crotty (1998) writes that the reason for choosing certain methodologies and methods not only depends upon the purpose of the research question identified by the research, but also on the philosophical assumptions about the nature of reality that researchers bring to our research. It is important for researchers to understand the underlying ontological and epistemological assumptions behind each research paradigm. In other words, prior to designing and conducting research, it is important for novice researchers to take a position on which research paradigms or theoretical perspectives will be adopted for each piece of research.

Denzin and Lincoln (2005), cited in Duff (2008), point out that this dissimilarity in research paradigms is caused by the differences at some level represented in “*an ideology concerning the nature of reality, a philosophical basis regarding the nature of knowing, and various practical methods for studying phenomena.*” However, these were replaced by modern classifications; for example, Guba and Lincoln (1994) suggest four basic paradigms that form a structure for social science research: positivism, post-positivism, critical theory and constructivism; whereas Crotty (1998) suggests five categories: positivism, interpretivism, critical inquiry, feminism and postmodernism. Moreover, in business research, Burrell and Morgan (1979) (cited in Bryman & Bell, 2011; Saunders *et al.*, 2012) state that there are four paradigmatic positions in the study of organisations: functionalist, interpretative, radical humanist and radical structuralist.

However, there are various paradigms that can guide the design of a research project; researchers should underpin the one which matches their own basic philosophical assumptions and the context of the research. In addition, Saunders *et al.* mention that the nature of the research question is the most significant determinant underpinning any philosophical assumptions (Saunders *et al.*, 2012). Gray (2009) summarises the two “*continuums*” of positivist and interpretivist paradigms, in terms of basic beliefs, what the researcher should do and which appropriate methods should be included in each type of paradigm (as shown in Table 3.2).

Table 3.2: A summary of the two “*continuums*” of positivist and interpretivist paradigms (Source: Adapted from Gray, 2009, p. 23)

	Positivist paradigm	Interpretivist paradigm
Basic beliefs	<ul style="list-style-type: none"> • The world is external and objective • The observer is independent • Science is value-free 	<ul style="list-style-type: none"> • The world is socially constructed and subjective • The observer is a party to what is being observed • Science is driven by human interests
The researcher should	<ul style="list-style-type: none"> • Focus on facts • Locate causality between variables • Formulate and test hypotheses (deductive approach) 	<ul style="list-style-type: none"> • Focus on meanings • Try to understand what is happening • Construct theories and models from the data (inductive approach)
Methods include	<ul style="list-style-type: none"> • Operationalising concepts so that they can be measured • Using large samples from which to generalise the population • Quantitative methods 	<ul style="list-style-type: none"> • Using multiple methods to establish different views of a phenomenon • Using small samples researched in depth or over time • Qualitative methods

In order to take a position about this research, these philosophical assumptions were considered, along with the research question and the aim of this research. The interpretivist approach offers an effective means for theory development, whereas a positivist approach is a well-established approach when the study sets out to test theory. An interpretivist approach was therefore employed for this study since the aim of this study involved constructing theory rather than testing theory. Thus, an inductive approach was used because this study was informed by an interpretive philosophical stance. Consequently, the research paradigm chosen was interpretivism. This is because the philosophical assumption of this paradigm is compatible with the aim of this study, which attempts to provide a conceptual model of understanding with regard to how decisions get made in terms of the choice of transport modes based upon primary fieldwork.

What is the philosophical assumption which lies behind an interpretive paradigm? Gray (2009) claims that an epistemological assumption, closely linked to interpretivism, is constructivism. Guba and Lincoln (1994, p. 108) explain that epistemology asks the following question, “*what is the nature of the relationship between the knower or would-be knower and what can be known?*” This is related to “*what we accept with valid knowledge*” (Collis & Hussey, 2009, p. 59). In others word, epistemological assumptions are concerned with how knowledge can be generated. Gray (2009, p. 18) further explains that a constructivist epistemology states that “*truth*

and meaning do not exist in some external world, but are created by the subject's interactions with the world. Meaning is constructed not discovered, so subjects construct their own meaning in different ways, even in relation to the same phenomenon." Crotty (1998, p. 43) gives an example with regards to a tree: *"...we need to remind ourselves here that it is human beings who have constructed it as a tree, given it the name, and attributed to it the associations we make with trees."* Without someone naming it a tree, a tree is not a tree. Accordingly, knowledge is constructed by the interrelation between researchers and participants. In other words, researchers and the subjects to be researched should interact. Collis and Hussey (2009, p. 58) further explain in terms of an ontological assumption (the nature of reality) of such a paradigm that reality is *"subjective and multiple, as seen by the participants."* Interpretive researchers give value to these multiple opinions and then provide a rich description and explanation of the issues being explored. In this current study, the researcher's intent was to *"make sense of (or interpret) the meaning others have about the world"* (Creswell, 2009, p. 8), and not to test any hypothesis. The inquiry adopted for this piece of research was based on an interpretive perspective.

3.3.2 Methodology

"...the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes" (Crotty, 1998, p. 3)

As mentioned previously in the section on theoretical perspectives, this research was designed based upon interpretivism. There are five main qualitative research designs under this umbrella, including: narrative research, case studies, grounded theory, phenomenology and ethnography (Creswell, 2013). Each strategy is appropriate for the design of certain research purposes. For example, *"narrative research"* is suited when *"exploring the life of an individual"* (Creswell, 2013, p. 104); in contrast case studies are defined as *"an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence"* (Robson, 2002, p. 178). Grounded theories are suited when *"developing a theory grounded in data from the field"*; however, when the researcher seeks to understand *"the essence of the experience"* of persons about a phenomenon, it is deemed appropriate to use phenomenology (Creswell, 2013, p. 104). Finally, ethnography research is applicable when *"describing and interpreting a culture-sharing group."* The choice of methods and techniques for data gathering and analysis is also determined by the methodology adopted for each piece of research.

To answer the question on how experienced managers within the Thai rubber industry choose the logistic pathways for transporting rubber, and what factors are deemed to influence their decision, a sectoral case study seemed to make sense for this research design. Consequently, a sectoral case study was used as my choice of research methodology to explore the shipping managers' perspectives on the selection of intermodal freight transport and their current transportation practices, since these refer to *"a particular contemporary phenomenon"* (Robson, 2002, p. 178). Additionally, the aim of the research was to explore and investigate factors influencing shipping managers in their choice of intermodal freight transport within the particular context of the rubber industry. This made a sectoral case study suitable for this study.

Robert Yin identifies the definition of a case study as an: *"...empirical enquiry to investigate a contemporary phenomenon in a real-life context, especially when the boundaries between phenomenon and context are not clearly evident"* (Yin, 2003, p. 13). In addition, Stake (1994, p. 236) also points out that a *"... case study is defined by interest in individual cases, not by the methods of inquiry used."* Furthermore, Merriam (1998, p. 19) point outs that *"A case study design is employed to gain an in-depth understanding of the situation and meaning for those involved. The interest is in process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation"* (Merriam, 1998, p. 19).

There are some differences between researchers' understanding and definitions of a case study. For example, Stake (2005) points out that case study research is a choice of *"what is to be studied,"* in preference to methodology. However, other researchers (Denzin & Lincoln, 2011; Merriam, 1998; Yin, 2003) consider it as *"a strategy of inquiry, a methodology, or a comprehensive research strategy"* (Creswell, 2013, p. 97). This study views it as a design strategy of qualitative research in which researchers attempt to explore *"a bounded system"* or *"multiple bounded systems"* over time (Creswell, 2013; Stake, 2005).

A case is defined by Louis Smith (the first educational ethnographer) in 1978 as *"a bounded system"* (Stake, 1994, p. 236). Then later, in social science, Stake defines case as being *"...likely to be purposive, even having a 'self'. The case is an integrated system. The parts do not have to be working well, the purposes may be irrational, but it is a system. Thus people and programs clearly are prospective cases"* (Stake, 1995, p. 2). In other words, a case study can be anything; it could be a person, a team, a company, a trade industry or even a group of individual people working on similar activities within a bounded system. It just depends upon what researchers want to

focus on and how data is collected, either from a single site or multiple sites. Various sources of evidence are collected to build a description around the case and facilitate our understanding of the issue or contemporary phenomenon. What researchers try to do is analyse how something works within a bounded system.

A sectoral case study was employed since this study gives emphasis and scope to a manager, who is responsible for the selection of freight transport modes e.g. shipping managers within the wider sectoral landscape (the Thai rubber sector). While a variety of definitions of the term “case” have been suggested, this study will use the definition suggested by Stake (2000) who saw it as “a *bounded system*.” He stated that “...*the case need not to be a person or enterprise. It can be whatever ‘bounded system’ is of interest*” (Stake, 2000, p. 23). For this study, experienced managers were studied in the context of the Thai rubber industry. Collective views were compared and contrasted with those of a number of other rubber firms which were located in four provinces in Southern Thailand: Trang, Nakhon Si Thammarat, Songkhla and Surat Thani.

In line with Stake (2000), this study may be best described as a sectoral case study, as it sought to achieve a comprehensive understanding of the issue of the selection of intermodal freight transport from a group of senior managers in the Thai rubber industry (21 individual interviews across 21 companies taken collectively). In this study, the case is the experience and viewpoints of the experienced managers who play an important role in the selection of freight transport in the Thai rubber sector. These participants are part of the rubber sector and their experiences are a result of them working in the specific context of the Thai rubber industry. Consequently, the majority of their viewpoints is impacted and dominated by the Thai rubber context. Moreover, the intention of this study was to create a conceptual model, which would facilitate a better understanding of the determinants behind the choice of freight transportation within the specific context of the Thai rubber industry.

In summary, the Thai rubber sector seemed to make sense as a sectoral case study for this study, whereby the points of view of a group of senior freight transport managers will be analysed. The study sample included experienced managers from 21 Thai rubber companies, whose collective views were taken on the issue of the selection of freight transport modes. In other words, the unit of analysis is the individual manager, focusing on how decisions get made about the choice of intermodal freight transport and how experienced managers make these decisions.

Taken together, this study adopts a sectoral study but uses principles from case study research to provide a meaning of investigating breadth but still keeping enough depth.

Selection of and Justification for Using a Sectoral Case Study

Research in the field of operations management is predominantly quantitative. However, this work is concerned about understanding the human aspects in operations that lead to decisions. Stuart *et al.* (2002, p. 432) argue that “...a number of emerging areas in operations are still in the understanding, discovery and description stage.” They point out that to “provide contributions in these unmapped areas,” researchers in new emerging fields, such as logistics or SCM, should carry out more research into soft operations (Stuart *et al.*, 2002, p. 432). However, researchers should be aware of feasibility during the data access stage, because it usually needs more time and resources for the fieldwork. In addition, it is not easy for independent researchers to access information in some business sectors.

In the meantime, this study will consider either doing quantitative or qualitative based research. The former should be easier for me both in data collection and analysis, as my background is in natural science; however, if this study want to lay a foundation for future development and contribute to the emerging economy in the Thai business sector, the aim of the research should attempt to develop a conceptual model of understating factors influencing decision-making in the selection of intermodal freight transport within the Thai rubber industry, rather than testing out some hypothesis. Therefore, theory building can be considered to be appropriate approach for answer the aim of this study. This judgment was made for three main reasons: firstly, the purpose of this research was to better understand “*how decisions get made about the choice of freight modal transport*” in the context of the Thai business sector. Secondly, there was a high possibility that the researcher would be able to access the data, as a Thai researcher and work as a lecturer. Therefore, the researcher should be permitted to gather the viewpoints of managers. Finally, this study will take advantage of the fact that the researcher studies in the United Kingdom, which will also give credit to the qualitative research. So these are the reasons for me conducting sectoral case study research, using qualitative interviews as a main method of data collection to get in-depth information. This will help to get a better understanding of the complexity of how decision-makers used their experience in making decisions on freight transport.

In management research, according to Stuart *et al.* (2002, p. 431), if the source of data involves practitioners' perceptions and puts emphasis on the need for a "*customer focused approach*," then qualitative case studies could be "*a more powerful, influential, and useful contribution to both management practice and theory development.*" In this regard, the main data sources were the viewpoints of individual managers, based on their experience and perspectives in the selection of freight transport and experience on transport usage. Therefore, sectoral case study research was the most appropriate research in the context of this research project.

3.3.3 Methods

"...the techniques or procedures used to gather and analyse data related to some research question or hypothesis..." (Crotty, 1998, p. 3)

3.3.3.1 Research Approach

There are two broad research approaches - deductive and inductive (Bryman & Bell, 2011; Collis & Hussey, 2009; Saunders *et al.*, 2012). The deductive approach moves from a general approach to a specific one. Conversely, an inductive approach starts with specific observations and then widens its spectrum. In other words, the deductive approach involves formulating theory or hypotheses first, and then gathering data so as to test the proposition(s). In contrast, the inductive approach captures the pattern from the data collected in order to develop a theory. There are clear differences between deductive and inductive approaches.

According to the outcome of the literature review, no existing model with regard to the freight transport mode choice has been found in the Thai rubber sector. There are two main reasons for the lack of such a model. Firstly, the accessibility of the data needed to build the model is limited, since the rubber industry is broadly located in rural areas and some rubber exporters may not provide the necessary access. Secondly, a language barrier may exist, as the gap in knowledge needs to be identified from the literature that is primarily written in English, but there is a need to collect data in Thai in order to address the gap. Finally, a qualitative approach is new for Thai researchers, because the existing Thai literature provides reports that have mainly been conducted using a quantitative approach. As a consequence, this research set to build such a model to fill the gap in the existing knowledge by aiming to inductively generate a conceptual model to enhance our understanding of current shippers' practices.

According to the aim of this study, it was necessary to build a theory in order to fill the gap in knowledge due to the topic being under-researched. As a result, this research intended to gather rich and in-depth data so that the theory can be built based on it. Therefore, this study makes a research contribution by adding to the existing knowledge base described in the existing literature, rather than testing it. This research aims to provide the details of potential themes in terms of the main factors and sub-factors, both from the extant literature and from the derived primary data. In doing so, the themes found and their connections could capture the pattern and details that can answer the research questions. This study adopted an inductive approach because the research was informed by an interpretive philosophical stance. Although the stage of developing an interview guide involved the creation of “*a priori categories*” through the literature review, it is important to note that such a process “...is not to be used in a deductive way, i.e. to test if it fits in a particular context, but as an initial basis for the inductive process of understanding a phenomenon that was already studied previously in other contexts for which theories were developed” (Nunes & Al-Mamari, 2008, p. 68).

According to Gummesson (2005), “...inductive research lets reality tell its story on its own terms and not on the terms of extant theory” (p. 322). Moreover, Gregor (2006) argues that one of the five types of theory that can be built is that dealing with explanation.

“Explanation: The theory provides an explanation of how, why and when things happened, relying on varying views of causality and methods for argumentation. This explanation will usually be intended to promote greater understanding or insights by others into the phenomena of interest.” (Gregor, 2006, p. 619)

Therefore, this approach is consistent with the aim of this study, which is to provide a conceptual model in terms of understanding how decisions get made with regard to the choice of transport modes, that emerges inductively based upon primary fieldwork. In summary, the findings of this research will be used to build the theory, relying on the various views of managers in the Thai rubber sector, to build on existing reasons by showing/illustrating how decisions could be made with regard to the choice of freight transport mode.

3.3.3.2 Research Methods

There are three main research designs for gathering data to study a social phenomenon; qualitative, quantitative and mixed methods (Creswell, 2009). Creswell explains that qualitative research is framed in terms of using words or open-ended questions, while quantitative research is rather more concerned with numbers or using closed questions (Creswell, 2009). Regarding mixed method research, both qualitative and quantitative methods are used in a single study, as the name suggests. According to Creswell, mixed method research “...is more than simply collecting and analysing both kinds of data; it also involves the use of both approaches in tandem so that the overall strength of a study is greater than either qualitative or quantitative research” (Creswell, 2009, p. 4).

In order to overcome the weakness of a particular method, this project implements both quantitative and qualitative methods at the data-gathering stage. This is because a questionnaire survey allows the researcher to access a number of respondents and help capture the bigger picture which is one of the present gaps that is being investigated. Therefore, the researcher first starts with a survey of the current practice of freight transport usage in the Thai rubber industry. Then, the main qualitative research phase was implemented by using in-depth interviews to get rich data from participants, as this technique fits more closely with the aims, objectives and context of this current study.

3.3.4 The Research Design Framework of this Research

Figure 3.2 presents Crotty’s framework, which is composed of the following four elements: epistemology, theoretical perspective, methodology and methods, which can be used to present the underlying philosophical assumptions behind this research. Accordingly, Easterby-Smith *et al.* (2012) suggest that understanding epistemology assumptions assist in simplifying research design issues. In addition, Grix (2004, p. 64) points out that “researchers’ differing ontological and epistemological positions often lead to different research approaches towards the same phenomenon.”

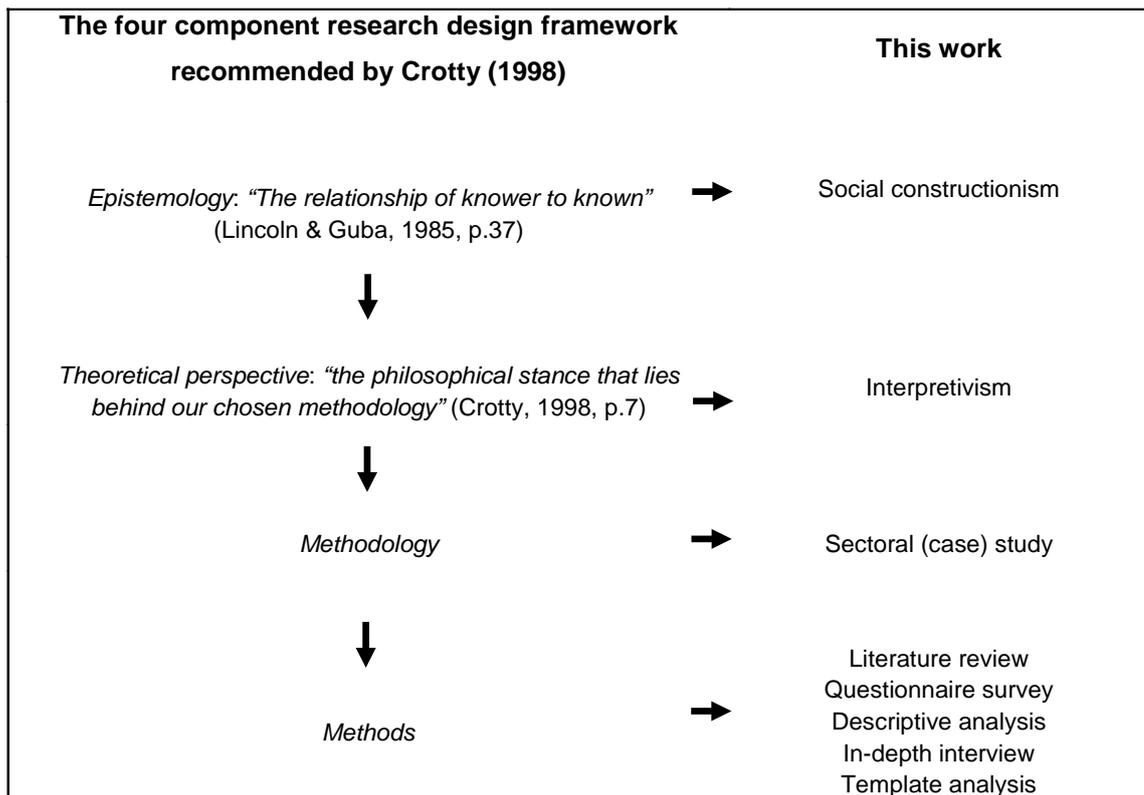


Figure 3.2: A framework of research design—the interconnection of epistemology, theoretical perspective, methodology and methods of inquiry (Source: Adapted from Crotty, 1998)

This thesis adopted constructivist epistemology – *“truth and meaning do not exist in some external world, but are created by the subject’s interactions with the world. Meaning is constructed not discovered...”* (Gray, 2009, p. 18). This is compatible with the theoretical perspective of the interpretive philosophical stance. In this respect, my intention was to construct meaning from viewpoints of individual experienced managers across 21 Thai rubber companies, in order to get a better understanding of how these managers make decisions on the selection of intermodal transport. Therefore, a sectoral case study was adopted as a research methodology – the strategy and the research design was linked to the desired outcomes – which in turn determined the choice of data collection and analysis methods. Data was gathered using multi methods, including the use of survey questionnaires and in-depth interviews, whereas descriptive analysis and template analysis were used as methods of data analysis in this study. The use of multi-methods in a piece of research enables the researcher to focus and capture issues in the investigation both in breadth and in depth to a certain extent (Fielding & Fielding, 1986; Morse, 2003). So, this strategy can enhance the explanatory power of understanding within the research. Similarly, Denzin and Lincoln (2008) often refer to triangulation and they found that the results

of the research can be triangulated to form a comprehensive whole. They also argue that the use of multiple methods can lead to an in-depth understanding of the phenomenon under consideration. Therefore, the combination of survey questionnaires and in-depth interviews in this study is considered as a useful technique in terms of conducting research involving a sectoral case study.

3.4 The Research Process in this Study

The purpose of this section is to provide a brief overview of the research process in this study, before going into greater detail in Sections 3.5 and 3.6. Figure 3.3 presents the diagram of research in the study. It begins with the brief aim of the research, which was to understand, in the real world context of the Thai rubber sector, the issue of the choice of intermodal freight transport. Therefore, a sectoral case study was adopted as the methodology of this research. In order to be successful in employing an inductive approach, a literature review is necessary for inexperienced PhD research students (Nunes & Al-Mamari, 2008). The outcome of such a review then results in the development of an preliminary theoretical framework (see Chapter 2; Figure 2.15) which facilitates the researcher when it comes to focusing on research aims and objectives.

With regard to data collection and analysis, it was divided into two phases: an exploratory phase (Phase I) and the main phase (Phase II). Research Phase I focused on a broad view of the contextual background regarding the use of freight transport in the Thai rubber industry, by using a survey based questionnaire. It is necessary to have knowledge of the context under investigation before proceeding to the main phase, which intends to develop a conceptual model of understanding the factors influencing intermodal freight transport choice from a shipper's perspective. In the main phase, it was decided that appropriate methods to adopt for this investigation included semi-structured interviews and documentary data, with the use of template analysis to analyse textual data.

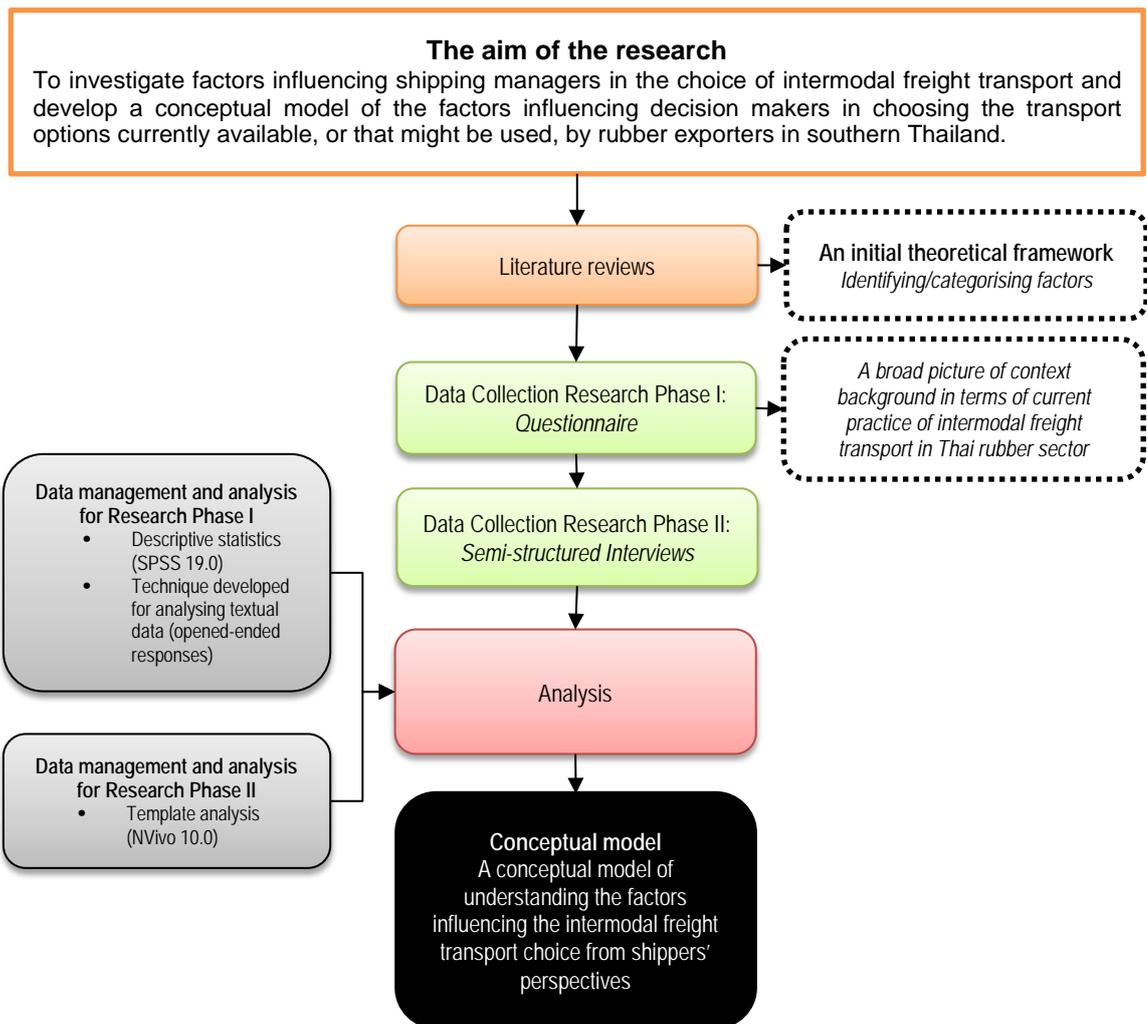


Figure 3.3: The research process in this study

An overview of all main research tasks was carried out during the PhD journey from October 2010 to September 2015, and are summarised in Figure 3.4. Prior to starting the data analysis in 2012, the preliminary theoretical framework was finally revised, based on suggestions from the UK Academy for Information Systems (UKAIS) PhD consortium, along with additional literature research. This early work in Research Phase One delivered a preliminary understanding of the investigated case by conducting a questionnaire survey in one time period from July to September 2012.

The Second Phase consisting of semi-structured interviews was applied as the main data collection method. This was designed in such a way as to interview experienced managers within the Thai rubber sector. Face-to-face interviews were carried out by the researcher from June 2013 to August 2013. The aim of the main phase was to obtain in-depth and rich data about the viewpoints of Thai shipping/logistics managers. The subsequent research task related to the data analysis and

interpretation stage which included data transcription, member checks, data coding, and data translation; all these research tasks were carried out from September 2013 to May 2014.

The final task involved the writing-up of the thesis required a great deal of motivation and focus to complete the thesis. I took about one full year to complete the thesis. At this point, after finish writing-up of the thesis, the next stage will be to write up a paper for submission to a journal or a conference paper based on the first and second group of findings.

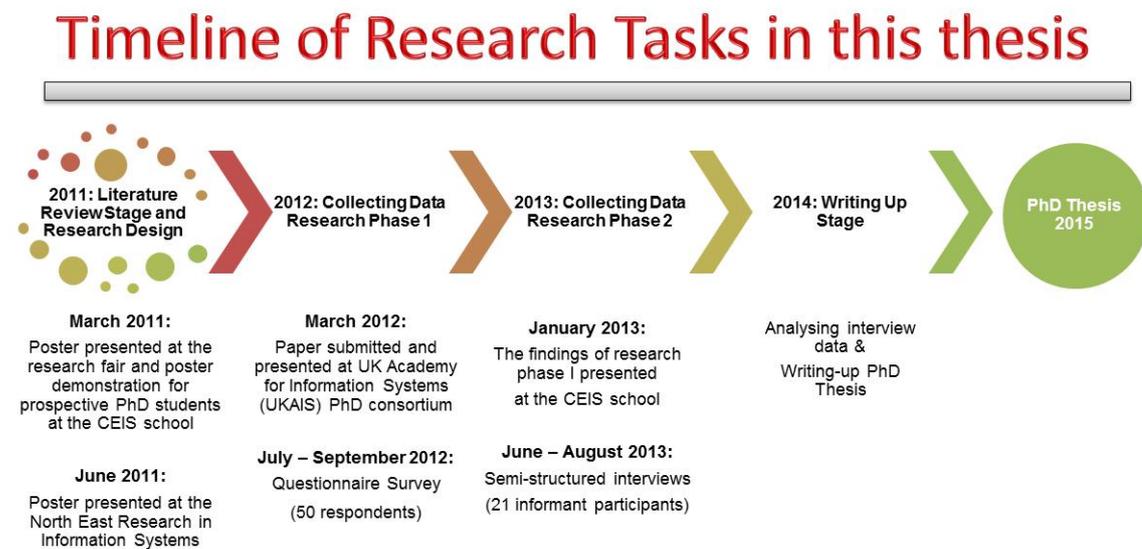


Figure 3.4: Timeline of the research tasks/activities

3.5 Methods of Data Collection and Analysis - Phase I

This section reveals the justification for, and details of, individual methods of data collection and the analysis used in phase I of this research. It deals with the methods used in relation to the survey questionnaire and the analysis of the data obtained.

3.5.1 Survey Questionnaires

This survey aims to explore the background of the South Thai rubber business, such as its demographic characteristics and the current situation of freight transport usage, as well as determinant factors that could affect choice processes. With regard to the selection of intermodal freight transport, the designed questions were divided into two main elements: inland transport modes as part of intermodal transport and loading ports. Additionally, another objective of the questionnaire was to find out the feasible

range of alternatives, in terms of intermodal freight transport pathways currently used in the Thai rubber sector. The reasons why the survey method was chosen for this project as the preferred data collection method for the primary stage of this study is for its ability to accommodate a large number of studied attributes and participants within the time and budget constraints.

3.5.1.1 Survey Questionnaire Design

In order to carefully develop a reliable questionnaire instrument, this questionnaire was designed by following Churchill and Lacobucci's design steps (Churchill & Lacobucci, 2005). Such a procedure is composed of nine steps, the details of which are shown in Figure 3.5. This project was conducted using a self-administered questionnaire, and was sent out to the participants in the post.

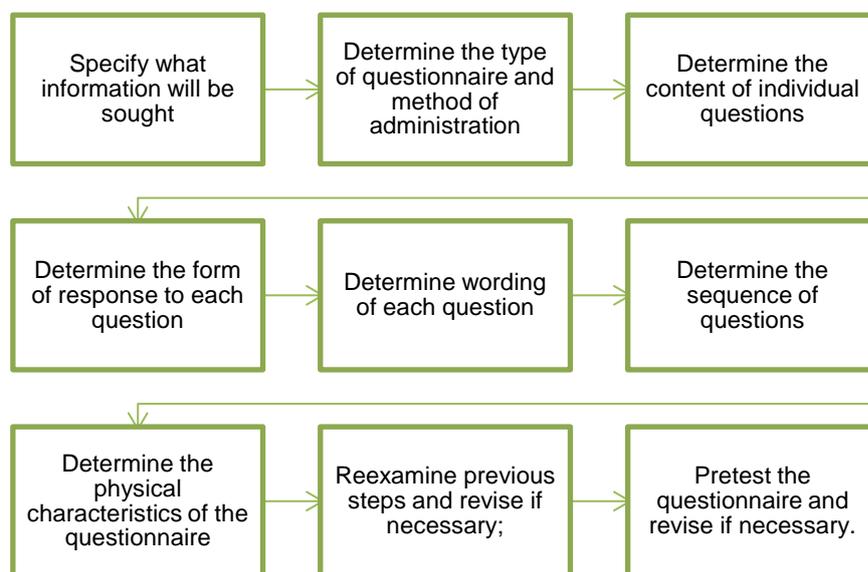


Figure 3.5: Step by step guide for developing a questionnaire (Source: Adapted from Churchill & Lacobucci, 2005)

In order to specify what information would be required in this study, a review of the existing freight transportation literature (see Chapter 2; Section 2.3.2), along with face-to-face interviews using five shipping managers working in different conditions in natural processing companies in three main provinces in southern Thailand were conducted. Less structured interviews were used for this stage. According to Easterby-Smith *et al.* (2012), they argue that the use of less structured interviews is appropriate in cases where lines of questioning should be explored further. In addition, this approach seems to be appropriate for any researchers who want to set out clearly their design aims and research objectives.

This research instrument was composed of four main sections. Figure 3.6 depicts a conceptual framework of the survey questionnaire and the related analysis techniques in each section. The questionnaire consists of four main concepts: 1) an individual background of survey respondents and an organisational background of the natural rubber processing companies, 2) the current practice for freight transport in the natural rubber industry 3) the sequence of decision-making among elements of freight transport, 4) the perspectives of shippers on the subject of the determinant criteria that could affect the selection of Transport Modes and Loading Ports.

The research instrument includes both open and closed questions, with the details in Appendix D. The form of response in sections one (A) and two (B) was in the form of category questions, quantity and grid questions. In order to investigate the decision-making process among elements of freight transport, including transport modes, ports and shipping lines, the third (C) section used dichotomous questions of whether the respondents agree or disagree with each statement. According to Bell (2014), verbal/open questions usually provide worthwhile issues for follow-up interviews. The final (D) section consists of five open questions related to factors influencing freight mode selection, in order to allow respondents to draw attention to anything about the related questions which they feel strongly about. Additionally, this study plans to follow up with semi-structured interviews in research Phase II.

The questionnaire was originally written in English and then translated into Thai. The reason for the translation of the questionnaire into Thai is that Thai is possibly the main language of the research participants. Therefore, the Thai version was actually used in data collection. It was considered that the translation process may create unreliability in the questionnaire instrument. Forward-backward translation was therefore carried out to make sure the meaning of both Thai and English versions was the same (Sperber, 2004). This follows a *“back-translation”* method (Sperber, 2004, p. 125), in which *“...a questionnaire is translated into the target language by one translator and then translated back into the source language by an independent translator who is blinded to the original questionnaire. The two source-language versions are then compared.”* In this case, the translation procedure was conducted using the consecutive methods of forward translation from English to Thai and backward translation from Thai to English, and then a comparison between the original version and the backward translation was done. The complete English version is presented in Appendix D.

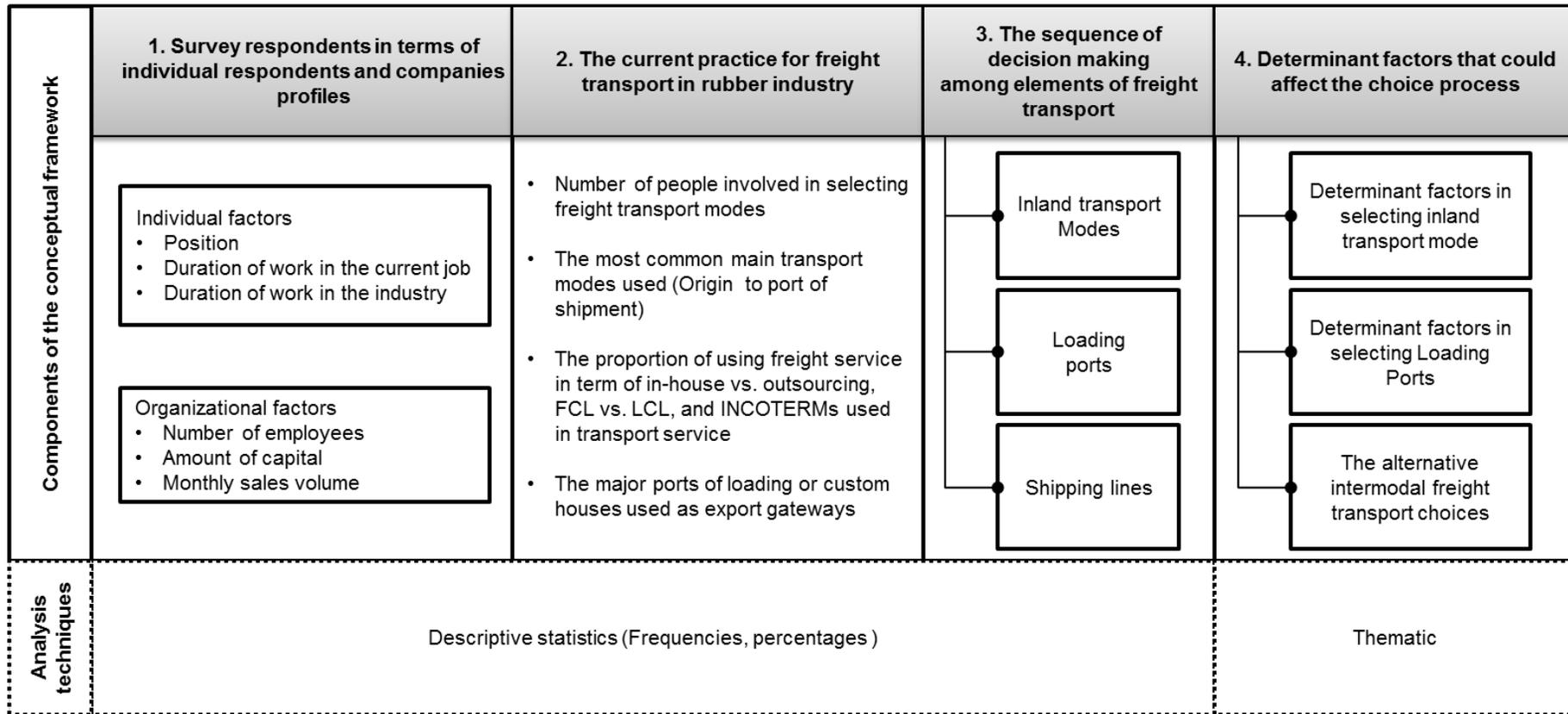


Figure 3.6: A conceptual framework of the survey questionnaire

3.5.1.2 Questionnaire Research Participants

According to the directory of natural rubber processing factories in 2011, there are 163 factories in Thailand (RRIT, 2011a). The majority of them are situated in the south of Thailand. This study applies purposive sampling in the four largest export provinces in southern Thailand. Thus, the participants are composed of 73 companies located in Surat Thani, Trang, Songkhla and Nakhon Si Thammarat. These four provinces were chosen as the sample of this study because the majority of rubber companies are situated here, and the volume of rubber products exported cover more than half the country's total. Another reason why these locations were chosen is because of the high frequency of decision-making required from the managers. Thus, questionnaires were distributed to 73 companies located in the aforementioned provinces in July 2012. With the purpose of gaining a reliable source of data and high response rates, respondents were carefully determined by initial contact with the professional body within the industry in these four provinces; so as to accurately identify who is responsible for the selection of freight transport modes. In addition, the participants' details and the purposes of this survey were contained in a covering letter (see in Appendix D), in order to make sure the information obtained from the questionnaires was from the correct person. In addition, it enabled those who received questionnaires (the name of whom was on the postal letter) to pass on a questionnaire to another staff member, who was considered more appropriate for the purposes of this survey.

3.5.1.3 Piloting the Questionnaire

The pilot test was conducted with three participants, who have experience in freight mode selection within Thai natural rubber processing companies. The implementation of the pilot study aimed to ensure that participants understand the instructions correctly and provide the following information:

- How long the questionnaire took to complete;
- The clarity of instructions;
- Which, if any, questions were unclear or ambiguous;
- Which, if any, questions the respondent felt uneasy about answering;
- Whether in their opinion there were any major topic omissions;
- Whether the layout was clear and attractive; and
- Any other comments

(Bell, 2014, pp. 167-168)

The questionnaire, together with the covering letter, was piloted with three experienced managers. These participants were selected based on their industry expertise and willingness to take part in this research. The particular delivery and collection of the questionnaires was chosen to be able to receive almost a full response rate. Although this form of administering questionnaires adds costs compared to other methods, response rates are likely to be as high as 98 % (Saunders *et al.*, 2012). Additionally, all participants in the pilot were first contacted by telephone in advance to arrange a convenient meeting time. After the pilot process was completed, the instrument was revised based upon the opinions and comments received.

3.5.1.4 Administering the Mail Survey

Data was gathered in one time period between July and September 2012 from experienced managers (e.g. shipping managers or export managers). In July 2012, questionnaires were first distributed by post to 73 companies located in four provinces, namely Trang, Nakhon Si Thammarat, Songkhla and Surat Thani. The covering letter enclosed with the questionnaire requested a return date within two weeks. This length of time was seen as a reasonable period for respondents to complete the questionnaire (Bell, 2014). For the non-responders, the first follow-up was targeted two weeks after delivering the survey by resending the questionnaire. Then, a second-follow up was carried on in the sixth week by telephone. Finally, a third-follow up was done in the eleventh week. As can be seen in Table 3.3, 50 out of 73 respondents completed and returned the questionnaire. The response rate was 30.1% for the first month, and then increased to 34.2% after the first follow-up reminder by post. As a final follow-up, after the last two reminders by telephone, the response rate was 75.3 %; however, only the data from 68.5% of those surveyed was usable because five returned questionnaires were not completed and were therefore discarded.

Table 3.3: Main process in the Survey

Date	Mailing	No. of responses (out of 73)	Response Rate (%)
25.07.2012	Initial questionnaire (By post)	22	30.1
22.08.2012	1 st follow-up questionnaire (By post)	25	34.2
15.09.2012	2 nd follow-up questionnaire-phone calls	4	5.5
17.10.2012	3 rd follow-up questionnaire-phone calls	4	5.5
	Total response	55	75.3
	Useable questionnaires	50	68.5

Note: The actual sample size= 73

3.5.2 The Questionnaire Survey Data Analysis

The questionnaire survey was in paper format, composed of both numerical and textual data. In the case of the numerical data, statistical analysis was employed as a data analysis method for calculating frequencies and percentages for each question. Data management and analysis were performed using SPSS 19.0. This numeric data helps to capture a broad picture of current freight transport usage in the rubber industry. In contrast, textual data was analysed by carefully reading the answers to each question from all respondents. Subsequently, coding categories were developed manually to answer each question. Table 3.4 presents a summary of the analysis methods used in each component, with regard to the conceptual framework of the survey questionnaire.

Table 3.4: Data analysis methods used in the survey questionnaire

Components of the conceptual framework	Analysis techniques
1) Organisational and individual characteristics	Descriptive statistics (Frequencies, percentages)
2) The current practice of freight transport usage in the context of the rubber industry in southern Thailand	Descriptive statistics (Frequencies, percentages)
3) The sequence of decision-making among elements of freight transport	Descriptive statistics (Frequencies, percentages)
4) The open-ended questions explore determinant factors that could affect the choice process	Qualitative analysis techniques were used to analyse the response to open-ended questions (a brief guide to the analysis of open-ended survey questions attracted in Appendix E)

The use of simple approaches to the data analysis here reflects the number of respondents in abstract terms and the overriding objective sought. Phase I obtained a macro view of the case selection. Since the research position taken in the study is an interpretive rather than a deductive approach, no a priori hypotheses were made, and hence no further analytical study involving statistical testing has been undertaken. As a final point, the findings of Research Phase 1 are summarised in Chapter 4, which presents a description of current freight transport practices in the context of the South Thai rubber industry, based on shippers' perspectives.

The next section describes the synthesis and evaluation of methods of data collection and analysis used in Research Phase II.

3.6 Methods of Data Collection and Analysis - Phase II

As described on the previous section, Research Phase I was conducted in the form of a survey-based questionnaire. Research Phase 1 was a valuable way in terms of providing a brief overview of the contextual background of the case under investigation, particularly current freight transport practice in the Southern Thai rubber sector. Turning now to the main data collection methods, in Research Phase II a semi-structured interview was used. Phase II was set up to obtain data that help develop an undefined conceptual understanding of how decisions are made with regard to the choice of intermodal freight transport, by means of detailed semi-structured interviews. These subsequent sections are then devoted to clarifying the methods of data collection and analysis employed in Research Phase II.

3.6.1 Semi-structured Interviews

Drever (2003, p. 1) describes the process of semi-structured interviews, as “...*the interviewer sets up a general structure by deciding in advance what ground is to be covered and what main questions are to be asked...*” A semi-structured interview was chosen as a main data-collecting method because it was compatible with the interpretivist theoretical perspective and methodology, which enabled me to get interviewees’ own perspectives and also follow-up on points which arose from interviewees’ responses. There are two major types of interviewing techniques in qualitative research: unstructured and semi-structured interviewing (Bryman & Bell, 2011). Unstructured interviewing means that the interviewers do not need to use an interview guide to handle the investigated topic. However, for semi-structured interviews, the list of questions tends to be prepared to make sure that all studied topics have been covered; however, the order of questions is flexible depending upon the conversation and any new points that may be brought up during the interview (Bryman & Bell, 2011). These two types of interview mentioned above are flexible and allow the opportunity for participants to express their own opinion, unlike structured interviews in quantitative research. These have a fixed set of questions and the conversation follows a question schedule, which has been decided upon and structured “*to maximize the reliability and validity of measurement of key concepts*” (Bryman & Bell, 2011, p. 466).

Barriball and While argue that “...the perceptions and opinions of respondents regarding complex and sometimes sensitive issues and enable probing for more information and clarification of answers” (Barriball & While, 1994, p. 330). To understand the full picture of how shipping managers in the Thai rubber sector make decisions on intermodal freight transport mode choice, a semi-structured interview method was undertaken as a data collection method. According to Saunders *et al.* (2012), this type of interview is suitable for both exploratory and explanatory study, particularly, to investigate the different variables involved in decision-making from the initial study. As this research starts with initial study in the survey method section, certain factors are defined as the determinants of managerial decision-making for the selection of domestic transport modes and loading ports. Thus, semi-structured interviews are the most appropriate for gathering participants’ viewpoints.

3.6.1.1 Interview Question Design

The design of the questions used in the interviews was based on the initial findings of the exploratory stage (Research Phase I), along with the preliminary theoretical framework as presented in the literature review chapter (see Chapter 2, Section 2.7.4). The interview questions were designed to consist of three main sections: the context variables in terms of the organisation, individual perceptions and past experience, as well as business environmental and operational factors affecting freight transport mode selection. The list of interview questions used in this research is explicitly clarified and included in Appendix F: the list of interview questions. Moreover, the details of the interview questions, explanations, and support provided by underpinning areas of the literature are revealed in Appendix G.

3.6.1.2 Interview Research Participants - Sampling

The participants in this study were people who have knowledge and experience in the selection of freight transport in the rubber export industry, located in four main provinces: Surat Thani, Nakhon Si Thammarat, Trang and Songkhla (see in Appendix H). This research does not only apply to one position, such as logistics managers or shipping managers, because of the variation in organisational structure from one company to another. The job title of participants includes shipping managers, managing directors or whoever else deals with transport or logistics within rubber processing organisations. However, the most important criterion for selecting participants is that they must have knowledge and experience of the areas covered by the interview guide.

In summary, the main concern is that the participant needs to be considered an expert in managing outbound transport within the rubber industry. Without any preference given to a specific gender or education level, the following key participants were sought who:

- are willing to participate in this study
- have knowledge and experience of transport management in the rubber export sector
- work for rubber export companies established in the four provinces concerned, namely Trang, Nakhonsrithamarat, Songkhla, and Surat Thani
- have been permitted by their organisation to participate in this study

Besides people who qualified for the research based on the above criteria, efforts were made to ensure that people from the different subgroups (such as manufacturing locations, business size, product types) were contacted to take part in this study.

In order to select samples for the interviews, this work was not based on the probability sampling assumption, whereby a sample is selected randomly, but rather focused on a small sample (non-probability sampling), as it was expected that such a sample would provide me with “*an informative-rich case study*” (Saunders *et al.*, 2012, p. 283). Twelve participants recruited from the survey questionnaire stage were interviewed at the start of the interview phase, and this extended to further cases by applying a snowball sampling technique. There were two sampling techniques used: purposive sampling (selected from survey respondents) and snowball sampling. From research Phase I of the survey questionnaires, 12 out of 50 survey respondents expressed a desire to take part in this study for the purpose of in-depth interview data collection, while 9 participants were recruited by using snowball sampling techniques (Noy, 2008). Researchers asked all 12 participants at the end of interview to help with further recruitment, and these participants played a crucial role in the second stage of recruitment. This was done because in some big organisations it is difficult to get access to managers as an “*outsider*” researcher. Therefore, it is important to have people on the inside who can open doors to help with initial contact, then after to get permission to obtain the names and personal contact details of transport experts who are interested in taking part in the project, so that the details of the project can be given and a convenient time and place for interviews to take place can be assigned.

With regards to the snowball sampling technique, a total of 9 participants were eager to take part in this project.

3.6.1.3 Interview Procedure

Face-to-face interviews were carried out from June 2013 to August 2013. Firstly, the interview guide was sent to participants in advance by email or post depending on the participants' preferred method. This method may increase the ability for participants to provide rich data. The interview guide was sent out to participants at least one week before an interview appointment, so that participants were able to prepare for the interview. Prior to undertaking the interview, ethical clearance was obtained from each participant. In the end, 21 participants were interviewed (demographic details of participants is depicted in Table 3.5) and the data was recorded on a digital audio recorder. Prior notice was given and the participants were asked for their permission for the interviews to be recorded on audio. The researcher also introduced myself beforehand and gave a brief description of the purpose of the project and had the participants sign a consent form before commencing the formal interview. The duration of the interview was between 1.5 and 3.5 hours. The total length of the audio recording was approximately 52 hours for the 21 participants. Although digital audio was recorded almost throughout the entire interview, notes were taken to write down key issues, new information and sensitive information that was not allowed to be recorded. This was done to help in the data transcribing and coding interview data stage. This is because this information could help researchers to focus on the important points during the analysis stage and may add to key contextualising that was abstracted from real live interactive interviews. Kvale and Brinkmann (2009, p. 178) argue that, "*the audio recording of the interview involves a first abstraction from the live physical presence of the conversing persons, with a loss of body language such as posture and gestures.*" The chronology details of duration and date of interview are shown in Appendix I.

Table 3.5: Details of the interview participants

Participant Code	Position	Manufacturing Locations		Sales Volume (TEU)	Product Types		
					STR	RSS	Conc. Latex
IP1	Export manager	North	Surat Thani	50-100			✓
IP2	Assistant shipping manager	North	Surat Thani	55	✓		
IP3	Marketing manager	North	Nakhon	40-50			✓
IP4	General manager	North	Nakhon	400-1000		✓	✓
IP5	Export division manager	North	Nakhon	20-50		✓	
IP6	Shipping manager	> 1 Branch	> 1 Branch	500-900	✓		
IP7	General manager	> 1 Branch	> 1 Branch	500	✓		
IP8	Assistant shipping manager	South	Trang	100-150	✓		✓
IP9	General manager	South	Trang	80-100		✓	✓
*IP10	Managing director	South	Songkhla	500-1000	✓		✓
*IP11	Chief operating officer (coo)	South	Songkhla	100-150	✓		✓
*IP12	Managing director	South	SongKhla	50-70		✓	
*IP13	International marketing manager	South	SongKhla	80	✓		✓
*IP14	Executive director	> 1 Branch	> 1 Branch	4000	✓	✓	✓
*IP15	Marketing manager	South	Krabi Branch	100-150			✓
IP16	Deputy vice president	> 1 Branch	> 1 Branch	3000-3500	✓	✓	✓
*IP17	Factory manager	> 1 Branch	> 1 Branch	700-900	✓	✓	
*IP18	Export manager	> 1 Branch	> 1 Branch	3000-4000	✓	✓	✓
IP19	Operation manager	North	Surat Thani	90-100		✓	
*IP20	Logistic manager	> 1 Branch	> 1 Branch	1000	✓	✓	✓
IP21	Export manager	North	Nakhon	30-50	✓	✓	✓

Note: *: participants' recruitment by snowball sampling;
 STR: Standard Thai Rubber;
 RSS: Ribbed Smoked Sheet; and
 Conc. Latex: Concentrated Latex

3.6.1.4 Data Saturation

According to the Sage Encyclopaedia of Qualitative Research Methods, data saturation is “...the point in data collection when no new or relevant information emerges with respect to the newly constructed theory” (Saumure & Given, 2008, p. 195). Generally, most qualitative researchers make their judgment on whether they need to continue collecting more data or not based on this concept. However, prior to collecting data, the researcher self-inquired about the number of participants to ensure rigour. (Mason, 2010) and Guest *et al.* (2006) recommend that there are a certain number of researchers who provide guidance on the actual sample sizes that are appropriate in qualitative research depending upon the research methodology underpinning the study:

- all qualitative research: “fifteen is the smallest acceptable sample” (Bertaux, 1981, p. 35);
- phenomenology: no less than six (Morse, 1994, p. 225), 5-25 interviews (Polkinghorne, 1989 cited in Creswell, 2013, p. 81);
- grounded theory: 30-50 interviews (Morse, 1994, p. 225), 20-60 interviews (Creswell, 2013, p. 105);
- ethnography: 30-50 interviews (Morse, 1994, p. 225); 30-60 interviews (Bernard, 2000, p. 178);

(Adapted from Guest, Bunce & Johnson, 2006; Mason, 2010)

As this current study is underpinned by a sectoral case study methodology, the target number of participants was between 15 and 25. In the end, 21 experienced managers were interviewed, which is considered sufficient data is needed for this research.

3.6.1.5 Data Transcription

According to Kvale (2007, p. 93), “transcriptions are translations from an oral language to a written language...” For this work, the audio-recorded interviews of the 21 participants were transcribed word-for-word (verbatim) into a Word format, so that the transcripts could be imported to NVivo 10.0 software for data coding. This is a time consuming stage; however, this laborious task allowed familiarise with the data. All transcriptions have been done and are composed of appropriately 900 pages of A4 size paper. They were divided into 21 files and each file was composed of an introduction about the participants and the organisation characteristics; for example, business size, main exported product types, manufacturing locations, as well as a summary of the notes made during the interview. These individual and organisational contexts and noted key issues were considered useful for data analysis and interpretation. Kvale and Brinkmann (2009, p. 178) argue that transcribing is

“abstraction, where the tone of the voice, the intonations, and the breathing are lost... and decontextualizing renderings of live interview conversations.” To ensure the accuracy of transcripts, they were presented for verification. All participants received their transcription by means of electronic mail; however, all participants were contacted by telephone to ask for their cooperation. Finally, no alterations of the transcripts were required by any participants.

3.6.2 Qualitative Data analysis

3.6.2.1 Template Analysis

Template analysis is a pragmatic analytical technique in qualitative research and suitable for applied research. The technique was established by Crabtree and Miller in the 1990s (King & Horrocks, 2010; Waring & Wainwright, 2008). The method was then further developed by Nigel King and became well-known in the UK, particularly in the area of health and applied research (Waring & Wainwright, 2008). Waring and Wainwright (2008) argue that although this approach has gained credibility through King's work, the technique seems to be applicable and useful in business and management research.

King (2004, p. 256) defines template analysis as: *“... the researcher produces a list of codes (‘template’) representing themes identified in their textual data. Some of these will usually be defined a priori, but they will be modified and added to as the researcher reads and interprets the texts”* (King, 2004, p. 256). Template analysis is in line with both a *“top-down”* approach, similar to a metric approach, and pretty much *“bottom-up,”* like grounded theory or the method of Interpretative Phenomenological Analysis (IPA) (King & Horrocks, 2010). This is because prior to starting the process of developing a template, some *“a priori codes”* are usually defined in advance and used as tentative codes. However, these codes can be revised, modified or deleted later in the whole process of data analysis, depending upon the way researchers interpret the textual material. King and Horrocks (2010) summarise that there are two sources to develop an *“a priori theme”*; derived from theoretical perspectives or practical issues related to the aim of the research.

This section has demonstrated the history and the principle of this analysis technique that summarises the key fundamental of the technique. It is now necessary to explain it in further detail to address the question of *“why use template analysis?”* King (2004) argues that there is a similarity between IPA and template analysis in practice in the *“development of conceptual themes”* stage.

“...template analysis is in practice very similar to IPA, in terms of the development of conceptual themes and their clustering into broader groupings, and the eventual identification across cases of ‘master themes’ with their subsidiary ‘constituent themes.’” (King, 2004, p. 257)

In addition, both King (2004) and, Waring and Wainwright (2008) point out that these two techniques differ, in terms of the use of “*a priori codes*” and the balance between within and across case analysis.

Another benefit of template analysis is that it offers “...*a more flexible technique with fewer specified procedures, permitting researchers to tailor it to match their own requirements*” (King, 2004, p. 257). For instance, the coding hierarchy in template analysis is not fixed, whereas IPA is limited to three different levels of hierarchy. This flexibility enables the researcher to focus on issues and capture them in terms of both depth and breadth. The benefit of openness of data is one important reason for the use of the technique in this thesis.

Furthermore, template analysis can be used with any size of textual material; however, it is well-established with a total number of between 10 and 30 participants (King, 2004). According to Waring and Wainwright (2008), one advantage of this technique is that it also works well with a big volume of information. Waring and Wainwright used this technique to analyse over 85K words of a large volume of rich textual material, which led to “*a novel approach for learning about current IT project management practices*” (2008, p. 86). In addition, others scholars (Charity, 2010; Lai, 2012; Niamsorn, 2013) have successfully used thematic analysis for qualitative based case studies, which involved a large volume of rich textual material for their respective doctoral theses. They have proved that template analysis is a suitable analysis method for huge volume data. Thus, in the qualitative data analysis stage, the template analysis was applied in this research in order to gain an insight into how shippers make decisions on the selection of intermodal freight transport modes.

3.6.2.2 Using NVivo

After considering the huge amount of words in the transcripts, it could be worthwhile to spend time learning how to use software that can help make the procedure of data management and analysis a lot easier and manageable. NVivo is one of the “*Computer Assisted Qualitative Data Analysis*” (CAQDAS) platforms for analysing all forms of text data. Gibbs (2007, p. 106) argues that “*qualitative analysis requires careful and complex management of large amounts of texts, codes, memos, notes.*”

After attending a two full-day NVivo workshop, the NVivo software was found to be very useful tool for storing, sorting and managing text data in the form of an electronic file, and it also provides support in the procedure of analysis and data management. In addition, the software is not too sophisticated for a new user. According to Gibbs (2007), the key features of CAQDAS developed to assist in the process of qualitative analysis are:

- Import and display rich data
- The construction of code lists, in most cases as a hierarchy
- Retrieval of text that has been coded
- The examination of coded text in the context of the original documents
- The writing of memos that can be linked to codes and documents.

(Gibbs, 2007, p. 107)

These software features not only enable chunks of texts to be brought together with the thematic nodes, they also assist in going back to the theme location on transcript by clicking on the code. This function of being able to bounce back to the original context of the conversation is very supportive when revising and modifying templates or even creating new codes, particularly when the researcher's judgment is required to decide whether any more changes to the template are necessary.

Using NVivo to undertake the analysis of the qualitative data is much quicker than portray the analysis manually. Gibbs argues that the software only has the advantage of being able to organise and manage the text data to "*make qualitative analysis easier, more accurate, more reliable and more transparent,*" but the tools will never be able to analyse text data, construct codes and interpret data to facilitate the research project for researchers (Gibbs, 2007, p. 106). In order to organise a big volume of interview content well, software named NVivo 10.0 was used and was fully supported by Northumbria University, both in providing free access for the licence key and workshop training for new users.

In this work, the basis function of the software enables researchers to add similar chunks of text from different participants into codes ("*nodes*" in NVivo) and restructure these nodes based on the judgement of the researcher before coming up with the final template, in which all related information for this study can be presented.

3.6.2.3 Data Analysis Procedure

As explained earlier, this study was conducted using semi-structured interviews in the participants' first language, which is Thai; therefore, the data was transcribed into Thai. After completing the process of data transcription, it was necessary to do member checks in order to make sure of the accuracy of data. Therefore, the interview transcripts of each participant were returned to participants to ask them to check their accuracy. Prior to undertaking the analysis, all Thai transcripts were read through, so that the researcher was more familiar with the data. Then, data analysis was carried out by reading Thai transcripts using the template analysis technique via NVivo software. At this time, themes were developed in English, with the support of Thai quotations (as show in Appendix J). After finishing the data analysis, these Thai quotations were translated into English (see Appendix K). To make sure of the accuracy of the quotations, it was necessary to check the equivalent meaning between the original Thai transcripts and the English quotations (Sperber, 2004). Consequently, these two versions were presented to a lecturer at Suratthani Rajabhat University, Thailand. As a final point, the findings of the current study were presented in English, with the supporting evidence in English quotations, as shown in Chapter 5. Figure 3.7 presents a diagram of the qualitative data analysis and translation process of this research.

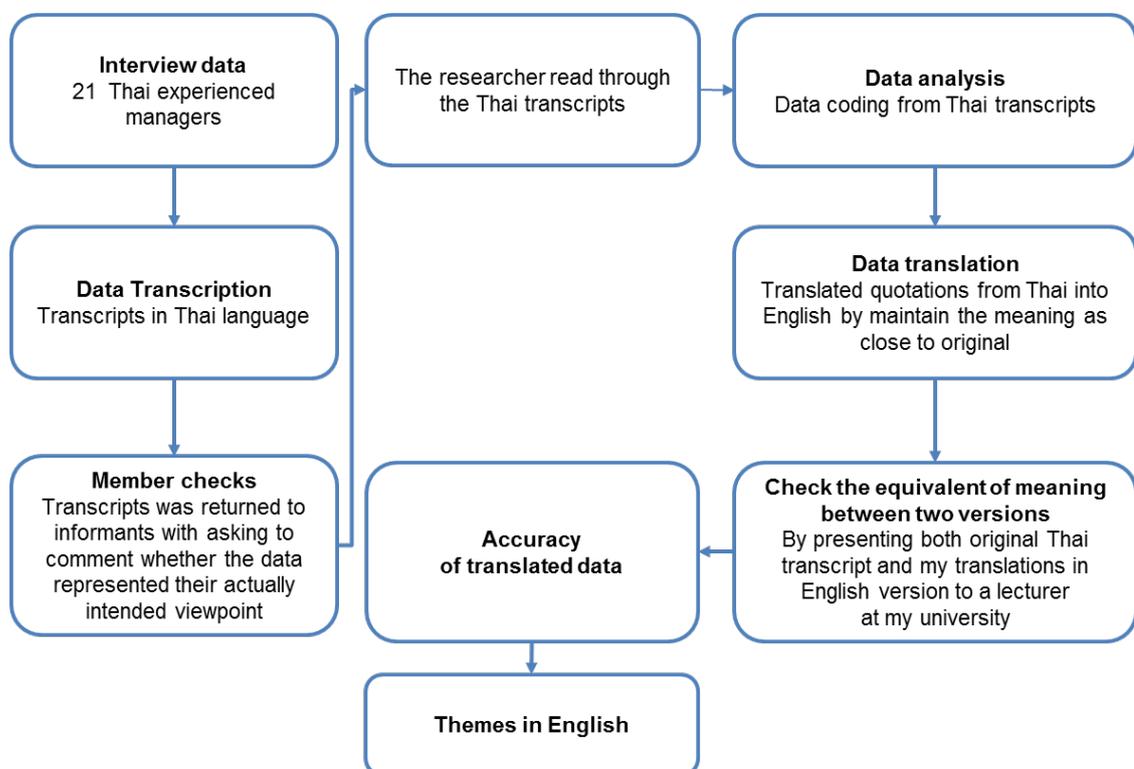


Figure 3.7: Qualitative data analysis and translation process of this research

3.6.2.4 Developing the Template

With regard to developing the template, it can be summarised in three stages: firstly, “a priori” codes were developed, then “an initial template” was constructed – with a sub-set of material based on the idea of “a priori codes,” also including emerging themes from the data—in order to use as a template for subsequent transcripts, and finally codes were organised or modified in an initial template until a “final template” could capture all the data to satisfy the aim of the study. King (2004) argues that this analysis technique allows openness of data and not genuine structure in the development of the initial template stage and allows researchers to fully cluster, modify and categorise the template, in order to obtain a meaningful “initial template.” According to Waring and Wainwright (2008, p. 86), the four broad steps of “the complete analysis process of organising, connecting and corroborating/legitimising involve:

- *Creating a code manual/coding scheme*
- *Hand or computer coding the text*
- *Sorting segments to get all similar text in one place*
- *Reading the segments and making the connections that are subsequently corroborated and legitimised.*”

(Waring & Wainwright, 2008, p. 86)

This project adopts the template analysis technique because of the flexibility of the coding structure, the use of a priori codes, the potential to revise, as well as the use of the initial template. These main features provide support throughout the process of data coding, which allow the researcher to revise or modify the codes based upon the a priori codes and the initial template.

Data analysis process in this thesis is composed of three broad steps, whose process is summarised in Figure 3.8, and the details are explained as follows:

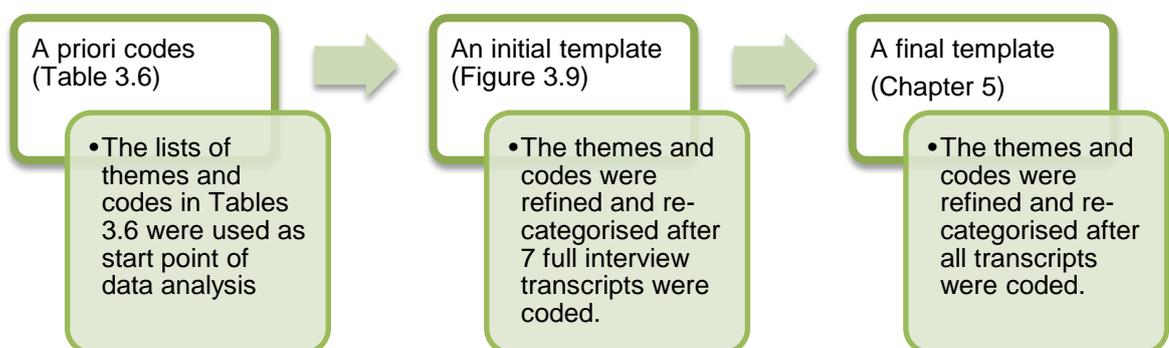


Figure 3.8: The process of developing a template

- 1) Defining “*a priori codes*” derived from literature reviews (see Chapter 2; Figure 2.15) and the exploratory findings from Phase I and some initial code from the interview guide. Table 3.6 presents the “*a priori codes*” for this study.
- 2) Creating an initial template based on the idea of “*a priori codes*,” together with an emerging theme on the basis of the data from 7 out of 21 interviews. At this stage, the analysis started with a “*bottom-up*” data coding process. In order to construct an initial template (see Figure 3.9), the sub-set of textual material (7 full interviews transcripts) was analysed line by line based on the general idea of the “*a priori codes*” and brought together with emerging themes from the data. An example of a coding tree is presented in Appendix L.

Table 3.6: A priori codes based upon literature and interview guides

Themes:	The context variables in terms of the organisation	The context variables in terms of the environment	Individual perception and past experiences	Operational factors
Codes:	<ul style="list-style-type: none"> • Organisational structure • Transport resources within the company • Outsourcing transportation • Transport policy within the company 	<ul style="list-style-type: none"> • Economic conditions • Transport infrastructure • Nature of rubber industry trading 	<ul style="list-style-type: none"> • Individual skills/ experiences • Importance of problem • Risk perception • Cost and service requirements • Past experience on each transport mode 	<ul style="list-style-type: none"> • Cost/ Rate/Price • Service reliability • Transit time/ Transit time reliability • Loss and damage • Fast response to problems

- 3) Developing the final template involves the analysis of the remaining 14 interview transcripts using the initial template from stage 2. The coding process in this stage is different from that of the primary stage of developing an “*initial template*” that analyses line by line. At this stage, the identification of segments of text or phrases that match existing codes in the initial template was undertaken. In the case of segments of text related to the aim of the research in fresh textual material, these cannot be added to existing codes. They are coded as new codes, which will be considered in more detail when the initial template is revised and modified after 14 transcripts have been analysed. The decision can therefore be made at this point about whether to add new codes and to redefine the template. Then, the analysis process for the rest of the transcripts is repeated in the same way as the data coding in stage three, but applied with a two-thirds template “*until it captures as full a*

picture of the analyst's understanding as possible" (King & Horrocks, 2010, p. 166). The updated final template is presented in Chapter Five.

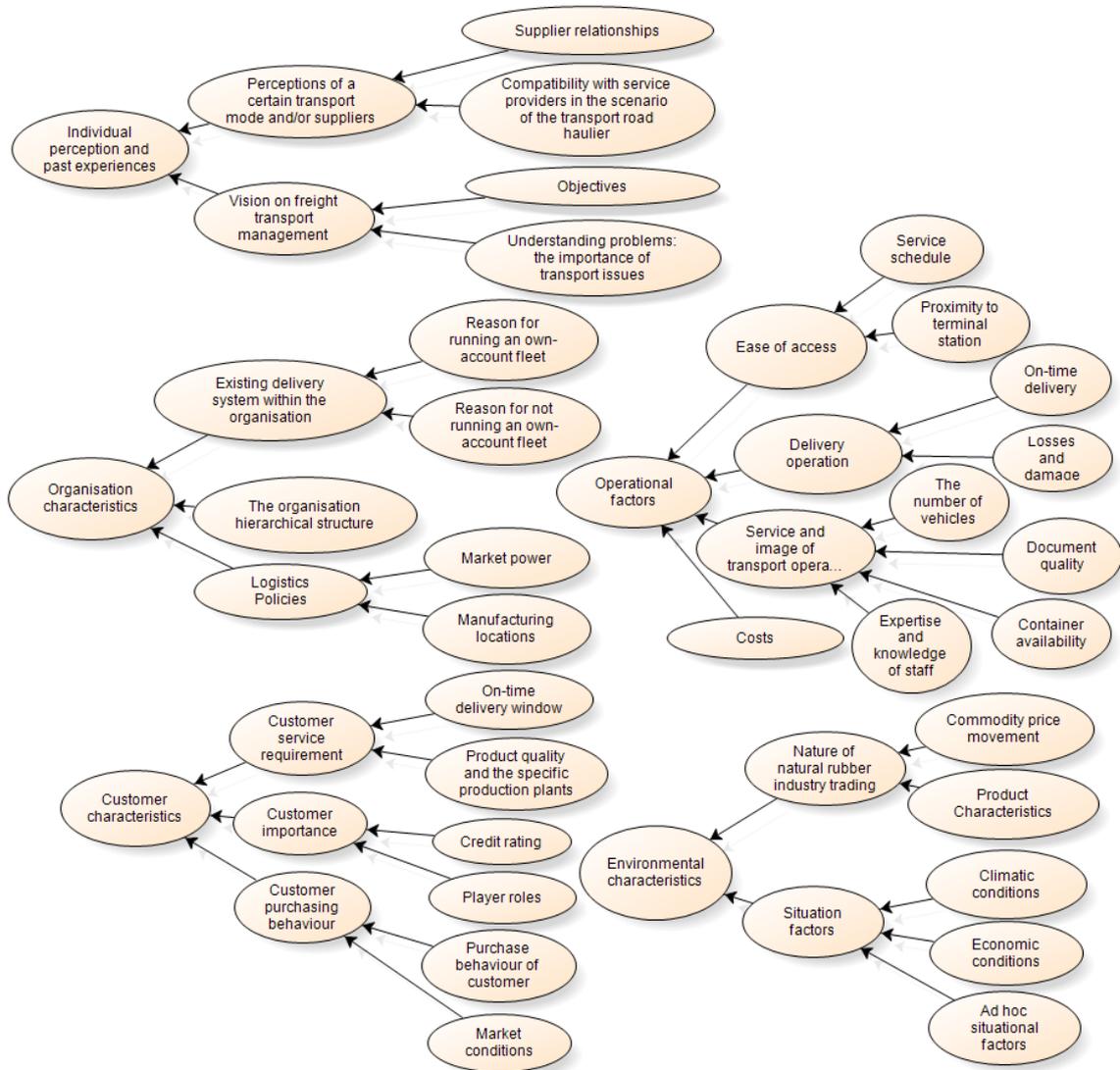


Figure 3.9: The initial template for this study

3.6.2.5 Data Translation

Only some sections extracted from the original (Thai) transcription to support using quotations the findings were translated into English. The aim of this work is to maintain the original meaning as best as possible, rather than translate it word-for-word. This is because Thai sentence structure and the way Thai is spoken are different to English; therefore, it is impossible to do “*word-for-word translations.*” However, the best possible attempt was made to make the translated version as close to the original version as possible in terms of meaning. In addition, the accuracy of the translation was validated by presenting the original Thai transcripts, which will be used as a source of quotations in the findings, and the translated English version to a lecturer at the university to check the two versions, as indicated earlier in the chapter. Most of the translations retained the meaning of the original version, as indicated earlier in the chapter with only minor differences found in vocabulary usage; nevertheless, some quotations were revised if those recommended were considered more appropriate.

3.6.2.6 The Write up

At the stage of interpreting and writing up the final findings, several coded passages of conversation text were categorised and grouped under the same codes and exported to a Portable Document Format (PDF), node by node, then the retrieved material was read through several times. As Marshall and Rossman (2011, p. 210) recommend that “*reading, rereading and reading through the data once more forces the researcher to become intimate with the material.*” In order to illustrate the key meaning of each code and their importance, a narrative of those quotations as well as supporting quotations from other transcripts were used. The details of the findings are presented in Chapter Five.

3.7 Ethical Considerations

As this study involves human subjects at the data gathering stage, ethical considerations were essential for conducting the research. This research project was reviewed and approved by the Northumbria University, and was carried out in line with their research ethics guidelines (Northumbria University, 2013).

As mentioned in the research design, the procedure for gathering primary data in this research study consists of two main stages as follows:

- 1) **The questionnaire survey:** this study applied purposive sampling on the basis of the four largest export provinces in southern Thailand. The sampling frame is composed of 73 companies located in Surat Thani, Trang, Songkhla and Nakhon Si Thammarat. The aims of this study and an approximate timeframe to complete the questionnaire were detailed in a covering letter, which was attached to the first page of the questionnaire (see Appendix D). Moreover, all information received was treated with absolute confidentiality and participants' responses were used in aggregate form, in combination with all other survey participants. No specific details about companies or respondents were reported.

- 2) **Semi-structured interviews:** the participants included 21 experienced managers working for natural rubber processing companies, who were selected using purposive and snowball sampling. The main data was in the form of the managers' viewpoints and was collected with the use of semi-structured interviews. These interviews took place at the workplaces of the participants. A consent form (the CEIS Research Ethics Sub-Committee CONSENT FORM – C see Appendix M) was signed by all the participants before commencing each interview. In addition, the research participants were informed by the use of a project information sheet (see Appendix N) of the aims, objectives and activities involved in the research. Moreover, a formal letter (asking for permission from the owners of the rubber companies to take part in this research) was signed by the project supervisor (see Appendix O) and was sent to the interview participants along with the project information sheet and interview guide.

The details concerning the ethical issues will be illustrated in three sub-sections; recruiting participants, informed consent and data security and storage.

3.7.1 Recruiting Participants and Gaining Access

For the survey questionnaires, a sampling frame was generated from the directory of natural rubber processing factories (RRIT, 2011a). Such a document also provided the company names and contact details, such as business addresses and telephone numbers. Survey methods seem to have a low degree of risk as far as ethics are concerned, as the data received was used in aggregate form, in combination with all the other data received from the survey participants, and no specific details about companies or respondents were reported. Therefore, information provided was

treated with absolute confidentiality and participants' responses were used in aggregate form, in combination with all the other responses from survey participants. No specific details about companies or respondents were reported. In order to increase the response rate, survey participants received Olympic Games key rings or pens as remuneration for taking part in the survey. These were enclosed with the postal questionnaire. This was the only way that the questionnaire was made to stand out from other questionnaires.

With regards to the recruitment of interview participants, contact was made with the professional bodies responsible for the Rubber Research Institute of Thailand and for rubber companies, because they have good connections with natural rubber processing companies. In this regard, they were able to pass on to me information on the names, telephone numbers and business addresses of the experienced managers who had been targeted for this research. Some background information was provided to the potential responses regarding the study and ask them to be volunteers for the research.

3.7.2 Informed Consent

"Informed Consent – A norm in which subjects based their voluntary participation in research projects on a full understanding of the possible risk involved." (Babbie, 2004, p. 64)

This research study used the CEIS Research Ethics Sub-Committee CONSENT FORM – C. Prior to commencing, the form was signed by all the participants, and all interview participants were well-informed about the main points relating to the information mentioned on the consent form. According to Gray (2009), the principal of informed consent is concerned with sufficient and accessible information related to the project, such as the purpose, procedures, benefits and the degree of risk involved in the study. This is made available to participants so they can make a decision on whether to volunteer for a project. However, he argues that sufficient information should be gauged based on the degree of risk involved. To illustrate this, a survey questionnaire involves a lower degree of risk; as a result informed consent may be not necessary in this case. On the other hand, interviews involve a higher degree of risk compared to survey questionnaires, consequently informed consent is required. In this study, survey respondents were informed of the purpose, an estimate of the time to complete the questionnaire and the benefits of the study by the use of a covering letter (see in Appendix D), which was attached to the first page of the questionnaire. In the case of the interview participants, a project information sheet,

interview topics and a formal letter asking for cooperation/permission from the owners of the rubber companies were given to them before the interview appointment date. At the beginning of the interview itself, all interview participants were informed about their right not to answer any question(s) if they wished or even to withdraw from the interview at any time during the interview. Permission was asked for to make an audio recording of the interview and a short explanation of the usefulness of this during the data analysis process was given. The interview participants were also given the opportunity to request the suspension of the recording at any time during the interview. Additionally, the issue of anonymity and confidentiality were mentioned, in order to make the interviewees more relaxed and confident when expressing their viewpoints without the fear of any consequences.

3.7.3 Data Security and Storage

In this research, two techniques to ensure anonymity and confidentiality were employed to protect the participants' identity. Accordingly, Babbie (2004, p. 65) states that *"Anonymity is guaranteed in a research project when neither the researchers nor the readers of the findings can identify a given response with a given respondent."* In addition, the same author points out that confidentiality can be achieved *"when the researcher can identify a given person's responses but promises not to do so publicly"* (Babbie, 2004, p. 66). To guarantee that no participants could be identified, all participants' names were changed into a coding system, for example: IP1, IP2, IP3, ..., IP21, as can be seen in Table 3.5. In this regard, only the researcher is able to track back by the use of a key, linking personal details to a participant code. All data was kept secure in such a way that it could not be accessed by unauthorised personnel. To illustrate this, data files in electronic form were kept either on a personal laptop or university hard drive, with controlled access to both, while manual documents, such as completed questionnaires in paper form were stored in a locked cabinet. Furthermore, all primary data will be destroyed after a period of two years after the completion of the PhD. After completing the research, hard copy information will be destroyed by shredding it, while electronic data will be deleted from hard drives/networks, as well as the recycle bin.

3.8 Trustworthiness in Qualitative Research

Trustworthiness is one of the standard criteria which allows qualitative researchers or readers to evaluate the quality of qualitative research. Lincoln and Guba (1985, p. 219) refer to four criteria which correspond to the principles employed by positivist researchers, as shown in Table 3.7.

Table 3.7: Criteria of Guba’s trustworthiness concept in a qualitative approach, mapped with quantitative research (Source: Adapted from Cohen, Manion & Morrison, 2011; Lincoln & Guba, 1985)

Qualitative approach	Quantitative approach
Credibility/ truth value	Internal validity
Transferability/ applicability	External validity
Dependability/ replicability/ consistency	Reliability
Confirmability/ not biased/ neutrality	Objectivity

3.8.1 Credibility

One of the salient criterion for ensuring quality in constructivist qualitative research is explained by Costantino (2008, p. 117) who “...sought to determine the credibility—not validity—of knowledge warrants...A knowledge warrant may be deemed as credible if there is consensus among informed and qualified persons. A constructivist inquiry is successful if it presents increasing understanding of its phenomenon.” This point is also supported by Lincoln and Guba who state that “credibility” is central for establishing trustworthiness in qualitative research (Lincoln & Guba, 1985). In addition, Given and Saumure (2008, p. 895) state that “...a credible study is one where the researchers have accurately and richly described the phenomenon in question....making sure that they have accurately represented the data” (Given & Saumure, 2008, p. 895). Moreover, credibility is defined by Jensen “...as the methodological procedures and sources used to establish a high level of harmony between the participants’ expressions and the researcher’s interpretations of them” (Jensen, 2008, p. 138). In others word, it is mainly concerned with the credibility of collected data and analysed data, as well as the presentation of findings to a research question.

So as to deal with “how congruent the findings are with reality?” (Merriam, 1998, p. 201), the following section attempts to address three questions, which in turn mitigate the threat to the credibility of the key elements of research processes, for any qualitative researcher to consider in relation to credibility as follows:

- 1) Were the appropriate participants selected for the topic?
- 2) Was the appropriate data collection methodology used?
- 3) Were participant responses open, complete and truthful?

(Jensen, 2008, p. 138)

Regarding point one, the aim of the present study is to understand a rich picture of the selection of intermodal freight transport within the Thai rubber industry sector. The number of participants who play a crucial role in making decisions on freight transport mode choices in Thai rubber companies were selected as a sampling frame, and the more details about the selection of research participants can be seen in the Section 3.6.1.2. Therefore, this study draws different perspectives from experienced managers within the Thai rubber sector. In addition, the collection of data from different sites gave rise to a wide range of perspectives. Finally, a rich picture of viewpoints of those participating in this study can be constructed based upon the commonality of the range of managers' points of view. The use of participants across 21 Thai rubber companies enables me to verify the viewpoints and experiences of these participants against each other.

With regard to point two, the data gathering methods employed in this current study were a survey instrument, in-depth interviews and public/company documents. *"Triangulation via the use of different methods"* increases the level of credibility, because it helps in terms of cross-checking the data. Moreover, the survey instrument is composed of open and closed types of questions; therefore, it gives freedom to the respondents when providing answers. Focus groups were not included in this study because of the awareness of friend enemies/frenemies. It would decrease the credibility of the study if participants did not provide truthful information when other companies are involved in the study. In other words, participants who work for small-scale organisations may not be confident to express their thoughts in the presence of larger-scale organisations. Therefore, this study deems the use of individual interviews as an appropriate method.

As for point three, each participant was asked to validate the data. Transcripts were returned to the participants asking them to check whether the data represented their actual intended viewpoints or not, and if any point was invalid or had been misunderstood, any amendments or deletions to the transcripts were appreciated. The details of feedback mentioned in the previous section showed that all the participants requested that no changes be made. In qualitative research, using respondent validation is considered as essential before moving on to data analysis, and it leads to more confidence in the accuracy of the data for both the researcher

and the readers. It may be claimed that this study gained credibility, as issues of confidentiality and accuracy were addressed during the data acquisition stage, before moving onto the data processing analysis and interpretation stages. To ensure quality, an iterative questioning process was followed which included confirmatory questioning during the interview, summary at the end of the interview and follow-up questioning after the interview. Additionally, two techniques, *“prolonged engagement between the investigator and the participants”* (Shenton, 2004, p. 65) and the signing of consent forms, were used to make sure the participants were open and honest when giving their responses. This is because the more participants feel confident and relaxed to express their thoughts without fear of any consequences, the more open and honest they will be. It is a duty of any qualitative researcher to inform the participants of their rights, so as to make them confident enough to provide the truth. Following all the above procedures ensures this research’s credibility.

3.8.2 Transferability

Transferability (corresponding to external validity) is mainly concerned with *“the need to be aware of and to describe the scope of one’s qualitative study so that its applicability to different contexts (broad or narrow) can be readily discerned”* (Given & Saumure, 2008, p. 895). In this regard, this principle refers to the extent to which the findings of this study can be generalised to other settings or business sectors. As this research is qualitative, it does not generalise its findings because the quality of interpretation external researches might differ. The purpose of research based on case studies is to make it valid within the case study with a detailed account of a studied phenomenon (Stake, 2005). Accordingly, Costantino (2008, p. 118) argues that *“...it is up to readers to transfer this understanding to other contexts and assess the similarity.”* This provides an option for readers to make a decision on whether the findings can be transferred to another setting, the scope of the present study provides clear details of the small sample provided. In other words, the likelihood of transferability of the present research depends upon how the context setting is different. This consideration can be judged by users based upon the level of differences in terms of the context setting that the researcher provided in the form of thick descriptions of this study. For example, as this study focuses on shippers’ perspectives in the selection of intermodal freight transport in the Southern Thai rubber sector, some points of the findings might be applied to other rubber sectors, such as in the North of Thailand, if the region is comparable in terms of context settings. They could even be applied to other developing countries in South East Asia, if the details of the context are considered similar enough to the present study.

In addition, the position of constructivism by Costantino (2008, p. 118) “...rejects the idea that there is objective knowledge in some external reality for the researcher to retrieve mechanistically. Instead, the researcher’s values and dispositions influence the knowledge that is constructed through interaction with the phenomenon and participants in the inquiry.” This idea is consistent with the present study, which does not seek to generalise.

3.8.3 Dependability

Dependability is defined as the degree of accuracy in the findings when “...reproducible if they can be replicated exactly when using the same context and procedure” (Given & Saumure, 2008, p. 895). Generally, the terms “dependability,” “replicability” and “consistency” in qualitative research are in accordance with reliability (Cohen *et al.*, 2011; Lincoln & Guba, 1985). However, the notion of validity is more important than reliability in both quantitative and qualitative research. According to Morse and Richards (2002, p. 168), “reliability requires that the same results would be obtained if the study were replicated.” Replication is still a challenging task in qualitative research; however, this research was made as reliable as possible. For example, interview schedules (a list of question asked) were employed as an interview protocol for conducting interviews. Although, in practice it was impossible to ask the questions in the same order for each interview, since the interview technique used was that of a semi-structured interview. Every attempt was made the procedure of data collection as reliable as possible by using both the interview schedule and by attempting to cover all the research topics and questions which had been prepared. Moreover, all participants were interviewed by the researcher; so the data gathering procedure remained relatively the same. There is no doubt that in qualitative research, reliability is questioned by positivist researchers. Accordingly, Shenton (2004, p. 73) recommends the use of “overlapping methods” and “in-depth methodological description” by qualitative researchers, as these two strategies allow other researchers to repeat this study if they wish. In this regard, an explicit account of research methodologies and methods, as well as philosophical perspectives, has been made available (see Research Design Framework Section). It can therefore be argued that this present study is highly transparent and relevant in terms of the research process and design, which in turn increases the dependability of the study.

3.8.4 Confirmability

Lastly, confirmability “...reflects the need to ensure that the interpretations and findings match the data...no claims are made that cannot be supported by the data” (Given & Saumure, 2008, p. 895). It is a fact that in qualitative research it is very easy to be biased, as researchers may fall into the trap of taking a subjective rather than an objective view when interpreting information. Researchers need to be aware of this concern; therefore, the best possible attempt was throughout the process to make this study as natural as possible. Confirmability of this study can be addressed by two procedures —the use of template analysis and the presentation of excerpts from the raw data (together with illustrations by researchers in the results section) — which were intended to be used to avoid bias in this study. Firstly, the use of template analysis helps to ensure an unbiased approach. Waring and Wainwright (2008) argue that one of the advantages of this analysis technique is that it reduces the problem of bias in the process of data coding. The principle of data coding allows researchers to find large piece of texts related to the purpose and objective of their study. In this regard, the function of “*a priori codes*” and “*initial templates*” are part of the data coding procedure, and the use of developed codes as a potential template for undertaking data coding is an on-going step. This function will give this study some degree of protection against bias towards interpretations and findings. Secondly, the way of reporting results was supported with excerpts from the raw data (participants’ quotations), which typically act as clear evidence, along with explanations by researchers. This enables users, readers and experienced researchers to recognise the confirmability of this study.

3.9 Limitations of the study

This research intends to develop a better understanding of the particular issues relating to freight transport mode choice in the Thai rubber sector, rather than providing a complete solution to them. This is due to the finite amount of time available, the word limits and the finite set of resource available to this researcher. Therefore, some limitations in terms of the selected methodology and methods used exists. These are as follows:

Firstly, as this research employed purposive and snowball sampling from different companies, one of the methodological limitations of this study is the range of participants, in that they may not come from the same management positions, such as logistics managers or shipping managers in the companies involved. This is

because of the variation in the structure of companies. As a result, the research participants recruited in this study comprises of shipping managers, managing directors or whoever else deals with transport or logistics within rubber processing companies. However, this is not going to undermine the value of this research in that this is in line with the aims of this research which demand different perspectives from the ones who are experienced in freight transport mode selection in the Thai rubber sector.

Secondly, due to the limited time available to conduct this research, the research aim is only to build a conceptual model that enhances our understanding of freight transport mode choice based on shippers in the Thai rubber sector in the south of Thailand. However, the research results did not empirically test the proposed conceptual model in order to claim generalisability. According the outcomes of the literature, there is an absence of appropriate models. As a consequence, this research was seeking to provide one. Therefore, this study does not have ability to test the proposed model as this is not the intention of the study.

3.10 Summary

The purpose of this chapter was to describe and discuss the rationale behind underpinning interpretive research and sectoral case study approach adopted within study. Multi methods were used in this investigation to comprehensively understand how managers make decisions on their choice of intermodal freight transport in the case study of the Thai rubber sector. The study was divided into two phases. The purpose of Phase I was to provide a contextual background of the case under investigation by using a survey based questionnaire as the main instrument for data collection. Phase II was put in place to develop an undefined conceptual understanding of how decisions are made regard the choice of intermodal freight transport, by means of semi-structured interviews. These were used to achieve detail insight into participants' perspectives, and to gain an understanding of the complexity of the decision-making situation. To ensure the quality of the research, ethical considerations and trustworthiness in qualitative research were discussed. Finally, Section 3.9 provided the limitations of this study. In the next chapter, the findings of Phase I will be presented, with the findings of Phase II in Chapter Five.

Chapter 4: Findings I – Current freight transport practice: the shippers' perspectives

4.1 Introduction

This chapter provides an overview of the freight transport movement in the South Thai rubber industry, therefore providing background knowledge of the context of the study as a case to substantially investigate in great depth. The paper-based questionnaire survey was sent by post to all rubber-export companies located within the defined boundary for this current study. The chapter begins in earnest in Section 4.2 with demographic profiles of the surveyed respondents, who play a crucial role in making decisions in the selection of intermodal freight transport, and then goes on to company profiles. Following this is the presentation of the survey research findings in Section 4.3, which describes information about the current practice of intermodal freight transport within the Thai rubber sector. This is then followed by managers' viewpoints on the factors which seem to feed into the selection of logistics pathways. The final section (4.4) will end the chapter with a summary of the possible alternatives that are either currently performed or that might be performed for freight transportation in case of the Thai rubber industry. This exploratory phase of research, Phase I, provides an overview of the sector and contributes useful context to the following in-depth study (Chapter Five).

4.2 Demographic profile of the surveyed respondents

This section presents the summary of the demographic profile of the 50 surveyed respondents who contributed to this study, in terms of individual characteristics and detailed profiles of the companies that employ them. Details of the quantitative data presented in the form of a bar graph, a pie chart, and cross tabulation are depicted in Appendix P. Participant and organisation profiles can be summarised as follows:

- The majority of the respondents - 39 out of 50 - have been working in the rubber industry for more than eight years, and thirty respondents have experienced work in other firms over the recent period (during the last eight years). Only a relatively small number of respondents (3) have less than four years' work experience in the rubber industry.
- The role of respondents is varied, including export managers, managing directors, marketing managers, general managers, executive director, shipping

executive, shipping officer, factory manager, export officer and shipping and marketing staff.

- The survey responses indicated that the majority of survey participants are employed in small to medium sized companies, while only approximately 9 out of 50 respondents (18%) are considered to work for large scale organisations.
- Only a small number of respondents (7%) indicated that their companies exported in excess of one thousand twenty-foot equivalent units (TEUs) a month. Another 7% recorded that their companies trade a number falling between 501-1000 TEUs each month. In contrast, over three quarters (87%) of the respondents indicated that less than 200 TEUs are distributed per month by their company, consistent, arguably with the small- to medium-sized status of these organisations.
- The survey results indicated that the majority of companies are situated in Songkhla (56%), while the other three provinces, Nakhon Si Thammarat, Surat Thani and Trang, were home to 18%, 16% and 10% of the companies respectively.
- When the respondents were asked about the port of destination in terms of the main place to which those surveyed export natural rubber products to, just under fifty percent of the participants (46%) trade with China, followed by Malaysia, Japan, and 'other', comprising 30%, 16% and 8% of survey respondents respectively.

From research Phase I of the survey questionnaires, 12 out of 50 survey respondents expressed a desire to take part in this study. A profile set of the interview participants who took part in the research Phase 2 are previously provided in Table 3.5 of the methodology chapter.

4.3 Survey findings

In this section the survey research findings are divided into three main sub-sections. Firstly, Section 4.3.1 describes information about the current practice of freight transport movement within the rubber industry sector. Secondly, the sequence of decision making among three main elements of intermodal freight transport will be discussed in Section 4.3.2. Thirdly, this is followed with managers' viewpoints on the factors that most influence the selection of transport pathways (see Section 4.3.3).

4.3.1 The current practice for freight transport in rubber industry

The summary of the responses of those surveyed to the question about ‘the number of people involved in selecting freight transport modes’, are presented in Figure 4.1. It can be clearly seen that approximately two-thirds of the respondents (68%) stated that there are only a few number of people (2-3) involved in the decision on choice of transport mode. Only a relatively small number of respondents (2%) indicated that more than six people contribute to these decisions. Other responses to this question reported a single person (16%) and 4-5 people (14%).

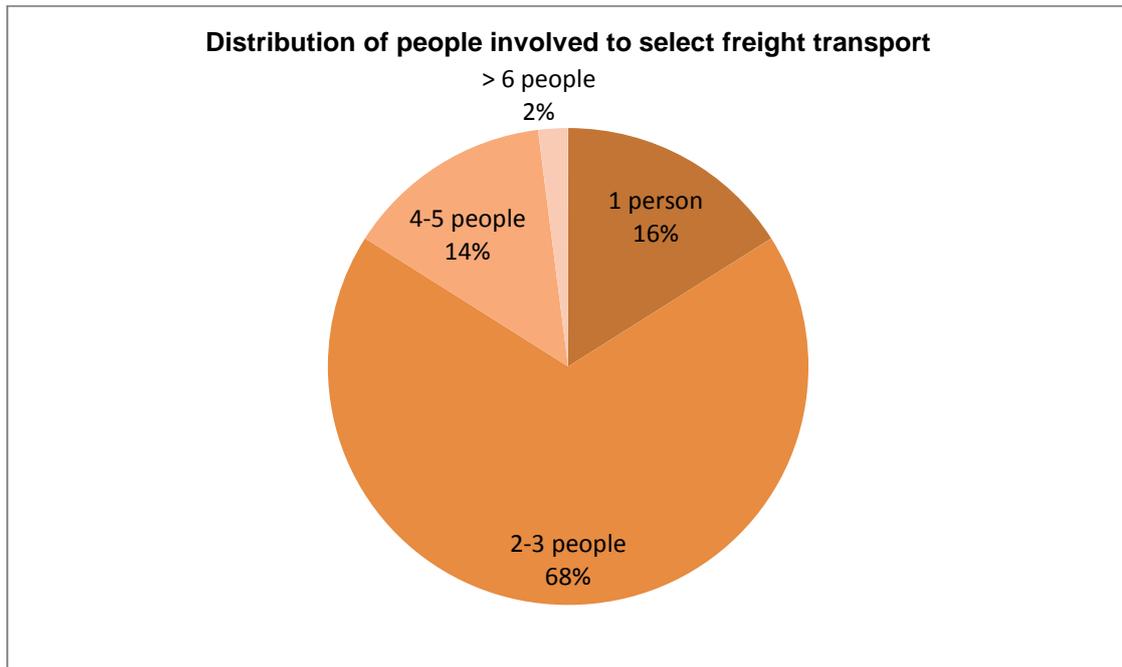


Figure 4.1: Number of people involved in selecting freight transport modes.

The bar chart below (Figure 4.2) shows the breakdown of transport modes (e.g. road, railways or sea/water transport) most commonly chosen for inland transport as a part of intermodal transport. When the participants were asked about the predominant transport modes currently used for the transport of the rubber goods from the shippers’ factory to the port of shipment, the majority of those surveyed (70%) indicated that transport is mostly by road, while 14% deliver by rail and inland waterways. Only two percent (one respondent) indicated that his company use all three means of transport equally.

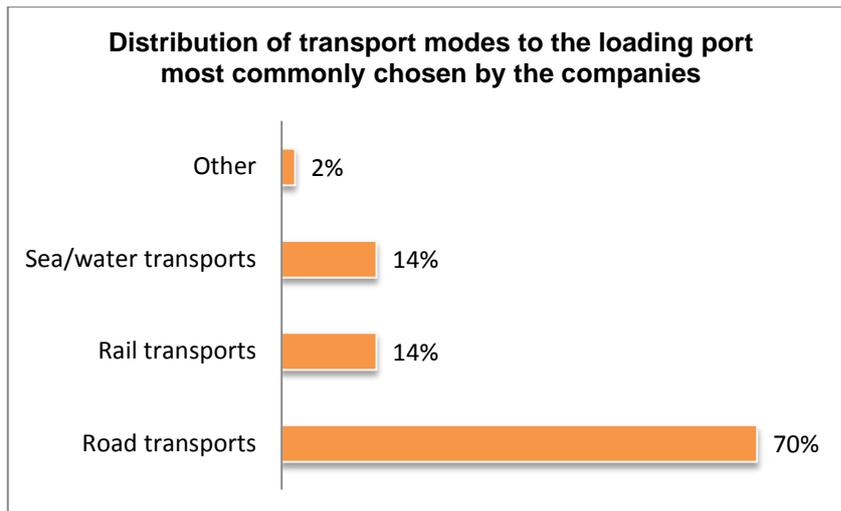
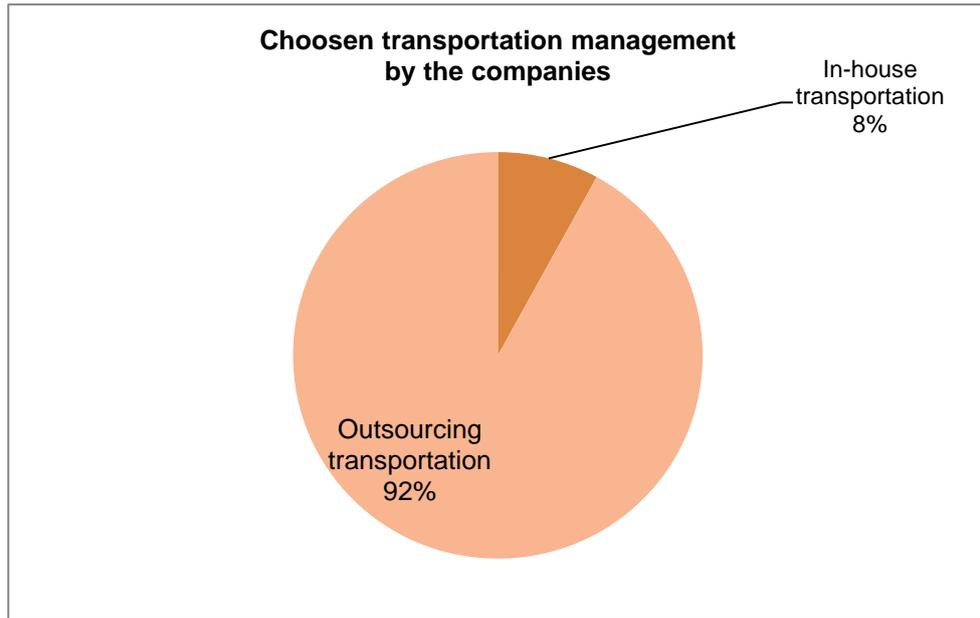


Figure 4.2: The most common transport modes used for transit of the goods from the company location to the loading port.

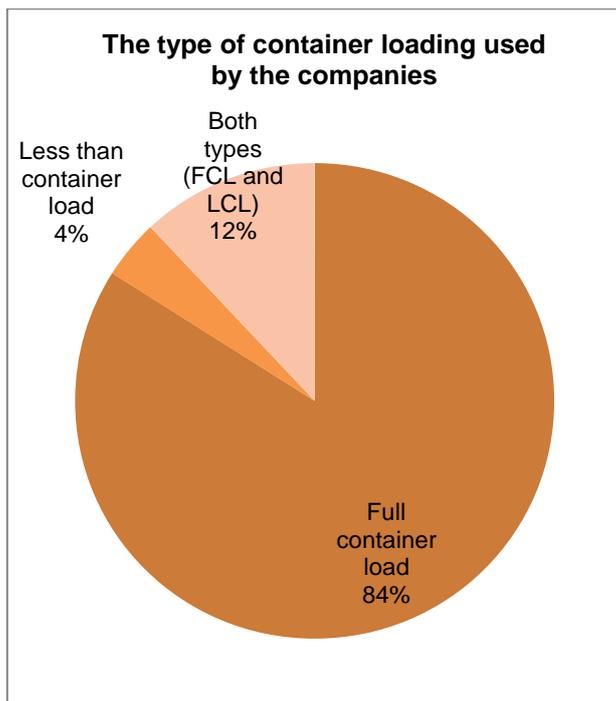
In response to the question about the ‘*chosen method of transportation management by the companies (either in-house or outsourcing transportation) mostly used in their organisation*’, the descriptive analysis results are present in Figure 4.3(a). 92% of the respondents who took part in the survey indicated that outsourcing transportation is generally used for outbound transportation. Only a small number (8%) of respondents reported that their company uses their own transport vehicles (in-house transportation).

Figure 4.3(b) shows the results of the question asked about the main type of container loading – full container load (FCL), less than container load (LCL), or both types – are normally used by the companies. 84% of those surveyed indicated that FCL is normally used for loading rubber products into containers, while just 12% used both types of container loading to accommodate cargo, with only four percent loading cargo into a container using the LCL type, which means this cargo needs to be placed into the same container with material placed by other shippers.

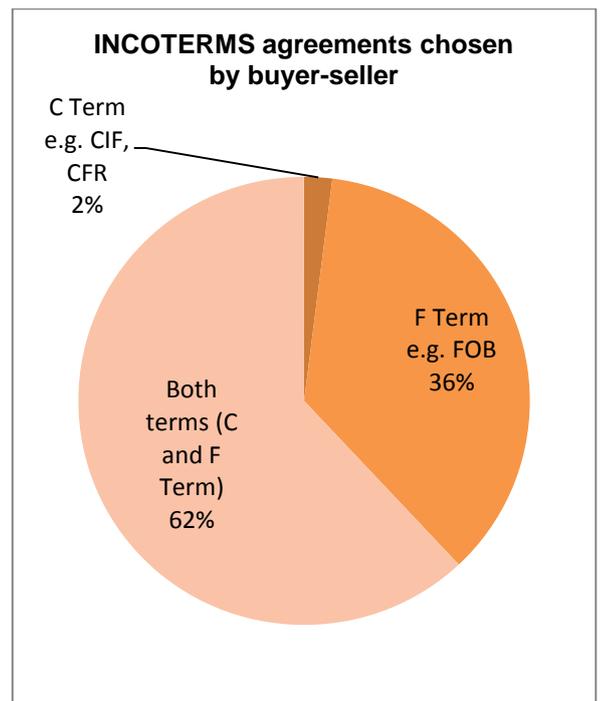
In response to common trade terms normally used by customers in the shipping industry, approximately sixty per cent (62%) use a combination of FOB (Free on board—named port of shipment), CIF (cost, insurance and freight—named port of destination) and CFR (cost and freight—named port of destination). Just over one-third (36%) of those who answered this question reported that they sell in the condition of FOB only, while just a relatively small number of those surveyed (2%) trade in CIF or CFR terms. The summary of the detailed results of this question can be found in the pie chart shown in Figure 4.3(c).



(a)



(b)



(c)

Figure 4.3(a): The type of transportation management used for the transit of the goods from the companies to ports of loading; **(b):** The type of container loading used by the companies; and **(c):** INCOTERMS used in buyer-seller agreement.

The last question of this section explores the current port of shipment used as the logistics gateway for export goods in the rubber industry. In the detailed results depicted in Figure 4.4, Padang Besar Custom House (PBC) is the most predominant gateway used, at 27%, followed closely by Sadaul Custom House at 21%. This is perhaps answering because these two custom houses are situated close to Song Khla province, where most of the companies surveyed are located. Laem Chabang Port (LCB) is the third ranked, with almost one-fifth (17%) of the respondents indicating that this is the favourite port of shipment for their company, followed by Bangkok Port (BKK) at 14%. It is worth noting that the majority of those surveyed who selected these two ports as logistics gateways seem to be located in the upper south of Thailand. This is probably because these ports are located too far from shipper's factories positioned in the lower south of Thailand. Only a small number of respondents (6%) choose Kantang Port as the main gateway for exporting their cargo. It is worth noting that the containers exported via this port mostly transfer to a mother vessel at Port of Penang in Malaysia. The remaining respondents who indicated 'other gateway' (Phuket Port, for example), represented only a small percentage (2% of the total participants).

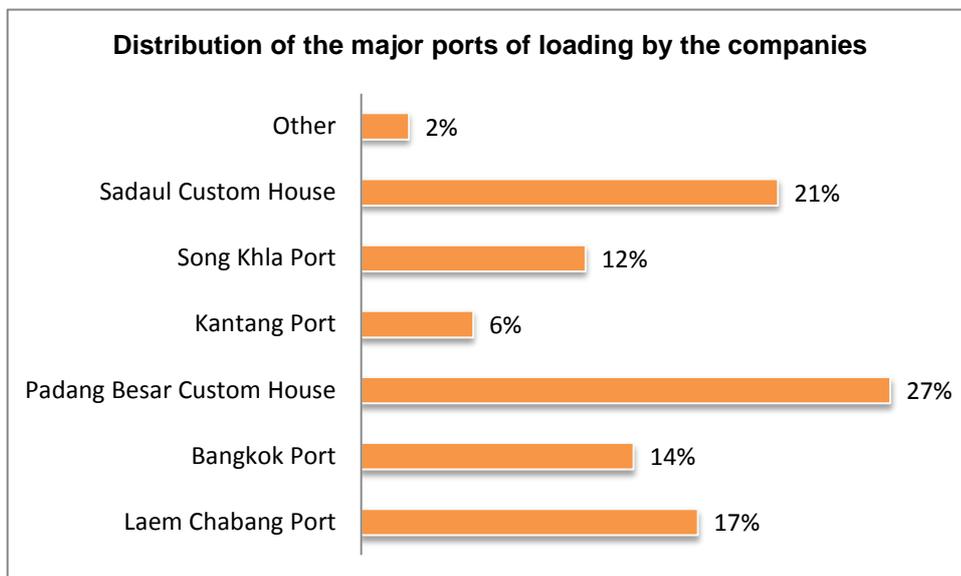


Figure 4.4: The major ports of loading or custom houses used as export gateways.

4.3.2 The sequence of decision making among three elements of freight transportation

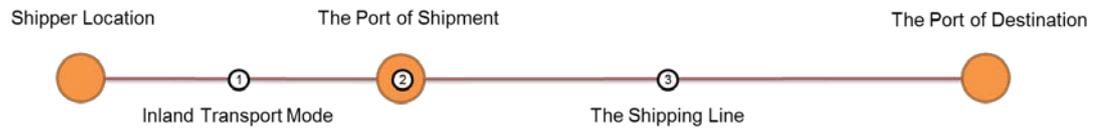


Figure 4.5: The three main elements along the whole rubber transportation chain.

As shown in Figure 4.5, this section will clarify which among the three main elements related to the selection of freight transport movements is given the first, second and third priority in selecting logistics pathways along the whole chain. It will also show whether there is any interrelationship among them, and if so, how it affects the decision. In order to investigate the mechanics of the transportation decision-making process, including the three main elements of: 1) inland transport modes; 2) ports of shipment; and 3) shipping lines, six statements were presented in dichotomous question of whether the respondents agreed or disagreed with each statement. The detailed results are presented in Tables 4.1 and 4.2.

- **Shipping lines vs. Ports**

Table 4.1: Results of the sequence of decision making on two elements of freight transportation between shipping lines and ports.

STATEMENTS	Agree		Disagree		Result
	N	%	N	%	
1. I decide the shipping line to use first, and after that select the port of loading from those served by the shipping line.	10	20	40	80	Consensus 80 % disagree
2. I choose the loading port first, and after that select the shipping line only from those serving that port.	31	62	19	38	No consensus
3. Neither the items 1 nor 2 because the shipping line and the loading port are considered separately.	18	36	32	64	No consensus

As the results of Table 4.1 show, it was found that 80% of those surveyed disagree with Statement 1, that a shipping line is selected first, and then ports of shipment will be selected from the set of ports that are available due to the service provided by the selected shipping line. However, for Statement 2 only 62% of those surveyed agree that they choose the loading port first. This refers to the method in which the port of shipment is selected first and then the shipping lines will be selected from those

serving that port. This may be because some destination ports are only serviced by certain shipping lines and therefore, the choice of shipping line may be determined by the loading ports - perhaps only one specific shipping line can be used. For this reason, the data shows no consensus on Statement 2. However, most international ports offer a variety of shipping lines services that mostly cover what users' want. So, it would seem that shipping managers give more priority to port of shipment than shipping lines. Nevertheless, shipping lines are considered to be a key factor, consequent to the choice of loading ports.

- **Ports vs. Transport modes**

Table 4.2: Results concerning the sequence of decision making involving two of the main elements of freight transportation including ports and transport modes.

STATEMENTS	Agree		Disagree		Result
	N	%	N	%	
4. I decide the port of loading first, and after that select the transport modes for transit of the goods from the company to that port.	35	70	15	30	Consensus 70 % agree
5. I choose the mode of transport first, and after that select the loading port only from those that can be accessed by that mode.	11	22	39	78	Consensus 78 % disagree
6. Neither item 4 nor 5 because the loading port and the transport mode are considered separately.	14	28	36	72	Consensus 72 % disagree

As can be seen from Table 4.2, responses to these three statements (Statements 4, 5 and 6) show consensus from respondents, in that more than 70% take the same side (agree/disagree) with each statement (70%, 78% and 72% respectively). This means that prior to modes of transport as part of the inland transportation being selected, the port of loading tends to be the primary pinned point or first node.

In conclusion, it may be argued that the ports of shipment are typically decided first, and then the shipping line is selected from among those serving that port. However, if the selected port does not have a matching schedule of shipping lines departing from that port, then the company may change to another. Finally, the transport modes for delivering goods from the company to that port will be considered in terms of how they fit with the schedule available.

4.3.3 Determinant factors influencing the selection of intermodal freight transport regarding inland transport modes and loading ports

The specific objective of this section is to set out to investigate the determinant factors in the selection of freight transportation regarding inland transport modes as part of intermodal transport, and the reasons for natural rubber producers using their preferred loading ports. It was decided that the best form of question type to adopt for this investigation was open questions since this method allows the respondents the freedom to give their viewpoint in response to questions. The emerging themes are summarised and presented as follows:

- **In terms of preferred loading ports**

There are only four favourite international ports mainly used by the Thai rubber business: Penang port (in Malaysia), Songkhla port, LCB port and BKK port. Firstly, Penang port is the most popular port used by rubber exporters located in the south of Thailand. The survey respondents pointed out that the advantages of such a port are clear: cheaper freight rates and a variety of shipping lines. In addition, the rail transport that connects the Padang Besar border and Penang port is another reason for the large number of south Thai cargos exported via Penang port. This port is considered to have a good network of transport infrastructure with railways serving to connect Thai exporters directly to the port. It is a significant factor that has resulted in Penang port becoming one of the most successful ports in the South East Asia region. Therefore, companies located nearby the custom borders are likely to use Penang as the first choice because it is convenient for them. Interestingly, some respondents point out that the total transit time from their company to Penang port is less than operating by exporting via other ports: often by a day. This is another important reason for rubber-export companies choosing Penang port as their favourite loading port instead of BKK port, which sometimes offers lower total costs.

The second and third ranked ports are LCB and BKK ports. A similar number of respondents selected these two ports as their favourite port of loading. However, it was found that the respondents who employ these two ports as main logistics gateways are mostly situated in the upper south of Thailand; hence proximity is the clear rationality for this choice. In response to the question of why they chose BKK port, a significant reason given by respondents was the lower total cost compared to LCB port. Additionally, BKK port benefits from the convenience of loading cargo into a container and ease of accessibility to the port: for example, railways directly connect

to the port. In the case of LCB port, the survey findings suggest that the port is mostly used because it is nominated by customers and also boasts a variety of shipping lines. It may be argued that there was no significant difference in terms of total costs between these two ports.

However, some respondents commented that the cheaper option (BKK port) tends to be considered as the first choice, if customers do not nominate the port of shipment and there is freight space available. It is a fact that almost all shipping lines visiting BKK port are going to visit LCB port a few days later anyway since these two ports are close to each other. In the past, BKK port was the foremost international port of Thailand and there are restrictions on its location since it is located in the capital city, Bangkok. The growth in demand for container freight transportation has resulted in a limit in the capacity of transport services and road congestion near the port. Therefore, LCB port has been promoted and is currently the main port of Thailand instead of BKK. However, those companies located in the south still slightly prefer BKK port to LCB because of the shorter haulage distances from their companies to the port.

Songkhla port ranks fourth out of the four ports considered in this study. In response to Songkhla port, most of those surveyed indicated that proximity to the port is a significant reason for using this port. The majority of rubber companies (56%) are established in Songkhla province; therefore, Songkhla port is the closest international port among in Thailand. A strength point of Songkhla port is clearly seen in its location, in that it is situated near the hub of the rubber industry. Additionally, some respondents point out that the high accuracy of transit time when using of this port, can in turn be a benefit, easing transportation management. Interestingly, one respondent reported that his company is the biggest user of Songkhla port; therefore, he is empowered to acquire a greater level of convenient service. In other words, the huge volume which is supplied to third-party transportation providers results in high levels of willingness provide a quality service. However, there is no doubt that some of the surveyed respondents use Songkhla for the reason that its costs are less than those of other ports. Although many local entrepreneurs prefer to use the port of Songkhla, the volume of rubber exports through this port is still not large.

Nonetheless, a few respondents did not indicate any favourite port, providing the reason that there are no significant differences between those four ports because they all are measured as international ports, which have common ability in performance standards. Interestingly, the biggest concern of respondents that

emerged from the data is that it is necessary for ports to have adequate service regarding the number of available containers. The balance of quantity of containers in and out at the port is another concern, and, in turn, the impact this has on freight rates. In other words, the important factors are the number of containers standing by at the port and freight rates. In addition, one respondent commented that another decisive factor in the selection of a port depends is the subsequent port of destination. This is because this factor determines the total transport distance from the port of shipment to the port of destination and the shortest one tends to be picked as the first choice.

In response to the attempt to identify the most important factors pertaining to inland transport mode selection for the delivery of natural rubber products, these appear to be varied. The majority of those who responded to this item indicated that security in term of loss or damage to products, on-time delivery, and transport costs are predominantly mentioned as the three most important factors that impact on the choice of inland transport modes. Additionally, various factors are also identified, and the final results of the analysis are summarised in Table 4.3.

Table 4.3: The important factors influencing inland transport mode selection.

The important factors that contribute to inland transport mode selection

- **Cost:** over half of those surveyed reported that total cost (i.e. price per unit) is considered as one of the most important criteria with regard to influencing transport mode choice. In response to the growing competitiveness in the commodity sector due to low margins in terms of business profit, reviewing the cost structure - especially logistics management - can be used to reduce the total cost and maintain competitive advantage in the market;
- **Prompt and reliable delivery services:** the majority of those who responded to this question indicated that reliable transit times and security of cargoes have a significant impact on the choice of transport mode;
- **Packaging of rubber:** The ease of handling and the possibility of damage to rubber products were found to be important considerations for shipping managers. It seems possible that these results are due to the fact that rubber packaging appears to be vary, depending on the type of rubber involved (i.e. RSS, STR and concentrated latex). Therefore, the product packing criterion is an important factor when considering transport modes in terms of exporting rubber products;

Table 4.3: The important factors influencing inland transport mode selection.
(continued)

The important factors that contribute to inland transport mode selection

- **INCOTERMS:** of those surveyed, some respondents indicated that INCOTERMS are considered as important constraints which, in turn, impact on the number of transport options available to them;
- **Total haulage distances:** over half of those surveyed pointed out that total distance from the shipper's location to the custom border/loading port, has a significant impact on how decisions are made in terms of the choice of transport modes by transport users;
- **The number of alternative choices:** some small companies reported that limited options are available in terms of delivery or else, in the case of larger companies, more than one option is available for delivery;
- **The condition of weight capability:** road transport has a low volume per shipment compared with rail or inland waterways that can deliver higher volumes per shipment;
- **Geographical location (i.e. the total haulage distance between the shipper's location and the customer's location):** rubber products typically are transported by truck or tanker truck for locations in neighbouring countries, such as Malaysia;
- **Image of transport providers:** responsibility of the transport carrier, faithfulness of the staff (drivers), managerial capacity (i.e. the ability of transport carriers to manage the situation when faced with problems);
- **Quality of transport vehicle:** some of the respondents reported that lorry quality may lead to damaged products, particularly when the rubber is transported in the rain;
- **The characteristics of the transport mode:** over half of those surveyed commented on the advantages of road transport, e.g. speed, ease of loading cargoes at one time without transferring to other modes of transport, and the fact that lorry service cover all areas as well as offer door-to-door service;
- **Service delivery performance criteria:** some respondents pointed out that the received value of service performance meets the required specification of their companies by considering the amount of money spent on these service, and also the fact that such companies can meet the customer's expectations.

The favourite modes likely to be used for transport as a part of the inland transport mode from point A (a shipper location) to point B (a port of shipment), is presented in Figure 4.6.



Figure 4.6: Inland transport modes' usage as a part of intermodal transport.

Most of those surveyed indicated that road is the predominant mode of transport used, followed by rail and inland waterways at a similar volume. In this context, the responses 'railways' or 'inland waterways' simply imply that those respondents utilise a combination of roads and railways or roads and inland waterways for carrying cargoes, using roads for a certain period at the beginning of the journey. In other words, they are likely to use roads for a short distance, after which they transfer to another means of transport, either railways or inland waterways, for delivering cargoes to the port of shipment. However, the response 'road' possibly refers to the use of a single mode (as Option 1 presents in Figure 4.6), until transfer is made to another mode of transport, for instance the sea at the port of shipment for the main leg of transport. This means that the whole journey of products can be one of being carried by truck or trailer for a long distance from a shipper factory to a port of shipment. This is mainly the case with the firms that have their own transportation subsidiary as part of the rubber-export business. This is in contrast with other firms, which use road transport for only short distances and are mostly rubber exporters that employ outsourcing for transportation activities. Furthermore, in the case of railway and inland waterways, it is necessary that manufacturing locations should be situated nearby railways and inland ports. For this reason, some locations may be more appropriate for the use of a particular transport mode more than others.

Other responses were given to the open questions about possible reasons influencing the selection of inland transport modes used; the summary for those responses is presented in Table 4.4. As can be seen from the table, no single factor has ultimate impact on a decision. It is undeniable that there are many factors which contribute to the selection of inland transport modes and those reasons are different according to business size, existing transport facilities, plants' locations and the experience of the decision makers. For instance, the selection of transport modes depends on the

nature of the product in terms of its vulnerability to damage. In the case of products which need care during transit, it is better that empty containers should be dragged by train to enable loading into a container at the shipper's plants. On the other hand, for the one that less vulnerable, transportation is possible using trucks or trailers for delivering rubber products to be loaded into a container at a port.

Table 4.4: The possible reasons influencing the selection of inland freight transportation (Road, Rail, or Sea/Inland waterways).

Road is the favourite transport mode because	Rail is the favourite transport mode because	Sea/ inland waterways is the favourite transport mode because
<ul style="list-style-type: none"> • The company has their own road-haulier as a subsidiary of their rubber-export business. • In case of a prompt shipment, it is important to use a option that fast, highly flexible, and relatively on time. • The use of roads is only for short distances (drag empty containers to load at shippers' factory and return fully-loaded containers to transport by another mode e.g. railways or inland waterways). • Time in travelling can be quite accurate (transit time reliability). • Rubber products are filled at once with no more double handling need; therefore, product is not bruised and damaged or lost during unloading. • Road transport has the function of tracking shipments in real time. • It can reduce the risk of missed shipments. • Prefer railways, but no wish to use them for actual transportation because of an awareness of the non-punctuality of train services. • Bad experiences with the use of rail transportation that occasionally cause shipment delay, which in turn impact other work. 	<ul style="list-style-type: none"> • Rail is considered safe and cost is not high. • The lower cost compared to other transport modes. • Freight rates in Malaysia are cheaper than those in Thailand; as a result, the combination of road and rail is preferred for transporting rubber products to Penang port. • Container Yards have excellent service. • It is the mode that connects with the chosen port. • If the nature of products is that they must be carefully handled in order to avoid being damaged, then the condition of the products' packaging is most appropriate for the railways. • Convenience and confidence in product safety. • Energy efficient. • Although there are restrictions on opening times in the period of holiday season and serious jams at Padang-Besar checkpoint, it's cheap. 	<ul style="list-style-type: none"> • It is convenient, safe, and affordable. • It is able to transport a big delivery. • Safety is considered good. • Some manufacturing locations make the use of inland ports easy because of proximity to the port. • The most convenient transport mode compared to other feasible options in terms of service from transport providers. • Energy efficient, and can be used for sending bulk quantity • Lower prices but more slow than others transport modes; if there is good preparation in advance, there is no problem about longer transit time.

4.4 The alternative intermodal freight transport choices

This section summarises various alternatives intermodal freight transport methods that are currently employed by the Southern Thai rubber-export industry. Table 4.5 presents a summary of the possible alternatives to the logistics pathways usually performed by the rubber business. This current study concentrates on four main provinces, namely Surat Thani, Nakhon Si Thammarat, Trang and Songkhla; therefore, the data provides only the practicality of routes currently employed. Table 4.5 shows the manufacturing locations which are the origin of the various journeys to the uncertainty customers. It is worth mentioning that not all plants located in the same province are capable of using all the options marked (✓) in Table 4.5; transport usage needs to be considered alongside other conditions/circumstances such as business size, the past experiences of managers relating to certain options, the resources available adjacent to the shipper's factories and so on.

Table 4.5: Rubber export routes to international consumers.

Alternatives	Manufacturing location (Origin)			
	Surat-Thani	Nakhon-Si Thammarat	Trang	Songkhla
Road → LCB port	✓	✓		
Road → Railway → LCB port	✓	✓	✓	
Road → Feeder Vessel (at Surat port) → LCB port	✓	✓		
Road → BKK port	✓	✓		
Road → Railway → BKK port	✓	✓	✓	
Road → Phuket port	✓	✓		
Road → Songkhla port			✓	✓
Road → Barge (at Kantang port) → Penang port		✓	✓	
Road → Railway (at Padang Besar Custom House) → Penang port	✓	✓	✓	✓
Road → Road (at Sadao border) → Penang port		✓	✓	✓

In order to better understand the complexity of the selection of freight transport pathways within the context of the Thai rubber industry, semi-structured interviews were conducted in research phase II and the results from this will be presented, in themes along with excerpts from the interview transcripts, in the next chapter.

4.5 Summary

The exploratory survey has provided a clear insight into the current intermodal freight transport situation within the specific context of the Thai rubber industry. However, the limited survey method was unable to offer a better understanding of the way that shipping managers select one option among available alternatives, as this was not the intention of this survey.

According to the demographic profile of the surveyed respondents presented in section 4.2 and Appendix P, the research phase II intended to recruit research participants from the different subgroups such as manufacturing locations, business size and product types, but not to consider them in terms of their positions in management. Because of the variations in organisational structure from one company to another, this research is not limited in terms of one position within a company. However, the study requires senior managers who have knowledge and experience. As a consequence, the job title of the participants can be shipping managers, managing directors or whoever else deals with transport or logistics within rubber processing organisations. However, the most important criterion for selecting participants is that they must have knowledge and experience of the areas covered by the interview guide.

In summary, this research targets participants who have knowledge and experience in the selection of freight transport in the rubber export industry, located in four main provinces: Surat Thani, Nakhon Si Thammarat, Trang and Songkhla. The participants are employed in small, medium and large businesses, as well as covering three main rubber export product types. Finally, the data collection in research Phase I involved the recruitment of 12 participants who were willing to take part in the subsequent research Phase II. The profile of the 12 participants is depicted in Table 3.5: Details of the interview participants are provided in the methodology chapter.

In section 4.3.1, which is an investigation of real current practice in terms of freight transportation in the rubber industry, it can be seen that there is an increasing trend towards the usage of outsourced transportation within the rubber sector, and the huge volume of road usage. The majority of rubber exporters are of medium size, while the proportion of public companies and larger-scale organisations in the rubber industry is approximately only one-fifth. With regard to the decision-making process mechanism reported in section 4.3.2, it is clear that, prior to selecting the shipping line, the port of shipment tends to be picked first. Subsequently, inland transport options are then

selected for delivering goods from the shipper's location to the port. Section 4.3.3 (shown previously) presents a summary of the factors which seem to influence the selection of inland transport modes in terms of intermodal transport and loading ports, as well as the favourite options. Lastly, the existing rubber freight routes were investigated and shown in the last section (Section 4.4) of this chapter.

As regards the determinants of the selection of logistics pathways, these are certainly not within the individualistic dimension, and are not restricted to, say, only cost or service factors, which alone cannot adequately explain a situation which is recognisably complicated and complex. Therefore, a further research stage was introduced by using semi-structured interviews to obtain a much greater insight into this complexity using the viewpoints of experienced managers (e.g. senior managers or managing directors) in the industry. Both private and public rubber companies are important for investigating the details of the factors influencing the selection of intermodal freight transport in the specific context of rubber exporters. The detailed results of this in-depth data will be presented in the following chapter.

Chapter 5: Findings II – Factors influencing selection of intermodal freight transport

5.1 Introduction

Prior to presenting the research findings of this research, some points need to be clarified in this section.

Firstly, regarding participants' background, interviews were conducted with employees of Thai rubber enterprises who have knowledge and experience in the selection of freight transport in the rubber export industry, located in four main provinces: Surat Thani, Nakhon Si Thammarat, Trang and Songkhla (see Chapter 3; Section 3.6.1.2 for details). The majority of the respondents were male ($n = 16$). Approximately half the sample (47%) had graduated with a Master's degree, 43% had a Bachelor degree and the other 10% were educated at Vocational Certificate level. Sixteen of the 21 respondents had more than ten years of experience in freight transport management working for Thai natural rubber processing companies, while the remaining respondents had at least three years of relevant experience. At the end of the chapter, there is a summary of the main factors influencing the choice of transport modes.

Secondly, as this study interviews one manager from each company, the participants, with their individual offerings, views and expertise, may not represent the views of the organisation that they work for. The managers reflected on their experiences, mainly from an individual perspective, rather than being specific to a particular firm. The in-depth understanding of real-life management practice reflected by individual managers via the semi-structured method is considered valuable to the specific context of the rubber sector. If the study intends to present an organisational view, it requires a number of participants within the same company at any one time. However, as this research was conducted in the context of SMEs, particularly in agricultural markets in a developing country, the decisions made on freight transport mode choice tend to depend on individual perspectives rather than on interactions within the organisation. In summary, the expectation of this study was clearly from an individual perspective, whereby the points of view of a number of managers will be analysed, rather than based on organisational views.

This is also in line with the aim of this research that is seeking to draw the broad picture of freight transport mode selection for the rubber sector as a whole, instead of

a particular or a group of rubber exporter(s). The purpose of the research is to develop an understanding of the drivers of individual manager's behaviour, rather than what drives firm behaviour. The main goal of the current study is to construct a conceptual model which would facilitate a better understanding of the determining factors behind the choice of freight transportation within the wider sectoral landscape, in the form of the Thai rubber sector. As a consequence, individual views from experienced decision makers with regard to such decisions were selected for investigation for this study. As a result, the study is able to provide meaning by an investigation of the situation in breadth, but still providing enough depth.

Finally, when reporting qualitative results, some extracts from the recorded conversations with 21 research participants are available in Appendix Q, as indicated in the text labelled "QTE5.X_YY"⁵. Because of the restricted word limit, therefore, only some quotations can be depicted in the findings chapter. However, it could be very worthwhile for readers, who would like to get a clear picture based on real life practice, to read the rest of the quotations in the Appendix.

In the next section, the findings from the second stage of the primary research cover five key areas; environmental characteristics, organisational characteristics, customer (rubber buyer) characteristics, individual decision managers in the natural rubber industry and operational factors (image - carrier or haulier selection, delivery operations, ease of access, and costs). The findings are presented in sequence in this chapter and are based on the substantial primary research of the study that involved 21 in-depth interviews with managers from the sector. The subsequent research findings presented in this chapter were derived from the final template (see Appendix R: Final template) resulting from the data analysis associated with this research.

⁵ QTE5.X_YY refers to Quotation Number YY of Section 5.X in Chapter 5. For example: QTE5.2_01, QTE5.2_02, QTE5.2_03, ..., QTE5.2_YY, QTE5.3_01, QTE5.3_02, QTE5.3_03, ..., QTE5.3_YY, ..., QTE5.6_01, QTE5.6_02, QTE5.6_03, ..., QTE5.6_YY, as can be seen details in Appendix Q.

5.2 Environmental characteristics

The selection of transport mode is mainly driven by the delivery and operational factors such as transit time, safety and cost (see Chapter 4; Table 4.3); however, these factors have to be considered alongside external factors. These factors seem to have an impact upon the revision of a mode of transport. Therefore, it is important to understand external factors which may have a significant impact upon transport operations. For example, an increase in the quality of a delivery service is necessary on some occasions, particularly as a differentiator in terms of economic uncertainty or high price volatility. This is because refusal to collect, contract cancellation or claims for damaged products cause problems for sellers and this quality and reliability in service delivery become crucial. In order to understand how the business environment can impact on the choice of transport mode, two main sub-themes emerged from the interviews, namely situation factors and the scenario of the natural rubber industry trading, will be explained. One of the participants provided an insight, stating that:

“The choice of transport mode seems to depend more upon the environment. The environment is regarded as the most important factor in determining the price of natural rubber and the ability to procure raw materials... Price volatility considerably influences on the selection and rubber supply is a cornerstone of the choice of transport mode. Although I have carefully chosen a transport mode, the supply option is not followed. Sometimes it is hard to say which factor is greater. When selecting a transport mode, multiple external factors seem to affect the decision.” (IP16)

The perspective present here reveals that there are two significant, interrelated environmental issues influencing the selection of transport modes and loading ports including situational factors and the nature of natural rubber industry itself. The result is presented in Figure 5.1.

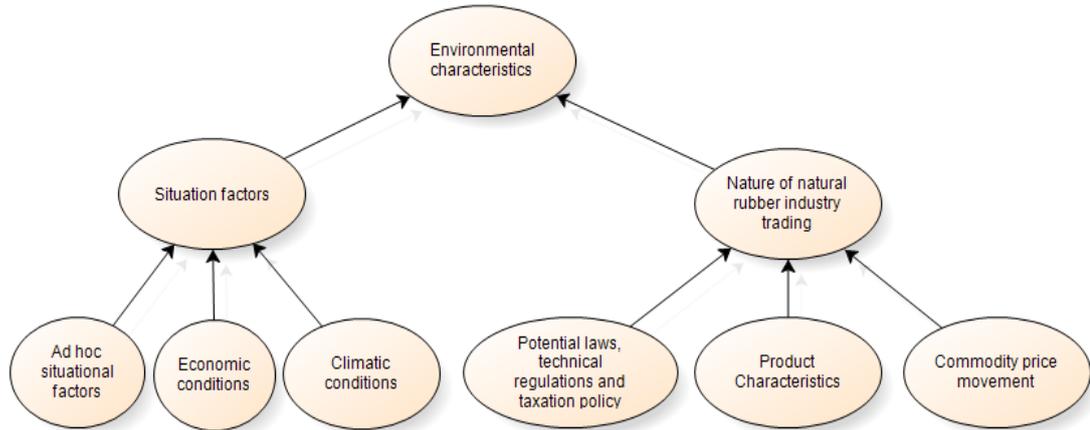


Figure 5.1: The influence of environmental characteristics

5.2.1 Situation factors

The analysis further identified that ad hoc situational factors, economic conditions and climatic conditions may have a significant impact upon the revision of transport processes. Detailed findings are presented in Figure 5.2.

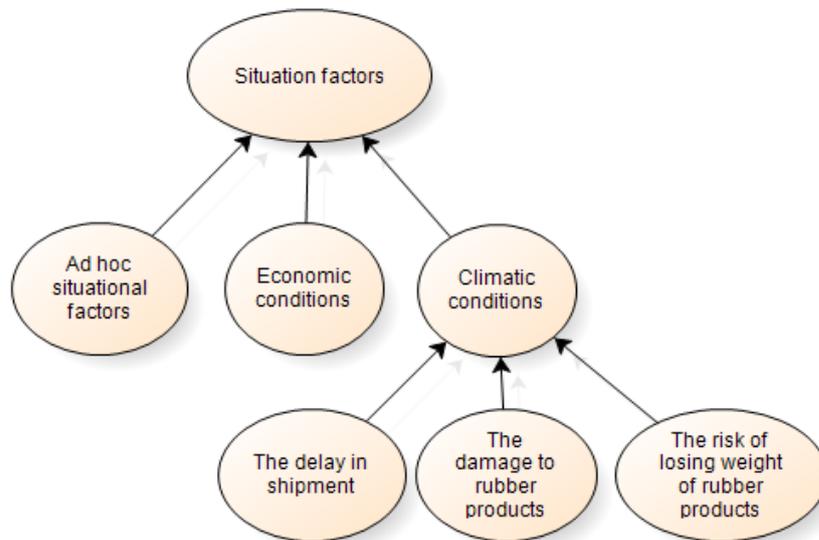


Figure 5.2: Showing situational factors

5.2.1.1 Ad hoc situational factors

An interesting result which emerged from the interviews is that both big and small firms situated in Songkhla province, which is adjacent to Malaysia, prefer to use Penang port in Malaysia rather than the Songkhla port in Thailand. Although the routes used for access to Penang port are likely become congested and hauliers are

frequently faced with problems with damaged handling equipment, ocean freight rate at Penang port is cheaper than the other alternative. In summary, transport decision makers in this location appear to give greater priority to cost compared with service quality. The interviews further reveal that although there may be problems with service, as long as businesses are not significantly compromised, Penang port remains the most commonly method used today. Furthermore, big organisations tend to spread their shipment across a number of alternatives in order to maintain good relationships with their transport suppliers. That is because of the limited capacity of Songkhla port, where in situations demand outstrips supply, only loyal customers can access this service. In order to secure alternative services at short notice, big companies spread their cargo across multiple feasible alternatives. For example, one of the interviewees from large-scale organisations mentioned that: [\(please refer to QTE5.2_02 in Appendix Q; Section Q.1\)](#).

In contrast, small or medium companies are likely to use a single port which is considered to be the most to their potential needs. An interesting issue arose from a number of the participants working at small companies, who suggested that any problems resulting from uncontrolled situations (e.g., natural disasters, accidents and damage to lifting equipment) are acceptable. Small companies rarely plan for such eventualities that they are likely to face, thereby, ready on occasions of increased costs. As one of the interviewees said: [\(QTE5.2_03\)](#).

5.2.1.2 Economic conditions

[It is an undeniable fact that](#) economic conditions directly impact upon the ocean container shipping market. The markets seem to depend upon the demand for, and supply of, ocean freight, which fluctuates in response to global economic indicators. For the Thai rubber industry, the main leg of the journey is by sea, and therefore changes in ocean freight rates will be a significant factor impacting upon overall transport costs. If ocean freight tends to be in limited supply during a particular time period, or if oil prices are likely to increase, [the current study found that](#) FOB⁶ is the preferred term of trade as opposed to CIF⁷.

⁶ Free on board—named port of shipment

⁷ Cost, insurance and freight—named port of destination

“...If container space is in short supply or the price of oil is very volatile. Of course, I would have to FOB in order to minimize risk as ocean container rates tend to fluctuate.” (IP16)

In addition, the global financial crisis of the early 21st Century has increased the financial risk for this particular industry. A variety of customers are involved in the rubber industry, therefore transportation has to be planned carefully and intelligently. Interestingly, the results of this study show that there is a company which operates by stocking rubber products in China. As a result, the delivery operation is much more flexible and manageable, in that it reduces some uncertainty in transportation. The following quote illustrates this:

“...The main market of company X is China, and one of the warehouses is located in China....These days, other economic conditions and factors, e.g. volatility in the price of rubber or a ‘grey bank’ in China, complicate the process of delivery. As this company has a warehouse in China, therefore I do not have to worry about the delivery, as our stock is available in the Chinese warehouse.” (IP18)

An interesting issue arose from the data revealing that the Thai government has managed to intervene in market prices on several occasions in recent years, since a low level of prices impacts on many Thai farmers. However, the outcomes of such an intervention were evident in that it cannot control crises associated with rubber prices. It may be concluded that movements in the price of rubber are mainly dependent on the world economy rather than on the main producer countries such as Thailand, Indonesia, Malaysia and Vietnam, etc. As one interviewee said:

“...this policy absolutely fails. This intervention on rubber prices by limiting the quantity of rubber export by 10%. This policy is collaboration amongst the world's three biggest exporters of natural rubber: Thailand, Malaysia and Indonesia and all use the same policy. By the time, it took more than that. The world economy tends to have a higher impact on rubber price movements.” (IP10)

5.2.1.3 Climatic conditions

Climatic conditions may have a significant impact upon rubber products in three ways: delays in shipments, damage to products and the risk of losing weight of rubber products. According to the interviews, damage seems to be the most significant issue

affecting rubber as natural rubber products such as Ribbed Smoked Sheet (RSS)⁸ and Standard Thai Rubber (STR)⁹ are sensitive to humidity. Therefore extreme weather seems to have a major impact upon product quality and the delivery service. Thus, modes of transport and loading areas must be selected carefully to prevent any risk may occur from climate condition.

5.2.1.3.1 The delay in shipment

It was found that rain may influence the loading of containers because natural products have to be kept away from humidity otherwise there may be an adverse impact upon rubber products. In addition, the choice of transport mode can depend upon the number of service users. The interviews reveal that water level is one of the barriers to the flow of goods in some costal sea ports ([QTE5.2_06](#)). This characteristic makes for an unreliable service because schedules may have to change depending upon the sea level. Therefore shippers tend to avoid such modes for orders which cannot fail or be delayed in shipment. The findings of this study provide an example of the delays resulting from bad weather conditions, lead to departure dates being postponed. Thus, transport managers should be aware of risks which may result from climactic conditions so that their choice of transport mode will be managed carefully.

5.2.1.3.2 The damage to rubber products

Climactic conditions may have an impact on the choice of transport mode on some occasions, particularly during the monsoon season. Further, some modes of transport such as barges are considered as having a high risk of capsizing. Owing to the high value of rubber products, such transport modes are not very popular, despite associated cost being suitable than another alternative. The security of the cargo is one of the significant factors influencing the choice of transport mode and may be more important than the transport cost. The following quote illustrates this: ([QTE5.2_07](#)).

⁸ RSS: *Ribbed Smoked Sheet - a form of plantation rubber prepared by coagulating latex and then dried with smoking.* (The Rubber Economist Ltd, 2014)

⁹ STR: *Standard Thai Rubber - it is also called "block rubber"...feedstock is mechanically chopped and ground into small pieces in the presence of water, washed, dried with hot air, and hot-pressed to form bales (mostly 35 kg or 33.3 kg).* (Hirata, Kondo & Ozawa, 2014, p. 349)

5.2.1.3.3 The risk of losing weight of rubber products

It is interesting to note that rain could have an impact upon the weight loss of rubber. It may be caused by the weight of rain that enters the body of vehicle. This seems to be common knowledge; however, it can cause conflict between sellers and buyers if customers receive cargo of an incomplete weight. One of the latex exporters mentioned: (QTE5.2_08).

5.2.2 Nature of natural rubber industry trading

Commodity price movement, product characteristics as well as potential laws, technical regulations and taxation policies are considered to be useful in the context of the natural rubber industry. That is because each element may have an adverse impact upon price changes for natural rubber. Transport decision makers need to understand the nature of the business before making any decision related to transport. The context is very important due to the primary causes of price change in the rubber market, in which this has an impact on cost contract in order to preserve financial margin. Any changes in the rubber market itself and other situational factors mentioned before seem to have a significant impact on transport management. Detailed results of the data analysis are presented in Figure 5.3 and in depth descriptions are presented thereafter.

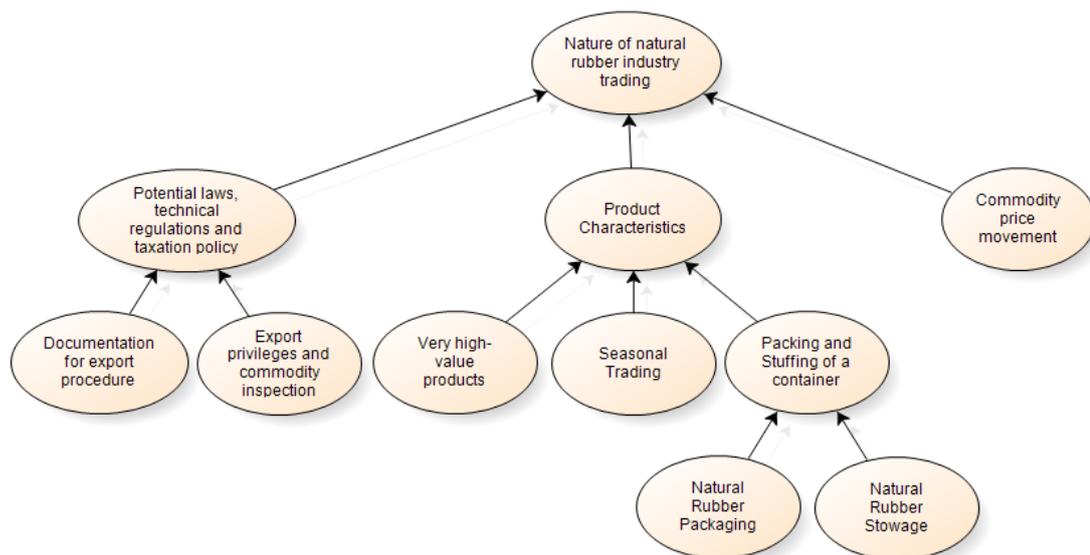


Figure 5.3: The nature of natural rubber industry trading

5.2.2.1 Potential laws, technical regulations and taxation policy

Laws and regulations involved with the export and import procedures are considered as crucial for managers in this private industry (QTE5.2_09). Therefore, exporters should understand how to deal with export procedures, custom clearance regulations, international transactions, or even tax privileges which may help in the reduction of costs.

5.2.2.1.1 Documentation for export procedure

The compulsory standards of rubber export processes can be summarised for most situation by the process presented in Figure 5.4. Prior to the process of custom clearance, the two documents including cess (the rubber export tax) receipt and the certificate of origin have to be received from the Office of the Rubber Replanting Aid Fund (ORRAF) and the Department of Agriculture respectively. Then exporters can submit the requested documents via the custom system to ask for export permission. One participant provided an insight, stating that: (QTE5.2_10).

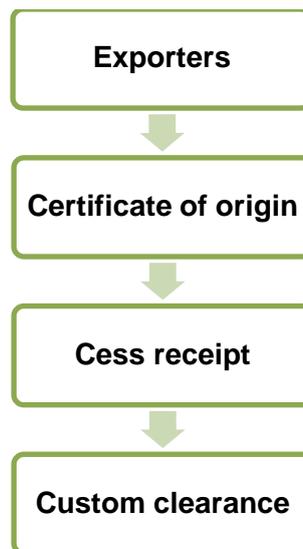


Figure 5.4: Rubber export procedure; adapted from:
http://www.rubberthai.com/service/export/export_index.html

It is fundamental to note that rubber industry have to pay a Cess defined as the Rubber Export Tax which varies according to the current market price (QTE5.2_11). In conclusion, if the FOB price exceeds Baht 100 per kilogram, a cess rate will increase from Baht 3 to Baht 5 per kilogram. Therefore, exporters may prefer to spend more on delivery costs but spend less on a tax. Transport decision makers have to make a trade-off between such factors which seem to have a significant

impact on the total product costs. A supporting example arose from one of the participants:

“Sometimes, the rubber prices rose to nearly Baht 100. At that time, it had been over Baht 90 per kilogram for a long time and the trend was predicted to exceed Baht 100. The majority of exporters wanted to export before the change in the cess rate. I was confronted with shortage of empty containers as there was a high demand for rail transport; exporters fought each other for limited containers. So, I managed deliveries by the most convenient mode. That was transport by road via the Sadao border to avoid the increase in the tax rate. Rubber moved via Sadao, although the transport cost became more expensive than the other routes.” (IP6)

It is interesting to note that any change in the legal environment (e.g. high prices) which enhances the volume of exports contributes to the inefficiency of transport for some areas in particular Songkhla province. It was found that the capacity of rail transport at Padang Besar was limited and when demand outstrips supply only loyal customers can access such a service. One participant commented: (QTE5.2_13).

5.2.2.1.2 Export privileges and commodity inspection

In order to gain a competitive advantage in the export business, taxation privileges are considered to have a vital role to play as they help to significantly reduce costs. Therefore, it is essential their Thai entrepreneurs in the particular individual sector should understand how to deal with the international market and any regulations before entering into the international trade. This theme was highlighted by one of the participants. She said that: (QTE5.2_14).

Further to that, it is necessary to study regulations concerning the quality of the goods. This procedure refers to the law concerning commodity inspection. In pre-shipment procedures, prior to the product being ready for delivery, the nominated responsible agency either public or private, have to check the specifications required for the technical and regulatory requirements—for example quantity, quality and storage in the container. For example, Iran has a requirement that if there is no certificate of inspection, customs do not allow rubber products entry into the country (QTE5.2_15).

5.2.2.2 Product Characteristics

There are three main types of rubber, specifically Concentrated Latex¹⁰, RSS and STR. Due to the physical nature of these rubber products, there are differences in packaging before loading into containers. Initially, the researcher thought that the differences in types of rubber did not influence mode choice as this study focuses only rubber products. However, a more careful analysis revealed that product characteristics are as important as any other factor in determining the choice of transport mode. The outcome of the interview can be summarized into three ways. Detailed results are presented in Figure 5.5.

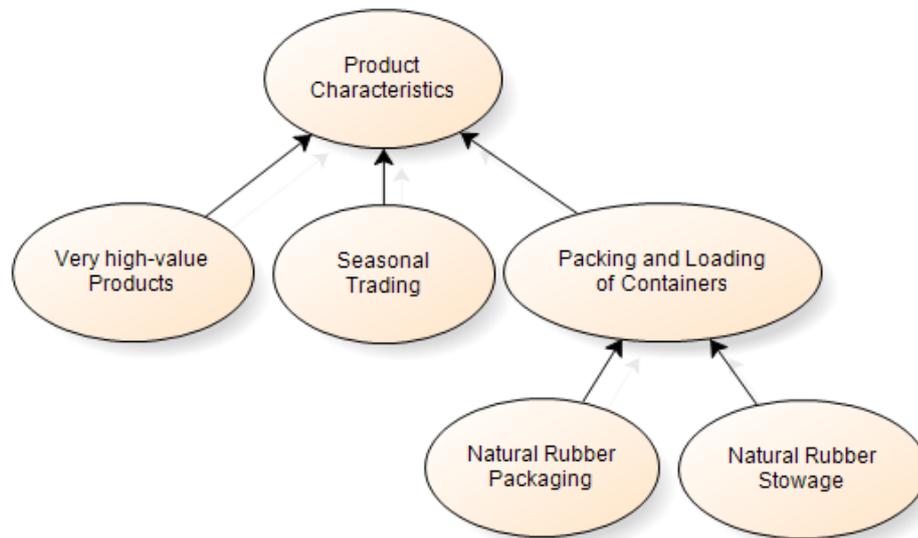


Figure 5.5: Product characteristics

5.2.2.2.1 Very high-value products

Rubber products are considered to be high-value but small margin. It seems to affect the capital of the company which cannot stock a number of products. One informant reported that:

“Rubber is a high-value commodity and is affected by price fluctuations that link to the ability in investment of two parties, both sellers and buyers need high capital. Will I have the ability to invest a lot of money in buying a number of raw materials to stock for a long time? From another angle, I have to question whether customers have enough money to pay for a large order. I must ask how

¹⁰ Concentrated Latex: Latex - the rubber content of which has been greatly increased by evaporation, creaming, filtration, or centrifuging. (The Rubber Economist Ltd, 2014)

I can make sure that they will not break an agreement. In reality this is not always the case.” (IP14)

In addition, rubber products may get lost or perhaps be stolen during transit because rubber is a high value product. Therefore, safety is considered to be one of the important criteria when choosing mode of transport.

5.2.2.2.2 Seasonal Trading

Rubber export is similar to other commodities in that output quantity depends greatly upon the season. Thus, export levels are unstable and this may have an impact on selection of transport suppliers. The majority of respondents mentioned that they utilized more than one carrier. A possible explanation for this might be that there is an enormous variation in the volume of products in each shipment (QTE5.2_17). Consequently, some shipments can be performed using small transport operators, while some have to be undertaken with larger transport operators (QTE5.2_18). This leads to great variations in shipment sizes around the average that an individual supplier is accustomed to. This is further exacerbated by uncertainty in monthly volumes. To alleviate any problems, shippers are likely to spread this shipment business, particularly if they are dealing with small transport operations (QTE5.2_19).

5.2.2.2.3 Packing and Loading of containers

This study into packing and container usage in rubber export reveals that the physical nature of product and how it is packaged is significant in the choice of transport mode. Some types of rubber, particularly RSS can only be loaded into an empty container at an exporter's factory, others may have more alternatives. Normally, one of two common sizes of container are employed which are either 20 feet and 40 feet in length, the findings from this interview in this research reveal that only the 20-foot containers are commonly used in rubber export (QTE5.2_20). In addition, it is worth to note that transport by truck is commonly used for domestic purposes or delivery to neighbouring countries, particularly Malaysia. A container system is mostly used in cases where transport by sea is the main part of the journey for the long-haul transportation.

5.2.2.2.3.1 Natural Rubber Packaging

Rubber can be exported in two states: liquid (concentrated latex) and solid (STR and RSS). The buyers will specify packaging by a suitable state on the basis of warehouse availability, rubber products and transport conditions. In order to understand the basis of this understanding of natural rubber packaging, this section of the finding will summarise the most popular packaging methods of each product.

Concentrated latex is commonly contained in drums or flexi bags. The former is at lower risk of damage compared with the latter; however, flexi bag packaging is more popular. It is crucial to note that, some shipping liners justify concentrated latex being shipped in flexi bags as they define the product as hazardous goods. It may cause damage to other containers, as containers housing the rubber products may leak (QTE5.2_21). Therefore, carriers usually request that exporters sign a letter of indemnity. This means that exporters are responsible for any damage that may occur during delivery. In summary, the physical nature of rubbers seems to restrict it from some shipping liners if the distributors (shippers) do not wish to engage in indemnity. STR is mainly packaged on shrink wrapped wooden pallets. Talking about this issue an interviewee said: (QTE5.2_22). As regards the packaging of RSS, all RSS are wrapped by a rubber sheet and covered with powder to prevent dust sticking. So, this type of rubber needs to be held in containers which are in good condition.

On the subject of container quality, an interesting issue was brought up by a participant regarding the potential esteem give to rubber exporters and their perceived therefore compare with other export business. She said: (QTE5.2_23). A common view amongst interviewees was that container condition often varies from one type of product to another. According to interview data, these findings suggest that in general RSS and flexi bags need to be better quality than STR because of its packaging methods (QTE5.2_24).

Despite this, there is a type of packaging known as “*metal crates*” which may have an impact on delays in shipments, for example, one interviewee said: (QTE5.2_25). A 1260 kilogram amount of rubber (35 kilogram per bale) in a metal crate is a method of packaging of STR. These crates are reusable and the design and dimensions meet with the tyre industries' requirements. A 20 foot container can store up to 16 fully-laden crates of a net weight of 20.16 metric ton of block rubber. Availability of these crates can provide potential despatch problems. The following quote illustrates this problem that is associated with the manufacturing process: (QTE5.2_26).

5.2.2.3.2 Natural Rubber Stowage

Currently, containers are commonly loaded and sealed at the factory. This may be because of customer requirements or sellers' intentions; however, the main reason behind this action is to ensure product quality. Nevertheless, a minority manage to load the cargoes at the port in order to reduce cost as a response to delay or urgency in despatch. All agreed that risk may be incurred due to loading into a container at the port. Transport decision makers should be sure that there are sufficient and appropriate employees available at the chosen port. As two of the interviewees stated: (QTE5.2_27; QTE5.2_28).

In contrast some exporters focus on the safety of their products, rather than concentrate on reducing the cost from packing products at port. They give priority to product quality; the main type of product where this occurs in is RSS. This is easy to contaminate, which prohibits its packing into containers at the port. Talking about this issue, one of the RSS exporters noted that in order to prevent any damage or contamination, it is preferable that the loading of containers be undertaken at the factory rather than at the port (QTE5.2_29).

5.2.2.3 Commodity price movement

Price volatility represents a major problem in commodity trades. This issue has been present for a long time; however, the pattern of commodity prices is not becoming easier to predict due to potential demand and supply issues.

“Rubber trading like is often like playing in a casino or gambling as prices can go up or down all the time. In 1976 when I entered the rubber business, rubber price movement changed by up to 0.01-0.02 Baht/day. At the present time prices may change by between 5-10 Baht a day. Moreover, a commodity is almost no margin. If you miss a small detail, millionaires may become a pauper.” (IP21)

In order to be successful in the trading community, rubber exporters have to understand how and why price movements may have an impact on transport management. This study provides detailed insight into the impact of the downward trend in rubber prices. Firstly, it was found that the majority of respondents believe that the downward trend in rubber prices may result in customers not adhering to their agreement. In the commodity trade, defaults often happen because the market is extremely changeable. Therefore, on-time delivery is considered to be a key to success for transportation management in rubber trade. As two of the interviewees stated: (QTE5.2_31; QTE5.2_32).

These findings point to the importance of on-time deliveries as one of the key performance indicators (KPIs) in a complete fulfilment process. Any mistake may be a point of negotiation for the customer, allowing them to cancel the contract, or request bargain deals (QTE5.2_33; QTE5.2_34). It was found that the majority of participants are confronted with this problem. Therefore, almost all firms manage their shipments carefully during times of high volatility or even discontinue selling with high risk customers. Interestingly, there are examples from this research of larger companies establishing their warehouse outside Thailand to solve this problem (QTE5.2_35). This study also provides evidence of the impact of price movement in the ineffectiveness of raw material procurement. This is considered as one of the problems that exporters encounter which impacts on their ability deliver on the committed date.

“Can factories purchase raw materials in period of price fluctuations? It is not only our view in the rubber market. All in the chain including intermediary, exporters, or end users look at the same data. They all receive similar information from the same source. For example, I thought the price was more likely to go up. As a result I have already sold the rubber but when delivery was due, I was unable to send it out because of a lack of raw materials.” (IP16)

5.3 Organisational characteristics

The purpose of this section was to understand how organisational characteristics interrelated in the choice of transport modes and loading ports. This was divided into three sub-section – “the organisation hierarchical structure,” “existing delivery system within the organisation,” and finally “logistics Strategy and Policies.” In order to understand the whole picture described in this next section, the results are summarising according to Figure 5.6.

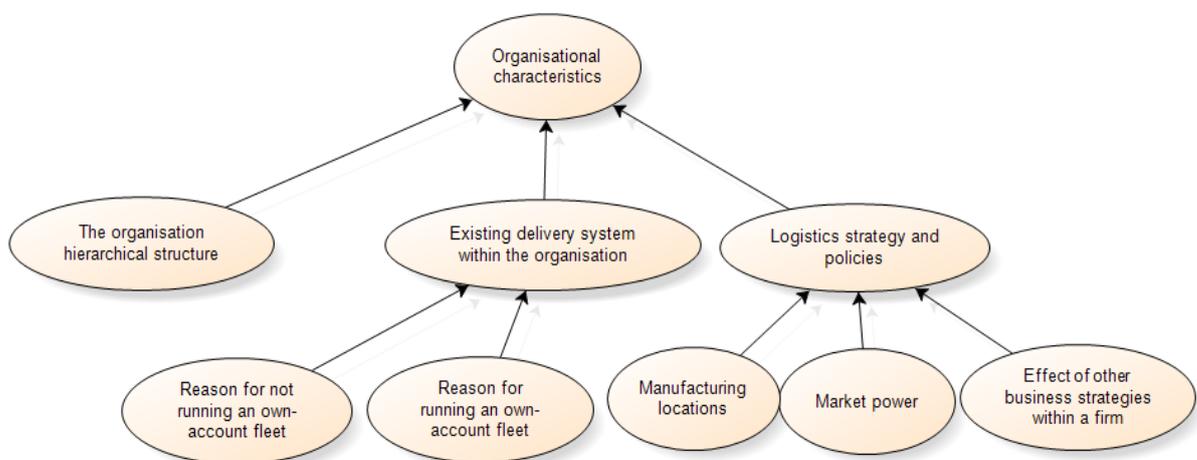


Figure 5.6: The influence of organisational characteristics

5.3.1 The organisation hierarchical structure

The different nature and size of a company may have a significant impact on the hierarchical position of the person who is responsible for transport mode selection. It can be argued that those working in SMEs where the sales volume is approximately 50-150 TEU per month, are likely to hold a high position within the organisation and have adequate freedom in decision-making. The results show that almost all decision makers are the owner, managing directors, or those who have a close relationship with the owner (please refer to QTE5.3_01 in Appendix Q; Section Q.2). Therefore, the decision makers are likely to make decisions by using their intuition and less through structure (QTE5.3_02).

In contrast, for the large business organisations in which the export quantity is more than half a thousand units per month, it appears that decisions are rather formal, with prescriptive models in place to provide formalised decision support. The following quote illustrates this:

“Departments involved in transportation management are marketing, logistic, purchasing, shipping and transport sector. Those influence the decision process. To come up with the final summary table, those five units must meet together. That is because sometimes marketing believes this cost will be a bit more expensive, so they ask purchasing to negotiate. Alternative suppliers may be offered, to be considered and compared with the active sources. Logistics may suggest another alternative mode. Transport operators might say that the offered prices cannot compete with the current market price. I will discuss with the operators in order to create the guide prescription, to which only managerial positions of marketing, shipping, logistics, purchasing, and transportation can get.” (IP14)

In other words, there is a model that represents the detailed cost of a number of effective alternatives for every production plant. There is a group of high level managers who discuss the related transportation in order to come up with the final solutions. The large company is incorporated great level of group decision; whereas SMEs rely on individual decisions, in that only one or two people take responsibility with the choice of transport mode.

Whereas several departments seem to be involved in the final stage of developing the guided model, only the logistics or shipping unit has authority for matching transport modes to the customers' order. As one interviewee said:

“I [an export manager] do not work alone. I have a team and also staff in our shipping department. Our team cooperates well. I would have to cost for

choices A, B, C, and D as I was told and give other details for each alternative. In other words, I provide at least four land costs for every production plant. Then, logistics will choose an appropriate option.” (IP18)

The decision bases mostly on the final cost model developed in conjunction with current situation. As a support unit, the shipping or logistics department has to react well under changing environments. It can be argued that the shipping or logistics department works as a support unit for the production and marketing departments (QTE5.3_05).

It is a fact that diverse departments have different priorities. For example the logistics is focused around saving costs, whereas the operations staff target the flow of work. Two participants added that: (QTE5.3_06; QTE5.3_07). Therefore, in operational decisions, decision makers need to listen to any immediate feedback from other units having an impact on transport management, so that the company is run in any as efficient way as possible. Production plants work directly with transport operators while marketing work closely with customers, so they may request something that results in a revision of monthly or weekly delivery planning therefore leading to potential conflicts.

The current findings point to the contradiction between cost saving and operation flow. It is important to prioritise the importance of those contrasting issues. Although the logistics function appears to be in a position of power and in control of the choice of transport mode, the chosen option needs to be agreed by the operation unit. Therefore, the service quality must go beyond the minimum level. The comment below, illustrates this.

“It may depend on logistic and marketing decisions, if it is necessary to delay for whatever reason under the business situation. You [logistics staff] have a duty to inform the factory that there is a need to use this mode only, so it is the responsibility of the plant to be waiting around... I am working as an operations unit. The ocean freight rate is not the only factor, as all factors impact on the decision. You use the volume to negotiate and all you get is the sales wanting to sell you ocean freights. However, do you monitor after-sales service? How different is in the service level from the committed conversation before to after the purchase date? It is up to us to provide answers.” (IP18)

The evidence from this study indicates that SMEs routinely work with a small number of alternatives that they feel satisfied with. With regard to who is responsible for decisions, only one or two people are involved in selection, and it seems to be an informal process, which is characterized as an individual decision. The people who

are responsible for the choice of transport mode have entire power to make the decision. For example, one interviewee said: (QTE5.3_09). The interviews indicate that only one or two options are frequently used for delivery. If there is nothing wrong and those active options still serve at a satisfactory level and there are no complaints from customers, along with a reasonable cost, this means that it is not easy to change means of transport and port of shipment, because decision makers are familiar and confident in usage (QTE5.3_10).

In contrast, an interesting issue arose from one of the participants, who said that large companies always observe a new transportation route, which does not necessarily come cheaper than the active options, in order to have a backup choice in case a regular option is confronted with any problems, and also to construct a business partnership (QTE5.3_11). This can be seen as quite different from medium or small organisations. Those of small-scale business tend not to focus on searching for new alternatives, as almost their efforts are invested in the core business.

It may be that SMEs alternatively devote more effort to their strength in production and marketing but less emphasis on transport function, which is not a fundamental criteria of the rubber business (QTE5.3_12). Almost all SMEs consume the service of haulers as the volume is not large enough to run an own-account fleet. The result of limitation of volume is that SMEs cannot generate a significant number of business partners; therefore the issues of limited route and mode of transport are currently top debates in transportation for the rubber business.

5.3.2 Existing delivery system within the organisation

In the rubber business, two types of transportation management are used for transporting goods from storage points to ports of loading: own-account vehicle (in-house) and outsourced transportation. The majority of natural rubber exporters adopt the latter, and only a small number of rubber exporters run an own-account fleet. It is interesting to note that not all large companies run an own-account vehicle, but in reality, it is only large companies that can run their own transport service. It may be argued that it is not only the aspect of export capacity that determines the choice of in-house or outsourced transport but organisational size is paramount.

In deciding on the best option, the advantages and disadvantages of fleet ownership have been considered. Existing facilities seem to have a significant influence on transport management style. For example, in-house transportation raises the issue of resource limitation particularly the number of vehicles. Port usages seem to be

distributed, so that various ship schedules are available. A deputy vice-president of a company running an own-account described that: (QTE5.3_13).

5.3.2.1 Reason for not running an own-account fleet (using outsourced transportation)

The decision on channel types is in the hands of the owner or executive managers, who define the direction of logistics distribution. According to Research Phase I, the survey results show that 92% of rubber exporters use outsourcing transportation. Two participants provided an interesting reason, stating that it is not worth managing an own-account vehicle for small-scale transportation (QTE5.3_14; QTE5.3_15).

Although large-scale companies have the potential to manage their own-account fleet, not all firms decide to do it themselves, a decision based primarily on cost, but also confidential in external service providers. Other factors included a lack of transport expertise. Another participant from a small company pointed out that the advantages of letting specialists handle the work are flexibility and cost reductions. Moreover, suppliers have loads of vehicles available to serve. He summed this up as follows:

“It is ease of use, for which the company pays for third party whenever as needed. This way doesn’t need to invest in transport facilities such as trailers, staff, insurance, and maintenance. It is considered as a difficulty. The most significant point is the limited volume, which has not reached the cut-off point at which is worthwhile to invest. It is going to take quite a long time until the company can recover that money back to the system.” (IP3)

5.3.2.2 Reasons for running an own-account fleet

According to the survey data from Research Phase I, only 8% of rubber firms run an own-account fleet. In addition, the further study in Research Phase II (using face-to-face interviews) indicate that all of these rubber exporters not only use in-house transportation but also employ outsourced transport providers. As one of the participants revealed:

“Our concept is that the company runs 100% of all vehicles, but it does not need to have 100% of vehicles to cover all the work.” (IP16)

From the research interviews conducted in this study, the findings emphasise three main reasons that may have a significant impact on this issue: cost advantages, product quality (QTE5.3_19) and non-dependency on suppliers (QTE5.3_20). For example, one participant provided an insight into cost advantages, stating that:

“I recognized from a group of friends who work in the haulers’ business, that they became richer and richer. So, I studied it. If I do it myself, it would not be too much effort. The key principle is that I have to know the real costs. How much the actual costs are. Beforehand, if suppliers asked for Baht 6000, I had to pay such an amount. They always have reasons for increasing the price such as that the fuel cost is expensive. However, when I have my own information, I can negotiate a fair price. If anyone is overpriced, I will try an alternative one. One might not accept it, but it does not matter. I told them that our vehicles use 100% Thai fuel and I can manage to do it. But you use just 20% of fuel from Thailand and 80% from Malaysia [cheaper but illegal] Why can’t you do it? The fuel costs are quite different.” (IP17)

5.3.3 Logistics strategy and policies

Logistics strategy and policies appear to be responsible for opportunities and weaknesses of the associated company. To decide on the direction of logistics management, organisational aspects related to transport activity play a crucial role. The three main issues appear to be manufacturing locations, market power and the effect of other business strategies within a firm. All these should be part of decision making for transport management.

5.3.3.1 Manufacturing locations

A decentralised structure of manufacturing locations (multi address) may have a significant impact on the usage of transport modes. In other words, multi-address manufacturing locations with average volume cannot compete with larger-scale manufacturing which has only a few or single branches. Those, certainly, the bigger volume that can be substantially provided to transport partnership, have great power due to this relatively the huge capacity compared to medium-scale manufacturers (QTE5.3_21).

An interesting issue emerged from one of the participants falling into a similar situation. IP18 pointed out that multi-address manufacturing resulted in a difficulty in determining volume. This is one of the reasons that some companies do not wish to sign a contract under the condition of *“predetermined minimum volume,”* as it may not be suitable for those employing more complex business structures. She said:

“I absolutely would not sign a contract which has the condition of predetermined minimum volume, because the total exported volume in each production plant is not clear. Marketing has traded our products before I know exactly the volume of rubber product I going to export...I must first know how many units from Surat Thani factory are added into the total volume of Surat zone. It is difficult to specify. The rubber business depends on a seasonal harvest, which quick

fluctuates. In the Surat region, either there are a number of raw materials in some months, or no products in some periods. Production factories may not reach their targets due to lack of raw materials in some periods. No one can guarantee the whole volume of each production plants...” (IP18)

Logistics distribution strategies tend to vary depending on company-specific factors, particularly manufacturing size compared with competitors in the same business in each zone (QTE5.3_23). As a result, one organisation may target for low-freight rates with satisfactory service, another may aim for acceptable-freight rate with good service, or even low-freight rate with excellent service all of which are scale specific. It may be argued that export volume is an important factor for negotiation with partnerships in the supply chain or even running an own-account vehicle.

Further, some organisations do not want to lock volume with transport operators because the location and manufacturing capacity is not convenient to support high volume. In contrast with some companies, the logistics policy is that all volume will be given to single partnerships (QTE5.3_24). Exporters believe that the transport business itself needs to operate on a large scale (economy of scale), so that good service with a bargain price will be received. It is interesting to note that some companies overcome the weakness of logistics issues by launching marketing goals for the domestic market instead of the export market in some particular areas (QTE5.3_25). That is because the cost of transportation is more than in other locations.

5.3.3.2 Market power

At the present, transport cost has never gone down and transport decision makers have to cope with that situation. Market power seems to be the answer for big companies who have the power to negotiate with their transport partnerships (QTE5.3_26). In other words, it is clearly seen that large companies are able to get lower prices than small or medium companies. One participant provided clear evidence that large business organisations gain excellent service against cheap freight rate because of market power. He said:

“Reliability comes first since I emphasise that this company must provide good quality. Quality means quality of products and transport services. Then I consider how to achieve that... because of the huge volume of our company compared with others in the rubber industry, I am able to have partnerships with the transport operators which provide best quality but lower prices. Because of the huge volume, our partnerships could complete with other transport operators that may not yet be sure of the quality. So they could be able to

manage better in economy of scale. As a result, it would be win-win for both” (IP14)

Some participants pointed out that it is not only cost advantages that transport decision makers negotiate with transport suppliers. The number of free days granted before returning full containers to the nominated depot is another shippers' need. For example: (QTE5.3_28).

Another important finding was that there are a number of alternatives for large scale organisations. This is in contrast to SMEs, where transport decision makers believe that only limited choices are available to them (QTE5.3_29), with a price focus taking priority, although service appears an easier target to realise. As a result, some medium business organisations may not target for low freight rates, as they cannot compete with competitors. Therefore, the majority of SMEs always use market power for gaining good service. This is because the certain amount of volume is not big enough to negotiate in terms of cost. In other words, it is possible to negotiate but it might not come up with a significant difference in terms of cost. For example, one interviewee said: (QTE5.3_30).

In summary, a common view amongst interviewees was that market power is the ability of a company to gain profitably in terms of marginal cost or service. However, the service level needs to be beyond the minimum. It may be argued that lower prices cannot compensate for poor service. One participant commented:

“The freight cost depends on the bargaining power of each person and I also have features to handle it. If I am satisfied with the freight rate but usually confronted with problem when using the service, I am not happy.” (IP16)

5.3.3.3 Effect of other business strategies within a firm

5.3.3.3.1 Distribution strategies

From the interview findings, one of the Thai rubber companies operates by supplying rubber products to trading and distribution centres in the main customer areas in China. This leads to a delivery operation which is much more flexible and manageable. If necessary, they can take risks on late shipment, as it is delivery to a subsidiary company rather than directly to a customer, thereby responsibility has been passed on. Only large companies are able to establish trading and distribution companies adjacent to their main customers. One respondent reported:

“The main trade market is China and the company has a warehouse located in China... As the warehouse is in China, I do not need to worry about the delivery as the stock is available at the Chinese warehouse.” (IP18)

5.3.3.3.2 Logistics strategies

The interviewed transport decision makers appear to make decisions based on their organisational policy, which may target cost savings or service improvements or both. For example, an interviewee talking about KPIs said: (QTE5.3_33). As a result, cost becomes the most important factor for some medium enterprises in terms of influencing the suppliers' selection. The company will select suppliers via the tender method and the cheapest one will be offered a large volume. This is a rather formal process compared with the past, when decisions were based much more on intuition. On the other hand, small enterprises already specify a route and port for delivery as they have limited options. It is fundamental to note that the main criteria for making the choice are convenience, punctuality, safety and fair costs, which is similar to the priorities of the larger companies.

Another important finding was that some marketing team is encouraged to use sales only in terms of FOB. This is because the export department office is located adjacent to the chosen port zone. The company has already planned for the distribution and decision makers familiar with this channel. It may be argued that the choice of transport mode is fixed and decision making become routine according to the transport scheme that was mentioned at the stage of business plan. In addition, some companies may want the flexibility in selecting port of shipment, thus FOB Thailand or Malaysia may be mentioned in the contract. This condition is often found in a company that has several branches.

5.3.3.3.3 Stock holding strategies

The current study found that holding stock policy has the potential to differ depending on their business strategy and financial situation of the individual company (QTE5.3_34). Some companies focus on speculative selling so that natural rubber will be kept at a high level stock if the prices tend to increase. Therefore, selling behaviour is not continuous and equable throughout the year, but is dependent on opportunities and rubber price movements. One participant commented:

“Some months I do not sell rubber. If I believe that the rubber price in the world market is in a climbing trend, I stock bulk of rubber and continue buy it, I do not sell.” (IP12)

For those companies that base their market strategies on speculative stocks, it may be argued that transport cost considerations typically have the target “...to be not over-priced,” which can be comparable with others rubber exporters in the same sector, but not need be very low. One of the interviewees working in an SME said: “It does not have to be the cheapest” and further explained this as follows:

“Transportation management is important, but not very. For my business, the core is the natural rubber products. Business profits or losses depend on the product itself. So, however you manage the costs of transportation, it cannot save much. Moreover, the standard transport costs pass completely onto the customers. Our customers will be responsible for all of them... Delivering goods to my customers to their satisfaction is my objective. Moreover, it must not be over-priced. It has to be an average price which I can accept. It does not have to be the cheapest.” (IP3)

In summary, logistics policy and strategy represent one of the significant factors influencing the choice of transport mode. Almost every senior manager is going to take action that is in alignment with their company mission.

5.4 Customer characteristics

Particular customer characteristics are considered to be a factor that may affect the choice of transport mode and port of shipment. Thai rubber trading mainly exports to international markets and those customers have complicated purchasing behaviours which vary from country to country. However, the more a management team understands a customer's needs, the more the company is able to compete in the business world. In order to maintain efficiency in organisation alongside fulfilling what the customer wants at the individual level, Thai rubber exporters need to underpin and clarify the preferences of each customer. The findings further study interviews suggest that there are three significant points to take into account to better understand customers' desires in the international rubber trading: customer importance, customer purchasing behaviour focused on terms of trade and contract behaviour, as well as customer service level requirements. The result is presented in Figure 5.7.

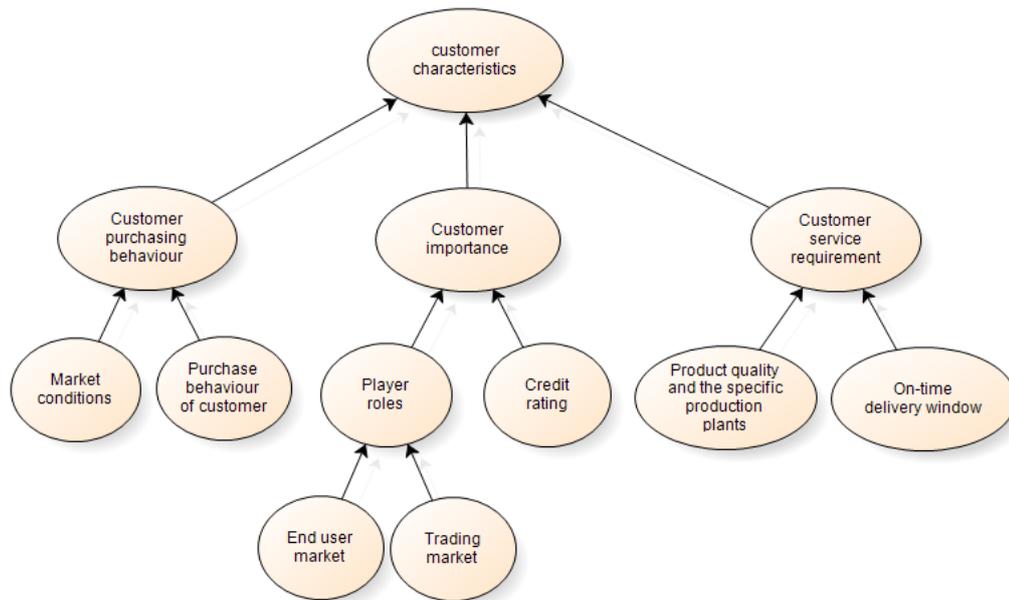


Figure 5.7: The influence of customer characteristics

5.4.1 Customer purchasing behaviours

There are two fundamental agreements known as “*terms of sale*” and “*terms of payment*” in common use in international trade. It is undeniable that these two agreements have consequences for delivery operation processes such as length of time for preparation and cost consideration, because who is responsible for each element of transportation is defined by these terms of trade. However, these constraints can be negotiated until the point of contracts being agreed by sellers and buyers.

5.4.1.1 Market conditions

In international trading, a terms of sale known as INCOTERMS is commonly used as the basis for undertaking business. This is considered to have a significant effect on transport mode selection because different terms mean very different responsibilities for transport functions and payment duty alongside the delivery. From the interview findings, three terms of sale commonly used in the rubber industry are FOB, CFR¹¹ and CIF. The different terms of trade have different implications for the choice of transport mode. For example, one interviewee summed this up as follows: [\(please refer to QTE5.4_01 in Appendix Q; Section Q.3\) and \(QTE5.4_02\)](#). It is fundamental

¹¹ Cost and freight—named port of destination

to note that who is responsible for nominating a port of shipment has a significant effect on the transport management process. The terms of trade have an influence on shippers' role as to whether they can or cannot take control over delivery.

Prior to selecting a transport mode, the terms of delivery need to be clarified as FOB, CFR or CIF. This is because terms of delivery impact on the remaining feasible alternatives. CIF does not affect any constraint about alternative shippers, while FOB has consequences of restriction on port of shipment which is nominated by buyers. Under normal circumstances, most rubber exporters prefer trading in term of CIF or CFR than FOB because of the advantages of flexibility and easy management. As one respondent reported:

“As a basic principle of management, it would be easier to deal with CIF or CFR than FOB because everything is my responsibility. While with FOB, customers deal with shipping carriers and then the essential information of a designated vessel is forwarded to me in order to follow along. Sometimes, I am confronted with the difficulty of communication in different time zones, for European customers for example, an error on letter of credit or the unavailable for delivery in some period. Further, sometimes I must wait until nearly the last minute before buyers inform a shipping liner.” (IP1)

It is interesting to note that it is not always CIF preferred by transport decision makers. The high level of fluctuations of ocean freight rates may affect which terms of sale is the most appropriate on such period. It was found that the European zone tends to have more risk than other areas in this respect. The comment below, illustrates this.

“...Exception is on the particular period that the high risk of ocean freight fluctuations in Europeans. Freight rates to China vary just a small amount, ranging from \$100 to \$200— not much when divided per kilogram. In Europe, it is up to 500 dollars.” (IP6)

With regard to FOB, it is not easy to make change for port of shipment. Therefore, before making the choice of transport mode, the shipping manager has to know all constraints relating to the transport process. One of the most important constraints is that whether the port of shipment is fixed or not because it is difficult to change. The mode of transport is then considered to comply with the prescribed port. Not only does the condition under the INCOTERMS impact on transport mode selection, but also how well the information flow is managed by the individual customer. Such systems tend to affect the period of time in the shipment preparation stage. Some customers inform their suppliers of the essential information beforehand while some notify just at short notice before the goods are placed on board. Where time is

constraint, particularly unreliable modes and routes are not considered. For example, one interviewee said: (QTE5.4_05).

5.4.1.2 Purchase behaviour of customer

It appears that purchasing behaviours differ from one customer to another. In order to fulfil a customer's needs, transport decision makers are required to understand clearly how their customers normally behave. Therefore the terms of trade preferred by different customers may be summarized based on country of background, for example, the majority of Chinese customers prefer to do business under CIF or CFR. In contrast, European customers are likely to trade under FOB (QTE5.4_06). The reason should be because they are able to negotiate for reduced ocean freight rates by giving a huge volume with their partner. Furthermore, almost all buyers are big organisations and have long experience of global trading.

It is interesting to note that not all customers adhere to the international terms of sale. It is more frequently seen in Chinese orders from the percentage of these Thai suppliers. A further interesting issue about an exception on INCOTERMS in the rubber market was explained by one of the participants:

“In practice, it turns out that the FOB condition is more detailed than you [the interviewer] think. For example, in the rubber industry, sellers are responsible for the cargo until it is on board a vessel. Formally, sellers must pay for transportation of goods until goods are actually on board the vessel. Rubber trading determines that THC (Terminal Handling Charges) must be a duty of buyers. If THC will not be paid, the goods cannot be picked up on board a vessel. This becomes an exception.” (IP8)

Different bilateral contract types (e.g. spot and forward contracts) may impact on the choice of transport mode; hence it is worth considering what the impact of each contract type of transportation. Most transport managers reveal that only length of time for preparation influences the transport operation process, but it is considered to be a small impact. A common view amongst interviewees was that the type of contract does not have any significant impact on the choice of transport mode. The reason may be due to purchasing characteristics of the rubber market itself. Normally, the delivery date is approximately more than two weeks after the trade date. For example, two of the participants commented: (QTE5.4_08; QTE5.4_09).

Almost all rubber customers are likely to buy goods at least two weeks before the required delivery date. It is important to point out that some customers are different to others, especially Korean customers. One informant reported that

“Our selling behaviour is that customers place an order this week so that they [Korean customers] want the shipment on board next week. Normally, 2-way return rail operated by J company takes around 10 days. If so, the cargo cannot be transported by rail for Korean case, thus concentrated latex packaged in drums is transported by one way truck for loading into a container at container yard [outside their factory].” (IP21)

Furthermore, it may be surmised from the data that China prefers to trade in term of spot contracts, while EU and US customers are more likely to trade in terms of forward contracts (QTE5.4_11).

In addition, a large number of those interviewed argued that rubber exporters do not like to trade in forward contract terms with Chinese customers, especially with small and medium-sized businesses. The reasons may be that Chinese requirements frequently change in terms of conditions. Interestingly, some small-sized Thai businesses even limit the risk of exposure to the lack of standardisation on the part of Chinese customers by not selling rubber to China. For example, one individual working in a small firm stated: (QTE5.4_12). Despite this, some large-sized businesses may reduce risk by limiting the range of contracts by dealing in only spot contracts or may even limit the size of orders they are willing to fill to such Chinese customers. For example, one interviewee said: (QTE5.4_13).

In contrast with Korean, Japanese and European customers, these customers are likely to respect the contract, for example: (QTE5.4_14) and (QTE5.4_15). The reason why Chinese appear more difficult to conduct business with than Japanese, Koreans or Europeans is the impact of rubber price volatility alongside with their nationality characteristic itself. Thus, a delivery service should carefully manage orders which will not tolerate mistakes or delayed shipments such as Chinese and Middle Eastern customers. One of the interviewees expressed Chinese characteristic as follows:

“...China is a big country and a mixture of people. People just want to look for opportunities. There are a lot of new companies starting, and some firms owned by adolescents. They work like they are gambling so I cannot trust them.” (IP3)

It was found that purchasing behaviour is differ from one to the other. This means a difference in customer service requirements. In order to mitigate risk, transport

decision makers should have the ability to deal with any strange orders, so that such an order can be examined. One informant commented:

“It seems to me that whatever customers want, I must support it all. However, it should be possible and reasonable to do that. Otherwise, customers may ask for impossible things, which is not the right concept. I am responsible for supporting my company and my duty is mainly as an operator behind the scenes. If I see any strange contracts, I have a duty to indicate the red signal for warning. That now this order is weird and please carefully monitor.” (IP18)

5.4.2 Customer importance

Customer importance is considered to influence mode selection in terms of the level of service provided to each customer. Transport managers usually consider who their customers are, so that transportation management can perform with high efficiency. In doing so, aiming to save cost as much as possible but also to serving customer needs at the individual level to an appropriate standard. It is interesting to note that these two service elements vary with customer importance. Awareness of product quality and the accuracy of delivery service represent their concerns of shippers. However, the evidence from the interview shows that there is no fixed formula to make a success of transport management. It depends on the circumstances that arise and then how managers cope with the situation; for example:

“I was confronted with whatever problems result in being unable to send the products to customer ‘A’. Basically, I need to check with Customer ‘A’ if the shipment delay is any issue. If Customer ‘A’ says that the impact of a delay in the shipment is that the production line is going to discontinue, as sellers I may possibly switch to the product stocked for customer ‘B’. I have to clear with customer ‘B’ that they are not in a hurry. In other words, I request permission to delay shipment with customer ‘B’ instead of customer ‘A’. It is about solving the problem under the current situation that evolves with either low or high risk factors. What option is seen to be satisfactory and the most perfect with everything?” (IP16)

5.4.2.1 Buyer roles

It is also important to understand how the buyer role affects mode choice selection in the natural rubber industry. Customer service requirements differ among the market segments in the rubber chain, and customer expectations tend to depend upon the use of the product. The definition of customer requirements is not easy to identify; however, the actors in the rubber business (e.g. end users or traders) are considered to be one of the significant aspects in terms of helping to clarify what the customer needs. The interviews revealed that there are two main groups of actors - rubber

buyers including end users (e.g. vehicle tire, construction material, belt products, and medical equipment users) and traders within the rubber chain. Overall, purchasers in the rubber sector can be defined into two types, end users who are the big tyre manufacturing company and traders who play as middlemen in the rubber supply chain (QTE5.4_19).

5.4.2.1.1 End user markets

Generally, end users are much more concerned with product quality (especially rubber contaminants) than delayed shipments. This is because certain contaminants may damage machinery which is very high in value while the delay shipment can be solved by sourcing raw material from another supplier. Two participants added that: (QTE5.4_20; QTE5.4_21).

Interestingly, it is not unusual to encounter one or two week delays, however sellers have to keep buyers informed on the progression of the fulfilment process. For example, one interviewee commented:

“It is understood that it can be plus or minus 1-2 weeks.... If he does not lack rubber, I can typically arrange a modification to a convenient week which can cause a delay up to two weeks.” (IP14)

5.4.2.1.2 Trading markets

Purchasing behaviour in the traders' markets is more complicated than in the end users' market, and not as easy to deal with. External factors (such as the volatility of rubber prices) tend to have a significant impact on what customers really need, while in turn, customer requirements vary in different situations. In addition, there is a variety of traders emerging in the rubber trade, and new markets such as China are increasingly involved with the entire supply chain for the rubber industry. It is important that transport decision makers understand and know their customers very well. One interesting finding is that punctual delivery is preferred to express delivery, or is even more important than product quality in the case of customers, who buy for resale. The results of this study indicate that short transit time is not always the right solution. One of the participants reported:

“There are a number of players in the rubber industry. For example, traders who have already ordered in anticipation of the rubber price going up. If at that moment their warehouse space is nearly full, a long transit time will be preferred. In contrast, in the case of traders who have already sold to another and shorted customer supply, a short transit time is preferred. Nothing is certain.” (IP16)

The most obvious finding to emerge from the analysis is that on time delivery is very important for the downtrend period. This is because sellers may be confronted with difficulties in reselling when prices have already dropped. Therefore, the effect is that buyers have a tendency to negotiate a reduced price or cancel the agreement. For example:

“If I delay shipment, customers will feel dissatisfied. In particular in the case of rubber, if the delay occurs on the period of a price downtrend. Our customer is usually confronted with the issue of reselling to others. In other words, the current value of rubber is decreasing and it is difficult to resell and still get the profit; therefore, if I delay shipment in a falling price period, I will have a big problem with customers such as asking for reduced price or defaulting on that contract.” (IP21)

However, one participant provided an example of a Thai rubber company which has a warehouse in China so that the company does not have to be concerned about delayed shipments, stating that:

“Some companies do not deliver to customers but transport for stocking at their warehouse at China. Little delays do not matter because they are buyers themselves. Such companies may take a risk in something occasioning a delay. One of the warehouses is located adjacent to the main customer area in China, so that they deliver the rubber in advance. This strategy allows them to take risks on delayed shipment.” (IP7)

5.4.2.2 Credit rating

Credit rating represents another important characteristic that is used to evaluate the level of trust on financial issues with customers. It is the fact that good cash flow determines whether businesses succeed or fail. Therefore, companies have to make sure that they will receive payment from existing customers with a poor credit rating or new customers before delivery is made. For example, one interviewee commented: (QTE5.4_26). For more established customers, orders can be organised in advance, so that clever transport management plan help in cost savings. In summary, credit rating can influence of the choice of transport mode, for customers with a poor credit rating, there is a built-on limitation to alternatives of transport modes, particularly driven by reducing timescales.

In addition, great delivery service tends to maintain customer loyalty or attract new customers. Shippers feel happy to pay extra for a reliable transport service to make the impression to their customer. It can be summarised that cost may be a bit higher, but overall it is a fall in the standard price range that can be traded off with good

service. Two of the participants mentioned that: (QTE5.4_27; QTE5.4_28). It was also found that shippers prefer not to change the shipping liners for customers who trade with their company for some time. That is, differentiation leads to difficulty and inconvenience with the customer in collection at a destination port. Some customers may receive outstanding service from certain liners which they seek to match. One of the interviewees, who had a working experience over 30 years, reported that:

“...I know each existing customer will want their goods exported to what city. If CIF contracts, I will use the same shipping liner they are used to. Delivery to existing customers using the same shipping liners as I commonly used is convenient for our customer. So, customers can request more free time for late returned containers. If I frequently change carriers, it is difficult in commutation and negotiation for our customers.” (IP21)

5.4.3 Customer service requirements

Customer service and meeting customer need is essential for Thai exporters seeking to complete a world export market. The purpose of this section is to understand how customer service requirements related factors influence the choice of transport mode. The findings of this study provide insight into product quality and service quality, with focus particularly on on-time delivery.

5.4.3.1 Product quality and the specific production plants

This section highlights the importance of product quality on transport mode selection. Specifically of the production plant or location for container loading decreases the number of possible alternatives for exporters. Customers may require certain terms of conditions for loading. For example, the products may not be allowed to be loaded into a container outside the factory because of the possibility of rubber contamination (QTE5.4_30; QTE5.4_31; QTE5.4_32).

In addition, some clients specify the production plant since particular chemical levels from that plant tend to be the most appropriate to their subsequent production line process. Talking about the issue of specific production plants an interviewee said: (QTE5.4_33). This can only be established through a committed relationship with highly informed consumers. Therefore, it is important to work in partnership with the customers to establish an understanding of their underlying needs.

The interviews reveal that product quality and the specific production plants may have a significant effect on mode selection. In addition, the type of packing also has a significant impact on location of goods loaded into container. It means some packing

formats are only appropriate for cargo to be loaded into containers at the shipper's factory, primary due to potentially contaminated products. This is particularly the case for RSS.

5.4.3.2 On-time delivery window

An important point which must be considered in the rubber business is not the length of time the delivery takes but that the delivery is on time. In practice, there are diverse time requirements thus the product should be sent to deviate as little as possible from the date agreed for delivery. When the time delivery window is agreed between buyers and sellers, transport managers plan for an appropriate mode that can match what customers require and any constraints. Two respondents reported: (QTE5.4_34; QTE5.4_35).

Delivery time constraints are important factors that have a significant effect on the delivery process. The pre-shipment stage runs from the submitted order date to the closing date for consolidated cargoes at port, and then mode choice will be decided in that time period. In concluding, a chosen mode must have the capability to transport the goods to arrive at the port of shipment before the closing date passes. One informant reported that: (QTE5.4_36).

Sometimes managers come across such incidents which require express shipment, for example a customer needs urgent shipment or customers request to change the delivery date to an earlier one. This action absolutely impacts on transportation plan. When the delivery date changes to be an early certain time and date, particular unreliable transport modes cannot be considered, example of cost control is compromised. For example,

“Customer request to make the delivery date earlier. Customers said the shipment needed to be shipped a week before the delivery date. If a customer begs, I need to send the cargo right away. I cannot wait to negotiate for increasing Baht 10,000 per TEU by using the excuse that I must use a trailer for delivery.” (IP15)

5.5 Transport decision-making in the natural rubber industry

This section was mainly interested in understanding the way past experiences may have an impact on individual managers. It is reasonable to note that the more experience individual decision makers have, the more they are able to make effective decisions. This was divided into two sub-sections – “*perceptions of a certain transport mode*” and “*vision on freight transport management.*” In order to understand the whole picture described in this next section, the results will be explained according to Figure 5.8.

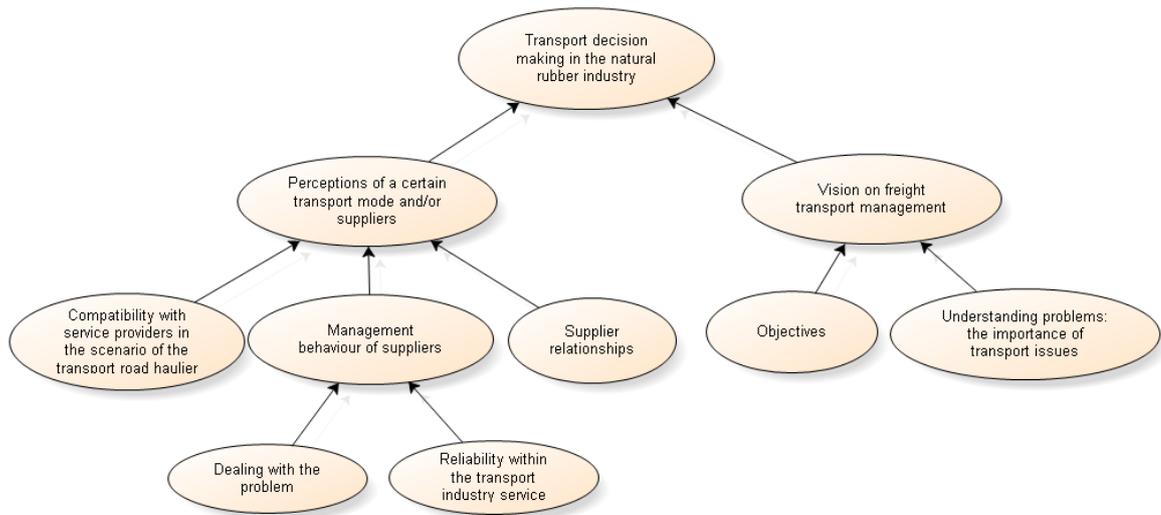


Figure 5.8: The influence of transport decision-making in the natural rubber industry

5.5.1 *Perceptions of a certain transport mode*

The clear finding, which emanates from the interviews, is that relatively inexperienced decision makers have limited knowledge on feasible options. In other words, where feasible alternatives need to be investigated; it is not easy for less experience decision makers to recognise all possible options. The preferred option is dependent on the perception of the alternatives available. In other words, for certain rubber companies, it is possible to have several modes and ports available, however, these only become the valid options if shipping managers realise it. It may be argued that past experience may have had an impact on the different valid options on an individual decision maker's frame of perception. This is because their perceptions of a particular mode relied upon their past learning experience and a bad memory of a certain transport mode may make some managers reluctant to use that option again in the future. For example: [\(please refer to QTE5.5_01 in Appendix Q; Section Q.4\)](#).

With the intention of understanding how decision-makers' perception on a particular means of transport and/or its transport operator can influence the choice, three main sub-themes will be explained. These are “compatibility with service providers in the scenario of the transport road haulier,” “managerial capability of transport providers” and “supplier relationships.” The interview data reveals that these three main points are important in influencing the selection of transport modes and loading ports.

5.5.1.1 Compatibility with service providers in the scenario of the transport road haulier

In day-to-day decision-making, the majority of staff or people who are responsible for supplier selection are likely to pick the one who is easy to work with and who is able to provide the service without any problems. If the service provided is acceptable, changes are less likely to follow. This is because working with new suppliers needs a period of time for learning and for relationship commutable on both sides to be built. One interviewee provided an insight when he stated that:

“After I have worked with transport providers for a long time, we will be compatible. I just give a quick call to inform them what I want without too many details. For example, I just give the number of containers, like 10 or 5 units. I know the way they usually work, such as supplier A likes to work early, while supplier B prefers to work near to the deadline. They are already experienced at the job, so they know the details of the work and when they should take action on each step; let's say when the B/L documents must be sent to me.” (IP9)

Another participant agreed with the above issue in that, if the problem can be solved, it is not necessary to change to another supplier. When changing to a new supplier, many new things need to be studied until they feel familiar in the working operation (QTE5.5_03). These details on transport function need to be learnt from action and take some time to be compatible with partnerships. One reason is that transport operations are not only to transport cargo from one production plant to another. These transport elements involve many and varied sectors that have to be in cooperation so that rubber distributions can be managed effectively.

It was found that container quality is one of the service issues that rubber exporters give priority to. This is because RSS is easy to damage because of the method of packing, for details see Section 5.2.2.2.3.1. Besides container quality, repeated delays in collecting cargos from the point of origin may have an impact on the inflow of the work process. This is because staff and loading area have been prepared to load rubber into a container, but if suppliers do not come at the appointed time, the

buffer time is already spent and the working space has been shared for stacking goods. Therefore, shippers are likely to spend more on labour costs because of the longer time it may take at the stage of loading rubbers into a container. One participant stated about the impact of delay pickup that: (QTE5.5_04).

Compatibility with road hauliers also has a significant impact on carrier selections. This is true of large-scale organisations, which authorize their production plants on the carrier selection; perhaps through the dedicated logistics providers. It is clearly evident that workers tend to use the service from suppliers that enables compatibility. As such service consistency of suppliers becomes one of the more significant reasons for carrier selection.

5.5.1.2 Managerial capability of transport providers

In freight transport in Thailand, only a few carrier services use rail transport and the coastal sea ports. The exception are the road hauliers who make up a highly competitive industry. The choice of transport modes is significantly impacted on by past experience, in that any bad memories associated with certain modes may have an adverse impact on their future use, particularly in the case of rail and feeder services. This is because there are only a few transport services on each route. Consequently, if a problem occurs with these operators, it is equivalent to it happening in terms of the mode of transport itself. The perception towards such a mode of transport will become negative, so it is not surprising that the company feels reluctant to use such a mode. The following section will explain the possible impact of past experience on the choice of transport mode made. It is important to note that different decision makers tend to take different actions, depending on their perceptions of certain transport modes and the external conditions of their organisation. The data reveals that there are two considerable, interrelated, mode loyalty issues influencing the selection of transport modes and loading ports: dealing with the problem of suppliers and the reliability of the transport service.

5.5.1.2.1 Dealing with the problem

It was evident from the several interviews that the supplier's responsibility seems to have an importance on the perception of shipping managers as to whether they want to continue the service or not. That is because they understand the basic concept that a problem can occur in daily life for almost any business. However, of more concern is not just the problem itself, but how suppliers deal with it. Therefore, it should be argued that dealing with the problem is a significant point that decision makers

perceive from past experience. The perception of certain transport modes is likely to have an impact on their use, or not, in the future. One respondent reported: (please refer to QTE5.5_06 and QTE5.5_07).

“...I think the problem is common for everyone who does business. So, I focus on the approach to deal with the problem. If you [suppliers] turn the mobile off, or do not answer the call in order to escape from the problem, it is common in business. It is possible for this to happen, even when you do not have the solution yet....The important thing is how you deal with it, finally. You can ignore it for one or two days but what next? If you are irresponsible in it, do I have confidence in doing business with you or not?” (IP16)

It is interesting to note that although some firms really want to use a certain mode such as feeder vessel, if the transport mode is operated by unprofessional transport providers, rubber exporters will be scared to use it and may even stop the service. For example, one interviewee talking about this issue noted that immediate increases in freight rates result in a problem that will have relatively high cost implications. A deputy vice president is of the opinion that: (QTE5.5_08).

In contrast with other transport modes, rail freight transport may have some problems, or even cause delays to shipments on some occasions. However, a common view amongst interviewees located in Nakhon Si Thammarat was that a rail transport provider was responsible for problems, particularly on the route from Nakhon Si Thammarat to BKK port. As a result, some small to medium-sized companies still use rail transport, despite the uncontrolled factors that can influence overall transit times in some shipments because the nature of the rail mode itself gives priority to passengers. As one participant said: (QTE5.5_09).

It is interesting to mention other large-scale companies may have a different perception on a problem that happened during the transportation of containerized cargoes by rail. In recent times, there have been Union protests, resulting in rail staff stopping the services suddenly. As a result, a big change occurred in the use of rail transport. One interviewee commented that the volume of deliveries carried by rail was reduced by 50%, although it was still the cheapest option. The main reason was losing of control over the deliveries. In other words, the difficulty of rail transport is inflexible to solve because lorries cannot access the railway to improve the situation. The other reason is that the service providers do not have an effective solution for such an uncontrolled problem.

Another remarkable problem that is worth mentioning is congestion at the Padang Besar border crossing, which is a terminal for shifting transport from road to rail, so that goods can be transported by rail to Penang port. The majority of rubber businesses who are situated adjacent to the Padang Besar border still use this route as the first choice, although the choice is well-known to be congested and has frequently broken handling equipment. The reason is that the alternative is considered as the most efficient distribution logistics at this point in time. For example, one interviewee reported: (QTE5.5_10).

5.5.1.2.2 Reliability within the transport industry service (Trust)

Transport decision makers said that they pleased to pay higher costs for some alternatives, which have a reliable service. This option might not be the first choice for them but they need to have the connection with the service providers. It means that whenever the demand for service is required and then the firm is guaranteed for the service. It may be argued that the controls over delivery and reliability on the mode itself are considered as the important factors that impact on the choice of transport mode. That is because shipments have to be delivered within a specified of time for certain customers and in some periods of time, such as a downward trend of the rubber price. It was also found that the reliability in service that the user can trust may be another significant factor that will motivate shippers to pay more for a premium service. One of the participants, who preferred to pay for the higher cost, said that:

“Songkhla port is more controllable than Penang. For example, sometimes I cannot control container deliveries from KTM Ltd. I have to speculate whether it will have arrived. After I return the fully loaded containers, I have to wait to see whether there is a problem. For instance, sometimes there was congestion or the crane was broken, so, it could not lift the heavy containers into the rail wagons. Everything I had done, including increasing the production rate, meant nothing. So, I choose a port where I can have more control of it.” (IP16)

5.5.1.3 Supplier relationships

Supplier relationships are defined as all types of closer relationships to third-party organisations that supply a delivery service to rubber exporters. As the majority of companies need to reduce risks on delivery, close relationships need to be maintained with key suppliers, so that the value of these interactions is at the maximum level. In the rubber business, almost all firms have partnerships with transport operators who provide a service for transport activities, such as road hauliers, feeder operators, freight forwarders, and custom brokers. Some companies

may prefer to transport by feeder vessels, but road hauliers may be the main transport mode for some companies and rail transport may be the favourite for others. The main transport mode is the difference from one to another; however, the majority of participants agreed that they have a close relationship with their key suppliers. One interviewee said that to maintain a close relationship with current suppliers is one of the key strategies of their company (see QTE5.5_12).

Interestingly, due to the limited capacity in Songkhla port, some companies always supply cargo to the supplier despite the fact that they do not wish to use the service on some occasions. The aim is to create a closer relationship with the supplier ahead of any problems in terms of shipment capacity.

There are further examples of studies in which services may be used because of the owner's decision or due to personal relationships. For example:

“On some occasions, my Dad’s friends ask for help by using their services. I can do nothing except to accept it if it is not over-priced. I have known many businessmen and some of them have a transport business. Sometimes, they need help and ask for it from my Dad. So, my Dad directs me to provide some work for them. It is good if they offer the same price as I currently use. However, I will not withdraw all of the work from my current suppliers. I will just rearrange it.” (IP3)

It is easier for the small to medium-sized Thai rubber firms to have a closer relationship with their road transport suppliers and the way they work seems to be an informal process, especially in the way of communication. For example, with those road transport operators who are easy to work with, users can submit orders by phone to ask for availability. Therefore, convenience factors may have a significant impact on supplier selection, an example given by: (QTE5.5_14).

5.5.2 Vision on freight transport management

This section aims to explain the purpose of the delivery to the customer based on the vision of the individual manager. It then goes on to understanding problems: the importance of transport issues.

5.5.2.1 Objectives

The distribution objectives of several rubber exporters involve ensuring quality goods are received by customers without damage and contamination at the right time for the least cost. The majority of transport managers want to achieve these potential objectives. These goals express consistent throughout the entire industry. In reality,

practice is much more complex. A common view amongst interviewees from large-scale organisations was that their main goals were on time with shipping costs as low as possible, punctuality and delivery with control (see QTE5.5_15; QTE5.5_16; QTE5.5_17). Other participants from small to medium-sized firms stated that their objectives were similarly (see QTE5.5_18; QTE5.5_19; QTE5.5_20; QTE5.5_21; QTE5.5_22).

It can be seen from the interviews undertaken that the majority of decision makers aim to excel in two main areas, namely service and cost. It is possible to summarise that SMEs are mainly concerned with the delivery service and the security of goods in order to improve customer satisfaction. It was found that decision makers rarely talk about cost as the main criteria. On the other hand, the large-scale companies include cost as an important indicator for company targets. It is worth pointing out that there are dissimilarities on the cost aspect between large and small-sized organisations. This may be because SMEs are more focused on core competencies so that companies are able to compete in the market, whereas the larger organisations have to run their business more efficiently.

5.5.2.2 Understanding problems: the importance of transport issues

It is reasonable to conclude from the interview data that transport decision-makers should try to use road transport for as short a distance as possible, if a company aims at cost saving. As one participant stated that:

“In my opinion, the combination of the three elements is the best choice. That is, transport from our factory by lorry... finally, ending with ships. Rail transport may be used between the two. In principal, it has to start with lorries and finish with ships and use as many railways as possible between them. ...It is riskier to use road hauliers to Penang port because of the nature of the characteristics of road transportation. So, I try to avoid using it as much as possible. There are both the risk of accidents and goods going missing during transport. Moreover, it is high cost. That is, if I transport goods for too long a distance by road, it will be not good. Lorries should be used for a short distance—between 100 and 200 kilometres.” (IP7)

However, it is possible that problems may occur along the transport process because of environmental change or transport system revolution, for example, delivery of conventional/bulk cargos to container shipping. In the rubber industry, the situation can change constantly, both in the rubber industry itself or with problems due to suppliers, ports and shipping lines. Therefore, decision makers have to consider the real-time situations to decide which option seems to be the most appropriate. In

normal circumstances it appears that the majority of rubber exporters tend to have between one and three preference options, depending on company size and logistics policy. If a problem occurs, decision makers will seek to switch to another mode, or even wait until the favourite mode becomes available, if they have only one option. One transport manager interviewed in this study stated that:

“It is the issue of a fussy job in many details, the routine tasks, and problem-solving tasks. I must know factories’ locations, Thailand’s ports and alternative routes to access the ports. The best option can be changing all the time, depending on the situation. However, I mostly use the currently used route in the normal situation... I believe that they are the most convenient and cheapest. So, the decision is not difficult in the normal situation.” (IP20)

It can be seen that manufacturing locations, existing transport infrastructure and suppliers available in area of production plants tend to have a significant impact on the choice of transport mode.

“Different companies have different criteria that may be slightly varied on punctuality, consistency, reliability, and price. It depends on them what they actually focus on... The important thing is that locations of factories, either in the north or south, make costs change.” (IP3)

It is equally interesting to point out that the interviewee's job description may have an impact on ideas as to the relative importance of the service and cost considerations. Logistics managers tend to have constraints about cost budgets, while production plant managers are likely to give more priority to service oriented company. Therefore, the relative importance of those aspects seems to diverge from one to another by specific working role. The authorities and the key responsibilities in the different sectors within the organisation form these expectations. An example given by one marketing manager focusing more on service than cost reported that:

“My business is rubber; so, profits or losses are mainly the result of rubber prices. The delivery method is just a service which can operate without any profit. If my customers want me to deliver to Wuzhou port, I don’t mind if what I charge is equal to what I have to pay. However, if they change their minds and want to go to the port of Shanghai instead, I will be happy because I can make some profit. I cannot make profits from the delivery service from customers because it is too little when compared to the rubber product’s value...Some other companies charge more if customers change the ports to be delivered to, but it’s not for me.” (IP15)

On the other hand, there are also a group of professionals in this industry who point out that cost is the first ranking, especially those who are in the position of logistics managers. This may be because managers need to monitor costs because it is one of

the KPIs in the logistics sector that is always found in larger-scale organisations. For example, one logistic manager said: (QTE5.5_25).

This has further supported and enhanced by another participant who indicated that cost is an important factor influencing transport management because logistics costs in Thailand are much more expensive, which is approximately 18% of GDP. In addition, one interesting point made by one executive director of a large company, was that the cost reduction can lead to an increase in competitive advantage because “...the cost of transport is the main cost of rubber business operations.” Thus, cost is considered as his company’s key competitive advantage. In the individual responses, logistic costs were considered to be a significant aspect of the budget in that the company is able to reduce them without any effect on rubber product quality. The executive director said: (QTE5.5_26).

Another important consideration that emerges from the interviews is that the different time of delivery has a significant impact on overall costs. This is due to the fact that the Cess rate, which is known as the rubber export tax, is directly proportional to the rubber price at the current market price. Therefore, if it is in a period of price volatility, the appropriate time period will be included in the equation when it comes to transport planning. For example, one interviewee said:

“The cess rate will be directly proportional to the price of rubber. Administration may have a significant impact on the product cost. The tax charges are revised every 15 days—divided on 1-15 and 16-30 every month. If prices have changed during this period, I have to manage carefully when products are delivered i.e. whether this occurs early or late in the month. The most appropriate action depends upon the predictions of the cess rate.” (IP20)

In summary, individual manager’s perceptions of transport objectives are subject to delivery, depending on the position and job role. It may be argued that managing directors and logistics managers put emphasis on cost more than service, whereas production professionals are more service oriented. Costs also complex in itself and sub dimensions are presented in Section 5.6.4 of operational factors.

5.6 Operational factors

The purpose of this point of the research findings is to understand how operational factors interrelate in the choice of transport modes and loading ports. This was divided into four sub-sections, “*ease of access*,” “*delivery operations*,” “*image - carrier (carrier or haulier) selection*” and “*costs*.” In order to understand the whole picture described in this next section, the results will be explained according to Figure 5.9.

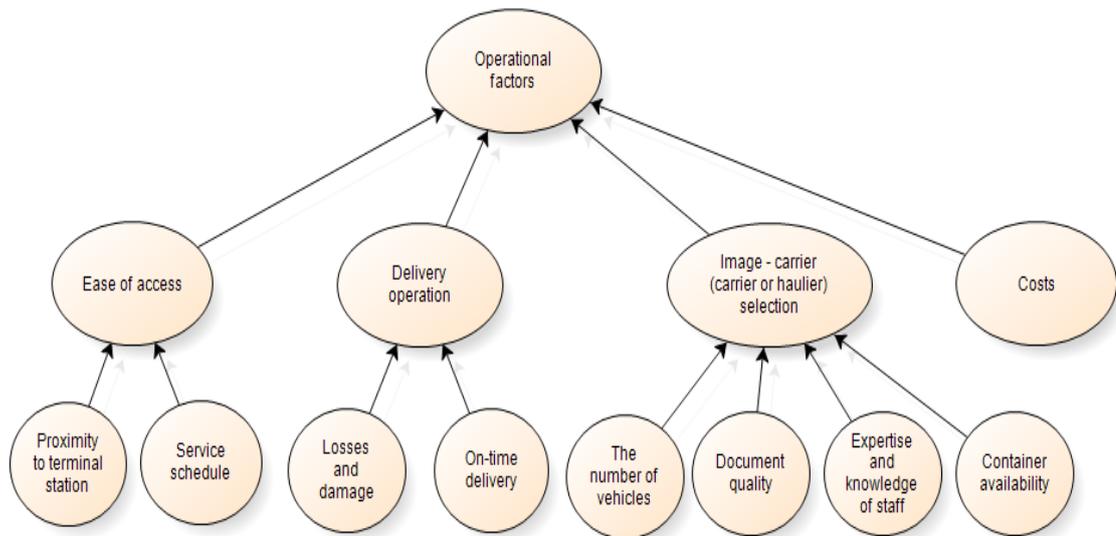


Figure 5.9: The influence of operational factors

5.6.1 Ease of access

The transport decision makers will consider whether or not there any alternative modes of transport are available with regard to nearby production plants. Furthermore, those options must be considered in terms of the other features such as acceptable cost and satisfactory delivery operations, so that the preferred option can be identified.

5.6.1.1 Proximity to terminal stations

It is observed from the interviews that the transport infrastructure such as roads, railways and inland waterways have to be investigated so that alternatives are clearly identified. This is because the majority of transport managers want to use roads as far as possible for short distances. They then transfer to other modes which are cheaper. In other words, the transport decision makers look for transport services near their factory location first, and then investigate other factors such as delivery operations

and cost. Therefore, the manufacturing location is one of the determinants of the choice of transport mode. For example,

“There are several zones in the south: the upper south or the lower south. I have to consider the options that can be accessed. Our purchasing team and I have a duty to find possible solutions whether it is inland waterways, railways or roads. When it finished, I have to summarise the cost for the whole loop of transport in a one page table. ...For example, if the location is Trang, there are 3-4 factories there. I have to find where the nearest port or customs border is. In this area it is Kantrang port. So, I have to research who are the best suppliers in the port. Then, I can choose among them.” (IP18)

Another manager pointed out that inland waterways are specified as the first choice because his factory's location is near the coastal sea port. Therefore, it is the most convenience port for him. He stated that: (please refer to QTE5.6_02 in Appendix Q; Section Q.5). Meanwhile, some rubber companies use rail as their chosen mode of transport from the production plants to the port for shipment. The reason is that the railway has the closest terminal station for transporting cargoes to Penang port. For example, one logistics manager reported that: (QTE5.6_03).

In conclusion, one company may prefer inland waterways, whereas others may prefer to use the railway as their first choice, with preferences clearly by locations specification. Transport decision makers always choose the most efficacious alternative; whereas, it is possible to differentiate one alternative from another. It is interesting to point out that although service problems frequency occur in terms of the mode of transport, one company KTM Ltd. still predominates in the transport service with regard to the rubber industry. It can be argued that the right location of the railway adjacent to the Thai border and connecting the Thai border to Penang port is the most successful logistics strategy in Malaysia. The majority of south Thai cargo transport goods are transported via this channel.

The most obvious finding to emerge from the analysis is that transport decision makers initially attempt to use the mode nearest their location. However, others factors still need to be considered in the equation, as to whether to use it or not. In other words, delivery operations such as transit time and safety will be evaluated in the try-out stage, as to whether the project succeeds or fails. It may be argued that a level of control over delivery has to be at a satisfactory level. One respondent reported: (QTE5.6_04).

It is somewhat surprising that not only did the terminal station near his plants impact on the choice of transport mode, but the transport managers stated that the office situated near the rubber exporter's plant also impacted on the choice. The significant reason is that local people are easy to talk to (QTE5.6_05). Therefore, small shipments, which do not need several vehicles, mean that small hauliers within the local area are preferred.

5.6.1.2 Service schedules

The other important criterion in terms of convenience, “service schedule,” is also recognised as a significant influence on the choice. It is the flexibility of the service offered to users, in which roads offer greater flexibility than railways or inland ports. Shippers are likely to pick an option that can fulfil customer needs first; then, if there is more than one option that satisfies this need, other factors will be considered such as difficulty of management, delivery performance or cost characteristics. An example given by: (QTE5.6_06).

Although railways seem to be the best option in terms of low costs and less risk of losses and damage, the significant barrier to their use is a less frequent timetable on particular routes. For example, unreliable railway schedules have a significant impact on choice for SMEs because the departure times are mostly tailored to suit bigger customers. The railways may postpone or cancel the service at any time if a big company is not ready to ship their cargo. Consequently, shipping managers perceive the rail option as being difficult to control in terms of service reliability. For example: one of the interviewees from a small-scale organisation reported that:

“There is the rail route from Thung Song to Penang. I used to use it five years ago, but it did not work for me. There was an experience when a big customer, Von-Bundit, delayed the delivery. This company is a small company and deliver just 4-5 TEUs per shipment, but the rail capacity is 40 TEUs. As a result, I had to delay as well. Von-Bundit is big enough to negotiate with the railways.... Finally, I decided not to use it. Instead, I use trailers from Thung Song to Padang Besar and then transfer to the railway for the rest of the journey [from Padang Besar to Penang Port].” (IP5)

Another participant from a medium-sized firm uses railways as the predominant option because this mode has more than one journey per day. Therefore, if any problems occur in terms of one delivery time slot, another slot can be found within the next 24 hours. The shipment may be delayed; however, there is less chance of missing the mother vessel booked at the port of loading. It is reasonable if the route offers a frequent service; consequently, if there is a delay the next time-tabled service

is not too far from the original plan. Thus, frequent schedules are recognised as reducing the likelihood of problems, especially damage and loss, because containers need only wait for delivery for a relatively short period of time. In summary, when the majority of shipments arrive on time for boarding the mother vessel, without loss or damage to the cargo, the integrity of the route can be accepted.

A common view amongst interviewees was that there are problems on the Padang-Penang route. However, the rubber exporters still supply a large volume of merchandise using the full capacity of the Malaysian transport provider on the Padang-Penang route (see QTE5.6_08). This may be because the problems noted are offset by access to several trips a day, offering control over damage at an acceptable price, while the issue of congestion can be overcome by sending products in advance. In other words, the transit times can be extended. In this way, there is less chance of cargoes arriving after the closing time for loading onto the booked ship.

In summary, proximity to the terminal station and availability of a frequent timetable has a significant impact on the choice of transportation mode, the reason being that transport managers are always looking for alternatives in close proximity to their location which can lead directly to lower costs and ease of management. Once these criteria are satisfied, only then will they investigate other factors in any significant detail.

5.6.2 Delivery operations

Delivery operations comprise a range of essential factors that determine whether or not that option can be used. This section is composed of two sub-sections, namely “*losses and damage*” and “*on-time delivery*.” The current study found that prior to a company choosing a means of transport for carrying their goods, the quality of the delivery service needs to be of a minimum level in order to satisfy the customers’ needs. In other words, the overall delivery service must at least reach a satisfactory level and, even then, that service will be considered as just one of many criteria. A poor level of service can cause customers to have a bad opinion of that delivery option and may result in a reluctance to make use of that service in the future. In the interviews, safety, punctuality and damage avoidance all appear to take precedence over cost for a number of managers. For example, one of the respondents commented: (QTE5.6_09).

Moreover, some participants admitted that they will consider costs first, to see whether total logistics cost lower than the maximum bar set. If overall costs are acceptable, then other delivery operation factors will be considered and transport activities can be managed until delivery service quality exceeds the minimum level. It was found that either the cost characteristics or the delivery operation will be considered first. As a result, these two initial criteria must be satisfactory; if only one of these factors reaches the expected level, the option will not be included in the alternatives. In other words, an option will not even be considered if the route has poor quality service leading to damaged or delayed shipment. Furthermore, when there is no control over the delivery pathway, that option will be eliminated from the available alternatives. Thus, it may be argued that a lack of punctual delivery cannot be compensated for by lower costs. It is reasonable to conclude from the interviews that any one of these criteria will not be accepted at the total expense of any other.

5.6.2.1 Losses and damage

Damage was found to be the most important factor for evaluating alternative pathways for transporting rubber products. This is because product value is typically very high. Even if a route is cheap, if it is considered to be insecure, this option is unlikely to be used for transporting rubber. In other words, transport managers prefer to take a safe pathway, even if the cost is higher, in order to make sure that their products are secure. Generally, there are two main interrelated problems with regard to damage to cargoes, namely leaking of concentrated latex and the rubber becoming mouldy. Therefore, proper packaging is crucial in helping to reduce the risk of product damage. One participant commented: (QTE5.6_10).

It was found that concentrated latex exporters are more concerned about the issue of safety than other types of rubber exporter (QTE5.6_11). As is recognised, latex supplied to export market is mainly packaged in flexi-bags and these are vulnerable to breakage during delivery. Transport managers try to avoid routes that need to re-load many times because the extra handling may damage the bags of concentrated latex. It may be therefore argued that some rubber products carry a higher level of risk of damage. Another participant who sells concentrated latex supported the clear evidence that different types of rubber require different means of transportation. The main reason for this is the safety of the goods,

“If they are block rubber, using lorries to carry the goods for loading into a container at a container freight station is acceptable. However, if they are flexi-bags of concentrated latex, I think it rather dangerous. When latex is carried in short containers of 20 tons, it is unbalanced. If the drivers are not careful enough, containers can turn over. In my opinion, using road hauliers cannot compete with using the railway. So, the railway is best when the goods are packaged in flexi-bags.” (IP15)

Another interesting issue worth pointing out is that the quality of the containers is a very important consideration in the transport of concentrated latex, because poor quality may cause the flexi-bags to leak. Therefore, bag loading inside the container need to be carefully operated and, at the same time, the container’s quality is checked.

Despite this, the high value of rubber makes it vulnerable to being stolen during transportation. In order to avoid this problem, the majority of rubber exporters prefer to load their goods into containers at their factory rather than at a port. This way, they are able to control the whole loading process. One respondent reported: (QTE5.6_13). Once the goods are loaded into a container, two seals are used for locking the container’s doors. One is the shipping line’s seal and the other is the shippers’ seal. This is one approach to preventing theft and is commonly used in rubber exportation, albeit, it is not recognised as being the ultimate safety measure in the prevention of theft.

It is interesting to note that some entrepreneurs still take the option of loading rubber into containers at the freight station instead of at the shippers’ factory, with the dual purpose of saving costs and reducing transit times. According to various interviews, these transport managers are aware of the risk of damage and losses and they attempt to manage the risk to a point that the company can accept. Therefore, the process of loading the rubber product into the containers is considered to be an important step to make a decision. The loading process needs to be controlled properly, otherwise if problems occur, exporters cannot deal with them. It is well known that the port does not allow outsiders to enter its territory and so shippers have no right to control employment there. As a result, there is an agreement with the transport providers that they oversee the loading of the rubber into containers, so that if there is a customer’s claim relating to its quality, exporters have a method of dealing with it. The comment below, illustrates this.

“I get them to adhere to our conditions. It is necessary to take photos of the arrival of the trailers, of the plastic covers, the front of the trailers, the trailer’s registration number, its driver and when the cover is opened. This company has a process to follow. After uncovering the trailer, there is the process of unloading the rubber from the trailer and into a container. They have to take photos of the empty containers, the top, the floor and both doors inside. Moreover, they have to take photos of the sky and the ground to demonstrate the weather conditions. Everything is monitored during loading: when the first forklift carries the rubber inside, a photo must be taken ... then after closing one of the container’s doors and when both doors are closed. They have to send the report to us every day with the details of loading at the port.” (IP18)

However, even this control system of loading process, relationships and assurances cannot entirely prevent problems, because some events are difficult to control, particularly weather conditions (see QTE5.6_15). Therefore the risk of damaged products can only be managed to a certain extent. With regards to goods being stolen, there is a risk in most pathways but roads are the most vulnerable. Therefore, if a transport manager sees a risk of damage or theft, he/she will try to avoid those routes. Although the insurance covers the products’ value, they do not want to encounter time delays and have dissatisfied customers.

5.6.2.2 On-time delivery

Long transit time typically have no effect on the quality of all types of rubber product (see QTE5.6_16). Therefore, duration of transport does not affect the quality of the products. All of the participants in this research confirmed that their rubber products have a life span of several years, but they need to be stored correctly. However, shipping delays have a significant impact on whether customers are dissatisfied or even withdraw from agreed contracts (see QTE5.6_17).

In order to avoid this kind of problem, the majority of exporters aim to deliver products within the agreed delivery time-frame. This means, choosing a delivery schedule that matches as near as possible the date of arrival requested by the customer. This seems to be the primary factor taken into consideration, so that goods will not arrive too early or too late. The reason is that if goods arrive before the requested delivery date, customers may be confronted with the issue of storage. On the other hand, a shortage of raw materials may affect the flow of the production line if rubber products arrive after their delivery date.

With regards to the impact of shipping delays on the customer, several participants believe that shipping delays can stop the production line in tyre manufacturing. Such delays can therefore damage, the credibility of the exporters from the perception of the customers. An example is the Toyota Company, which adopts a Just-in-Time strategy in their organization. In such a situation, the unavailability of raw materials will have a big impact. This issue is widely known in the rubber industry, so all exporters are careful to ensure their goods arrive on time, and if they need to, will pay a premium cost on some occasions. For example, one respondent reported.

“I focus on international trading. The credibility of our company (including that of Thai exporters) is important. Order fulfilment is important because if there is a problem with transportation (e.g. a delay in delivery), the company will lose credibility. Our company is the middle of the rubber supply chain. So, if the company delays delivery, it will affect other companies’ production plans. Nowadays, many companies such as Toyota need to reduce costs, I already know that they adopt a Just-in-Time philosophy. The capacity of their tyre manufacturing averages thousands a day, but they have to stop the production line if the company cannot deliver the raw materials in time.” (IP16)

Interestingly, traders will face more problems with delays during a period of lower rubber prices, because it becomes difficult to resell at a profit. Therefore, on-time delivery is of increased importance during periods of price fluctuation. As one of the interviewees commented:

“If I delay shipment, customers must feel dissatisfied. In particular rubber, if the delay occurs on the period of price downtrend. Our customer is usually confronted with the issue of reselling to others. ...If I delay shipment in the falling price period, I will have a big problem with customers such as asking for reduced price or defaulting on that contract.” (IP2)

Delays in delivery not only have an impact on customers but also on the rubber exporters themselves. Some participants pointed out that delayed deliveries have a consequence on the date of payment, for example: (QTE5.6_20). The sooner customers make payment, the better for the exporters. This is because good cash flow is essential for maintaining the normal operation of enterprises since the cost of raw materials are high. If a shipment misses the shipping schedule, this delays the customer’s payment. Exporters will have to wait for a later timeslot, which may be a week later, so transport managers aim to achieve what was initially planned. This has further supported by another participant who pointed out that they do not want their cargoes stowed at the port for a long time, especially concentrated latex.

It may be argued that control over delivery represents one of the most significant factors influencing the choice of transportation mode. The level of risk involved in certain modes commonly also includes a consideration of the effect of weather conditions. Transport managers therefore need to find a balance between service quality and costs. Most participants agreed that they are happy to pay more to make sure that their cargoes arrive on time and without damage, ready for boarding onto a pre-booked vessel. It was found that many rubber exporters measured the lowest proportion of shipments that miss their booked delivery slot as being the success measure in terms of delivery administration.

On the subject of on-time pick-up, this was also mentioned by some interviewees; however, it may not be a decisive factor. In other words, the chosen service will not be dropped due to delayed collection from the shippers' factory, so long as there are only a small proportion of shipments that fail to board the mother vessel at the port of shipment. Delayed pick-up may cause some difficulty for factory management in terms of less working space and inefficient use of manual labour; however, shippers can resolve the issue. For example: [\(QTE5.6_21\)](#).

In summary, most rubber exporters place on-time delivery as their primary first priority, because this can help to reduce the risk of contract withdrawal or losing customers. It was found from the interviews undertaken for this study that a balance between delivery service and costs has to be achieved and also account against other external factors. With regards to transit time, the total actual transit time (from collecting empty containers to returning fully-loaded containers) varies from ten to fourteen days. The transit time for each transport mode has an impact on the flexibility of the delivery plans. The shorter the transit times, the easier they are to manage. Therefore, transport managers aim to select routes with relatively short transit time. Above all, any transport provider that can offer empty containers available at all times seem to be preferred by the exporters. This is because the total transit time is reduced by eliminating the stage associated with the transport of empty containers from a container freight station that is located far from the shippers' factory.

5.6.3 Image - carrier (carrier or haulier) selection

Image can have a significant impact on choice especially with shippers used to purchasing transport services and who have had a negative experience. Additionally, this factor tends to apply in particular to two means of transport, inland ports and railways. This is because there are few carriers who provide freight transport services incorporating these two modes of transport. So, any bad experiences with one

transport provider may result in harm to the whole image of that mode. This means the criterion of image has more impact on the choice of transport a mode that has only a few services providers, such as railways and inland ports, than it does with road hauliers. As a result, some disappointing transport modes may be eliminated at the first stage of identifying possible alternatives. For example,

“I think that everyone who uses railways has to compromise on punctuality. There is not a delay on all shipments but it is quite frequent. I haven’t had a good experience with them, so, I decided that it not worth using them. It wastes time having to wait for passenger trains to pass first. It is not consistent with our policy. I am unable to produce goods in advance to compensate for the time delay. Using railways may save us some costs but I am not sure that our goods will be delivered on time.” (IP16)

From the interview responses, it may be argued that the potential of a delivery operation affects the user's perception of its delivery performance. It is interesting to note that a positive or negative image results from past experience of the willingness to serve or the professionalism of the transport providers. Hence, the behaviour of suppliers seems to dictate the perception of that pathway. For example,

“I develop an image of my suppliers by considering whether or not they provide a good service. This includes their previous service record: how many errors occurred in their jobs with us? It is also their reliability; if they do not have a bad record for breaking contracts. On the issue of responsibility, some suppliers, when faced with a problem, then abandon the task. I think the after-sales service also has to be good. Overall, it must be at a satisfactory level.” (IP20)

When contracting for the first time, transport managers may not necessarily consider the image of the carrier because they have never had any experience on them and information may not be necessarily obtainable. Nevertheless, the reliability of transport providers is initially evaluated in term of their capital, their experience and the readiness of their vehicles; for example, one interviewee said: (QTE5.6_24). If this is satisfactory, more details will be explored in particular container availability and document quality. The reliability of transport carriers is important because of the high value of rubber; shippers do not want to risk problems occurring in the future.

5.6.3.1 The number of vehicles

It was found that the number of vehicles have an impact on the size of shipments. This is because big cargoes need large-scale transport providers while smaller shipments can use the smaller road hauliers. For example two interviewees said the following, (QTE5.6_25) and (QTE5.6_26).

5.6.3.2 Document quality

Poor document quality, especially on the bill of lading, has an adverse impact on the image of carriers. It was found that the bill of lading is one of the most important indicators for after-sales service evaluation because this is a key document used as proof of delivery of the goods to the carriers and for any following up for billing and financial claim. In addition, it also affects the consignee when they are collecting goods at the destination port. This may cause a delay in acquiring the goods for the reason that buyers cannot provide evidence of ownership at the collection point. Thus, transport decision-makers are bound by the time by which such documents must be received. It can be therefore argued that the bill of lading is another significant factor that is commonly evaluated by users of transport services. One informant reported that (QTE5.6_27).

5.6.3.3 Expertise and knowledge of staff

Surprisingly, the expertise and knowledge of staff seems not to have a significant effect on the choice of transportation because a transport manager will not switch to another mode simply because he is dissatisfied with the staff of the first mode. This is despite the fact that transport managers want to work with professional staff. The results of this study indicate that if they are dissatisfied with the staff they are currently working with, they will request new staff, but still retain the same transport supplier. The most important qualities that shippers expect from the staff are their skill for solving problems, their ability to make judgments on common issues and their responsibility to complete contracts.

5.6.3.4 Container availability

Finally, container availability represents another emerging factor that has a significant impact on the image of each option. This is because it is one of the biggest problems in freight transportation in Thailand. Mostly, shippers are faced with a shortage of empty containers. It can be argued that the availability of containers may determine the success or failure of some transport operators, particularly in inland waterways, for example:

“There is the issue of the shipping liner’s support. For example, in the Port of Kantang, this was widespread before container shipping was established. When it changed to a container system, Kantang [inland port] had to stop providing a service because no shipping liners sent empty containers to be stocked at the port. The port suspended service for a period of time, so exporters in the Trang

area had to use trailers for export via the Padang Besar border instead, until Penang Port cooperated with the liners to promote Kantang. They managed to stock empty containers at the port...” (IP7)

This has further supported by another participant confirms that container availability has an impact on the image of transport providers (see QTE5.6_29). Moreover, the main criterion for most shippers is that there is a container freight station located in close proximity to their production plants in order to reduce transit time.

In summary, various factors included in this section of the findings may influence the choice of transportation mode. In particular, transport managers who have had a bad experience of a particular transport mode will have the direct consequence of gaining a negative image. As a result they will tend not to use it in the future, especially if alternatives cause a delay to services.

5.6.4 Costs

There are three basic prices commonly used for the selling price in the rubber business based on three main terms of trade: 1) Ex-Factory price, 2) FOB price equal to Ex-Factory price + cost of inland transit to port (named as inland costs), and 3) CIF price equal to FOB price + ocean freight rates (named as ocean freight costs). If total delivery cost is acceptable, other delivery operations will be investigated in respect of transit times and free time days for using containers. In the initial assessment, appropriate cost will be judged whether it is a possible option to use it or not. If costs and delivery service are satisfactory, then any risk in using such a pathway will be evaluated to see if such option can be included as a useful alternative. The comment below, illustrates this. Please refer to QTE5.6_30.

In relation to initial cost assessment, the total estimated cost will be considered. Attractive costs will then be investigated alongside others such as transport mode characteristics and transport providers. This means that too low or too high a price tends to be eliminated or negotiated for a standard price. Artificially low prices would not have ever been taken into consideration because they are likely to only provide the service for a short time or to be impractical in the long run.

“...considering inland transportation, in reality, how much should the cost be? If I cut their price too much, they may be able to operate only in the short-term at the start. Then I have to find a new one. Is it worth it to do it like that? Alternatively, I have to take risks; for example, there are road hauliers in this area operating by using cheap fuel in Malaysia. However, there are the following questions: ‘is it risky?’, ‘is it available all the time?’, ‘is it legal?’, and ‘is there the following problem?’.” (IP16)

Therefore, only reliable choices and suppliers that tend to work well for sustainable periods will be selected to further investigation of other elements, especially transit time and schedule service. If the transport manager is then satisfied with both delivery service quality and cost, this option will then be trialled for a small shipment with a familiar customer who will be tolerant of any mistake that may occur. If there is no problem with delivery, the actual cost is not different to the agreed cost, and overall everything is satisfactory, the option will be included in the set of useful and practical alternatives. One participant commented: (QTE5.6_32).

On the topic of standard costs, it was found that almost all rubber exporters have more than one transport provider to work with, with the condition that acceptable costs are similar among them. Transport managers try to keep a certain number of useful options open among railways, inland ports and roads. The reasons are to increase service quality by encouraging competition among their suppliers and to mitigate risk in case a supplier cannot serve them, as well as the huge transport volumes on their hands that cannot be met by only one supplier. There is some evidence amongst the research participants that they spread risk by dividing options into a set of practical alternatives, based on their knowledge of the various limitations of each option. For example, two interviewees said the following, (QTE5.6_33) and (QTE5.6_34).

However, one participant said that his company uses only one big and reliable supplier since he wants discounted prices; so, his transport cost is lower than some rubber competitors. He trusts in the capability of the transport operators because his supplier has extensively run a freight transport business and is the biggest one in that location. Thus, he will be given a good service at a bargain price. The comment below illustrates this.

“I understand that transportation is sometimes a problem. Sometimes it's the ones with the real power who must manage such problems. Transport operators need to have enough volume to be used in the negotiation. What they want is large volume; therefore the company needs to have a huge volume to meet their needs. Our supplier has enough volume, therefore he can use the certain volume to negotiate for bargains of even hidden power.” (IP7)

There is contradictory evidence where another participant supports all potential transport modes: inland port, railways and road are all used in order to maintain the services of some certain transport providers. One of the exporters, who had biggest export volumes, mentioned that: (QTE5.6_36). The main reason is to build flexibility into the delivery system, which is considered essential in the context of a large-scale

organisation. Due to the huge volumes of rubber involved in the business, several options are truly essential for easier matching with customers' shipment instructions.

With respect to the balance between cost and risk toward delivery service quality, it was found that lower costs cannot compensate for the risk of goods being stolen and damaged. This implies that although low cost is an important factor; the risks of using such an option need to pass the minimum acceptable point. Otherwise, the option will not be considered a useful option. Therefore, the balance of cost and risk at the acceptable points need to be considered. It is reasonable to assume most of the companies in the rubber industry are seeking to maintain or reduce costs; however, each option will be evaluated together with risk exposure to both service quality and flexibility in management. This research has found that the balance between costs, service quality and flexibility plays a major role in the choices made. For example,

“... If I consider only costs, I have to accept the potential risks that may occur. For example, is there any problem to deliver goods in the rainy season, or any road accidents that will occur. Finally, I have to agree to take the trade-off between costs and risks. For instance, if the barge sinks, the company will lose 60 million Baht in total compared to a transport saving of just 1,000 Baht/TEU. When I consider it, I have to save so much from delivery to recover it ...It is called management of cost and risk at acceptable point.” (IP16)

To a great extent, the small and medium sized rubber exporters who have contributed to this study usually have a few favourite transport routes involving a small number of carriers, while large-scale organisations make use of a wide range of transport modes. This is because the latter has a huge volume on hand; so they can manage to not have huge differences in transport costs between the different options because they are able to negotiate for discount prices. In addition, one transport mode alone cannot fulfil all the distribution volume requirements; thus, several potential transport modes are used to allow maximum flexibility in their distribution system.

It is undeniable that railways or inland ports have a positive advantage as a lower unit cost; however, limited schedules need to be taken into account. Road transport can meet the gaps in distribution schedules that cannot be met by the railways and inland ports, with a combination of all transport modes being used to enhance the overall provision of outbound transport activities. It is the fact that the more volume shippers provide to a supplier, the more money they save in terms of unit cost. Therefore, the large lots will be given to waterways and railways as a first priority, if those schedules can match customers' requirements. And then the next higher cost will be used respectively.

Interestingly, if any option is judged as diminishing supplier control over delivery, those options are likely to be suspended or the service even withdrawn at an early stage, even though higher costs may be incurred by switching to another option. For example, one interviewee said: (QTE5.6_38). It may be argued that higher cost may be preferred, in order to avoid difficulty in management that may result from others' hidden costs, time costs or interest costs resulting from late payments. In addition, there is a preference to spend a premium transport cost on new customers' orders, in order to create a good first impression and help to build substantially relationships.

On the subject of cost consideration, the findings from the interviews indicate that business size has a different impact on the relative importance of each transport element: inland costs and ocean freight costs. In general, all-in costs, which are composed of two main costs, namely inland costs (from shipper's location to port of shipment) and ocean freight costs (from port of shipment to port of destination), is calculated based on these two basic costs. An appropriate pathway will then be selected under the condition of acceptable costs.

Another important finding was that inland transport costs are more important than ocean freight rates from the perspective of large-sized firms, in contrast to their smaller counterparts. In other words, ocean freight rates have a more significant impact on the choice of transport pathways for small organisations than for large organisations because ocean freight rates are reduced in directly proportion to the volume shippers provide to a shipping line. In contrast, inland costs are calculated per unit, even though the larger the volume supplied, the more the discounted cost that can be saved on each unit. In other words, large volumes may not have a significant impact on ocean freight rates between different ports, whereas inland costs have a limited discount available and are expensive at present. So, ocean freight rates are similar from one port to another if sufficient volume is being transported. In summary, a lower ocean freight rate seems to have more impact on the choice of port for small rather than for larger suppliers. For example, one of the participants illustrates:

*“...inland cost is important because inland costs are more expensive than ocean freight costs. Moreover, ocean freight rates can be negotiated by supplying huge volumes, so I do not mind. For example, I deliver 10 TEUs and its cost is 10 dollars (=10*1\$). However, if I deliver 100 TEUs instead, the cost is just 70 dollars (<100*1\$). But for inland costs, if it is a 100 TEU lot, I have to pay for 100 multiplied by a unit cost (100*a unit cost). ...if it is a small company, he is more concerned about the cost of ocean freight as an important issue. However, I rather consider the possibilities of access to it; for example, can it be*

accessed, are there enough empty containers, is there a ship liner running to the port of destination.” (IP18)

5.7 Summary of factors influencing the choice of transport modes

According to the research question seeking to gain a better in-depth understanding of factors influencing freight transport mode choice in the Thai rubber sector, this research utilises the interview transcript and template analysis method previously mentioned in Chapter 3. Therefore, the findings presented in this chapter are derived from an interpretation of the final template (see Appendix R: Final template).

Moreover, the findings related to factors influencing decision makers on freight transport mode choice were divided into five main components. These were: environmental characteristics, organisational characteristics, customer (rubber buyer) characteristics, individual decision managers in the rubber industry and operational factors. Each category is complex and can be divided into multiple levels and sub-levels.

This research is not seeking to rank the priority of those factors that seem to constitute complex issues, due to the conflict from one interviewee to another, but could be continued as future work with proper methods. However, the above are prioritised according to the researcher’s interpretation of which factors are more frequent mention than others or based on the sense of what participants say, where one is more important than another. All of these levels are outlined in Table 5.1; that is, the summary of factors influencing the choice of transport pathway for rubber products.

Table 5.1: Summary of factors influencing the choice of transport pathway for rubber products.

Factors	Sub-factors
Operational factors	<p><i>Delivery operation</i></p> <ul style="list-style-type: none"> • Losses and damage • On-time delivery <p><i>Costs</i></p> <p><i>Ease of access</i></p> <ul style="list-style-type: none"> • Proximity to terminal station • Service schedule <p><i>Image - carrier (carrier or haulier) selection</i></p> <ul style="list-style-type: none"> • Container availability • The number of vehicles • Document quality • Expertise and knowledgeable of staff
Individual decision managers in the rubber industry	<p><i>Perceptions of a certain transport mode and/or suppliers</i></p> <ul style="list-style-type: none"> • Managerial capability of transport providers <ul style="list-style-type: none"> - Dealing with the problem - Reliability within the transport industry service (Trust) • Compatibility with service providers in the scenario of the transport road haulier • Supplier relationships <p><i>Vision on freight transport management</i></p> <ul style="list-style-type: none"> • Objectives • Understanding problems: the importance of transport issues
Organizational characteristics	<p><i>The organisation hierarchical structure</i></p> <p><i>Logistics Strategy and Policies</i></p> <ul style="list-style-type: none"> • Market power • Manufacturing locations • Effect of other business strategies within a firm e.g. distribution strategies, logistics strategies, and holding stock strategies <p><i>Existing delivery system within the organisation</i></p>
Environmental characteristics	<p><i>Nature of natural rubber industry trading</i></p> <ul style="list-style-type: none"> • Commodity price movement • Product Characteristics <ul style="list-style-type: none"> - Packing and Stuffing of a container - Very high-value products - Seasonal Trading • Potential laws, technical regulations and taxation policy <ul style="list-style-type: none"> - Documentation for export procedure - Export privileges and commodity inspection <p><i>Situation factors</i></p> <ul style="list-style-type: none"> • Economic conditions • Ad hoc situational factors • Climatic conditions <ul style="list-style-type: none"> - The damage to rubber products - The delay in shipment - The risk of losing weight of rubber products
Customer characteristics	<p><i>Customer service requirement</i></p> <ul style="list-style-type: none"> • Product quality and the specific production plants • On-time delivery window <p><i>Customer purchasing behaviour</i></p> <ul style="list-style-type: none"> • Market conditions • Purchase behaviour of customer <p><i>Customer importance</i></p> <ul style="list-style-type: none"> • Buyer roles (end user market or trading market) • Credit rating

1) Operational factors

In terms of the importance of the operational factor component based on the researcher's interpretation, these considered as the most important amongst five components. The current research findings suggest that, based on viewpoints of Thai rubber exporters participated in this research, operational factors are critically vital in their freight transport mode choice due to the particular business environments in the Thai rubber industry context.

Operational factors are the main focus of concern on the part of transport managers under normal conditions. Neither cost nor quality of service are the only significant criteria. Rather, there is a range of factors related to operational factors which can be categorised into four main groups: delivery operation (i.e. loss and damage and on-time delivery), costs, ease of access and image of transport carriers (e.g. container availability and quantity of vehicles).

It is worth pointing out that although speed is the most significant factor in some industrial sectors, such as pharmaceutical products and electronics (Punakivi & Hinkka, 2006), this study has identified that the despatch of goods within the agreed delivery time-frame, which typically is on a weekly basis for rubber products, is more important than speed. One of the main reasons given by respondents is that shipping delays may have a significant impact on customer dissatisfaction, even leading to a withdrawal from agreed contracts, while early delivery can lead to the issue of storage. If goods arrive after the requested and specific time-slot window, tyre manufacturing companies that adopt the Just-in-Time strategy may have problems arising from a shortage of raw materials. To make sure that there is a good transport service to customer, control over delivery has to be at a satisfactory level.

From this study, it may be the case that control over delivery is considered to be one of the decisive factors when it comes to some shippers not using Thai railways. Based on the current study, it is clear that the difficulties associated with rail transport are insoluble when a crisis situation arises, since lorries cannot access the railway to solve their problem. Thus, the rail transport mode is generally avoided for vital shipments, especially during periods in which there is a downward trend in rubber prices. Another important finding was that the risk of damaged products varies, depending on the rubber product type. To minimise such risks, routes that require extra handling are then avoided in the case of concentrated latex products. In contrast, extra handling may not be of concern when transporting RSS and STR, since they are not vulnerable to breakage.

It is worth noting that decision makers participating in this research have some degree of differences in terms of their attitudes, previous experience and the characteristics of organisations. From the analysis of interview data from this study, the decisions of transport managers are evidently affected by their perception of a certain transport mode and/or suppliers, while the decision is considered under the condition of existing delivery systems and logistics policy within the organisation.

As a result, this research has also been considered them together with analysis of all details of the operational factors, which have been divided into four sub-sections: ease of access, delivery operations, image of transport carriers and costs, all of which are required to reach a satisfactory level. According to the findings of this research, the satisfaction level of each decision maker varies in terms of these operational criteria based on the perception of decision makers and their previous experiences, the situation of rubber price movements, the economic situation and also the organisations that they are working with.

2) Individual decision managers in the rubber industry

Based on the researcher's interpretation, the second most important of the five components is the individual perception and past experience of decision makers. With regard to individual decision makers, the perceptions of certain transport mode/providers and the vision of freight transport management have emerged as the two main sub-groups of this theme. The decision-maker's perceptions with regard to individual transport mode/providers have a significant impact on transport choice. The most obvious finding to emerge from this study is that the ability of transport carriers to manage the situation when faced with problems plays a vital role in creating good or bad perceptions on the part of transport managers with regard to transport mode/providers. This can be summarised briefly based on the data that the perceptions of managers with regard to particular modes of transport are mostly affected by past experience. As a consequence, the attitude of shippers plays a crucial role in the selection of freight transport, particularly in the context of the Thai rubber sector.

From this study, there is a limited infrastructural availability of rail and water modes for transport operation in Thailand. It is a fact that the road mode is prominently different from the rail and water modes in terms of the number of road hauliers, whereas rail and water modes are limited mostly in terms of having just a single service provider that provide the service. As a result, the negative experience of previous use, such as the services given or individuals' attitude towards service providers, has an effect on

the current decision to use or not to use. Therefore, it may be contended that personal attitude toward a particular service provider also influence decisions for selecting a freight transport mode. These findings also illustrate a general point that a bad event occurring on a certain transport mode tends to have a greater impact than does a positive event. Thus, managers feel reluctant to use a mode of which they have had a bad experience because such negative situations tend to have more impact on human perceptions than do positive situations.

The current findings have shown that misunderstanding and misinformation with regard to acceptable alternatives may lead to bounded rationality in the design of transportation, which may, in turn, result in a decision which cannot be optimised. Different decisions may vary from one individual decision-maker to another, based on knowledge and past experience. Therefore, it seems in general that senior managers are more interested in sufficient choice rather than basing their decisions on optimal choice. Likewise, decision-makers spread risk by dividing options into a set of practical alternatives in order to minimise risk.

3) Organisational characteristics

The organisational characteristic component is considered as the third most important of the five components, based on the interpretation of the researcher. In regard to the investigation of organisational characteristics, there are three key aspects involved: the organisation's hierarchical structure, the existing delivery system used by a particular organisation and logistics policies. In terms of the existing delivery system used by a particular organisation, the majority of small-medium shippers in the Thai rubber business mostly employ outside transport providers, while some large-scale companies use both in-house and outsourcing for transport activities.

In relation to the organisation's hierarchical structure, the results of this study indicate that the nature of a company in terms of its structure and organisation is generally seen as a factor that strongly impacts upon the decision-making process. The following conclusions have been drawn from this primary study. To begin with, in the case of SMEs, the decision maker with regard to transport is likely to hold a high position within the organisation and is more flexible when it comes to making decisions. Decision makers are normally owners or have a close relationship with the owner. Consequently, the power to make decisions tends to be in the hands of one or two executives or senior managers. Thus they are likely to make decisions based on experience rather than be governed by formal processes. SMEs often tend to engage in repetitive processes, involving a similar quantity of rubber to specific customers,

with the use of a small number of transport options that they feel at ease working with. Another important finding was that close relationships with carriers can be a major factor when it comes to making decisions with regard to transport modes and carriers.

On the other hand, in the case of large-scale organisations, the decision process is somewhat stricter and more formal, while senior managers apparently make decisions based on a prescriptive model. The results of this study indicate that a transport provider offering a satisfactory level of service will tend to be chosen for future use rather than the lowest cost. This result may be explained by the fact that larger firms are able to negotiate price; thus, delivery service variables become decisive factors.

It is somewhat surprising that senior managers in large companies are strongly motivated to find new alternative solutions, being that no evidence of seeking new transport alternatives were found in SMEs. Another important finding was that, in order to have more transport options, large firms can accept higher prices if the provider satisfies the reliability requirements in terms of the transport service.

Furthermore, due to the interaction involved that appears to be various and complex in today's business circumstance, operational factors are impacted upon by external forces, which is mainly caused by a combination of environmental characteristics and customer (rubber buyer) requirements. The following section will thus summarise the finding of this study in terms of environmental characteristics and customer (rubber buyer) characteristics, respectively.

4) Environmental characteristics

The fourth important component resulting from the researcher's interpretation concerns environmental characteristics. In terms of environmental characteristics, a variety of perspectives were expressed throughout the interview data. However, two broad sub-themes may be drawn from the analysis. These are the nature of the rubber industry (e.g. fluctuations in rubber price and rubber product characteristics) and situational factors (e.g. economic conditions, ad-hoc situations and climatic conditions). Regarding the nature of rubber industry trading, there are three main sub-groups of factors related to the rubber trade: fluctuations in rubber price; fluctuations in rubber product characteristics; and potential laws, technical regulations and taxation policies.

First of all, two main problems resulting from unexpectedly low prices were found to be customers not fulfilling their contracts and the problem of a shortage of rubber in the local market. These findings, while preliminary, suggest that on-time delivery can lead to a decrease in the problem of contract default. Thus, to minimise risk, decision makers should pay more attention to on-time delivery during periods of high price volatility.

As regards potential regulations, laws and taxation policies, these findings suggest that a weak link may exist between the Rubber Export Tax (entitled Cess) and the rubber exporters' choice of transport modes. For example, where there are instances of uncertain Cess rates, the reduction in transport costs is less important than the export tax. Thus, to avoid the risk of increased Cess, the majority of exporters prefer to pay higher transport costs. Consequently, trailers would probably become the predominant mode of transport during such times, due to the strong advantage of short transit times and ready availability for express delivery at any time.

With respect to rubber product characteristics, RSS products should be loaded and sealed at the factory, except in the case of those big companies that are able to control the loading process. Concentrated latex exporters mostly avoid the use of routes requiring several transits. This is a major cause for latex exporters avoiding the use of the railway service, barges and coastal ports because more cargo-handling is required. In short, STR has the greater flexibility in terms of transportation. Moreover, both RSS and concentrated latex require a better quality of container than does STR. Although RSS and STR are both solid materials, RSS is more at risk in terms of the contamination that typically occurs in the process of loading on to a container. Due to the heavy weights involved, this process requires skilled labourers. Despite the above, it seems that rubber exporters should have flexibility in terms of delivery because a great variation in the shipment volume of rubber products can be the consequence of harvest season variations and demand uncertainty in the world market.

As far as situational factors are concerned, in situations of highly volatile ocean freight rates some shipping managers prefer to trade in terms of FOB (see Chapter 5; Section 5.2.1.2), in order to minimise the risk of a significant increase in transportation costs. With regard to ad-hoc situations, the majority of big firms are continually preparing for such situations by making use of a number of transport providers. Contrary to expectations, this study did not find any indication of any contingency plans on the part of small-scale organisations. Under such crisis situations, these

small firms typically end up employing road transport services, even though such a mode is relatively costly. Although more recent attention has focused on the provision of carbon emission issues, what is surprising is that no such issues were mentioned in this primary study. It is also worth noting that there is some evidence that climatic conditions may affect the choice of transport mode. The selection of loading locations, the risk of damaged products and the weight loss of rubber have all been found to be possible consequences of adverse climatic conditions.

5) Customer (rubber buyer) characteristics

The rubber buyer characteristics component is the fifth important component, in addition to operational factors, individual perception and past experience, organisational characteristics and environmental characteristics. The most obvious finding to emerge from this study is with regard to customer characteristics. Customer-purchasing behaviours, customer importance and customer service level requirements emerge as the three most significant sub-groups of customer characteristics. These three groups have provided an enhanced understanding in terms of customers' requirements in international rubber trading within specific industry.

Moreover, the results of this study indicate that a relationship exists between an individual customer's country of origin (e.g. a developing or developed country) and their trading behaviour in terms of adhering to contract agreements. The results of this investigation indicate that there is an overall perception that rubber buyers from Korea, Japan and Europe show high respect for a contractual agreement, unlike Chinese customers who are somewhat tricky in terms of contract agreements. Under such conditions, activities performed in relation to transport are becoming increasingly significant, while the reliability of the transport mode used is of even greater concern. This study has found that generally, Chinese customers are tricky and difficult to deal with, leading to many challenges when compared with customers from Korea, Japan and Europe.

In addition, customers exhibit some fluidity depending on economic conditions. This research found that types of rubber buyers also play an important role in terms of customer priority. For example, some rubber exporters pay more attention to their buyers who are the real users of rubber to add value to their business than those who are middlemen, trading it for profits. It can thus be suggested that, in order to avoid negotiations for price reduction or even the cancelling of an order, on-time delivery then becomes the most important decision factor in terms of transport choice.

Therefore, it seems in general that for the transport mode employed for Chinese customers, new customers and rubber traders, on-time delivery becomes the most significant factor influencing transport choice. As a result, the risk of defaulting contracts can be mitigated when trading during periods of unexpected drops in prices in the rubber markets.

This chapter has introduced the main findings emerged from this primary research in order to address the aim of this research. Hence, the next chapter will move on to the discussion of these findings with relevant literatures in more detail.

Chapter 6: Discussion –5 Forces influencing the choice of freight transport in the natural rubber industry in Thailand

6.1 Introduction

The aims of this chapter are to summarise the findings of the research, as presented in the previous chapters, together with offering a discussion of the factors employed in the selection of transport modes and loading ports. There are various factors that are influential and important in the management of intermodal freight transport choices, and these factors can be categorised into five key areas, as presented in Figure 6.1. The five main categories that were identified as factors influencing the choice of transport pathways are as follows: “*environmental characteristics*,” “*organisational characteristics*,” “*customer characteristics*,” “*transport decision making in the natural rubber industry*” and “*operational factors*.” Each category is composed of a range of factors and can be divided into multiple levels and sub-levels as presented in the previous chapter, with excerpts from the raw data evidence. This study has helped to assist our understanding of the selection of intermodal freight transport with regard to certain circumstances in the context of the Thai rubber industry. All of these factors are discussed more comprehensively in the following sections. At the end of this chapter, all of these factors are brought together to provide an important opportunity to advance the understanding of how managers in the Thai agribusiness sector make decisions on freight transport mode choice.

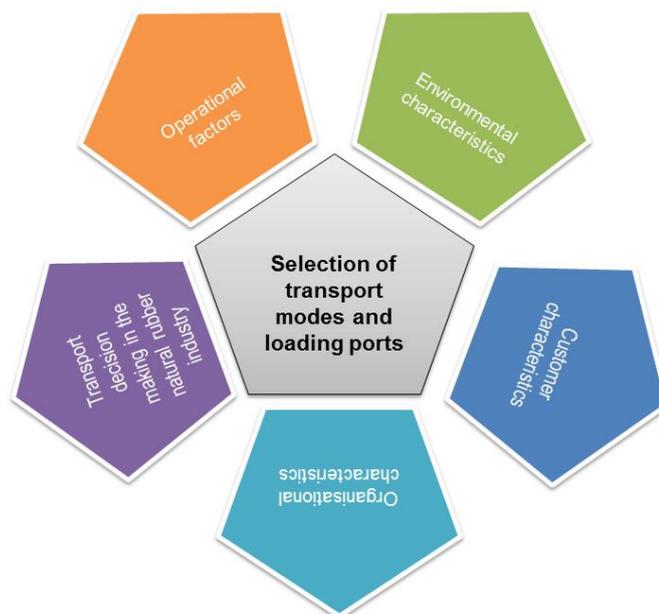


Figure 6.1: Five key areas influencing the choice of transport pathway in the natural rubber industry in Thailand

6.2 Transport decision-making in the natural rubber industry

This section is mainly a contribution to a better understanding of the way that past experiences may have impacted upon individual managers in making decisions on the choice of transport. The findings should make an important contribution to the studies of transport choice. There is clear evidence that a preferred option depends mainly upon the perception of available alternatives and these options only become practical if shipping managers recognise them. This finding further supports the idea of Notteboom (1998), who pointed out that misunderstanding and misinformation on acceptable alternatives may lead to *“bounded rationality”* in the design of transportation, which may, in turn, result in a decision which cannot be optimised. Therefore, it may be argued that past experience may dictate the set of acceptable alternatives (Simon, 1992; Swaim, Maloni, Henley, Campbell & Wagner, 2016). In other words, different decisions may vary from one individual decision-maker to another, based upon knowledge and past experience. This view is reinforced by Simon's discovery, cited in Kalantari (2010, p. 515), who writes that *“the problem solver uses his past experience to form an expectation of what he can attain [...] which demonstrates his level of aspiration.”* Furthermore, Kahneman and Tversky 's quote in Wakker (2010, p. 239), state that *“Losses loom larger than gains.”*¹² Because of this, managers whose perceptions on particular modes of transport are affected by past experience, arising from a bad event on a certain transport mode, tend to be impacted more than by a positive event. As a result of this, managers feel reluctance to use that risky option in the near future, since loss tends to have more influence on human perceptions than gain.

¹² Wakker (2010, p. 238) defines loss aversion: *“the main empirical phenomenon concerning the distinction between gains and losses is loss aversion. It implies that people are more sensitive to losses than to gains.”*

6.2.1 Perception of a certain transport mode and transport providers

This study has gone some way towards enhancing understanding of how human perceptions of particular transport modes or carriers have an effect on the mode choice. To understand better the mechanisms of perception of a certain transport mode and transport providers, this current study has classified cause into three distinct grounds: “*managerial capability of transport providers,*” “*compatibility with service providers in the scenario of the transport road haulier,*” and “*supplier relationships.*” Nevertheless, some points may have a greater influence on certain types of decision-makers than others. This is because of the complexity and uncertainty in the global context of today’s business landscape, and also the problems associated with the unstructured and complex decision making when it comes to the selection of transport modes and carriers (von der Gracht & Darkow, 2013). Then, the subsequent section provides a deeper insight into managerial capability of transport providers in the context of the Thai rubber sector.

6.2.1.1 Managerial capability of transport providers

It occurs to the researcher that the managerial capability of transport providers has a greater significant impact on the perception of managers with regard to certain transport providers than both compatibility with transport providers and supplier relationships; this, in turn, influences the choice of transport mode. According to Hwang *et al.* (2016), in the IC manufacturing companies study, the most important criteria in choosing 3PLs is the capacity to problem solve. This problem-solving capability enables firms to provide solutions to potential issues, deal with potential emergency situations, and be flexible in terms of adapting to changing business environments (Aguzezoul, 2014). Commenting on “*mode loyalty and source loyalty,*” Jeffs and Hills (1990, p. 33) states: “*mode loyalty refers to the tendency to remain loyal to a particular mode of transport even though different suppliers are used, while source loyalty implies sticking to one particular transport supplier.*” According to Jeffs and Hills’s argument, if there are only a few transport providers on that mode, then source loyalty is equivalent to mode loyalty.

In the meantime, in the context of this investigation, it is revealed that, while limited carriers for railways and coastal ports, which characteristically have only a few or merely one provider for each pathway, road transport is in a good position to be highly competitive according to price and service (Natejumnong, Byrne & Niruntasukkarat, 2002). For transport by road (there are more than a few transport providers in

Thailand), therefore, it is not difficult to change to another road transport provider. On the other hand, rail and water modes are characteristically monopolies for each local zone. Hence, if users have problems arising from administrator teams, it seems to become serious for top managers. As a result of this, the recent mode tends to be discontinued or changed to new transport providers, which means changing to another mode.

Having analysed the findings, it can be concluded that there are two types of consideration on the basis of managerial capability of transport providers that seem to have a strong impact on manager perception: *“dealing with the problem”* and *“reliability within the transport industry service (trust).”* It was also found that those bad perceptions of water and rail transport seem to have a greater importance than that of road transport because of the limited carriers in the modes of water transport and railways.

Regarding *“dealing with problem,”* it is a new and crucial variable that determines good or bad perceptions of transport providers by managers. Transport users are familiar with the possibility of problems in the day-to-day business and able to admit if some problems take place during transportation. However, how transport providers deal with the problems they face has become a major concern. If service providers are able to find a good solution, then the problem can be accepted. This finding further supports the idea of *“willingness to improve service quality to be the most important criteria”* (Williams, Garver & Taylor, 2013, p. 157). If not, irresponsibility and being unprofessional in business may lead to a bad perception of that mode, and a consequent switch to other modes. The results of this study indicate that responsibility for the problem has a greater influence on the perception of managers, which, in turn, plays an important role in the choice of mode.

For example, Thai railways sometimes have no control of deliveries as Thai railways have only single tracks (93.3% of total railways) and give first priority to passenger movement (Ongkittikul, 2014). Because of this, rail transport will possibly result in a delay to shipments. However, when there is a problem, those providers do take responsibility for it. When that happens some small and medium companies are still satisfied to use the option (see Chapter 5; Section 5.5.1.2.1). This contrasts with big firms who cannot accept the kind of risk that may lead to the delay of shipments. It occurs to the researcher that any problems that result in uncontrolled delivery in terms of damage or delay cause big firms to attempt to reduce the volume of their usage while waiting for clear solutions. This might be because of the large volume of

shipments, where managers do not want to take huge risks and, also, there are more options available. In summary, responsibility for the problem in terms of how transport providers deal with problems is very important for users' perspective and has a major influence on whether they use or do not use that transport in the near future.

As regards *reliability within the transport industry service (Trust)*, it is considered as another important factor which impacts on the perception of certain decision makers in terms of transport modes and carriers. This study further supports the findings of D'Este and Meyrick (1992) which suggests that shippers are happy to pay more for better service, but not happy to spend less for a poorer service. Moreover, the results of this research support the idea that control over delivery is significantly used for evaluation of the reliability of transport services, or in terms of trusting the carrier (see Chapter 5; Section 5.5.1.2.2). In general, service reliability is one of the key criteria that enhances the economic value added to transport providers. In support of this position, in a recent finding by Ndubisi, Jantan, Hing and Ayub (2005) and Ng (2010), the consistent management stability of transport providers, which in turn can lead to increased confidence in the capability of transport providers in terms of managing the company, has been considered as a decisive factor in supplier selection.

The important issues relating to transport containers are the efficiency of container movements and the avoidance of bottlenecks, so that costs and time can be reduced (Sourdin & Pomfret, 2012). The research found that as the issue of transportation bottlenecks are still a challenge in terms of Thai freight transport, back-up choices are necessary for firms in order to minimise shipment delays. The problems can be seen in the big cities, which are the centres of goods distribution, such as Bangkok and Songkhla. Regarding transportation bottlenecks, Goh and Pinaikul (1998) indicate in their findings that this issue is part of a current significant barrier in freight movement in Thailand.¹³ Hence, reliability of service can result in premium costs, in which shippers are willing to pay more.

Furthermore, the present study provides additional evidence with respect to “...*known suppliers offering well-proven products and services will be favoured in high-risk situations, and there will be an emphasis on non-price selection criteria (i.e. quality, delivery performance, service levels)*” (Sanderson *et al.*, 2015, p. 28). There is some

¹³ To quote Goh and Pinaikul (1998, p. 366): “*generally, as with any big city positions as a distribution node, Bangkok presents problems in in-bound and out-bound logistics flow creating delivery delays in distribution.*”

evidence that more reliability in transport service in terms of empty container availability can give rise to additional service costs. As mentioned in the section on customers' characteristics, some groups of rubber buyers are very serious in terms of delivery dates agreed and shown in the shipping instructions. Accompanied by the external (environmental) factors, the effect of uncertainty of rubber prices in the markets and the changing patterns of stock holding can give rise to awareness of punctual delivery under the constraints of a downward price trend. So that, to avoid the problem in high risk periods, more reliable transport services are preferred. Moreover, to handle uncertain business circumstances, firms need to balance the reliability and flexibility of their management that are derived from a mixture between strong and weak relationships with their business partners (Connelly *et al.*, 2013). Thus, medium to larger-scale organisations tend to maintain close relationships in a partnership. Because of this, during periods of high demand for containers, the utilisation of freight space can be guaranteed when it comes to transporting goods.

It is important to note that the imbalance of imports and exports is still a big challenge in ports in Thailand, especially in the case of the port of Songkhla, in that a shortage of containers can cause major problems. Such an imbalance of containerised traffic in both directions tends to lead to high-freight rates. This kind of problem is common in Asia (Mangan, Lalwani & Fynes, 2008). These results are consistent with those of other studies (Lu, 2003; Ng, 2010), which suggest that the capacity issue (the availability of cargo space) is one of the top-listed criteria variables in terms of transport carrier selection. For example, Ng (2010, p.153) reasoned that “...*this criterion provided the much needed confidence in the management capability of the supplier in operating and managing the company effectively.*” The following is a brief discussion on the findings on compatibility with service providers in the scenario of the transport road haulier.

6.2.1.2 Compatibility with service providers in the scenario of the transport road haulier

This study highlighted that those administrators who have responsibility for distribution do not want to change to new road hauliers. The following conclusions can be drawn from the present study; that those managers prefer not to alter the current transport mode or carriers, if, which, under normal circumstances, do not have any severe events impact on the flow of goods. A possible explanation for this might be the concept of “*satisfaction.*” In addition, to quote Kalantari (2010, p. 516): “*the decision maker simply chooses the first alternative that is ‘satisfactory’ to him and that*

no alternative is guaranteed to be optimal.” Also, this study lends support to the previous finding of D'Este (1992). It seems possible that these results are due to “... *transport is a non-productive activity that has a minor role in the overall activities of the organisation. As a result, its contribution tends to be undervalued and is only prominent when things go wrong*” (D'Este, 1992, p. 132). Because of this, it will be probably safer not to take risks except for a change of policy. Another possible explanation for this is that they do not want to learn something new; especially when working with new co-workers since it takes time to learn from each other (see Chapter 5; Section 5.5.1.1). These might be the two main reasons why shipping managers fear changing to a new transport choice, which may cause a disruption in the distribution of the flow of goods. However, in the Simon sense, it is notable as a “*stop rule*” (Simon, 1992). Therefore, current transport providers/partners that are capable of providing a satisfactory delivery service tend to be maintained for future use. The next section describes synthesis and valuation of supplier relationships.

6.2.1.3 Supplier relationships

The most likely cause of complexity and uncertainty in the Thai rubber market arises from fluctuations in the price of rubber, changing patterns of stock holding and the lack of empty containers in freight transportation. Consequently, strong relationships are required between transport providers and transport users (shippers) in order that shippers are able to gain valuable service and flexibility in using the transport services. It is a fact that a high demand for rubber can lead to shortages of empty containers supplied to freight markets. As a result of this, large firms tend to maintain good relationships with particular key transport providers. This is to make sure that in periods of high demand for freight movements or urgent shipments, logistics providers are willing to help as a priority.

In order to encourage and maintain close relationships with transport service providers, almost every Thai rubber exporter makes use of a key logistics provider, which carries the bulk of that exporter's produce. In accordance with the present study, previous results by Goh and Pinaikul (1998) have demonstrated that, in order to have a good understanding of organisational structure, better communication, information sharing and the reduction of logistics costs, having a close relationship with third party logistics companies is a major concern for Thai companies. Moreover, several studies (e.g. Hu & Munson, 2007; Ng, 2010) that have investigated supplier selection in Asian markets indicate that relationships is one of the most important intangible factors that influences the process of supplier selection. On the other hand,

another study in Malaysia by Sohail and Sohal (2003) indicates that Malaysian firms prefer not to depend upon just a few logistics providers but many providers appear to be employed, in order to enhance their transport service. However, with the small sample size in this study, caution must be applied as the findings might not be transferable to different conditions of transport infrastructure and context.

As explained earlier, for the Thai rubber sector, flexibility in transport services could be a major requirement in making decisions on the choice of transport. Close relationships therefore may have a greater influence on certain types of decision makers than others. It can be summarised that preferred transport modes (road hauliers, railways and coastal ports) can be different depending upon the perception of transport decision makers and his or her position in the company. These decisions have to be considered alongside manufacturing locations, business size and logistics policy. Visions of freight transport management will be discussed in the next section.

6.2.2 Visions of freight transport management

Visions of freight transport management may be divided into two main headings: 6.2.2.1 objectives and 6.2.2.2 understanding problems: the importance of transport issues.

6.2.2.1 Objectives

Visions on freight transport management enhance the understanding of objectives of the distribution sector, based on the personality of the individual manager which may differ from one to another. However, those objectives can be categorised into two main groups: cost oriented or service oriented. With regard to the question of objectives in freight movements, the majority of managers set broad targets to ensure that cargoes arrive at precise destinations on time and without loss and damage. Also, conditions must satisfy cost and service requirements (see Chapter 5; Section 5.5.2.1).

It was found that objectives seemed to vary depending on the person who took the decision concerning transport. This depended on his or her role and in which sector and position he or she held in the firm. In general, the two criteria, cost and service, have to be above the acceptable level with which a firm is satisfied. It seems possible that these results are due to *“aspiration levels”* (in Simon’s terms). According to his review of the theory of bounded rationality, Kalantari states that the level of aspiration *“...deals with the way an individual decision maker explores alternatives for action”* (Kalantari, 2010, p. 515). Kalantari (2010) also argues that the past experience and

knowledge of the individual decision maker plays a major role in influencing the setting of such an aspiration level. An implication of this is the possibility that the cost applicable to each company shows a discrepancy depending upon their price benchmark and market-power on rate negotiations. Moreover, satisfied service also differs from one administrator to another. What follows is an account of “*understanding problems: the importance of transport issues.*”

6.2.2.2 Understanding problems: the importance of transport issues

Finally, an understanding of transport issues can be projected onto a basic conceptual model, as presented in Figure 6.2

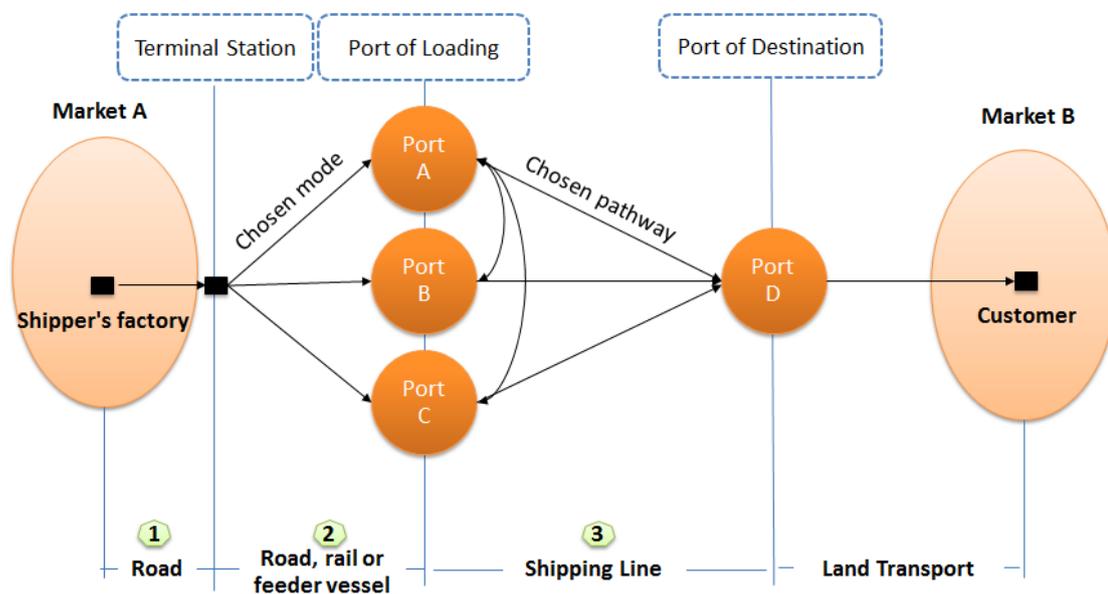


Figure 6.2: Diagram showing the basic model composed of three elements of transport activities (Source: Adapted from Magala & Sammons, 2008)

It is interesting to investigate the important features that individual decision makers give priority to regarding transport issues in the Thai rubber business. The principle and strategy in the transport management of each company may be different, based on circumstances and the personalities of administrators. However, the range of the principle concepts of freight transport management can be summarised in the basic model with regard to the choice of a logistics pathway, which is composed of three elements shown in the transport activities presented in Figure 6.2.

As shown in Figure 6.2 in column 1, road transport needs to be used to move the product from the shipper’s factory to another terminal station because none of the rubber companies have the rail track directly connected to their production plants.

Then, as seen in column 3 in Figure 6.2, the products are frequently transported by ocean by means of shipping lines. This is explained by the fact that it is rare that agricultural goods are shipped abroad by airfreight modes or other means of transport, particularly for trading in international markets. The primary agricultural product itself is very heavy and carries a low margin of profit as well as having to be transported long distances. Consequently, an ocean mode is the most appropriate compared to others modes of transport, in terms of cost and essential delivery service.

The middle chain, as presented in Figure 6.2 in column 2, for transporting goods from the terminal to loading ports can normally be performed by road transport, rail transport, feeder vessels or barges. The evidence from this study suggests that alternatives for action are different depending upon the resources available adjacent to the shipper's factories, the reliability of service and the shipper's perception of certain modes of transport, as well as the logistics policy within the company. The result of this research suggests that transport decision-makers should use road transport for as short a distance as possible, especially when a company aims at cost saving. However, transport managers may have different strategies of delivery depending upon a number of factors including who their customers are and what their working relationships with customers are like. At the same time, managers work under different logistics policies of their companies. It is an undeniable fact that existing delivery systems within the organisation definitely determine the ultimate alternatives for action.

In conclusion, the views of individual decision makers can be summarised in the Thai natural rubber industry under two headings: perceptions with regard to a particular transport mode and transport providers, and the vision of freight transport management. The detailed sub-factors can be summed up as indicated in Figure 6.3 which also presents the link of this theme to organisational characteristics. There is a clear evidence that the existing delivery system used by a particular organisation has a significant impact on the perception and vision of individual managers. For example, if their company prefers to use in-house transportation rather than outsourced transportation, road transport is the main mode used. On the other hand, rail and river transport become more interesting to companies employing outsourced transportation. A large amount of the existing literature raise the issue of the environmental impact of logistical activities, e.g. Sarkis (2012); Rossi, Colicchia, Cozzolino and Christopher (2013); Zailani, Amran and Jumadi (2011). Rogerson *et al.* (2013) speculate that in the near future, there will be an increase in firms'

considerations of CO2 emission issues due to freight transport activities. This is because of the awareness of firms themselves, as well as the forces arising from government regulations. However, based on the findings of the current research, it is surprising is that no carbon emission issues were mentioned in this primary study. The next section will discuss organisational characteristics.

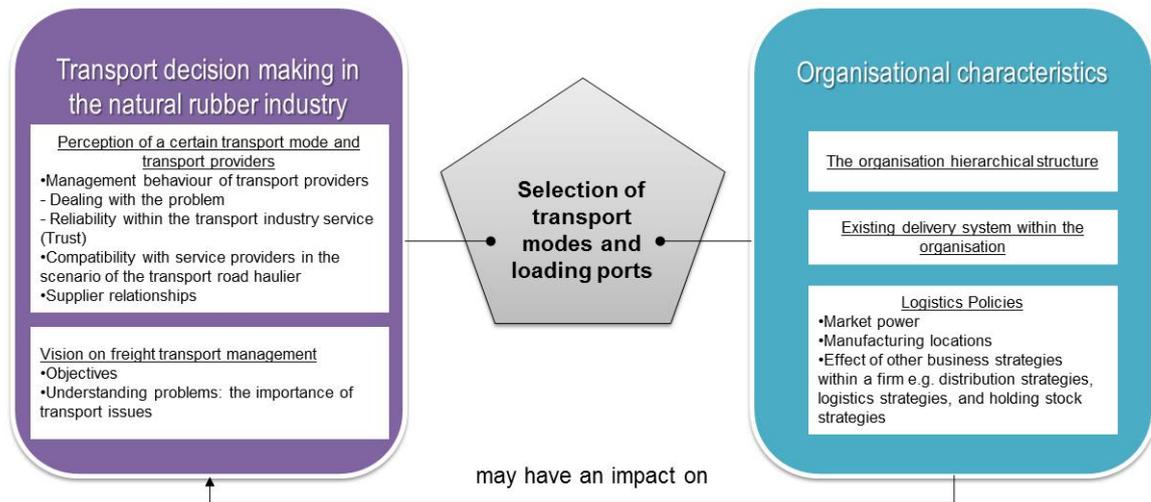


Figure 6.3: Summary of Transport decision making in the natural rubber industry (including links with organisational characteristics)

6.3 Organisational characteristics

This section of the conclusions aims to investigate the way in which organisational characteristics have an impact on an individual manager in his or her decision as to the choice of transport modes. An integrative model of industrial buyer behaviour (Webster & Wind, 1996) can be utilised to understand what factors influence organisational buying decisions.¹⁴ It is important to enhance understanding of how those organisational related variables reinforce the decision making process of choice of transport mode. The evidence from this study suggests that categorising organisational characteristics using the three variables — organisation hierarchical structure, existing delivery systems within the organisation and finally, logistics strategy and policies — further improves the understanding of how managers in the Thai agribusiness sector make decisions on freight transport mode choice. This work

¹⁴ According to Webster and Wind's model (1996) company-specific factors may be divided into three categories: "organisation orientation", "organisation sizes" and "degree of centralization."

contributes to existing knowledge of the model of industrial buyer behaviour by adding more supported evidence based on organisation-specific factors within a specific context in the Thai rubber sector. The details will be illustrated point by point in the following section.

6.3.1 The organisation hierarchical structure

This study has found evidence that business size, hierarchical structure and position in the firm may have an impact on the decision-making and action concerning transport activities.

6.3.1.1 Small and medium enterprises (SMEs)

The following conclusions can be drawn from the present study: those managers who work in SMEs are likely to hold a high position within the organisation and are more flexible in making decisions. These results are consistent with those of other studies and suggest that flexibility could be one of the advantages of the small company (Ghobadian & Gallear, 1997; Ozmen, Oner, Khosrowshahi & Underwood, 2013). In a quote from MacMillan (1975, p. 62) he states *“the company can change direction fast and respond to change quickly.”* Regarding customer requirements in the era of globalisation, a firms’ ability to respond quickly to customers’ demands is considered as a key factor in the success of their business (Wu *et al.*, 2013). In addition, the results show that decision makers are normally owners or have a close relationship with the owner (See Chapter 5; Section 5.3.1). These results further support the views of Ozmen *et al.* (2013, p. 212) who state that *“...ownership and general management structure can be summarised as owner-managers who dominate management and all crucial decisions.”* For this reason, power to make decisions tends to be in the hands of one or two executives or senior managers. Additionally, they are likely to make decisions based on experience rather than be governed by formal processes or basing such decisions on fact.

Another interesting finding is that SMEs routinely work with a small number of alternatives that they feel at ease working with, and which give satisfactory results. This means that they are able to use these options with confidence. In general therefore, choice seems to be characterised as being made using informal processes, with only a few decision makers being involved. It is possible therefore that close relationships with carriers can be a major reason when it comes to making decisions with regard to transport modes and carriers. These results corroborate the idea of Ozmen *et al.* (2013), who argued that close-relationships and network-based

businesses are likely to be key success factors for SMEs. These data must be interpreted with caution because the findings may not necessarily be applied to large firms that normally have complex planning and a strong control system. However, this finding can be applied to small companies whose sales of rubber are approximately 50-150 TEUs per month.

6.3.1.2 Large-scale organisation

In contrast with large firms who export more than a thousand TEUs per month, the decision procedure is somewhat strict and more formal and apparently supervisors make decision based on a prescriptive model. This refers to an incidence of a strong “control system” for large firms. In 1997, Ghobadian and Gallear published a paper in which they described the processes of large organisations as having complex planning and formal evaluation with control and reporting procedures (Ghobadian & Gallear, 1997). This finding is in agreement with Ghobadian and Gallear and it may be summarised that the decision is typically based on the final cost model which is considered alongside current situations of the rubber market and transport situation.

However, this finding supports a previous study which has demonstrated that managers give more importance to better service (service variables) than reduction on freight rates (McGinnis, 1990). This refers to a set of options for action which accounts for transport operators with service at a satisfactory level tending to be chosen for future use. These findings suggest that in general for large firms costs have less importance than service quality, since those firms are able to negotiate price. Thus, delivery service variables become significant factors in the evaluation processes.

One of the more significant findings to emerge from this study is that to have more transport options and to become the first user on some routes means that large firms tend to be able to accept higher prices if they satisfy the reliability requirements of the transport service. It seems possible that these results are due to the different types of search behaviour¹⁵ among those managers. The evidence from this study suggests that administrators in large companies have a strong intention to find new alternative

¹⁵ For Mintzberg, Raisinghani and Théorêt search behaviour is of four kinds: (1) memory search which is a search in an individual's and or organisation's memory; (2) passive search which means waiting for a solution to appear; (3) trap search which gets others to generate solutions and (4) active search which is directly trying to find alternative solutions (Mintzberg, Raisinghani & Théorêt, 1976).

solutions or “*actively search.*” In contrast with SMEs a majority of them are characterised as making a “*passive search.*” With the small sample size in this study, these results need to be interpreted with caution as the findings might not be transferable to other Thai business sectors. In the section that follows, it will be argued that there are differences between group and individual decisions.

6.3.1.3 Group decision vs Individual decision

This study found that large scale organisations tend to make group decisions and to be fragmented. At the level of operation, those who are in authority in deciding how to transport their goods will take action based on the information at hand. For large firms, it is a more complex decision process and any big changes have to be agreed by senior managers or executives. As a result of this, large firms are considered as being slower to respond to changing environments than small and medium-scale organisations. Similarly, Juma and Wachira (2013) found that bureaucratic structures performed well in stable business environments but this is questioned when the business environments have shifted to become more dynamic. On the other hand, small firms are likely to have an individual decision maker who makes decisions based on similar circumstances from past experience as long as they are satisfied with the result of that usage.

Another important finding was that large companies are more active in seeking new transport alternatives whereas small firms are inactive. In this way, the organisation is more likely to establish innovative options (new rubber export routes). As those big firms want to greatly improve delivery services they are continually searching for new routes and trying to find new alternatives. In contrast, the small companies show little or no sign of seeking new transport options. It is difficult to explain this result although it might be related to the restriction of small volume, which in turn results in low bargaining power and limited choices. It is then not easy for small sized companies to change to new transport modes or transport providers, especially when they are still satisfied with the existing service provider.

It was also found that shipping managers who work in small firms have knowledge of only a few transport options. This result may be explained by the fact that in small and mediums sized businesses there is less scope for a small customer base (Ghobadian & Gallear, 1997). Also, third party logistics are the main sources of information for small shippers. Therefore, business size could be a major factor, if not the only one, related to the ability of learning and experience in the use of transport modes and its

providers. In contrast to those managers in big organisations, they are involved with many transport alternatives and diversity of an extended customer base.

The findings of this study suggest that small sized firms may be able to get more knowledge and experience from the rubber society. It can be an opportunity for them to learn more from other large firms and may help them to be capable of comparing their actions with those of the big companies. What can happen is that small firms will compare modes of transport on the basis of whether or not they use the same transport gateways as big companies currently use for the same destinations.

Furthermore, there is some evidence of contradiction between different departments according to the target of transportation (see Chapter 5; Section 5.3.1). It can be summarised into two main issues, “*cost saving*” and “*operation flow.*” These differences and concerns can be explained by job descriptions and responsibility in company positions. The evidence from this study suggests that logistics emphasis is more on cost saving whereas operational departments give greater priority to the flow of goods. This finding corroborates the ideas of Ghobadian and Gallear (1997) who suggested that procedures of large organisations are characterised as fragmented by decision makers. The chosen option needs to be agreed by the operations sector although the logistics departments are in a more powerful position and in control of the choice of transport modes. In other words, the service quality must be at least in excess of the satisfactory level.

6.3.2 Existing delivery system within the organisation

Typically, transport managers need to make decisions under the existing delivery system within the organisation. The most obvious finding to emerge from this study is that not all large companies run an own-account vehicle. In fact, only very large companies are able to run in-house transportations. This result can be explained by the principle of economy of scale (Frémont, 2013; Slack, Chambers & Johnston, 2007). However, it is not only massive export volume which determines the choice of in-house or outsourced transport.

The results of this study will now be compared to the findings of a previous work study 3PL in a developing country — Thailand. As Setthakaset and Basnet note, “*large companies do not generally employ 3PL. Many of these large companies do not employ 3PL because they are big enough to have their own logistics department [...] and apparently do not want to give up their control. Most companies who employ 3PL are medium to small companies*” (Setthakaset & Basnet, 2005, p. 215). This is in

contrast to earlier findings of (Natejumnong *et al.*, 2002) which indicated that large-scale organisations had familiarity in making use of third-party logistics.

In the case of the Thai rubber sector, there is clear evidence that the majority of small-medium shippers in the Thai rubber business mostly employ an outside firm with expertise in transportation. It might be related to the need to operate under the conditions of huge volume. Without enough volume, it is not worth running an in-house transportation since massive money needs to be invested in transport assets. As a result, the success of 3PL selection is vital for firms in terms of both cost reductions and a competitive advantage in a market that has progressively been becoming more competitive (Hwang *et al.*, 2016). But for large-scale companies it can be found that they use both in-house and outsourcing for transportation. Interestingly, the evidence from this study indicates that the biggest firms do not make use of in-house transportation. This implies that the size of the business is not only the one determinant of the type of transport management. The following conclusions can be drawn from the present study as illustrated in Table 6.1 which summarises possible reasons for running or not running an own-account from the shippers' perspective.

Table 6.1: Reasons for running and not running an own-account fleet for shippers' perspectives in the rubber industry

Reason for not running an own-account fleet (using out-sourced transportation)	Reason for running an own-account fleet (Using in-house and outsourced transportation)
<ul style="list-style-type: none"> • Limited exported volume that is less than the cut-off point that makes it viable to run an own-account fleet • The difficulty of management issues that require a number of staff to be involved with many details; for example shipping documents, drivers and finance issues • The high competition in road transport at the present time meaning that there is an adequate number of carriers giving good service • Out-sourced companies have more expertise in transport activities than rubber exporters which can in turn give a high level of customer satisfaction 	<ul style="list-style-type: none"> • Cost reductions which can lead to significant extra profit which can significantly support core business profits • More flexible and controllable transport management, especially for urgent shipments • Less risk in terms of product quality, particularly for damages and loss • Non-dependency on transport providers and more bargaining power because shippers are acquainted with the actual cost, which then in turn results in more chance of a fair price • Opportunities for added income from logistics departments, which can earn considerable profit on transportation

As mentioned in Table 6.1, the applications of having an own-account fleet and also employing outsource transportation can lead to many benefits. First, it enhances their competitive advantage on service that can support cases of urgent shipments. Secondly, users know the actual cost so the shippers have more power for negotiated cost reduction. At the same time, shippers are more flexible in managing transportation because they do not rely only on outsourcing the service. This is consistent with Wu (2012) who argued that outsourcing in logistical activities can bring about several benefits to companies; for example, supply chain efficiency improvement and utilising staff's developing expertise.

In this study managers in the Thai rubber business have been interviewed and categorised into two groups: not running an own-account and running an own-account fleet¹⁶. It is impossible to have enough vehicles for delivery of all rubber products because the exported volume varies throughout the year. Although rubber exporters make use of in-house transportation, a certain volume of goods is dealt with by outsourced transport providers. Therefore, when additional freight service is needed, it will not difficult for such companies to access that service.

Moreover, there is some evidence to indicate that although a company runs an own-account fleet, it does not mean that all shipments are delivered by their own lorries. In other words, only a certain number of vehicles that are considered as being suitable to serve the firms will be invested in. The appropriate number will differ according to total volume, frequency and size of shipments and also enterprise resources. It is therefore likely that such connections which exist between transportation strategies and existing transport facilities will affect each other.

In addition, total shipment volume could be a major or possibly the only factor dictating the choice of in-house or out-sourced transportation. However, volume needs to be considered in conjunction with the transport vision, geographical distribution of manufacturing locations and current transport infrastructure proximity to shippers' plants. In order to enhance markets, increase service levels, as well as improve management flexibility in response to customers' changing needs, some companies have shifted their focus from cost reduction to a more strategic thrust

¹⁶ This study gives the definition of the group running an own-account fleet. This is where the companies have their own-account fleet and also use transport service from a third party logistics industry (3PL).

(Hwang *et al.*, 2016; Zacharia, Sanders & Nix, 2011). In determining an appropriate choice the advantages and disadvantages of the potential options have to be analysed in cooperation with other organisational characteristics, such as resources available and the logistics policy governed by the organisation. The following section will discuss logistics policies which are considered to play a crucial role in the decision-making process that transport decision-makers need to examine based on the organisation's goal and policy.

6.3.3 Logistics policies

In order to achieve rational transportation outcomes therefore, a logistics policy¹⁷ could be a major factor in guiding, assisting and controlling how managers make decisions. Large organisations seem to have a clear policy and formal evaluation system which enables most managers to make decisions on transport activities in order to achieve organisational goals. However, the current study found that logistics policies in small organisations are based more on subjective decision making and thus not easy to objectively test. It can therefore be assumed that owners and managers in small firms make experience-based decisions by comparing what is happening in the present with similar situations in the past. According to Dane and Pratt (2007)¹⁸, decision-making based on past experience can be considered as intuitive decision making.

In addition, it appears that most shipping managers are satisfied with their transport costs but still want to improve transport service. A possible explanation for this result may be that currently the use of road transport in Thailand has its own price which is lower than genuine costs that should be paid (Banomyong & Supatn, 2011). Thailand has a large number of transport operators, which in turn, contributes to high competition among road transport operators. As a result, freight rates are low enough to compete with other types of transport. Also, carriers (the road transport providers) are mostly SMEs and their prices are calculated based on the cost of fuel and their overheads. The fee does not take into account depreciation and expenses related to the administration of the calculation. It also does not calculate the total cost of the

¹⁷ For this study, a logistics policy is a thoughtful system of principles to guide and assist senior managers in making decisions.

¹⁸ Dane and Pratt (2007) published a paper in which they described five main types of intuition (see Chapter 2; Section 2.4.1.3 Intuition).

maintenance and expansion of the road infrastructure each year. Therefore, the road transportation costs of Thailand are lower than the real cost. The findings of this study indicate that almost all participants target improvement in service rather than decreasing transport costs, and therefore, 3PLs should aim to increase service levels instead of reducing freight rates. This is in line with Meixell and Gargeya (2005) who argued that organisations' missions, objectives, and strategies need to be included in managers' decision making as part of supply chain management at the international level, rather than just emphasising the reduction in costs.

Another study showed that land transportation in Thailand is very competitive (Natejumnong *et al.*, 2002). The current study found that the use of railways and coastal ports for inland transport is mostly seen in large firms. It is difficult to explain this but it might be related to the ability to negotiate reduced transport costs for big volumes and the capability of large firms to control delivery by using those transport modes. Furthermore, market-power has played a vital role in bringing about a lower unit price if large volumes are being transported.

The findings from these studies point out that there are three main subjects influencing transport policies: market-power, geographical distribution of manufacturing locations and effects of other business strategies within the firm. Possible impacts of these three elements, which may have contributed to logistics policies, will be discussed in the following section.

6.3.3.1 Market-power

Market power could be a major factor influencing the planning of logistics policy. As the name implies, market power addresses the ability of firms to negotiate cost reduction and a more specialised service. Currently, the transport market has become highly competitive and at the same time, customers have a high expectation coupled with the ability to demand lower costs. As a result of economies of scale (Slack *et al.*, 2007) one can see that concerning the principle of transportation, the more volume you have, the less logistics costs per unit you need to spend. Therefore, it is not surprising that large companies are in a better position than medium or small firms in terms of numbers of choices and costs.

These findings, as seen in Chapter 5; Section 5.3.3.2, suggest that in general for the big firms costs may not be considered as the most significant factor but that is not the case for small sized firms. For small firms, total costs tend to be a decisive criterion in the choice of transport mode. This is because huge volume from larger-scale

organisations enhances the ability in rate negotiations. Thus, those large firms are likely to be able to control transport costs with accessibility to many transport providers. An implication of this is the possibility that delivery performance, ease of use and flexibility in the accessibility of the service time table has become more important than costs.

Additionally, this study found that most shipping managers in large firms considered that there were an adequate number of transport alternatives whereas those participants working for small-sized firms were most probably dissatisfied with the provision of transport providers. Because of this it was not easy for them to control logistics costs and small to medium companies seemingly paid more attention to cost variables than service variables. Particularly at times of high demand for freight shipments, some alternatives can only be accessible to loyal customers. This is as a consequence of inadequate capacity of transport services caused by shortages of containers and wagons. It may be argued that the relative importance of cost tends to vary according to different business size.

Another important finding was that the extension of a free day for occupying containers is another major factor of concern by managers in the rubber industry. Surprisingly, the number of days in the possession of a container was found to have a major impact on shipping liners' selection. It is interesting to note that only some ship liners allow using containers for extra time and some maintain a strict standard allowance of time. Therefore, another value of market-powers suggests that a link may exist between high volume of shipments and more free-day allowances for container usage.

In conclusion, this study categorises the advantage of market-power on freight transportation into two main variables: cost reductions and the requirement of more free-day allowances in container usage. It was also shown that longer free time allowances may be required by certain groups of customers; especially Chinese purchasers (the largest consumer of natural rubber in the world). As a result, certain ship liners such as Wan Hai lines may be the first priority for delivery to those customers who demand extra free-days of container usage.

6.3.3.2 Geographical distribution of manufacturing locations

Manufacturing locations are considered as less important than market-power. It can be summarised from this study that single-site companies have a competitive advantage in terms of simple planning and management. In addition, they have more extended power as a result of the increase in aggregate volume. Another importance when talking about geographical distribution is the provision of transport infrastructure, modes and transport providers adjacent to the shippers' location. This is according to Sourdin and Pomfret (2012) who stated the factors relating to the transportation infrastructure and the impact these had on increasing trading costs.

Moreover, "*length of haul*" from a manufacturing location to the loading port could be a major factor influencing the choice of transport modes. This finding is in agreement with Jeffs and Hills' (1990, p. 45) findings which stated that "*the geographical location of the customer may rule out some modes depending, for example, on how well served an area is by road hauliers, the interaction between the spatial component and drivers' hours for own-account operation and the quantity of goods to be sent...*" Hence, certain transport modes may be eliminated for the reason that the mode is too far in terms of "*length of haul*." This consideration implies that means of transport such as railways and coastal ports which have connection pathways and which are close to the loading port as well as proximity to the shippers' location are considered first. It can thus be suggested that manufacturing locations have an impact on the design of logistics policies.

6.3.3.3 Effect of other business strategies within a firm

Other factors such as holding stock strategies may have contributed to the difference in logistics policy from one firm to another. One of the more significant findings to emerge from this study is that the use of different selling strategies may be linked to behaviour in holding stock. It was also shown that for the companies which adopted a speculation strategy, selling behaviours were more complex and difficult to predict. Moreover, the volume sold fluctuates throughout the year as this depends on the movement of prices in the market. The companies wait for a good selling opportunity and this may result in an increase in high stock level. It seems that these companies pay less attention to transport costs but then again have a greater concern with the core of business (selling prices). This might be explained by the fact that the profit for companies mainly comes from the rubber price margin. The cost of delivery is absorbed by the purchaser as it is already added to the selling price. This is one

group of exporters which is less concerned with transport costs but give importance to punctual delivery. This means that the reliability of transportation seems to have the greatest importance for these exporters (this is further described in detail in Section 6.6.2.1).

This section has reviewed the three key aspects of the organisation's hierarchical structure, existing delivery system within the organisation and logistics policies. To summarise, Figure 6.4 depicts the related factors of organisational characteristics which have a significant impact on the selection of transport modes and loading ports. The next section then describes synthesis and an evaluation of operational factors.

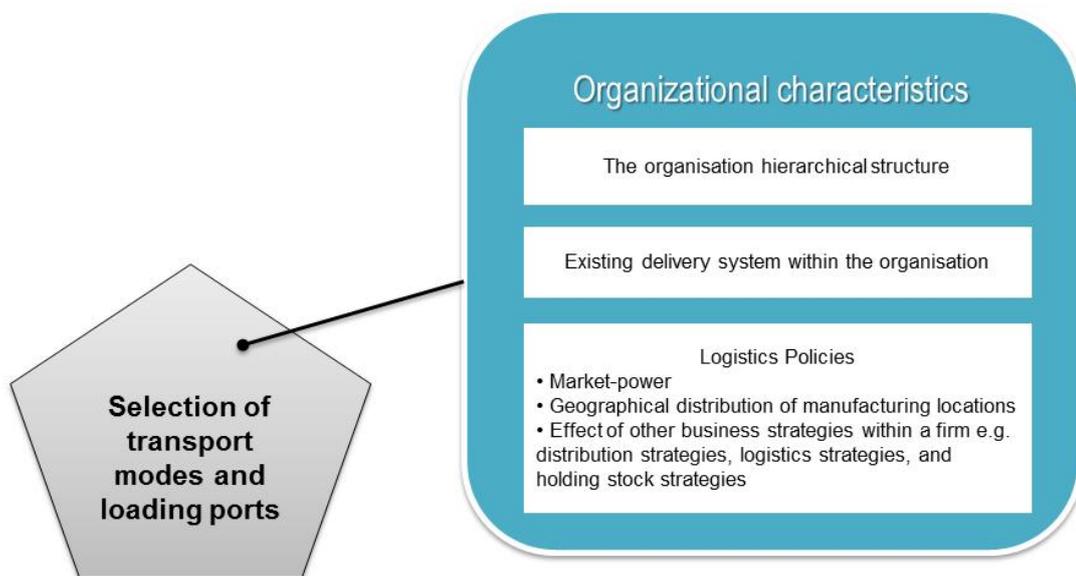


Figure 6.4: Summary of Organisational Characteristics

6.4 Operational factors

The purpose of this section was to better understand how operational factors have a possible impact on mode choice. The results in the previous chapter indicate that operational factors have the greatest influence on the selection of transport mode and carrier. A variety of perspectives (see Chapter 5; Section 5.6) were expressed on these operational task-related factors, especially regarding the issues of cost and awareness of failure of on-board mother/feeder vessels at a port of loading by a closing date. Therefore, it is argued that the operational factors are the primary criteria that deciders principally focus on when making decisions.

It is clearly seen that the predominant variables within this dimension are task related variables. As mentioned in the literature review, a model of OBB was categorised by Webster and Wind into two broad categories of variables: “*task variables*” and “*non-task variables*.”¹⁹ Then, this study adopted Webster and Wind’s idea of the categorized variables and addressed them as forms of task factors, as the factors that related directly to purchasing freight transport services in terms of delivery operations; while non-task factors accounted for variables that impact the changing pattern of tasks factors. For non-task variables are mainly seen in four dimensions (see Section 6.2, 6.3, 6.5 and 6.6), which mostly focus beyond the purchasing issues.

The discussion and presentation of operational factors will be discussed, based on their stage of consideration. The first section will start with ease of access, followed by delivery operations, image of carrier selection and costs, respectively.

6.4.1 Ease of access

It occurs to the researcher that options which account for the frequency of service availability and proximity to the shippers’ location certainly are primarily factors to be considered first. Transport managers seem to consider terminal stations, which are situated adjacent to their production plants, so that a “*consideration set*” can be identified.

As stated by Davies and Gunton, “*needs will emerge gradually as lower needs are satisfied*” (Davies & Gunton, 1983, p. 8). Also, an implication of Davies and Gunton’s finding proposed “*a pyramid model of freight buying*,” which established five main hierarchical criteria: risk avoidance, price, convenience factors, company image and objective appraisal. The conceptual model of the hierarchy of needs of freight purchasing has been developed based on the concept of Maslow’s argument (See Figure 2.10). This model explains that the factor at the lowest base of the hieratical model has to be reached to satisfy the level first, and another criteria at the upper level will then be considered. According to Davies and Gunton, the model indicates that at least risk avoidance, price considerations, convenience factors, and company image need to be satisfied first; otherwise the other upper level (objective appraisal factors) may not be included in the consideration. Furthermore, this model assists in

¹⁹ Webster and Wind (1996) demonstrated that “*those directly related to the buying problem, are called task variables; and those that extend beyond the buying problem are called non task variables*” (Webster & Wind, 1996, p. 53).

understanding the way that freight marketers' deal with their buying under the conditions of the multi variables involved.

However, it is undeniable that the transport option's proximity to factories is likely to be a highly efficient route in terms of cost and time. This might be because the total shortest haulage distance (that which is transported by road), can lead to reducing the overall cost and also, consequently, add to others benefit (as previously mentioned in detail in Section 6.2.2.2). For instance, it has more flexibility and ease of management, particularly when they are having problems. For small shipments, it is not necessary to supply into big transport providers. Local small road hauliers have more chance to get those small shipment jobs because local people are easy to communicate with and are available to discuss issues if there are any problems.

This might be because of flexibility in the service when working with local companies. According to the interview data, participants gave the reason that it is easier to talk in person rather than using communication media and face-to-face communication helps users feel better and they have more confidence in the service (see Chapter 5; Section 5.6.1.1). This point further supports the ideas of Natejumnong *et al.* (2002) of "*multi-local, multi-nationals.*" In view of that, Natejumnong *et al.* (2002) explored the current status and future prospects of the third party logistics industry in Thailand from the provider's perspective and they pointed out that "*to survive, international companies have adapted themselves to the local market, becoming 'multi-local, multi-nationals' and Thai logistics firms have developed at a rapid rate to a stage where they are openly competing against the large global firms.*"

The investigation of factors influencing the choice of transport modes has shown that "*proximity to terminal station*" and "*service schedule*" emerged as two main sub-themes of ease of access and its impact will be summarised in the following section.

6.4.1.1 Proximity to terminal station

This finding supports previous research into this area, which links proximity to terminal station and inland transportation costs (Norojono & Young, 2003; Tongzon, 2009; Ugboma *et al.*, 2006); it is, therefore, considered as one of the main determinants of a transport mode's attractiveness. As a result, it has a significant influence on the provision of transport modes, which shippers are able to access. The choice of transport mode is not only a function of proximate convenience, but another study by Tiwari, Itoh, and Doi (2003) pointed out that inland transportation costs have

been greatly affected by the length of haul. Therefore, transport providers and terminal stations close to shippers' factories are considered first.

6.4.1.2 Rate of recurrence on the service schedule

The more frequent the schedule, the fewer problems will occur. A frequent timetable is the variable generally considered after "*proximity to terminal station*" for the consideration of ease of usage. This study found that a regular timetable service can lead to a reduction of the likelihood of serious delivery problems; for example, the low possibility of missing a mother vessel and prevention of cargo loss during the transit. These two main criteria (on-time delivery and damage free delivery) are commonly used for evaluating the standard of delivery reliability. In addition, frequency of service may have contributed to the increase in the level of control over delivery. This finding is in agreement with Shinghal and Fowkes (2002, p. 376), who studied in India, and their results showed that "*...the frequency of service appears to be an important factor in mode choice, especially for the manufactured goods sectors, with tri-weekly services being acceptable to some sectors but weekly services not acceptable for most sectors.*" Hence, it could conceivably be hypothesised that frequency of service is a key factor determining mode choice for the Thai rubber sector.

Interestingly, this finding shows that small-scale shippers are sometimes dissatisfied with the situation of the railways or inland ports that omit the service. Sometimes a scheduled delivery has been delayed, or even cancelled, just because one major user has delayed the delivery. Therefore, small users tend to avoid using specific routes that rely mostly on big users. This result might be explained by the fact that an unreliable service, which does not conform to the advertised time schedule, may cause serious problems in certain circumstances.

In addition, the failure to deliver within the committed time, not only reflects the low standard of delivery performance, but also reflects performance of stock availability and order processing (Christopher, 2011). If a high proportion of total shipments arrive by the closing date for boarding onto a mother vessel, without losses or damage to the consignment, then, the integrity of transport gateways can be acceptable on behalf of the shippers.

In summary, this study adds to the viewpoint of users regarding a regular timetable by categorizing it into two main advantages. Firstly, it can reduce the likelihood of failure of being on board vessels in time. Secondly, goods have less chance of being stolen during transit since containers are kept at depots for a shorter waiting time.

The result shows that *“proximity to terminal station”* and *“rate of recurrence on the service schedule”* play a vital role in the stage of defining the *“consideration set.”* However, cost considerations are also involved, as the initial criterion for preliminary assessment, then it is considered throughout the choice process (in terms of whether or not a particular mode or carrier can be used). This is consistent with D'Este and Meyrick's survey findings (1992), which showed that the majority of deciders agree that they have a reference point of a maximum price for the transportation budget, which they are able to spend. Whenever that cost is lower than the limit, service has higher importance. Their results confirm that shippers are willing to use options where overall costs are lower than a limited budget.

Thus, it can be suggested that if the overall transport costs fall in the satisfactory range, as well as the option accounts for proximity to shipper location, and have frequently and consistently been within in advertised time schedule, then the delivery operation will be investigated in further detail concerning transit time, control over delivery (risk consciousness) and safety. This issue will be further discussed in the following section.

6.4.2 Delivery operation

Delivery operation, with reference to losses and damage and on-time delivery, seems to be one of the greatest factors of importance that influences the choice of transport mode. Those variables are generally considered as two main decisive factors for the evaluation of delivery performance, which means in turn that, options can be kept in the set of current alternatives. These results indicate that the bar set for service level may be different from one to another, depending on external constraints and which organisation the shipping managers work for. However, the majority of them have a bottom reference point, which they are able to accept. The reference point might vary, based on the perception of perceived risk for damaged goods and the ability to have control over the delivery time. Whenever one of these factors is evaluated at lower than the specified point, they will try to avoid the option that may lead to dissatisfied customers. As Mitchell argues that: *“...since consumer motivations in purchasing are more often to avoid mistakes rather than to maximise utility in purchasing”* (Mitchell, 2015, p. 350). In other words, they may prefer to spend extra, to make sure that goods can arrive in secure conditions and on time. A possible explanation of this result may be the high value of rubber products and also the long-term relationship with their customers. This finding corroborates with the ideas of the non-compensatory approach suggested by D'Este (1992, p. 136), that *“...any given factor*

cannot necessarily be traded-off against other factors at all levels of performance. Instead, it is argued that options are compared on an attribute-by-attribute basis and that there are minimum acceptable levels of performance. Exceptional performance in one factor cannot necessarily compensate for sub-standard performance in another."

Therefore, it can be assumed that the control over delivery in terms of delivery without any damaged goods, turns into one of the factors of greatest importance in the selection of transport modes and carriers because shipping managers do not wish to take any high risks, especially when they may contribute to harming their goods. This is because the impact of a damaged or delayed shipment may possibly result in customer dissatisfaction. Therefore, an unsatisfactory delivery service cannot be compensated for by lower costs. This also leads support to the previous findings of Cunningham and Kettlewood (1975), cited in Davies and Gunton (1983, p. 5) who recommended that *"the transporter should aim at improving service quality while maintaining cost, rather than reducing the cost and maintaining service."* Moreover, they argued, *"Buyers seem to be subject to pressure from their organisations to find a good, reliable service, rather than the cheapest one."* This issue will be further discussed in the following sections on delivery time and losses and damage.

6.4.2.1 On-time delivery

This study gives the first important information regarding on-time delivery, while losses and damage are less important. On-time delivery becomes the most important factor for freight movement in the context of the rubber industry. This is because delays in shipment may have a direct result in contract withdrawal, particularly when there is high price volatility.

However, it does not mean that short transit time is better than long transit time (see Chapter 5; Sections 5.4.3.2 and 5.6.2.2), customers are not happy for goods to be delivered too early or too late. If too early, it may result in the problem of limited inventory space (Punakivi & Hinkka, 2006). On the other hand, tyre manufacturing adopting the Just-in-Time approach may have to stop the production line because of a shortage of raw materials. Customers, therefore, want to receive goods within specific time-slot windows, which normally are in a certain period of time on a weekly basis or up to a monthly basis, depending on the agreement between sellers and buyers.

This is consistent with the findings of Jeffs and Hills (1990, p. 45) who stated that the *"...speed of freight transport is less important than the prompt despatch of goods at*

the required time and the guaranteed predictability of the transit time.” Therefore, it is important that goods must arrive in on time. There are similarities between the attitudes expressed by on-time delivery, as one of the primary criteria when making decisions on mode choice in this study, and those described by Cullinane and Toy (2000), Matear and Gray (1993), Moschovou and Giannopoulos (2010), Shinghal and Fowkes (2002) and Ugboma *et al.* (2006). Furthermore, this finding is in agreement with Rahman and Laosirihongthrong’s (2008, p. 54) finding which stated that “...‘on time delivery’ is, by far, the most frequently used measure (34%) to identify quality in logistics for the companies, followed by ‘total support of customer needs’ (20%).” These results agree with the findings of other studies, in which an important measure of delivery performance is that the most important choice of transport mode is on-time delivery.

In addition, this study has found that, generally, traders in China are really difficult to deal with; therefore, shippers mainly manage deliveries based on commitment, even if they have to spend more. Most exporters are aware of default contracts and negotiate for discounts when buyers are in a position to use competitive disadvantage caused by a sudden price drop. The evidence from this study suggests that on-time delivery then becomes the most important concern; so that buyers do not have any excuse for cancelling contracts or asking for discounts. The findings of this study suggest that shippers should pay more attention and carefully manage transport activities in case of shipments to traders located in China, rather than shipments to the big Tyre Company.

Interestingly, it is not only buyers that have an impact on delayed delivery; there is some evidence to suggest that sellers are occasionally affected as well. This study indicates that exporters are worried about late payment when their goods fail to be loaded on board vessels at the committed time (see Chapter 5; Section 5.6.2.2). It is important to note that a high proportion of rubber products’ value comes from raw materials, which to a certain extent, is approximately 90% of the value of consignments and that a cost of a TEU of rubber products is typically one to three million Baht²⁰, which is a huge amount of investment for one shipment. So, exporters do not want to have any trouble with their cash flow, which is essential in the rubber business. Also, exporters do not want to have bad records showing on the database

²⁰ A value of one shipment is one to three million Baht when the price per kilogram is approximately 50-150 Baht.

of big tyre manufacturing, so they target to keep credibility for their company. If it is necessary to pay extra costs on some occasions; they will do so in order to maintain the status of positive sellers.

6.4.2.2 Losses and damage

Losses and damage that commonly occur in the shipment of rubber products can best be seen under two forms: *“rubber being stolen during transport”* and *“commodities damaged during delivery.”* Firstly, this study provides a new understanding of the reduction of risk on damaged products during movements. The findings point out that managers usually deal with these problems by emphasizing the process of loading goods into containers. This refers to which place is more suitable for loading goods — the shippers’ location or the container freight station. The results of this study indicate that loading into containers at shippers’ locations is more secure than that at container freight stations.

In addition, the risk of damaged products varies, depending on rubber product types as well. The results have shown that concentrated latex carries a higher risk on leaking; therefore, the avoidance of routes that require extra handling is a safer option. In contrast with RSS and STR, it is not necessary to be concerned about it being vulnerable to breakage; thus, they seem to be acceptable for extra handling. However, the process of loading into containers is an important stage, which may cause contamination or theft. Because of this, almost all transport managers make their decision to load them into containers at the factories’ locations.

However, there is some evidence that certain big companies prefer to load containers at the container freight station. Those companies have a method to manage this kind of risk by transferring that risk to third parties logistics. This method is not easy for small-scale organisations, because when any problem occurs, the one who has more market power can deal with it. Thus, it is much more secure for small shipments to be loaded into containers at their processing factory. Because of this, the entire procedure of loading is under control. Consequently, this finding supports the fact that the loading process into containers is commonly operated at the shippers’ manufacturing rather than loading at the container freight station, especially for small shippers.

The results so far have been encouraging transport providers to aim for the improvement of service quality, particularly for the security of products because shipping manages at the moment to really concentrate on risk of product damage.

Although there is insurance covering the total value of consignments, it tends to avoid options, which may face the risk of damage (see Chapter 5; Section 5.2.1.3.2 and 5.6.2.1). The main reasons are that they do not want to have problems of cash flow, waste time, or dissatisfied customers. Therefore, routes that may cause a damaged consignment tend to be removed from the current alternatives. This finding is in agreement with other researchers (Lu, 2003; Moschovou & Giannopoulos, 2010; Voss, Page, Keller & Ozment, 2006) who found that damage is another key factor for the choice of transport mode.

Secondly, on the subject of goods being stolen during freight movement, all types of rubber products need to be carefully handled to avoid theft. The evidence from this study suggests that road transport holds the highest risk of accident and also damaged goods during a journey, while coastal ports and railways embrace a lesser level of this risk, respectively. It is worth pointing out that the risk of rubber products being stolen has a tendency to increase if the rubber price is high. The results of this investigation show that options that expose it to risk of theft tend to be avoided for transporting their commodities (see Chapter 5; Section 5.6.2.1).

6.4.3 *Image – carrier (carrier or haulier) selection*

One of the more significant findings to emerge from this study is that actual delivery performance has a great impact on the image of the carrier. It is important to note that this study was carried out within the context of an emerging economy, and that Thailand does not have global transport providers such as FedEx, UPS, DHL, TNT etc. As a result, decision makers tend to perceive the image of carriers based on their past experience or on current trials, rather than being due to their long-term reputation in the transportation business. Therefore, the criteria used for evaluating delivery performance seem to have a greater influence on carrier selection. However, financial reliability of transport operators may be essential to monitor at least in terms of financial statements, in order to make sure that those providers have the ability to run transport services.

Capacity issues, container availability, knowledge of staff, document quality and expertise, emerged as important factors that may lead to creating the image of a carrier. It was also shown that the capacity issues and container availability have a greater impact than document quality and expertise and the knowledge of staff. A possible explanation for these results may be the lack of availability of adequate empty containers. Also, international shipments involve lots of documents, thus document quality is quite important for import and export matters. However, there is

some evidence to suggest that the last two factors—document quality and expertise and knowledgeable staff—seem to not to be considered as decisive factors because the reconsideration process in the choice of transport modes or carriers cannot be triggered by frequently made mistakes on shipping documents and unskilled staff. If there are any kinds of problems similar to that, shippers will almost certainly ask the owner or senior manager to amend documents or change coordinators. It is not necessary to change to other transport providers just because of a disappointment with service quality caused by document quality or unskilled staff (see Chapter 5; Sections 5.6.3.2 and 5.6.3.3). Therefore, the findings of the current study are partly different from the previous research by Banomyong and Supatn (2011, p. 419), which indicated that “...it was observed that accuracy of documents; EDI and E-commerce services; customer relationship management; customer care; updated freight rates; and consolidation provision significantly influenced how shippers selected 3PLs.” For the case of a new transport provider, the image of transport providers may not have any impact on the choice. This is because this criterion is mostly affected by past experiences, rather than the perceived image of providers.

6.4.4 Costs

Last but not least, cost is one of the important factors influencing the choice of transport modes; especially in the final decision. It seems to be one of the greatest decisive factors, which are considered alongside the whole decision process used for evaluating options. In the first stage of the identification and listing of all the alternatives, prior to considerable options are able to be included in the consideration set, if the total costs are satisfactory. According to Kalantari (2010, p. 513), “*Simon’s behavioral model promotes the idea that, although rationality is the goal of organisational decision making, the decision maker is limited by cognitive abilities (habits, values, reflexes, knowledge, etc.) as well as external (environmental) factors; therefore, the decision cannot be optimized.*” Consequently, this study has found that, generally, it is not only one low-priced cost option commonly used for transporting rubber products. If estimated transport costs fall into a satisfactory level, a certain number of useful options usually open among railways, inland ports and roads and those options tend to be kept for additional consideration. These findings are similar to the results in the Australian context, where D’Este pointed out that the entire transport volume is not supplied to only one choice, but tends to be spread among a practical set, based on different limitations of each option (D’Este, 1992).

The present study provides additional evidence on cost considerations with respect to firms' size. Those big-scale organisations principally seek improvements in the quality of delivery services, rather than minimizing costs (see Chapter 5; Section 5.6.4). A possible explanation for this might be that *"buyers seem to be subject to pressure from their organisations to find a good, reliable service, rather than the cheapest one"* (Cunningham & Kettlewood, 1975 cited in Davies & Gunton, 1983, p. 5). In contrast with small-sized firms, the owner maintains most transport decision-making, or those having a close relationship with the owner; therefore, they do not fear the mistakes that may be caused by using reduced options.

In addition, most transport managers try not to rely on one or two transport providers in order to enhance their service. Having said this, at the operational level, only one of the potential options will be selected for the delivery of goods. The selection is based, generally, on the cheapest option amongst the alternatives that meet the customer's requirements, bound by the timing of delivery. An implication of this is the possibility that the cheapest option that matches the required delivery window is likely to be chosen. If not, the price of the higher options which can provide the necessary transport service within the required time slot, will be used.

However, there is some evidence to suggest that a medium-sized firm mainly employs only one logistics provider in order to get advantages on a reduced price (see Chapter 5; Section 5.6.4). This means that the low-cost of transport is considered as the first priority. This is because a large volume is required for negotiating a price reduction. It was also shown that a big and reliable transport provider was used for this case. This lends support to the previous finding in the literature that Thai exporters value their relationship with transport providers, (Goh & Pinaikul, 1998).

The current findings add to a growing body of literature on lower costs, which could not compensate for the risk of goods being stolen and damaged. Although low cost is an important factor, the service quality of using such an option needs to reach a satisfactory level of service. If not, any low-cost options will not be considered as an everyday option. This finding is in line with the findings of Cunningham and Kettlewood (1975), who mentioned that managers are mostly under demands from organisations for focusing on improving the service rather than cutting costs. This might be because their current cost is near, or already at, the price it should be.

On the whole, small to medium-sized firms commonly have a few options for transport with close relationships with a small number of carriers, but large-scale organisations prefer to purchase transport services openly among all possible transport modes for a certain number of providers. This may be because of different purposes among Thai rubber exporters; the one who just relies on a few carriers means that a close relationship with a supplier is expected, so as to enable shippers to get the direct advantage on bargains of transport cost. In addition, Goh and Pinaikul highlighted that having a close relationship with transport providers can result in some advantages towards enhancing more understanding of organisational structure, improved communication, better information sharing, and reduced logistics costs (Goh & Pinaikul, 1998). In contrast with using a number of transport providers, service quality then becomes the factor of most concern, as using several options can result in greater flexibility when it comes to management. Moreover, an increase in competition among their providers can give a rise to an improved level of services.

Above all, these operational factors seem to have a greater influence in the choice of transport modes under the normal situation. It is clearly seen from the discussion mentioned above that those operational factors could change the priority of importance, based upon external (environmental) constraints, particularly resulting from economic conditions and rubber price movements. For example, on-time delivery increases in the level of importance when the rubber price is highly volatile, especially when prices drop dramatically. The following section will discuss variables, which have been found to have significance on the decision-making, in terms of external factors, named as environmental characteristics.

The operational factors are summarised in Figure 6.5 and the next section will discuss the environmental factors, which are divided into the nature of rubber business and external environment constrains named as situation factors.

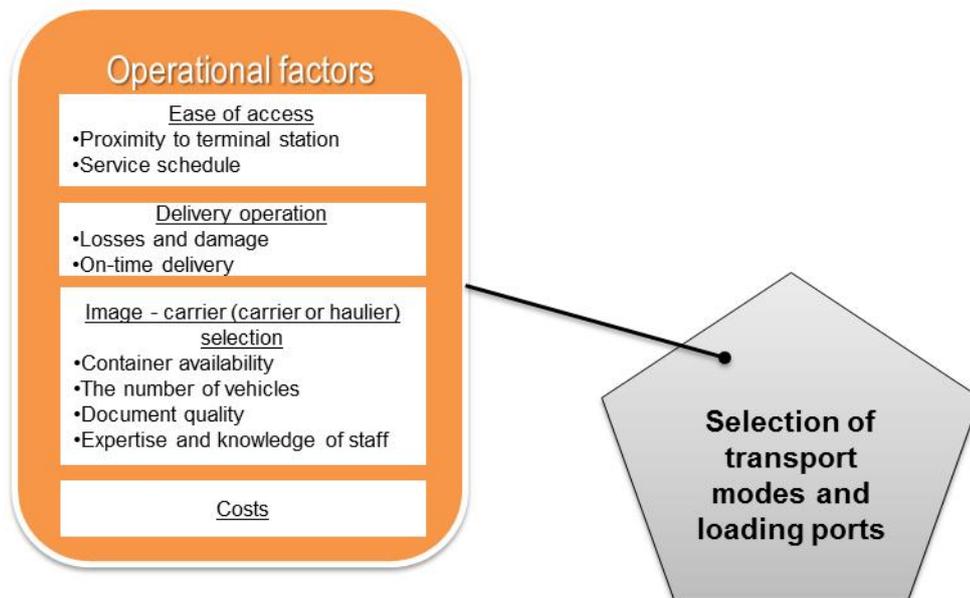


Figure 6.5: Summary of Operational factors

6.5 Environmental characteristics

As noted earlier, operational factors seem to have the greatest influence on the choice of transport modes; however, the relative importance of each operational factor might be different depending upon time and circumstances. As Sainidis, Robson and Heron (2013) state: “[The] business environment is governed by ‘uncertainty’ [...] Uncertainty, which accounts for changes in innovation, alongside fluctuations in the market and the behaviour of the competition, may also encompass scarcity of capital, market share diminution, industry dynamics, and economic recession in general terms.” Similarly, von der Gracht and Darkow (2013) argued that such uncertainty has been growing due to the complex and dynamic nature of logistics management circumstances. As a consequence, managers who deal with logistics are exposed to even greater levels of risk. Because of this, it is undeniable that business external factors are influential in freight mode choice, especially with changing patterns of top priority in decision variables. The evidence can clearly be seen in this study (Chapter 5; Section 5.2.2.3) that the preference of managers might change according to external constraints: for example, with the increased importance of punctual delivery becoming greater than transport costs when rubber price is highly volatile.

As a consequence of these changed external (environmental) situations, the second- or third-ranked transport options will probably become the first choice. Even though this action may lead to higher spending on transport costs, they will still go ahead, if it is the most appropriate choice during a period of rubber price uncertainty or when goods must be delivered within a short time. This study points out that the majority of managers decide to use road transport in such situations, although the use of a single mode (road transport) can lead to relatively high costs and carbon emissions for long-haul distances, particularly where the transport distance is longer than the break-even distance, for instance 300 kilometres (Tavasszy & Meijeren, 2011). However, the market situation is a key determining factor of the break-even distance with regard to intermodal freight system. Consequently, a generalization of the break-even distance is not possible (Kim & Van Wee, 2011). In general, therefore, it seems that a combination of transport modes should be employed for transporting rubber.

However, road transport can meet a short-term need, particularly when transporting urgent shipments. According to Woolford and McKinnon (2011), there are three main advantages to using road transport. The first is convenience, since the road network can be accessed by every business in most areas. Secondly, road transport in Thailand is currently price competitive.²¹ As a final point, the restrictions concerning fixed timetables and infrastructure networks in rail and water transport cause these two transport modes to be far less flexible than road, especially where volumes are small. Consequently, road transport is considered as having a greater flexibility than rail or water transport.

According to Alkhatib, Darlington and Nguyen (2015), uncertainty levels rise due to the threats to the marketplace, e.g. the impact of globalization, economic recessions and issues relating to sustainability. These considerations clearly imply that external variables have a great impact on change patterns in transport mode usage, with diverse freight movements developing into progressively complex and uncertain situations in the rubber business. This study further supports the idea of Hall and Wagner (1996), cited in Mangan *et al.* (2001, p. 280), that *“the key selection criteria for one mode or modal segment may not be applicable or critical for another mode or*

²¹ This point is clearly supplemented by Natejumnong *et al.* (2002); their study of Thai logistics providers' perspectives indicates that, with *“...the entry of international 3PLs in '95-'97 and the emergence of a number of local 3PL companies, this market is becoming more competitive.”*

modal segment; hence it is important to attempt to distil the more critical factors for a specific context." This also accords with earlier observations, useful for understanding organisational buying behaviour, which showed that *"the organisation, in turn, is influenced by a variety of forces in the environment"* (Webster & Wind, 1996, p. 53).

Despite its exploratory nature, this study offers some insights into the specific context of the Thai rubber industry and its impact on the key factors determining the choice of transport modes. To better understand the impact of environmental uncertainty on freight mode choice, environmental characteristics may be divided into two main categories. The first category is *"situational factors"* and the second is *"the nature of the natural rubber industry."*

6.5.1 Situational factors

The key aspects of *situational factors* can be divided into three sub-groups as follows: economic conditions, ad-hoc situations and climatic conditions.

6.5.1.1 Economic conditions

Based on the research findings resulting from feedback intensity interpretation by the researcher, economic conditions may be the most important concern among the three main sub-groups of situational factors. It has also been shown that volatile ocean freight rates are the most likely cause of extra costs in transportation. Thus, the ocean freight rate is considered as a decisive variable that will always determine overall transport costs in international trade. Moreover, the nature of the Thai rubber market is predominantly one of production for export, and currently Thailand plays the role of the world's biggest rubber exporter (Hirata *et al.*, 2014; Leodvittayanon & Siriphattasophon, 2014; Weerathamrongsak & Wongsurawat, 2013). As a result, ocean shipping is mainly used for transporting rubber products over long-haul distances.

It has been suggested that *"a seller with large and regular sales volumes is able to arrange transport better and more cheaply than the occasional buyer of smaller quantities"* (Malfliet, 2011, p. 169). This does not always appear to be the case. This current study indicates that the situation in the market needs to be taken into consideration, particularly in a highly volatile market like that of rubber. So, if situations alter due to uncertain markets, even large firms prefer not to trade in terms of FOB. When there is a high demand and inadequate supply of freight space, it can be difficult for exporters to manage the situation during periods of highly volatile ocean freight rates. The current study found that when there is high risk of increasing

ocean freight rates, some shipping managers prefer to trade in term of FOB (see Chapter 5; Section 5.2.1.2). In this way, the risks associated with ocean freight rate alterations can be transferred to the rubber purchasers.

Based on the interviews with the research participants, the global financial crisis may have contributed to an increase in the awareness of customers with regard to financial issues. This study has found that there is a diversity of buyers in the rubber market, especially in emerging markets like China. Consequently, order fulfilment needs to be planned and managed in a way that involves good/proper judgement. If a problem occurs after the goods have been dispatched, there would most likely be a significant challenge for the shippers, having to deal with reverse logistics (Rushton *et al.*, 2010) and perhaps resulting in their having to resell to another buyer with a reduction in price. Therefore, financial crises also have an impact on Thai rubber exporters in terms of their trading in the global market.

It is a fact that, in international markets, it is difficult to completely avoid the effect of uncertainty in the rubber trade and of financial crises around the world. According to Alkhatib *et al.* (2015), uncertainty levels rise due to the threats to the marketplace, e.g. the impact of globalization, economic recessions and issues relating to sustainability. They argue that such situations can have an effect in terms of considerably increasing the level of risk to businesses that can cause them to reconsidered the methods they use for evaluating and selecting their business partners. Moreover, the issue of the need of such new methods in business partner selection has been increasingly important since the financial crisis in 2008 (Alkhatib *et al.*, 2015). Therefore, it would be impossible for the rubber market not to experience an impact due to uncertainties with regard to the global financial situation. Based on the current findings, even the Thai government is unable to control the price of rubber (see Chapter 5; Section 5.2.1.2). Additionally, Thai exporters experience instability due to political issues within the country. Changes in global demographics and politics, some commodity scarcity and fuel price volatility are important determinants that lead to an uncertain business environment associated with supply chains at the global level (Corominas, 2013; Hasani *et al.*, 2015). It is interesting to note that Thai exporters' experience instability due to political issues within the country. At present, in the face of unclear government policies, transport managers are managing distribution with an even greater level of care and judgement.

So far, this section has focused on economic conditions; the following section will discuss ad-hoc situations.

6.5.1.2 *Ad-hoc situations*

As the second category of situational factors, ad-hoc situations may impact upon the preference options available for delivery, sometimes becoming the main cause triggering a reconsideration of the transport model choice. This finding suggested that large organisations generally have the capacity to deal with these problems better than small and medium-sized firms. Because of their high power in the market, these large-sized firms have good connections and better relationships with transport providers. This set of connections then allows them to access facilities even at times of limited service, when demand is high for freight movements.

Since the rubber business depends mostly on global economic indicators, business opportunities mostly occur during similar periods of time among rubber exporters. Therefore, exporters usually export high volumes during similar periods of time. At peak times, it is primarily small exporters that are faced with limited accessibility to their favourite options. They then need to use their second- or third-ranked options. As a result of this, it is sometimes necessary to pay high(er) transport rates in the case of small firms. This is one example of external constraints having an influence on different transport mode usage in the rubber industry.

In relation to risk awareness, three to four transport providers are usually employed by a company at any one time, so that the company has backup options in emergency cases. In practice, only a small proportion is given to the higher-cost options, to enable the company to maintain a good relationship with those transport providers. But when small firms are confronted with problems, leaving them unable to use their favourite mode of transport, they need another option, their last option always being road freight transport along the entire route to the loading port. The use of a single mode all along the route until the cargo arrives at the loading port usually costs far more than that of combined modes. This might be because of the smaller volume of these firms' shipments. As a result of such an inadequate delivery service, it can be difficult for these small firms to manage risks for such eventualities, since they are considered to hold a low amount of power in the market.

The results of this study indicate that the majority of big firms are continually preparing for the case of ad-hoc situations and keep supplying jobs to a number of transport providers, even if some options require them to pay more. In contrast, this strategy is rarely found in small-scale organisations; when there is a limited supply of freight services, these small firms usually end up with the most flexible option available by road transport. However, due to the small sample of participants, caution must be

applied, as the findings might not be transferable to other Thai business sectors. The next section moves on to discuss the climatic conditions.

6.5.1.3 Climatic conditions

Climatic conditions have a major impact upon the selection of loading sites. It is a fact that rubber is a product that is sensitive to humidity; therefore, the loading process is considered an important stage that can have a damaging impact on products. The study found that loading into a container at the shipper's factory is safer than loading at seaport terminals, in terms of product quality. The most significant risks related to handling and loading of goods in the location of seaport are loss of control and lack of skilled labour. Another study by Notteboom (2013, p.84) states that *“an increase of scale of the vessels, which [expanded] from the late 1960s, meant that the grouping of man loads could no longer be sustained [...] Man loads, which initially were so important, disappeared in the ports.”* However, the findings of the current study indicate that man loads continue to be used in the Thai ports, especially for unloading rubber from trucks and then loading it into containers at the Inland Container Depot (ICD).

The evidence from this study suggests that shippers need some way to monitor and control loading procedures. One implication of this is the possibility that the requirement of saving event images from every step of the loading process could have contributed to the decrease in damaged products (see Chapter 5; Section 5.6.2.1). Therefore, in the event of a problem occurring, it should be more difficult for transport providers to deny responsibility. It was also shown that high market power and tightened inspections can act as leverage with shippers, since the evidence from recording can be used for negotiating rates with transport providers, as when customers make claims on the causes of damaged, lost and contaminated rubber products. On the other hand, loading rubber goods at the ICD presents small exporters with many challenges, due to their low market power. Thus, the decision will almost certainly be made to load products which are vulnerable to damage, into a container and seal it at the shippers' location. Such loading allows the shippers to maintain control throughout the loading process.

Bad weather conditions are an additional factor, which can lead to unreliable waterway transport, vulnerable to schedule alteration. Thus, this water mode is likely to be avoided for vital shipments; for example, the use of coastal ports is often avoided in cases of selling to new customers. Moreover, this study shows that the use

of barges on some routes involves the risk on capsizing is further increased by the uncertainty of bad weather conditions, especially on the route from the Kantang Port to the Penang Port. Consequently, those options are less popular than the use of feeder vessels, which are considered less risky than barges. In addition, another study involving an assessment of the risks associated with different types of vessel, by Bateman, Ho and Mathai (2007, p. 323), has discovered that “...barges are highly vulnerable to attack, especially at night, due to their slow speed, restricted manoeuvrability, low freeboard and small crews.” In general, therefore, it seems that routes requiring barges are often avoided.

Another significant result indicates that transportation during periods of rainfall can result in the weight loss of rubber (see Chapter 5; Section 5.2.1.3.3). In order to avoid conflict between sellers and buyers, shipping managers should understand that the weight loss of rubber may result from the total weight of the rubber replaced by rain. This problem is mostly found in the shipment of concentrated latex contained in tanker containers.

In summary, these results show that the climatic conditions impacting upon the choice of transport modes can be listed as follows: the selection of loading locations, the risk of damaged products, and the weight loss of rubber. The next section moves on to discuss the nature of rubber industry trading.

6.5.2 The nature of rubber industry trading

Commenting on the assumption that context-free determining factors affect an exporter's choice of freight transport mode, D'Este cited in Mangan *et al.* (2001, p. 292), that: “Carrier choice cannot be understood as an isolated decision in time and space. It encompasses past, current and future implications in both the transport and wider organisational context.” According to D'Este's argument, it is necessary to attempt an investigation of mode choice for a broad range of perspectives; therefore, this study focuses only on the decision in a specific context: the Thai rubber industry. In addition, there are similarities between the attitudes expressed by D'Este in this study and those described by Brooks (1995), Hall and Wagner (1996), Mangan *et al.* (2001), and Pedersen and Gray (1998). It is therefore important in terms of this current study to provide additional evidence relating to the specific context of the Thai rubber sector, given that there is still very little specific understanding of mode choice.

In summary, these results show that there are three main sub-groups of factors relating to the rubber market: fluctuations in rubber price, rubber product

characteristics, and potential laws, technical regulations and taxation policies. These three themes will be further discussed in the following section.

6.5.2.1 *Fluctuations in the price of rubber*

As regards rubber price fluctuations, it is a fact that changing patterns in commodity price are hard to forecast, as a consequence of demand uncertainty in the market. Rubber price movements could be an important factor in mode choice. This study has highlighted the two main challenges that can be caused by unexpectedly low prices: customers not adhering to their contracts, and the problem of a shortage of rubber in the market. The results of this investigation show that exporters sometimes even turn to their competitors for raw rubber materials, so that they are able to fulfil delivery within the period agreed upon and, in turn, maintain the trust of their customers. Hence, on-time delivery is one of the most important delivery performance indicators influencing shipping managers' decisions concerning the choice of transport mode. It can thus be suggested that on-time delivery could contribute to a decrease in contract termination.

At present, rubber prices in the market are very volatile (Boonyanuphong & Sriboonchitta, 2014). This can give rise to complexity and uncertainty in the business environment. This could make the business context an important factor in the choice of transport mode. To illustrate, purchasers who aim for speculative gains stress the importance of the timeliness of product delivery. This is because the slightest delay can result in failed sales opportunities. Consequently, when prices suddenly drop, it can be difficult for them to find good customers. In such cases, if contract parties are in a difficult situation, they might negotiate for a discount or even withdraw the contract. Therefore, on-time delivery is a decisive factor in transport management. The evidence from this study suggests that on-time delivery can result in a decrease in the problem of contract default. In order to avoid the problem, shipping managers should pay more attention to on-time delivery during periods of high price volatility. Having defined what is meant by fluctuations in the price of rubber, I will now move on to discuss potential regulations and laws, as well as taxation policy.

6.5.2.2 Potential regulations, laws and taxation policy

The potential regulations and laws, in addition to taxation policies, must be completely understood before entering into the international market. As a result, a familiarity with the documentation for export procedure and export privileges (see Chapter 5; Section 5.2.2.1) appears to be necessary knowledge for managers in this industry. Although these sections may not have an important impact on the selection of transport modes, an inadequate understanding of the required documents for export procedure may cause delays in delivery.

In addition, a lack of knowledge concerning tax privileges can lead to exporters missing out on VAT relief. Exporters may be eligible to claim exemption from export tariffs, if the country to whom they are selling participates in international trade agreements. Following this, free trade agreements (FTAs) are one example of the agreements between countries by which exporters can apply for the elimination of import/export tariffs for some kinds of goods. Two useful example of FTAs are the Agreement on Accelerating Tariff Reduction for vegetables and fruits traded between Thailand and China (Thailand-China FTA), and the ASEAN-China Free Trade Agreement (ACFTA); these agreements have been in place since October 2003 and July 2005 respectively (ERTC, 2009). According to these agreements, exporters can apply for tariff reduction in particular countries/provinces; for example, rubber trading between Thailand and China is only applicable for some cities, such as Shandong Province, Guangdong Province and Fujian Province, etc. In order to get benefits from tax privileges, Thai entrepreneurs require knowledge of the regulations for those countries with which they are in business.

Moreover, the results of this investigation show that some countries (Iran, for instance) require a certificate of inspection for their customs procedures. Without this certificate, customs clearances are not given for rubber products imported into the country. To avoid any fault that may be caused by import/export regulation apart from tax privileges, it is necessary that exporters are obliged to obtain the requisite knowledge about export procedure, international transaction, and customs clearance regulations for all countries they operate with. According to the ERTC (2009, p. 2), *"...Thai exporters and entrepreneurs in the rubber industry are experiencing difficulties and problems due to the lack of necessary information. For example, it is often unclear how to get approval from the designated regulatory body, how to contact a designated testing laboratory, or a designated certification body, all of which they must do before distributing products..."* Therefore, what is now needed is a study

to investigate export procedure, international transaction, customs clearance regulations and tax privileges in the context of the Thai rubber business, and then make it available to small entrepreneurs.

The present study provides some additional evidence suggesting that the Rubber Export Tax could be associated with exporters' choice of transport modes. It is important to note that export tax may possibly increase or decrease according to the current rubber price in the market. There is some evidence that shipping managers prioritise the reduction of export tax, as opposed to logistics costs, during an uptrend in rubber price in the market (see Chapter 5; Section 5.2.2.1.1).

The investigation of the effect of the Rubber Export Tax (called cess) has shown that rubber exporters mostly prefer to pay higher transport costs, if that enables them to avoid the risk of increased Cess. This was also shown to be the case if the price uptrend might have the consequence of an increase in Rubber Export Tax. In this case, trailers would probably become the most popular mode of transport. Although this choice involves higher transport costs, these can be traded off with the short transit time and availability for express delivery. Therefore, the use of this option is considered more convenient in terms of flexibility of timetable service, short transit time and availability of empty containers.

Following this, options which are rarely used under normal circumstances may be preferred, as a result of a massive reduction in export tax. Thus, managers pay more attention to reducing Rubber Export Tax than transport costs under these circumstances. These findings enhance our understanding of the business environment context of the rubber industry. Rubber Export Tax is considered one of the most important external constraints influencing mode choice. Although overall transport costs may exceed transport budgets, managers may still decide to use more luxurious choices if they can compensate with short transit times within situations of uncertain cess rates (see Chapter 5; Section 5.2.2.1.1). Hence, it could conceivably be hypothesised that the importance of Rubber Export Tax outweighs overall transport costs. Having discussed the importance of potential regulations, laws, and taxation policies with regard to mode choice, the final section will discuss the nature of rubber industry trading as it addresses factors relating to rubber product characteristics.

6.5.2.3 Rubber product characteristics

The empirical findings in this study provide a new understanding of the ways in which different physical states of rubber products and different methods of packaging can have a significant impact on the preferred modes of transport and types of container. According to Notteboom (2013, p. 84), “...a modern division into categories of goods is therefore no longer based on the nature of the goods, but on their handling characteristics.” However, the findings of the current study only partly support the previous research. Although, in international trade, all three types of rubber are contained in standard containers, for smoothness of cargo handling, the different types of goods still have a significant impact on the choice of transportation. The present study has shown that there is a greater flexibility in transporting STR, than there is with RSS and concentrated latex, since the latter two are exposed to contamination and to leaks respectively (see Chapter 5; Section 5.2.2.3). It can therefore be assumed that the exporter’s factory is the preferred location for loading containers; after this, containers are trucked to terminals located near the factory, where they are then transferred to another mode of transport, before being transported to the loading port.

In addition, different types of rubber products may require different qualities of containers; RSS and concentrated latex are packed in flexi bags, meaning they require a better quality of container than STR. Although RSS and STR are solid materials, RSS is wrapped only with rubber sheets and powder, while STR is covered by plastic and contained in pallets or metal crates. Therefore, STR is in the position of risking far less damage (see Chapter 5; Section 5.2.2.3.1). In contrast, RSS is more at risk, in terms of the contamination that mostly happens during the loading process. Hence, this process has need of skilled labourers because of the heavy weights involved.

The results of this study indicate that concentrated latex exporters mostly avoid the use of routes requiring several transits, since repeated moving can lead to an increase in the risk of leaks. This is only the case with products contained in flexi bags; those packed in drums are at far less risk of being damaged. Moreover, transport providers ask for a letter of indemnity to be sign off, guaranteeing that any accidents that risk endangering the other cargo are all the responsibility of the shippers.

Taken together, these results suggest that RSS products should be loaded and sealed at the factory, except in the case of the big companies that are able to control the loading process. This is because this study has shown that loading at ports exposes goods to a high risk of damage, contamination, or even stealing during the loading process. In general, therefore, it seems that the physical nature of the products and their packaging may have a significant impact upon the choice of loading site, which may then also result in external constraints concerning the selection of transport mode. Thus, this factor is considered one of the external constraints that may have a direct effect on the selection of the loading location.

With regard to very high-value products, the evidence from this study has shown that very high-value raw materials (rubber products) may have the consequence of decreasing levels of stock, making supply inelastic (see Chapter 5; Section 5.2.2.2.1). This point might be explained by the fact that both sellers and buyers are concerned for the high amounts of capital they have to spend. As a result, the majority of shipments will almost certainly be delivered in smaller volumes (approximately five to ten TEUs per shipment), yet more frequently. This purchasing behaviour differs from that of the past, in which exporters deliver using break bulk vessels each time. According to Sainidis, Robson & Heron (2013), small batch sizes with greater frequency can lead to a need for greater flexibility and an enlargement of transport costs. However, rubber products mostly trade on a TEU basis; therefore, the loss of an economy of scale has only a slight impact on the basis of reduction of transport costs for the company mainly transporting by road transport.

This study has found that there is a great variation in the shipment volume of rubber products, as a result of the particular harvest season and of demand uncertainty in the rubber market. Therefore, it is important that exporters should have flexibility in delivery. However, there is some evidence that transport infrastructure in rail and costal ports needs to be developed²², and that the current transportation in Thailand is of a lower standard. To ensure flexibility in transport capacity, the majority of firms transport goods by employing at least two transport operators. Only a few exporters decide to employ only one, and in these cases, that one must be in the form of a large and reliable transport provider.

²² For more on the improvements associated with rail network in Thailand, see: <https://www.gov.uk/government/publications/exporting-to-thailand/exporting-to-thailand>

It is difficult to say which option is better, because there are various factors that seem to impact on this choice. The following conclusions that can be drawn from the present study may be classified, on the basis of business size, according to three main classes of decision situation. The first situation is when total volume is too little for rate negotiation or service negotiation; these SMEs will mostly decide to employ approximately two-to-four transport providers. The use of more than one provider enables managers to monitor prices, as well as benefit from the enhanced service arising from competitive advantages among those transport providers (Sohail & Sohal, 2003). Secondly, in cases where the overall volume is adjacent to the reference point at which they may perhaps get a discount, firms seem to divide total volume between one or two providers, so that they have the potential to decrease the logistics costs arising from the advantages of economies of scale (Slack *et al.*, 2007). Thirdly, large-scale organisations have more competitive advantages than transport providers. Thus, big exporters generally aim for both high transport service and low costs. Therefore, it is easier for larger-scale organisations to obtain good service as well as reduced costs. Since economy of scale is the key success factor for transportation (Frémont, 2013), those firms who have an adequate volume for rate negotiation seem to be in a better position in terms of prices and services.

The findings discussed above provide some evidence to support the conceptual premises that “*environmental characteristics*” have a significant impact on “*operational factors*.” The analysis of environmental characteristics undertaken here, which has extended the available knowledge of the priority of operational factors, could change depending upon current circumstance. This study takes account of “*environmental characteristics*” as one of the five most powerful drivers determining the selection of transport modes. Therefore, this study makes a major contribution to research on the area of transport mode choice by demonstrating that the specific context of the Thai rubber industry has a significant impact on the decision-making situation. The summary of environmental characteristics is illustrated in Figure 6.6. The next section will discuss customer characteristics which may be influenced by changing patterns under a variety of external conditions.

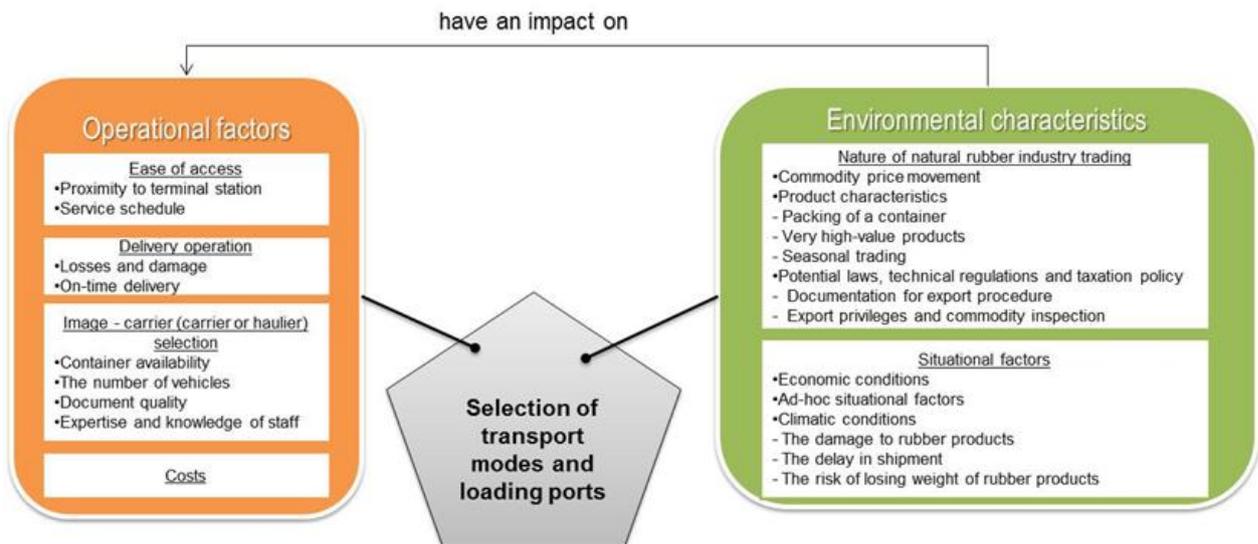


Figure 6.6: Summary of environmental characteristics (including link with operational factors)

6.6 Customer characteristics

The evidence from this study suggests that there are three significant points to take into account in order to develop a better understanding of customers' requirements in international rubber trading. These three points are: "*customer-purchasing behaviours focused on international trade terms and contract behaviour,*" "*customer importance*" and "*customer service requirements.*"

6.6.1 Customer purchasing behaviours

It is necessary for managers to completely understand their customers' purchasing behaviours. This is because "*the rising demand for customer-specific solutions*" is one of the major causes of today's supply chains being more complex than ever before (Gaudenzi & Christopher, 2016, p. 3). The authors also argue that in particular, firms have to achieve cost reductions, and at the same time need to enhance their simultaneous responsiveness to their customers' needs in order to achieve and maintain their competitive advantage in today's business environment. The following conclusions can be drawn from the present study. First of all, customer purchasing behaviours differ from nationality to nationality in terms of adhering to contract agreements. The current study found that Korean, Japanese and European customers are likely to respect a contract, unlike Chinese and Middle Eastern customers. In the case of Chinese and Middle Eastern customers, more attention has first to be paid in terms of on-time delivery. Consequently, customer reliability needs

also to be considered so that the risk from an unexpected fall in prices, that may in turn result in defaulted contracts, can be mitigated. Hence, it could conceivably be hypothesised that Chinese customers are tricky and difficult to deal with, leading to many challenges when compared with customers from Korea, Japan and Europe (see Chapter 5; Section 5.4.1.2).

Secondly, with regard to the effect of INCOTERMS, in general, CIF and CFR terms are preferable when it comes to trade than FOB. This is because they offer greater flexibility and better control in terms of transport management. As Tongzon exemplifies on FOB terms: “...*the seller is responsible for delivery of the goods to the warehouse of a designated consolidator or carrier at the FOB port...*” and the Port of Loading is nominated by the buyer (Tongzon, 2009, p. 187). According to INCOTERMS, exporters may have constraints on the basis of limited alternatives in the choice of the Port of Loading. This study has demonstrated that the delayed notification with regard to shipment information may have a direct impact on the time available from the informed date to the booked date for delivery. Therefore, the time available until the booked date could be a major constraint, if not the only one, that influences the choice of transport mode. It has also been shown that unprofessional purchasers may provide sellers with only a short period of notice, which make it difficult for shippers to use rail or water modes. However, this kind of problem is less likely to occur in the case of professional purchasers. Flexibility and responsiveness in terms of logistics planning is the means to deal with uncertainty and short shipping notice, such that firms can still achieve customer satisfaction which can be derived from adopting a dual-response logistics strategy (Wu, 2012). It is likely that such connections exist between INCOTERMS and the smoothness of transportation management.

In the rubber business, the data reported here appears to support the assumption that CIF and CFR may be preferable to FOB under normal circumstances (see Chapter 5; Section 5.4.1.1). When there is a high risk with regard to ocean modes, this study shows that a weak link may exist between the preferences with regard to INCOTERMS and freight rate situations. To illustrate, instead of C terms (CIF and CFR), FOB may become the preferable trade term, especially with European customers. A possible explanation of these results may be because the ocean freight rate for delivery to Europe is significantly higher when compared to that for China and other Asian countries. As Tongzon (2009, p. 187) states: “*the terms of sale specify two important conditions for cargo movement: who is responsible for the transport stages and what port or ports will be used.*” Furthermore, the evidence from this study

shows that the European zone involves higher risks in terms of ocean freight rates than is the case with other regions. In summary, FOB is preferred to others for a European destination when being exported from Thailand.

Surprisingly, no differences in terms of delivery were found in the choice of mode with regard to different buying contract terms between spot and forward contracts. This may be due to the fact that the delivery date for rubber trading typically falls at least two weeks after the trade date, given that firms still have plenty of time for the preparation of orders and transportation.

This is the first study to point out some customers' purchasing behaviours in the context of the Thai rubber industry. An implication of this knowledge is the possibility that it could support newcomers to the rubber business, allowing them to develop a more in-depth understanding of customers' purchasing behaviours. This knowledge may help them plan their transport activities in order to meet the needs of customers and, at the same time, increase customer satisfaction. The following section will discuss customer importance.

6.6.2 Customer importance

Secondly, customer importance mainly influences the service levels that should be provided to each customer. Transport managers routinely consider who their customers are, so that they are able to meet the customer's needs. The results of this study indicate that there are two elements that are used to rate the importance level of customers. These are "*buyer roles*" and "*credit rating*." The priority between awareness of product quality and the accuracy of delivery service could change at any time, depending upon the customer's requirements, which may change in line with the current situation of market price.

6.6.2.1 Buyer roles

Customers' requirements seem to differ from one client to another based on the role of the stakeholder in the chain. In relation to the interview data, it may be argued that "*end users*" presumably give first priority to the quality of the product, particularly in terms of contamination issues and the chemical indexes of rubber products; whereas "*traders*" pay more attention to selling prices and delivery times. This study has found that generally purchasers actually focus on accuracy of delivery times, rather than on short or long transit times (see Chapter 5; Section 5.4.3.2).

In support of this position, *end users* (e.g. big tyre manufacturing) utilize rubber as the main raw material and its value is added to by the manufacturing process. Therefore, any contamination or problem with rubber quality may result in damage on the cutting machine and difficulty in mixing the product constituents. However, particular customers, who are really concerned about the chemical components of the rubber, may specify rubber from specific factories. These conditions imply that product quality may have a greater importance than delivery time. In other words, rubber price fluctuation may have a slight impact on their purchasing behaviour, but not as much as changes in product quality. In the case of *traders*, slightly differences in price and delays in shipments can lead to serious problems, as their profit depends mainly upon the resale margin to another in the chain.

6.6.2.2 Credit rating

The other important factor in the form of "*credit rating*" is also useful when it comes to valuing how important a customer is, and can lead to differences in the level of transport service provided. This criterion is mostly assessed via financial issues as they apply to the customer. For low credit rated customers, it does not seem appropriate to use options requiring a long transit time, especially when using coastal ports and rail transport. If a company wants to use these options, it may need to plan and prepare empty containers in advance.

Additionally, in terms of shipments to new customers, the delivery method generally involves the use of the most reliable transport service available, even if the company has to pay more. However, there is evidence to confirm that this issue is only important for managers working in small companies. These findings cannot be extrapolated to all situations. It is difficult to explain this result, but it might be related to centralised systems. In a small organisation, a manager is generally responsible for multi functions such as marketing and shipping. In addition, the firm is normally dependent on a small customer base. Therefore, such managers are likely to know individual customers quite well.

In summary, credit rating may have an influence on the limited number of alternatives available. This section provides a deeper insight into the influence of customer importance when it comes to making decisions. The next section therefore moves on to discuss customer service requirements.

6.6.3 Customer service requirements

Customer service requirements are aimed at understanding what customers really need. As mentioned previously that the role of the stakeholder may have a consequence on the customer's requirements (what is it that the customer actually wants?). This study then provides considerable insight into two relevant subjects: *“product quality”* and *“service quality, focusing on on-time delivery.”*

6.6.3.1 Product quality

Product quality may be influenced by two main factors: 1) the chemical indexes of the raw material in different geographical zones, and 2) the site in which the containers are loaded²³. Firstly, the chemical ingredients in rubber can differ according to the location of the rubber tree. Consequently, some factories may be able to manufacture higher quality products which match the customer's requirements.

Secondly, customers who are really concerned about the quality of the product, tend to place orders made up under CY conditions. This means that the loading of the containers must take place at the shipper's factory. In particular, large-industrialized buyers (e.g. Bridgestone) are very strict about the risk of rubber contamination. Thus, the process of loading into containers must be completed at the shipper's location. An implication of this is the possibility that the delivery method requirement is considered to be a shipping constraint, and may contribute to the decrease in the number of possible alternatives.

There is also evidence that different customers result in different methods of transportation, even under the condition of the same destination. This result may be explained by the fact that particular buyers will not accept cargo delivery in CFS terms, especially in the case of big tyre manufacturers. Therefore, a practicable option needs to be consistency with the condition of shipment instruction. On the other hand, traders who buy for resell, are more concerned with on-time delivery rather than product quality. Therefore, shipping managers need to select the options available in terms of transit time reliability. It was also shown that traders seem to have only a few requirements with regard to the product itself; hence, the choice of transport mode

²³ This is generally classified into two types: at the container yard, (the CY), and at the container freight station (CFS).

allows a great deal of flexibility. This is because products can be collected from any shippers' location.

6.6.3.2 On-time delivery window

As regards service quality focusing on on-time delivery, the preparation time remaining before the closing date is an important constraint in terms of making a choice. According to the preparation time period, the transport options which cannot deliver within given time constraints will be ignored. Consequently, transport modes that have the capability to deliver products by an agreed delivery date, have a tendency to be selected first. In summary, an option that is capable of delivering goods to the Port of Loading nearby within the estimated delivery window, will almost certainly be selected first. In the case of urgent or vital shipments, road transport is mostly chosen, and unreliable transport modes are unlikely to be even included in the set of acceptable alternatives. A possible explanation for these results may be that administrators tend to be "*satisficers*" (in Simon's terms) rather than "*optimizers*" (Campitelli & Gobet, 2010; Kalantari, 2010) (see Chapter 2; Section 2.4.1.2).

In summary, it can be argued that the requirements of each individual customer are different, and may vary with time and circumstance. The most important customer characteristics is that an assessment of the customer's requirements, customer-purchasing behaviours and customer importance, will enable the shipping managers to appraise the feasibility of the various transport modes available and the port selection. However, managers' judgments need to be considered under the current rubber price conditions and general economic conditions which have to be considered alongside customer characteristics. Additionally, the results of this study indicate that the complexity and uncertainty of environmental characteristics may have an influence on customer characteristics, on the basis of changing patterns of customer requirements. For example, Chinese customers need to be aware of the importance of adhering to agreements during downward trends in rubber prices. It was also shown that "*end users*" place a great deal of importance on quality, while traders are very sensitive to punctual delivery. Therefore, administrators should pay more attention to on-time delivery in order to help prevent negotiations for cancelled contracts and rate reduction in the event of delays.

As a final point, this study has gone some way towards enhancing our understanding of customers characteristics in the context of the Thai natural rubber sector, as well as link with the effect of environmental characteristics is presented in Figure 6.7.

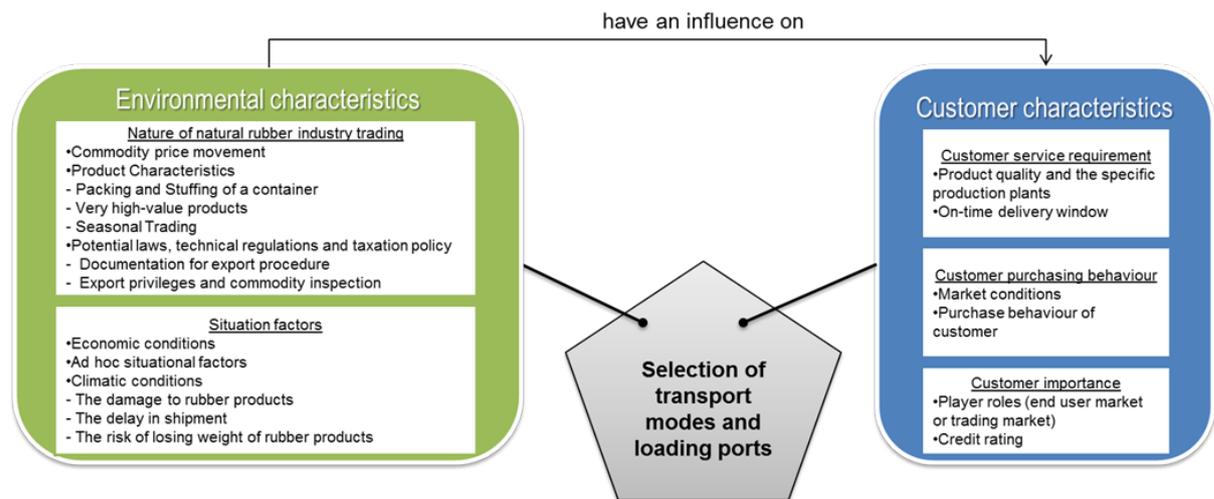


Figure 6.7: Summary of customer characteristics (including link with environmental characteristics)

6.7 Towards an understanding of how managers make decisions on freight transport mode choice in the Thai rubber sector

The discussion in this chapter provided an important opportunity to advance our understanding of the important factors influencing intermodal freight transport choice from a shipper's perspective, following element by element, the five key areas as briefly summarised in Figure 6.1 at the beginning of this chapter.

The summarised five components, with each component including a range of factors divided into multiple levels and sub-levels, are brought together and presented in one conceptual diagram, as shown in Figure 6.8. All five elements ultimately form a conceptual model that helps us to understand the selection of transport modes with regard to the Thai rubber sector.

There is no fixed formula to follow in the choice of transport modes. However, the data reported in this study appear to support the assumption that each choice must be governed by several variables comprising of business size, manufacturing locations, logistics policy, organisation resources and current transport infrastructure proximity to shippers' plants. Moreover, each option must differ in its value depending upon shippers' perspectives, economic conditions, ocean freight rates and transport visions of individual decision makers. There is a range of influencing factors which play a crucial role in the selection of transport modes and ports of loading within the context of the Thai rubber industry. Transport choice is a much more complex

process than can be explained by one theory. However, this study proposes a conceptual model for transport decision makers in the natural rubber business as seen in Figure 6.8. Moreover, the inter-connectedness of the model can possibly fall under three headings, operational factors that are included in the factors related to transport operation, the external context that consists of environment characteristics and customer characteristics and the internal context that is composed of organisational characteristics and an individual decision maker.

As stated by Meixell and Norbis (2008), there is a general lack of research employing qualitative modes of enquiry, particularly by means of interviews which are considered as difficult depending on accessibility to the field of business and especially with Thai firms. A consolidated effort spent on this thesis would enable a theoretical perspective on understanding how decisions get made in the choice of transport modes by transports users. Therefore, this thesis takes the form of a sectoral case study which examines the factors influencing the selection of intermodal freight transport. This study has demonstrated for the first time, summaries of all the important factors emerging from this investigation, in one diagram presented in Figure 6.8. The study has then added competent knowledge concerning the area of freight mode choice, with regard to how important those factors are in the particular context of emerging countries such as Thailand. In addition, the potential impacts of each factor based on Thai senior managers' perspectives have been initially established and discussed in Chapters five and six. In summary, this conceptual model is considered as the main contribution of this research as it has inductively emerged from the context of the rubber sector. The power of explanation of the various factors feeding into the decisions in terms of freight transport mode choice will be disseminated to shipping managers within the commodity market sector.

This chapter has discussed the significance of research results with explanations and compared and contrasted those results to previous work. It is now necessary to summarise the main findings and examine the principal issues and suggestions which have arisen in this discussion. These are provided in the next chapter which also points out research contributions, limitations of the current research and recommendations for future research work, as well as suggesting implications of the results.

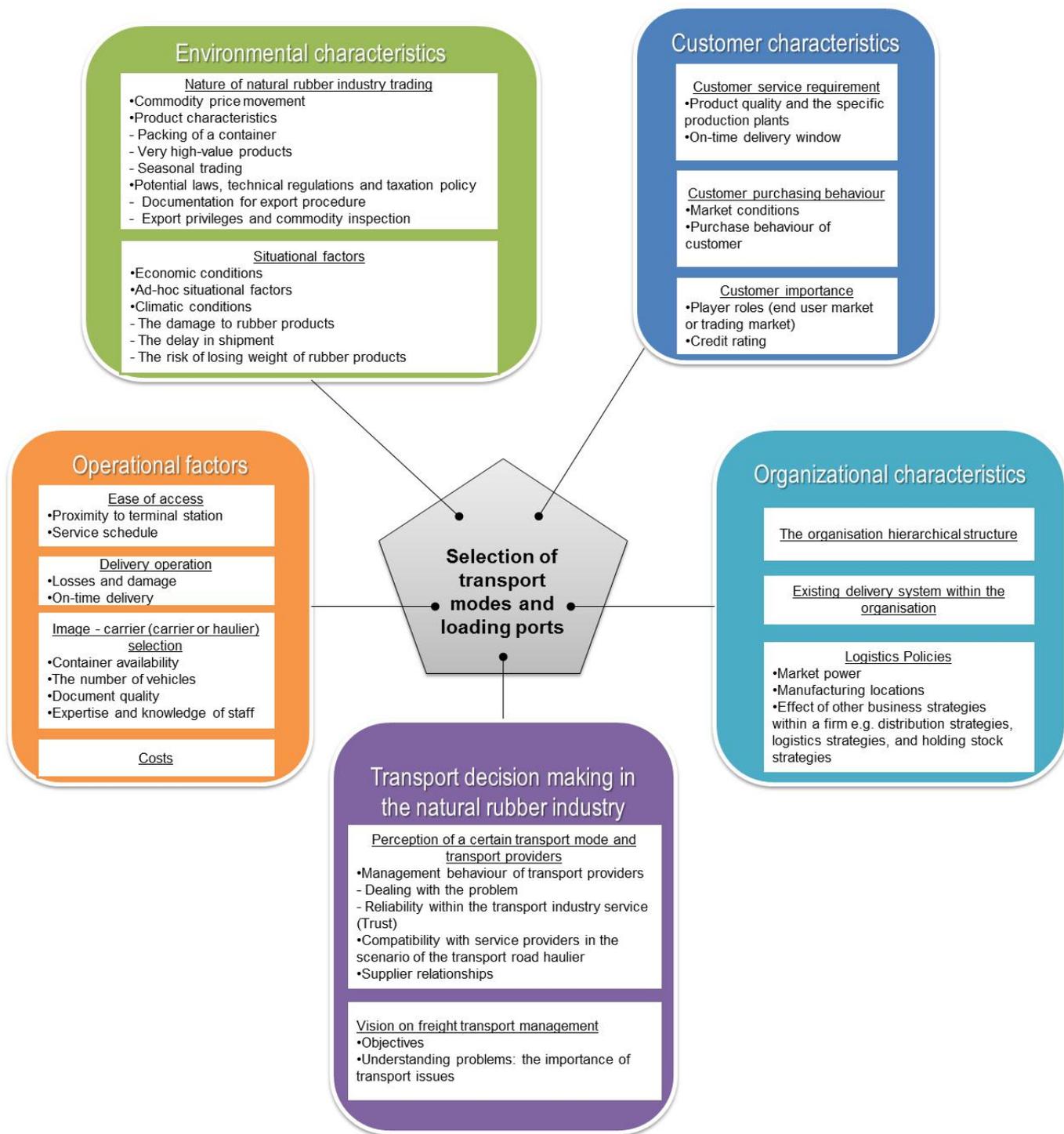


Figure 6.8: 5 Forces influencing the choice of intermodal freight transport in the natural rubber industry in Thailand

Chapter 7: Conclusions

7.1 Introduction

This chapter provides a brief conclusion of the present study. In Section 7.2 the main findings are discussed in relation to the five research objectives. In Sections 7.3 the original contributions of the research and its implications are addressed from two broad perspectives: a theoretical perspective and a practical perspective. Section 7.4 is devoted to a description of the limitations of the study. Recommendations for the Thai natural rubber industry are then presented in Section 7.5. The final section outlines suggestions for further research.

7.2 Main findings

This research originated from the intention to improve our understanding with regard to the choice of freight transport in emerging countries such as Thailand, in view of the fact that there is a lack of research in the area of intermodal freight transport choice. As a consequence, this study is concerned with investigating the factors that influence company shipping managers regarding their choice of intermodal freight transport modes. Once several study approaches had been considered, the behavioural approach was adopted in order to investigate mode choice selection, as it provides an important opportunity to enhance the understanding of management practices. As a consequence, the current study has developed a conceptual model to provide an understanding of the factors that influence decision-makers in terms of the transport options that are used, or that might be used, by rubber exporters as a means of closing the gap in our knowledge of the workings of the Thai rubber industry as previously mentioned.

To summarise the main conclusions that have emerged from the empirical work, the following sections will address the specific research objectives of this study.

7.2.1 Research objective 1

To evaluate the concepts and theories involving transport modes selection and decision making processes (see Chapter 2 for details)

Initially, the first research objective was to seek out existing concepts, models and theories relating to transport mode selection and related decision making processes. Based on the literature review with regard to decision variables relating to freight transport mode choice and carrier selection (see Chapter 2; section 2.3.2), identifying/categorising operational factors (see Table 2.8) were derived, based upon several pieces of empirical research. Moreover, these were accompanied by aspects of a number of useful theoretical areas, including the bounded rationality Theory, models of OBB, Institutional Theory, and resource/knowledge-based views of the firm, all of which were used to determine the preliminary conceptual framework for this study. They also assisted in explaining how managers make decisions with regard to their choice of intermodal freight transport, based upon shipper's perspectives in Thai rubber companies.

For this thesis, the Thai rubber sector was chosen as a sectoral-based case study. The research was conducted using two main methods: questionnaires and semi-structured interviews. To achieve research objectives 2 and 3, the findings of Research Phase 1 were presented in Chapter 4. Chapter 4 provides an overview of freight transport movement in the South Thai rubber industry, therefore providing background knowledge of the context of the study of a specific case. This allowed a substantial investigation of the situation in great depth by employing semi-structured interviews. Subsequently, the findings of Research Phase 2 were revealed in Chapters 5 and 6, with an attempt to achieve research objectives 4 and 5 respectively.

7.2.2 Research objective 2

To investigate the current practice of freight transport usage in the context of the rubber industry in southern Thailand (see Chapter 4 for details)

Based on Research Finding I as previous presented in Chapter 4, the exploratory survey provides a clear understanding of the current intermodal freight transport usage within the specific context of the Thai rubber industry. Nevertheless, the survey method has its limitations, in that it cannot enhance the understanding of how shipping managers choose one mode of transport rather than other equally viable ones, as this is not the purpose of this research.

The main findings regarding the objective in this section can be summarised as follows:

This is the first study offering an overview of current practices with regard to intermodal freight transport in the Thai rubber industry. It is an investigation of current practice in terms of freight transportation in the rubber industry. The survey results have shown a growing trend towards the practice of outsourced transportation in the rubber sector, and a massive increase in the volume of road usage.

Another important finding is with regard to the mechanism of the decision-making process. It is recognised that, prior to selecting a shipping line, the port of shipment tends to be chosen first. Subsequently, inland transport options are selected for delivering goods from the shipper's location to the port.

This study also provides a summary of the determinants which drive the selection of inland transport modes as part of the intermodal transport system, as well as favourite options as presented in Section 4.3.3 and also summarised in Table 4.3. Furthermore, the possible reasons influencing the selection of inland freight transportation (Road, Rail, or Sea/Inland waterways) are highlighted in Table 4.4.

As a further stage of Research Phase II involved the application of in-depth interviews, the background knowledge of the investigated case provided by Research Finding I was very useful in these interviews in terms of providing comprehensive knowledge of the current situation with regard to freight transportation in the industry.

7.2.3 Research objective 3

To explore the feasible range of alternatives in terms of intermodal freight transport pathways in southern Thailand (see Chapter 4 for details)

Research Objective 3 relates to what are the practicable range of alternatives currently available. At that point, a survey was considered to be the best method for dealing with Research Objective 3. To respond to the objective, Research Phase I involved a survey, with data being gathered from a group of people who are responsible for the selection of freight transport modes. Surveys were returned from 50 respondents which yielded a 68.5% response rate.

This section reviews the alternative intermodal freight transport methods that are currently employed by the southern Thai rubber-export industry. The current rubber freight routes were investigated and are presented in Figure 7.1. This offers a summary of the possible alternative logistics pathways regularly used by companies involved in the rubber business.

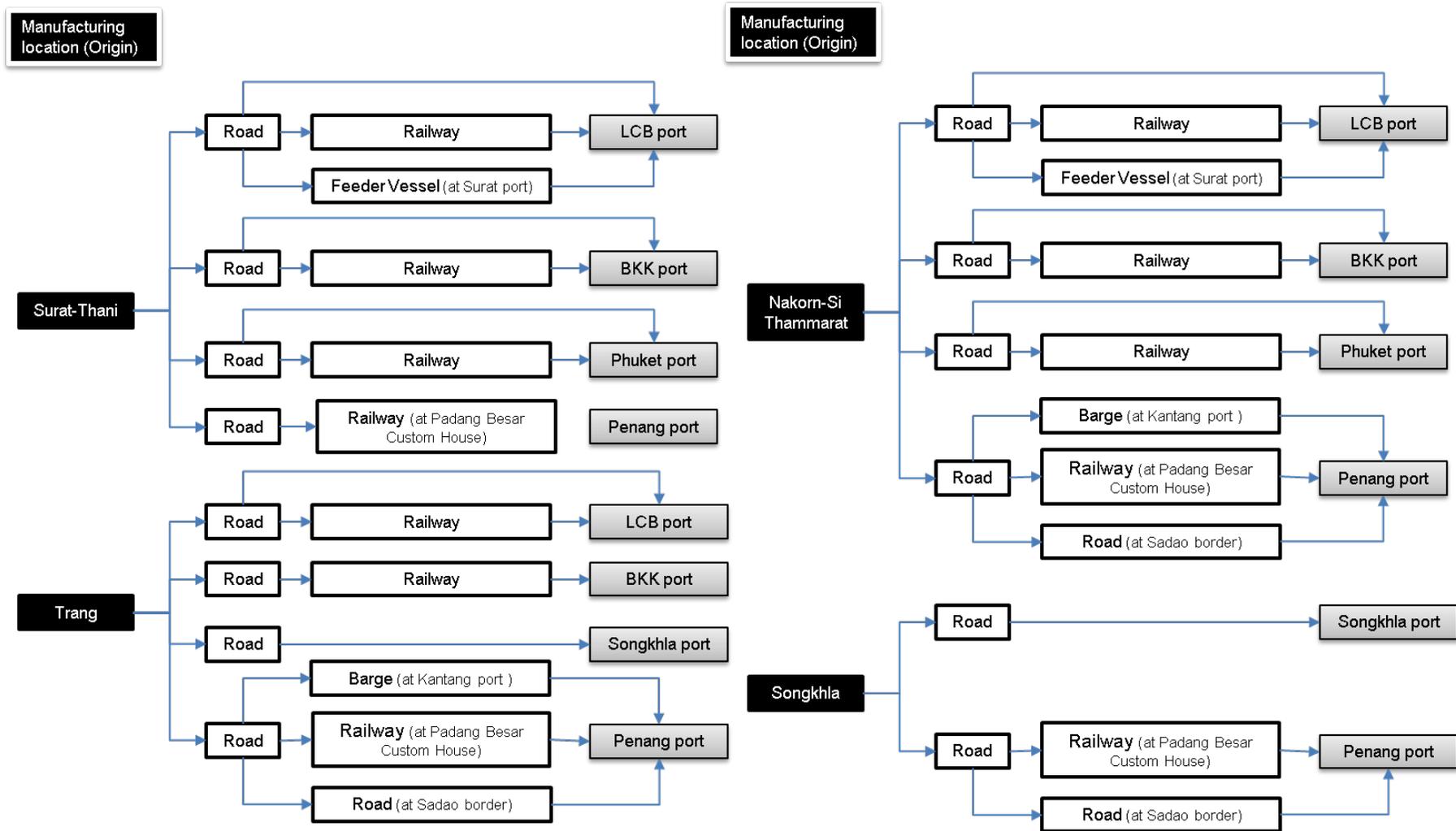


Figure 7.1: Alternative intermodal freight transport choices

7.2.4 Research objective 4

To examine factors that could affect the choice process with regard to selecting transport modes (see Chapter 5 for details)

According to the research findings emerging from the fieldwork, several factors appear to influence the decision-making process in terms of mode choice. However, it is possible to categorise them into five main categories. The main variables that were determined as factors influencing the choice of intermodal freight transport are presented in Table 5.1 in Chapter 5. In addition, the interdependence amongst these factors also eventually influences the mode choice selection. These five themes are: environmental characteristics, organisational characteristics, customer characteristics, transport decision making in the natural rubber industry, and operational factors. These themes contribute towards a better understanding of the factors which have an impact on the choice of intermodal freight transport.

Not only is the decision-making with regard to transport selection complicated, but it also includes numerous irrelevant-cost factors. Such factors tend to be excluded from a cost-based mode choice model, since they do not seem to be relevant to the model's objectives. However, the results from primary data indicate that there is an interaction amongst the factors determining mode choice selection. The relative importance of these factors is also dynamic (changing from one circumstance to another). It is interesting to note that circumstances at the time of making a decision have a significant impact on that decision. Due to such complexity, it is difficult to generalise a conceptual model that can be applied to every industry. Moreover, variations may occur even within the same industry as a result of different individual and firm behaviours. Therefore, the emerging factors found in this study as presented in Table 5.1 can be seen as a theoretical model aimed at offering an understanding of which factors have an impact on how shipping managers located in the south of Thailand make decisions within the Thai rubber industry.

7.2.5 Research objective 5

To propose a conceptual model aimed at providing an understanding of the factors that influence the intermodal freight transport choice from a shipper's perspective (see Chapter 6 for details)

To address this objective, this study proposes a conceptual model with regard to transport decision makers in the natural rubber industry. Details of the explanation can be seen in Chapter 6, and the proposed model is presented in Figure 6.8. The proposed model was derived from the assessment of the proposed conceptual framework using primary, qualitative data from the fieldwork. Additionally, the conceptual framework built from the existing literature extends the knowledge of the model of OBB, which was originally proposed by Lysons and Farrington (2012) and Webster and Wind (1996).

Considering the proposed model, there are three components that differ from the original OBB model. Two components were added based on the emerging concept from the literature review, namely operational factors (see Section 2.3.2 and 5.3), and the research findings, namely customer characteristics (see Section 5.4); whereas one of the components of OBB, namely the interpersonal component, was eliminated as it is less relevant to this research context. Moreover, although this research utilised OBB as a main concept, some of the related OBB concepts were used to generate a model that enhances our understanding of freight transport mode choice in the Thai rubber industry, rather than testing the theory. The details of such factors in relation to the individual, organisational and environmental concepts were illustrated in Sections 6.2, 6.3, and 6.5, respectively. Moreover, the details of the factors in relation to the two additional components were presented in Sections 6.4 and 6.6. As a consequence, a number of details of factors related to particular concepts emerged from the findings of this study. As the recommended model has been developed from very rich contextual evidence, a number of factors included in the model are derived from practical perspectives within a specific industry. Therefore, they are also considered as one of the main contributions of this research. In order to clarify the way the researcher come up with the factors that make up the model, Figure 6.8 in the discussion chapter is modified and represented in Figure 7.2. The figure clearly distinguishes between factors which were drawn from the current findings of this study or resulted from the literature review by the notations '*' and 'a', respectively.

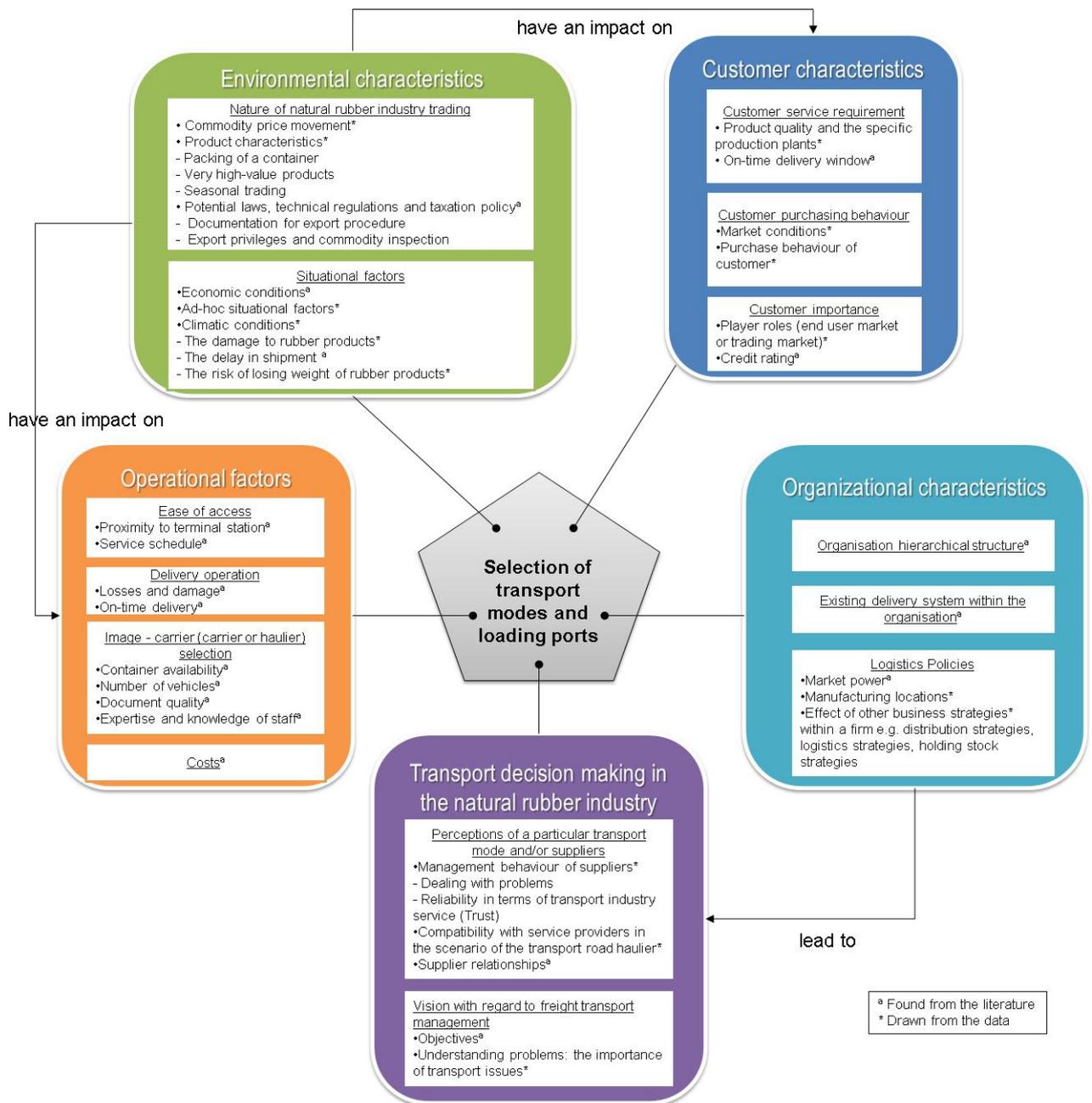


Figure 7.2: Five forces influencing the choice of intermodal freight transport in the natural rubber industry in Thailand

The proposed conceptual model offers a number of implications with regard to the practices of various practitioners. For example, due to the lack of research into the context of the Thai rubber freight transport mode choice in practice, a contribution to knowledge on the part of this current research is the potential to support both novice and experienced researchers who are interested in doing research within the Thai rubber industry. This is because the proposed model assists both types of researcher in their understanding of how to effectively manage in the rubber supply chain or other industries that need to export products from Thailand, such as the rice, rubber wood and frozen food industries. The model summarises a list of important factors for making decisions with regard to transport choice. Hence, this work has value in its own right, in terms of consultancy that could be used to inform researchers as to what factors need to be considered when making decisions on freight transport choice. This could facilitate such choices by providing an important opportunity to gain a greater understanding of the purchasing behaviours of rubber customers, as this study serves as a basis for further research.

The most obvious benefits of this research relate to the rubber companies themselves. Since this research results were drawn from the broad perspectives of various shippers employed by different rubber companies, such shippers could gain a better understanding that goes beyond their own practices. Consequently, based on their ability to learn from the proposed model, they may improve the planning and managing of appropriate transport activities/strategies/techniques in accordance with the type of rubber products and buyers. Furthermore, perhaps novice shippers would gain the most benefit from this study by learning from other practices rather than starting with trial and error such as was the case with other existing shippers reported in this research. Additionally, the benefits of this research are not limited to shippers who already work in the industry. An individual who desires to work as a shipping manager in the rubber industry may learn from current shippers in terms of practice from the recommended model. Therefore, this may lead them to place them in a better position to be recruited as a new shipper by rubber companies.

In addition, though this research emphasises understanding based on shippers' perspectives resulting in direct benefits to those shippers in terms of freight transport mode selection, the proposed conceptual model could be beneficial to transport providers as well. The research findings derived from this research potentially provide assistance to third-party logistics (3PLs) providers who supply transport services to rubber exporters. In other words, the recommended model could also help transport

providers enhance their understanding of the requirement of transport users from the shippers' point of view in their freight transport mode choice in terms of significant factors that they could include in their considerations. Therefore, they could have a better chance to be chosen as transport providers by rubber exporters. Moreover, 3PLs could utilise the criteria resulting from this study by using them for guidance purposes when it comes to assessing their business in terms of where they are or how they can improve their business capacity to meet the significant criteria that rubber exporters use to select them. As a result, their business could gain a competitive advantage with regard to their competitors.

7.3 Contributions and implications of the research

This section can best be categorized under two headings: the academic contribution, and the practical contribution.

7.3.1 Academic contribution

The present study makes several noteworthy contributions to knowledge in terms of a theoretical perspective. These can be divided into three categories: the proposed conceptual model, the theoretical framework used for this study, and the research methodology used for this research.

7.3.1.1 The proposed conceptual model

Regarding the conceptual model proposed in this study (see Figure 6.8). It enhances the understanding of mode choice selection of exporters of natural rubber in the south of Thailand. The model offers two main understandings in terms of mode choice selection. Firstly, a conceptual model is proposed for the context of natural rubber companies in southern Thailand. It is important to note that this is the first study to undertake a sectoral case study in this context. Secondly, it also provides an understanding of the factors influencing managerial decisions relating to the choice of transport mode.

Data gathered from top managers across the rubber sector, though a number of in-depth interviews, led to an extensive primary study. This resulted in the creation of a significant amount of credible, rich, useful findings, which considerably expand upon the existing literature in the choice of transportation mode and carrier selection. Consequently, the findings in this primary study were built upon a conceptual model aimed at understanding the selection of transport mode. In that respect, the model is considered unique for Thailand. This proposed conceptual model has demonstrated,

for the first time, an understanding of management practice, in terms of the factors that affect purchasing decisions, by emphasising the selection of transport modes in the context of Thai rubber exporting. The model comprises five groups of factors that influence decision-making regarding transport modes. These five categories of classification are: business environmental characteristics, organisational characteristics, customer (rubber buyer) characteristics, transport decision-making in the natural rubber industry, and operational factors in relation to distribution-related factors, as shown in the main findings in Section 7.2.5 of this concluding chapter.

The proposed conceptual model makes several contributions to the current literature. First of all, the proposed model aims to fill the existing gap in knowledge identified at the beginning of this research (see Chapter 2; Section 2.5). Therefore, the conceptual model emerging from the findings of this study is considered a key contribution to knowledge. This research contributes to the existing knowledge of OBB by building upon the models of Lysons and Farrington (2012) and Webster and Wind (1996). In support of this position, the findings in this primary study (see Figure 6.8) support four elements presented in the primary framework (see Figure 2.15) as important to shipping managers when making decisions on the choice of freight transport mode. Apart from providing additional evidence relating to four components, the current findings also add to a number of contextual factors, special to the Thai rubber sector. Additionally, the study offers some important insights into real practice in a much neglected industry. The component of customer characteristics, which inductively emerges from the primary research, is built upon the primary framework (Figure 2.15). This is the first study to summarize customers' purchasing behaviours in the context of the Thai rubber industry (see Chapter 5; Section 5.4.1 and Chapter 6; section 6.6.1). An implication of this knowledge is the possibility that it could support both novice and experienced researchers who are interested in doing research within the context of rubber, as this research serves as a basis for future studies, by providing an important opportunity to advance the understanding of rubber customers' purchasing behaviours.

According to Craig and Easton (2011, p. 57), there is a general lack of research in delivering "...an understanding of the drivers of individual managers' behaviour and of their decision-making processes." Consequently, this study is at the beginning of developing an understanding of what drives shipping managers' behaviour in terms of how they make decisions on the choice of freight transport mode. Hence, the study should also make an important contribution to the supply chain field.

7.3.1.2 The theoretical framework

The outcome of the review of literature discussed in section 2.4.2.3.1 indicated that transport mode choice is considered to be a complex and unstructured decision issue, especially when the process of making decisions occurs under the rising complexity of global business circumstances. The approach of this research has been to make use of existing theories to analyse and explain such complex and unstructured situations with the intention of a deeper understanding of freight transport choice decisions within the particular context of the Thai rubber sector.

The researcher reviewed previous studies on the choice of transport mode in various contexts, mostly those established in developed countries. This resulted in identifying some significant factors influencing the selection of transport mode choice and carrier selection, named as “*operational factors*” (see Table 2.8). Concepts and theories involving decision-making processes are also evaluated. As a result, this research developed a conceptual framework derived from the combination of the OBB model in terms of contextual factors, and with relevant literature in relation to operational factors. The development of the theoretical framework can be found in Chapter 2 and the preliminary framework used for this research is revealed in Figure 2.15 in Section 2.7.4 of the literature review chapter.

The preliminary conceptual framework for this research was based upon the main concepts of OBB (see Chapter 2; Section 2.4.2 and 2.7.4). Thus, the study has confirmed that the two OBB models proposed by Webster and Wind (1996) and Lysons and Farrington (2012) were very useful for the purposes of research, which intends to investigate the contextual factors influencing the decision-making process. Additionally, some beneficial theories and concepts are summarised as follows. The OBB models help structure key components in terms of the contextual factors that would affect an individual decision maker who makes decisions that need to benefit the whole company. This model has been instrumental for the development of a preliminary conceptual framework for this research. In addition, the theory of bound rationality was used to advance the understanding of the results of this research. Simon (1992) introduced the process in alternative searching, the method by which managers find and select an alternative to be implemented. The theory of bound rationality helps the researcher to explain the research findings emerging from the primary study, by providing a useful account of how managers' experiences have an impact in setting the level of aspiration in decision-making.

In summary, the combination of OBB model, operational factors, and the decision-making theory of bounded rationality of Simon (1992, 1997), was successful in uncovering and understanding the factors influencing the selection of freight transport choice in the specific context of Thai rubber exporters. Because of this, a theoretical framework developed for this study (see Figure 2.15) may be used by other research studies seeking to understand research in the field of transportation mode choice and carrier selection.

7.3.1.3 *The research methodology used*

In terms of the research methodology used in this research, this research provides a framework for the exploration and explanation of management issues which are considered under-researched. This is due to the fact that this research employs semi-structured interviews and template analysis methods. Using semi-structured interviews results in obtaining rich data, allowing the complex issues of the investigated industry to be addressed. Moreover, such data has the potential to help uncover and provide a better understanding of the contextual factors associated with the Thai natural rubber sector. The findings of this thesis could be used to help shipping managers when making their decisions.

Template analysis has some pre-determined coding. However, the technique allows emerging coding to take place throughout the data analysis, and also has a stage which allows the revision of the template. It assists the researcher to analyse transcript data in both inductive and deductive ways. As a consequence, important issues and related factors can emerge from the process of analysis as part of an iterative process. Eventually, a comprehensive, precise and comprehensible version of how natural rubber shipping managers make their decisions in terms of selecting mode choice can be derived, and mostly varies from the initial template.

In conclusion, this research will serve as a base for future studies in relation to the enhancement of transport management performance, based on current practice. It offers a conceptual model which is rich in detail with regard to Thai transport mode choice in the south of Thailand. Furthermore, it offers a summary of the feasible range of freight transport alternatives used in the rubber business, as is demonstrated in Figure 7.1. The findings of this thesis will serve as a base for future studies into the Thai rubber sector in terms of the current freight transport options used by rubber exporters. It is consider useful information for further study on the part of anyone who is interested in seeking to propose a logistics decision making model for routeing and

mode selection by employing hard operations research. Thus, solution-seeking research, such as research involving optimal simulations, may be conducted based on the findings of the current work.

7.3.2 Practical contribution

The findings of this study have a number of important implications for exporters in the natural rubber industry, which is a key industry in Thailand as the world's largest rubber exporter. The research provides an understanding of the determinants of managerial decision making processes with regard to the selection of intermodal freight transport modes for the exporting of natural rubber products from Thailand, given that the country has several transport modes as it has a long coastline and a number of rivers. Regarding the proposed conceptual model and the importance of the rubber industry, this research has potential implications for academics, exporters, and policy makers as follows:

Natural rubber exporters

First, the research provides a conceptual model to provide an understanding of freight transport mode decisions, focusing on managers in the Thai rubber sector. As a result, the proposed model directly benefits natural rubber exporters who are the main focus of this study. Understanding their own practice comprehensively can lead to an increase in shipping managers' capabilities when making decisions with regard to freight transport modes as part of their daily practice.

Second, the findings provide a new understanding of customer characteristics focusing only on the rubber sector, as presented in section 6.6 of the discussion chapter. This can support transport decision-makers when it comes to choosing an appropriate transport mode or combination of transport modes based on the characteristics of their customer. High levels of understanding of their customers may result in an improvement in the level of customer satisfaction, which then in turn increases rubber exporters' business competitiveness in the market.

Third, the findings in this study support all levels of stakeholders in terms of providing a better understanding of the strengths and weaknesses of each of four favourite international ports (see Chapter 4; Section 4.3.3) so that policy makers will have an awareness of the difficulties involved.

Finally, one of the findings of this thesis (the third objective of this research) provides a range of intermodal freight transport pathways in southern Thailand. Therefore, the study helps both beginner and experienced SMEs in terms of understanding the current freight transport options used by rubber exporters. Fully understanding the possible options may result in an increase in a company's competitiveness.

Policy makers

The findings in this primary study provide policy makers with an understanding of the mode choice selection of natural rubber shipping managers in practice; therefore, they can develop appropriate policies that can increase the competitiveness of the Thai natural rubber industry as a whole.

Academics

By focusing on the Thai rubber industry, the outcome of this study provides us with a list of important factors that influence transport mode selection. This will enable academics to extend their understanding of related factors as used by shipping managers, so that they can conduct research such as using simulation or optimisation methods, and propose a solution for exporters and/or policy makers.

7.4 Limitations of this research

Similar to other research projects, this research has some limitations. Some drawbacks of this research will be identified and discussed in this section.

Firstly, one limitation of this study is the issue of the generalisability of the research results, although such generalisability was not the intention of this research. This is because this research was conducted using a qualitative approach involving purposive and snowball sampling methods in order to address the research aims identified in Chapter One. In doing so, the research results could be used as a framework or basis for other investigation. As a consequence, this research utilises transferability rather than generalizability to evaluate its quality (see more details in terms of transferability in Section 3.8.2).

This is due to the fact that this research relies on rubber exporters situated in just four out of fourteen provinces in the south of Thailand, although the four provinces produce over half the total natural rubber in the south. Therefore, factors influencing shipping managers in their choice of intermodal freight transport deriving from the sample may limit the scope of this research. As a result, the findings of this research

may not be applicable to every rubber exporter. Nevertheless, this research included the very rich and contextually robust research context in the rubber sector in which the research was conducted. Therefore, regarding the high transparency of the context of the research, the results might be transferable to the rubber exporters located in other parts of Thailand or in other countries. Moreover, they might be transferable to other commodity exporters having similar contexts to that of the rubber exporters considered in the research. It is worth noting that more details with regard to the clear and critical discussion of the justification for using transferability instead of generalisability criteria in terms of the research quality assessment of this thesis can be seen in section 3.8.2 in the methodology chapter.

Secondly, this research was carried out over a time span of five years, information collected at one point (cross-sectional data) in time for the second stage of data collection. Data was gathered in one time period between July and September 2012 in Research Phase I and face-to-face interviews in the Research Phase 2 were carried out from June 2013 to August 2013. Since new issues may have emerged due to the rapidly changing external environment, for instance, the physical changes in the logistics industry and transport infrastructure. By way of illustration, this research result indicates that the rail mode is not a popular choice (accounting for 14% of the total mentioned in Section 4.3.1) on the part of Thai rubber exporters to China. However, the Thai and Chinese governments have entered into initial negotiations to build a rail network between the two countries in the near future. This might result in a turning point in terms of the freight transport mode choice behaviour of the Thai rubber exporters to China, or even becoming the most prevalent one. It is important to note that these research findings relied on the data gathered at a specific point in time.

However, the value of findings from this research does not decline as this research does not seek to generalise the research findings beyond the scope of this study and investigate the issue in a dynamic manner.

7.5 Recommendations for the Thai natural rubber industry

As a consequence of the research findings, several recommendations have emerged for rubber industry' stakeholders, rubber exporters, transport providers and policymakers in the south of Thailand.

7.5.1 Natural Rubber exporters

Due to the fact that this research was based on rubber exporters' perspectives, the results reveal that the transport service is considered as one of the key functions of their business. Despite the ability to have in-house transportation for large exporters, small firms seem to be unable to afford it. Therefore, they depend largely on outsourcing transportation. However, from the evidence of this primary research, small exporters tend to manage independently of one another, even though their processing factories are located in the same area. As a result, if such small companies engaged in co-operation, this could result in increased power in negotiation for transport cost reductions.

7.5.2 Transport providers for exporting natural rubber

This study shows that outsourced transport providers play a crucial role with regard to exporting natural rubber from Thailand, in that they account for 92% of exports (as presented in Chapter 4). Moreover, over half of the rubber exporters located in the south of Thailand use the Port of Malaysia, namely Penang Port. This indicates that a great deal of money is paid to Malaysian transport providers instead of to Thai transport providers. This means that there is still a big opportunity for Thai transport carriers, who can provide the service quality and/or the reduction costs to satisfy rubber exporters. In doing so, this could result in on-going improvements of existing transport carriers, third-party companies or even the introduction of new ones.

7.5.3 Policymakers in relation to the natural rubber sector

According to the research findings, there is the need for improving the existing transport infrastructure or the addition of new transport infrastructure related to the exporting activities of the Thai natural rubber industry in the south; particularly rail infrastructure. The enhancement of service quality and the improved availability of freight wagon equipment are the main priorities. Moreover, the need for additional facilities such as new, modern cranes to load containers from lorries to trains at the customs posts or from lorries to ships at Songkhla port, has emerged from this study.

7.6 Recommendations for further research

Based on the results of this research, there are several issues that are considered as potential additional research topics. The follow section deals with three aspects for suggested future research.

7.6.1 Further research in the natural rubber Industry

This research was conducted in the context of rubber exporters situated in the south of Thailand. Therefore, another possible area of future research would obviously be to investigate the issue in the context of other parts of the country, such as the north and northeast. Such areas are the new growing areas of rubber trees and are geographically different from the south. As a consequence, their alternatives and the factors influencing them might differ from those derived from this study.

7.6.2 Further research in other mode choice selection

It would be interesting to assess the effects of companies' size on their behaviour in mode choice selection. For example, smaller firms may have fewer available transport modes and be less flexible to the changing business environment, compared to bigger ones. Therefore, it is possible to gain greater understanding of mode choice selection behaviour from different conceptual models, rather than just one generalised model.

In order to gain understanding of adaptive behaviours responding to dynamic business circumstances, further studies may be carried out using a behavioural approach as the approach can capture a manager's or organisation's adaptation according to the variation in both internal and external factors.

7.6.3 Further research on the Conceptual Framework

Regarding the complexity of freight flows, the development of a generalised conceptual model of mode choice selection seems to be difficult to achieve. Therefore, a more specific model may be more useful for studies with a particular purpose. By way of illustration, key constructs included in the proposed model can be used as a basis for future studies on the part of researchers who would like to investigate a specific context. It could involve research for solving problems in relation to multi-criteria decision making, employing the Analytic Hierarchy Process (AHP).

Appendix A: Context of the study

This section of the context of the study gives an overview of the Thailand's geography the country's economy. The next part will then address the use of freight transport in Thailand and the importance of the natural rubber industry to the country.

A.1 Thailand's geography and economy

A.1.1 Thailand's geography



Figure A.1: Map of Thailand

(Source: <http://www.un.org/Depts/Cartographic/map/profile/thailand.pdf>)

Thailand is located in the middle of South-East Asia's mainland and has borders with Malaysia to the south, Myanmar to the northwest, Cambodia to the east, and Lao PDR to the north and northeast as can be seen in Figure A.1. The capital city is Bangkok, which is situated roughly in the centre of the country. In terms of logistics performance index (LPI), it is ranked in the first half of the top rank in terms of scale, both within the ASEAN and the world. The actual ranks are 3rd out of the 10 ASEAN countries and 35th out of the 160 countries in the world (Thailand Board of Investment, 2015).

It can clearly be seen that Thailand's location is appropriate in terms of playing a role as a logistics hub in ASEAN (Thailand Board of Investment, 2015). Apart from having borders that are adjacent to four other ASEAN countries, Thailand is able to access all other ASEAN countries via water: the Mekong River, the Gulf of Thailand in the east and the Andaman Sea in the west.

As a consequence, Thailand is considered competitive in providing logistic service in ASEAN due to its geographical location. Because of its location, Thailand has attempted to become a main trading hub in Asia (Chao, 2011) and this can be seen from the country's levels of exported goods, of which just over one third are manufacturing-based products. In their important work related to Thailand's logistics, Goh and Pinaikul (1998) point out that when selecting Thailand's logistics service providers, decision makers must consider several important criteria, i.e., service reliability, the flexibility and responsiveness of suppliers, suppliers' customer orientation and the prices of the services offered.

Despite its geographical advantages, Thailand's domestic logistics costs are considered high relative to developed countries. According to statistics from the National Economic and Social Development Board (NESDB), as presented in Table A.1, the costs are as high as 17.9% of the country's GDP (NESDB, 2010). NESDB indicates that domestic logistics costs are a comparative disadvantage for Thailand and that they are a result of the country's inefficiencies. However, Sopadang (2007) posits that despite the problem of high transport costs within the country, the Japan External Trade Organisation (JETRO) and the United Nations Conference on Trade and Development (UNCTAD) have ranked Thailand as high as third in Asia in terms of its attractiveness for Foreign Direct Investment (FDI) and as one of the best locations for the establishment of manufacturing-based companies.

Table A.1: Logistics costs to GDP from 2001-2010

Unit: Percent

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Transport Costs to GDP	9.9	8.8	8.4	8.0	8.5	8.8	8.9	9.1	8.3	8.7
Inventory Holding Costs to GDP	7.9	7.7	7.7	7.7	8.1	8.5	8.2	7.8	7.0	7.6
Administration Costs to GDP	1.8	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.5	1.6
Total Logistics Cost to GDP	19.6	18.1	17.7	17.3	18.3	19.0	18.8	18.6	16.8	17.9

Source: Thailand's Logistics Report 2010 (NESDB, 2010)

There are several barriers that have prevented the government from improving the efficiency of logistics. These include high fuel prices, main port congestion, the limited capacity of ports and uncompetitive rail and water transport (UNESCAP, 2007). To date, there is growing competition in the international trade market due to free trade zone agreements, which makes trading businesses aim to increase their competitive edge (Houngbedji, 2007). The amount of competition has been continuously increasing. Thus, reducing costs is a way of improving a company's competitiveness. To encourage this, entrepreneurs and organisations are attempting to decrease the costs through logistic management.

A.1.2 Thailand's economy

The Thai economy has moderately expanded at a constant rate in the past decades (NESDB, 2011). Although the manufacturing industry is the main source of product exports from Thailand, the agricultural industry has also played an important role in this growth because it generates income and supplies raw material to add to the manufacturing industry's value. According to Table A.2, natural rubber products are one of Thailand's top ten export goods. Therefore, this study aims to examine the rubber industry as a sectoral case study.

Table A.2: Top 10 exported and imported goods in 2010

Top 10 Exports in Percentage*		Top 10 Imports in Percentage	
Data Processing Machines	10.4	Crude Oil	14.15
Motor Cars & parts & accessories	7.22	Machinery & parts	9.2
Precious Stone & Jewellery	6.82	Electrical Machinery & parts	7.09
Electronic Integrated Circuits	4.23	Chemicals	6.6
Refined fuels	3.49	Electrical Circuit Panels	6.08
Rice	3.32	Iron & Steel & products	5.32
Iron & Steel & products	3.25	Computer & Accessories & parts	5.16
Polymers of Ethylene, etc.	2.93	Precious Stone & Jewellery & Gold	3.58
Rubber products	2.91	Other Metal Ores	3.55
Chemicals	2.9	Vegetables and vegetable products	2.72

Note:* In terms of value (Source: Ministry of Commerce, Thailand)

A.2 The use of freight transport in Thailand

The amount of freight transport in Thailand has grown continually both domestically and internationally. Road transport is one of the predominant modes of transport used. This causes a serious problem to members of the public living near main roads, in particular those households situated close to border crossing points. There are many trucks, trailers and private cars that pass by throughout the day and night all year round, causing noise and air pollution. However, road transport had the highest proportion of freight transport at 82.4 % (Ministry of Thailand, 2012), because of the nature of the mode that enables companies to provide a 'door to door' service.

Also, the service charge in Thailand is lower than the actual price that it should be priced because the transport providers calculate costs without taking into account depreciation of vehicles and roads. Consequently, the current road transport costs are slightly higher when compared with other transportation services. Furthermore, there are many small and medium enterprises (SMEs) road carriers operating in the transport sector, which may result in a highly competitive situation among hauliers in the transport sector. One of the reasons why road transport in Thailand is so competitive in the market has been reported by Pomlaktong, Jongwilaiwan, Theerawattanukul and Pholpanich, (2011, p. 277), who note that "*freight transport is a free competitive market without price regulation.*" They also argue that this is a result of the ease in acquiring licenses from the Department of Land Transport in Thailand and the licenses' fixed cost price is considered cheap and they are valid for five years.

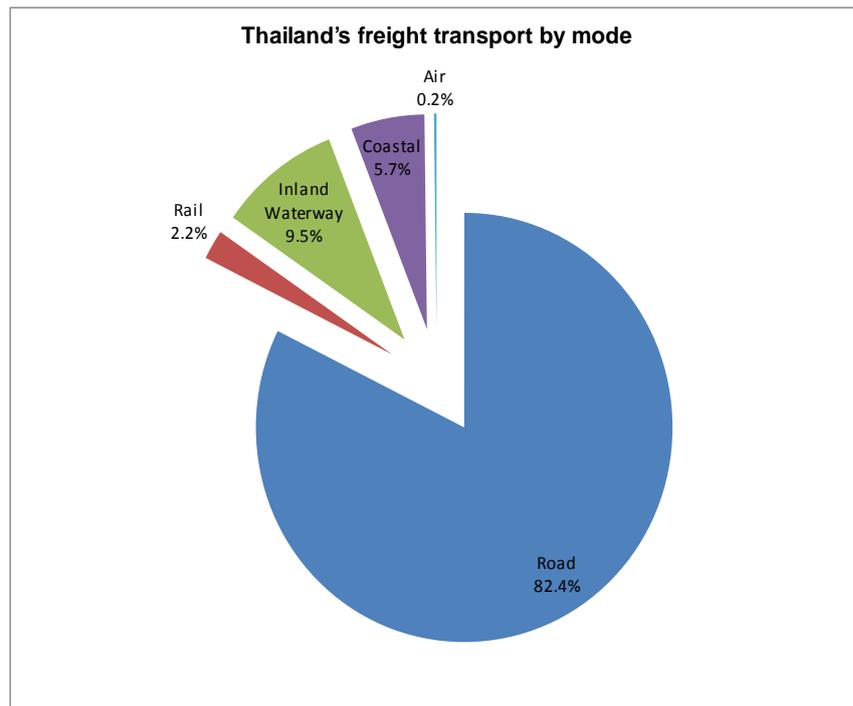


Figure A.2: Thailand's Freight Transport by Mode (Source: Ministry of Thailand, 2012)

With regards to the structure of transport, NESDB (2010) indicates that Thailand depends heavily on roads for transporting commodities, accounting for over four-fifths of the total freight transport volumes. According to Figure A.2, the statistical data shows that the truck plays a dominant role in Thailand's freight transport while rail serves only a minor role. The World Bank and NESDB (2009) point out the limitations of capacity and the inefficiency of trucks used in freight transport in Thailand. Moreover, there is a lack of good management information technology for service providers.

Table A.3 presents details of the export of natural rubber via ports or customs posts in the last eleven years (2001-2011). In 2011 the proportion of exports via Padang Besar Custom House (PBC) was highest at 38.6%, closely followed by Laem Chabang Port (LCB), Sadaul Custom House (SDC), Song Khla Port (SKP) and Bangkok Port (BKK), with 25.6%, 13.0%, 6.9% and 5.6%, respectively. In 2007, exports via PBC were the highest with 42.2%, followed by SDC, LCB, SKP and BKK at 14.2%, 13.4%, 10.2% and 8.6%, respectively. From 2008 to 2011, the percentage of exports via LCB increased significantly by 90.8% while the proportion of exports via SDC, PBC, SKP and BKK decreased by 8.3%, 8.5%, 32.4% and 35.6%, respectively (RRIT, 2011b).

Table A.3: Natural Rubber Export Quantities by Ports/Custom Houses from 2001 to 2011

YEAR	BANGKOK		SONGKHLA		LAEM CHABANG		PADANG BESAR		SADAUL	
	Metric ton	%	Metric ton	%	Metric ton	%	Metric ton	%	Metric ton	%
2001	166,061	8.1	429,250	21.0	64,157	3.1	709,651	34.8	251,861	12.3
2002	429,990	18.3	408,223	17.3	60,182	2.6	770,804	32.7	303,385	12.9
2003	454,087	17.6	509,091	19.8	69,365	2.7	851,766	33.1	338,307	13.1
2004	340,454	12.9	387,141	14.7	145,304	5.5	946,427	35.9	359,234	13.6
2005	320,694	12.2	317,401	12.1	138,164	5.2	935,163	35.5	475,203	18.1
2006	334,840	12.1	307,140	11.1	163,852	5.9	1,026,619	37.0	449,726	16.2
2007	233,832	8.6	275,366	10.2	362,044	13.4	1,141,981	42.2	384,305	14.2
2008	173,295	6.5	290,888	10.9	492,384	18.4	1,101,117	41.2	373,574	14.0
2009	156,739	5.7	240,138	8.8	586,087	21.5	1,065,990	39.1	385,916	14.2
2010	168,599	5.9	171,400	6.0	701,371	24.5	1,128,393	39.4	394,967	13.8
2011	164,515	5.6	203,225	6.9	754,365	25.6	1,140,848	38.6	385,016	13.0

A.3 The natural rubber industry

According to the World Bank, Thailand's economy relies mainly on exports (which account for approximately over half of the country's GDP). Among exported products from Thailand, agricultural products play a vital role. Presently, natural rubber is one of the key economic crops of Thailand and has been one of Thailand's top ten export products. The country has been one of the world's leading natural rubber exporter since 1991, exporting an average of three million tons of rubber per year or approximately 40% of the world's exports. It exports to China, Malaysia and Japan at approximately 52%, 11% and 8%, respectively, in 2012 (RRIT, 2012) (see Table A.4). Moreover, there are over six million Thais working in the natural rubber industry (Chawanisakun, 2001). This research focuses on shipping managers in the natural rubber processing industry as a case study that examines the selection of intermodal freight transport.

Table A.4: Thailand natural rubber exports by major consuming countries from 2000 to 2012 (Metrictrions)

Thailand's natural rubber exports by major consuming countries (Metrictrions)								
Year	Japan	China	US	Malaysia	South Korea	EU	Others	Total
2000	505,233	417,638	329,504	243,708	136,387	231,178	302,505	2,166,153
2001	435,453	368,114	302,174	296,989	139,295	233,390	266,664	2,042,079
2002	498,854	436,637	382,317	363,651	138,756	266,392	321,809	2,354,416
2003	542,837	650,898	278,693	365,486	165,832	294,239	275,465	2,573,450
2004	525,654	619,800	249,196	383,695	171,668	291,670	395,413	2,637,096
2005	540,485	573,385	237,858	403,506	185,308	281,090	410,766	2,632,398
2006	492,740	747,168	210,784	442,664	173,477	261,882	442,958	2,771,673
2007	405,599	827,369	213,080	413,049	151,824	262,182	430,659	2,703,762
2008	394,742	824,833	219,986	398,043	154,340	249,509	433,830	2,675,283
2009	256,984	1,160,339	156,069	480,313	133,079	245,589	293,820	2,726,193
2010	346,302	1,128,553	177,859	443,000	171,530	268,693	330,510	2,866,447
2011	333,669	1,274,188	205,410	344,589	186,634	223,938	383,953	2,952,381
2012	269,418	1,630,322	172,577	353,501	181,403	179,302	334,809	3,121,332

Source: http://www.rubberthai.com/price/eng/price_eng.htm

A.3.1 The rubber market: its concept and definitions

Weerathamrongsak and Wongsurawat (2013) note that there are two types of rubber of different origins. Natural rubber is extracted from a perennial crop, called “*para*,” which was originally found in the Amazon forest. Nowadays, it is planted mostly in South-East Asian countries, namely Thailand, Malaysia and Indonesia. In contrast, synthetic rubber is a product derived from petroleum. This study focuses only on the natural rubber sector.

Natural rubber is an exported product. Although it is also consumed within the country, it accounts for just over 10% of the total amount consumed worldwide. There are two main methods of trading natural rubber in the world market (RRIT, 2010):

- 1) The first is the open market or futures markets located around the world, mainly in consuming countries such as Japan (the Tokyo Market), China (the Shanghai Market), Singapore (the Singapore Market), the UK (the London Market) and the US (the New York Market), from east to west, respectively.
- 2) The other method is direct trade, taking place directly between buyers and sellers with a publicly undisclosed price. Even though natural rubber is traded by geographically widespread markets around the world, it is largely consumed by just a few tyre companies, namely Bridgestone, Goodyear,

Continental, Michelin and Pirelli, and traded via the direct trade method, which accounts for around 80% of the total trade.

According to Weerathamrongsak and Wongsurawat (2013), in 2010, the total world consumption of natural rubber reached around ten million tons and it has constantly increased in the last few decades. One of the possible reasons for the increase in consumption has been the growth in the price of crude oil, which is used for producing synthetic rubber.

A.3.2 Background to the Thailand's natural rubber industry

There are three main standard types of natural rubber that are exported, namely Ribbed Smoked Sheet (RSS), Standard Thai Rubber (STR) and Concentrated Latex.

- **STR:** *Standard Thai Rubber - it is also called "block rubber"...feedstock is mechanically chopped and ground into small pieces in the presence of water, washed, dried with hot air, and hot-pressed to form bales (mostly 35 kg or 33.3 kg).*

(Hirata *et al.*, 2014, p. 349)

- **RSS:** *Ribbed Smoked Sheet - a form of plantation rubber prepared by coagulating latex and then dried with smoking.*
- **Concentrated Latex:** *Latex - the rubber content of which has been greatly increased by evaporation, creaming, filtration, or centrifuging.*

(The Rubber Economist Ltd, 2014)

They are also called semi-processed natural rubber. The products are derived from processing natural rubber from the original raw material forms, such as latex, cup lump and unsmoked sheet rubber, which are widely traded in local markets. Regarding the packaging of the three main exported products mentioned above, they are normally presented in different forms depending on customers' requirements. However, packaging is used in accordance to the forms of exporting rubber products as follows: RSS: lump (111 kg/lump), STR: lump (35 kg/lump) and concentrated latex: 200-litre tanks or 20,000 kg flexi bags (Hirata *et al.*, 2014; Leodvittayanon & Siriphatrasophon, 2014)

In terms of delivery, there are a variety of transport modes for delivering ready-to-export goods (natural rubber products), such as a truck, goods train, coastal ship and international cargo ship (Leodvittayanon & Siriphatrasophon, 2014). They also posit that the most appropriate and cheapest cost of the transport route is related to the

International Commercial Terms (INCOTERMS) in contracts i.e., FOB (Free on board—named port of shipment), CFR (cost and freight—named port of destination) and CIF (cost, insurance and freight—named port of destination). Leodvittayanon and Siriphattarasophon (2014), also reveal that apart from different domestic modes of transport (such as by road, rail or water) for exporting rubber, the process also involves a variety of departing and arrival ports.

A.3.3 Rubber plantations in Thailand

Natural rubber is a vital economic crop for Thailand, both in terms of domestic use and export (Shattuck, 2013). Its area of origin and main growing areas are concentrated in the south of Thailand (Prommoon, 2009; Thongnamchaima, 2009). With regards to the total farming area (see Figure A.3), over two thirds of the area is dedicated to rubber trees. Moreover, the opportunity to expand rubber plantations in this area seems to be limited and the area is seen as relying too heavily on rubber. As a result, the government has begun to diversify crops, with farmers now growing fruit trees and oil palms in replanting schemes operated by the Office of the Rubber Replanting Aid Fund (ORRAF) (Prommoon, 2009; Thongnamchaima, 2009).

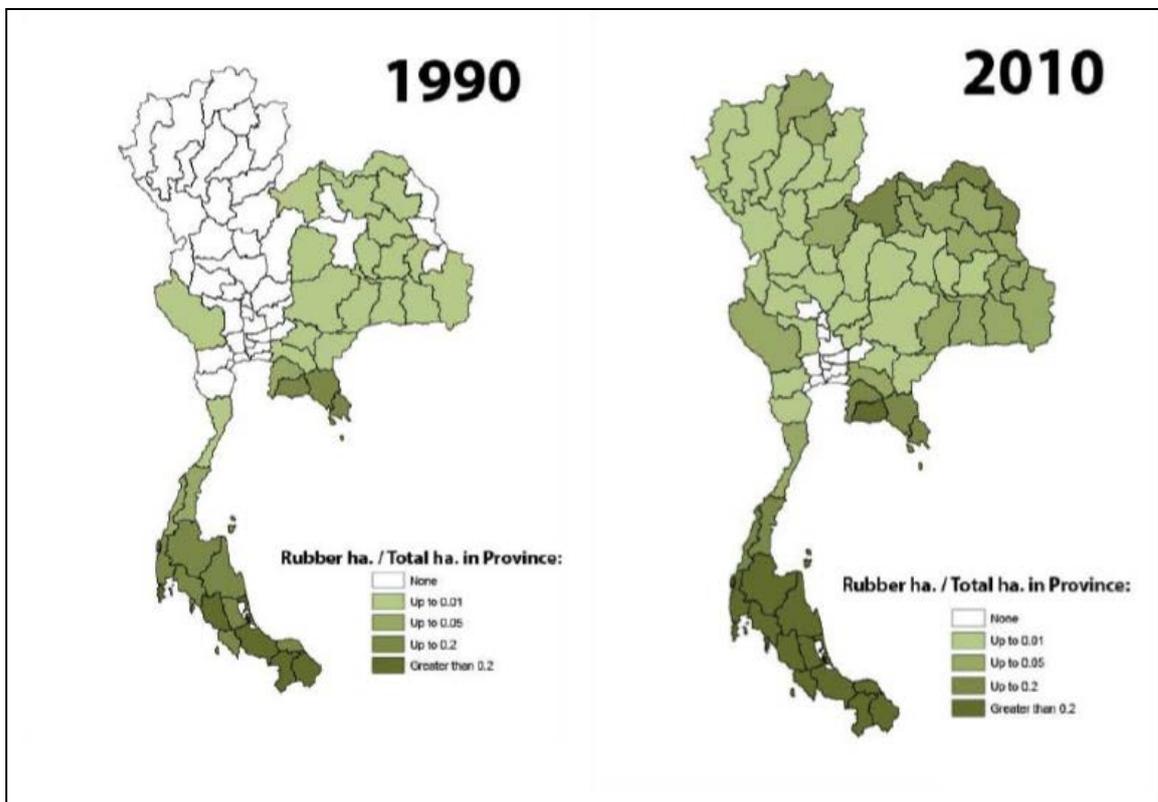


Figure A.3: Area of rubber planted per hectare by province in Thailand, 1990 and 2010 (Source: Shattuck, 2013)

As Shattuck argues: “...the type of supply chain organisation lends to conceptualizing farmers’ relationships with markets in terms of core-periphery hierarchies” (Shattuck, 2013, p. 15). This view is supported by Kaiyoorawong and Yangdee (2008, p. 11) who state that “...rubber farmers are merely product suppliers at the upstream process.” Viswanathan (2008) points out that smallholder growers accounted for almost 90% of Thai rubber plots, with a typical 0.3 to 8.0 hectare plantation. In other words, the countrywide production originates mostly from a broad base of smallholder farmers. As a consequence, the Thai rubber sector “...is controlled by large processing plants that purchase the material via local dealers. There are two marketing chains, one for the large plantations owned by large firms; the other for the small producers, with lots of middlemen and collecting centers” (Neupane & Calkins, 2013, p. 189). In general, therefore, it seems that natural rubber is a very important industrial crop for the country as a whole, both for local consumption as well as for the global market. The following section relating to the natural rubber industry moves on to study insights into the structure of Thailand’s rubber supply chain.

A.3.4 Structure of Thailand’s rubber supply chain

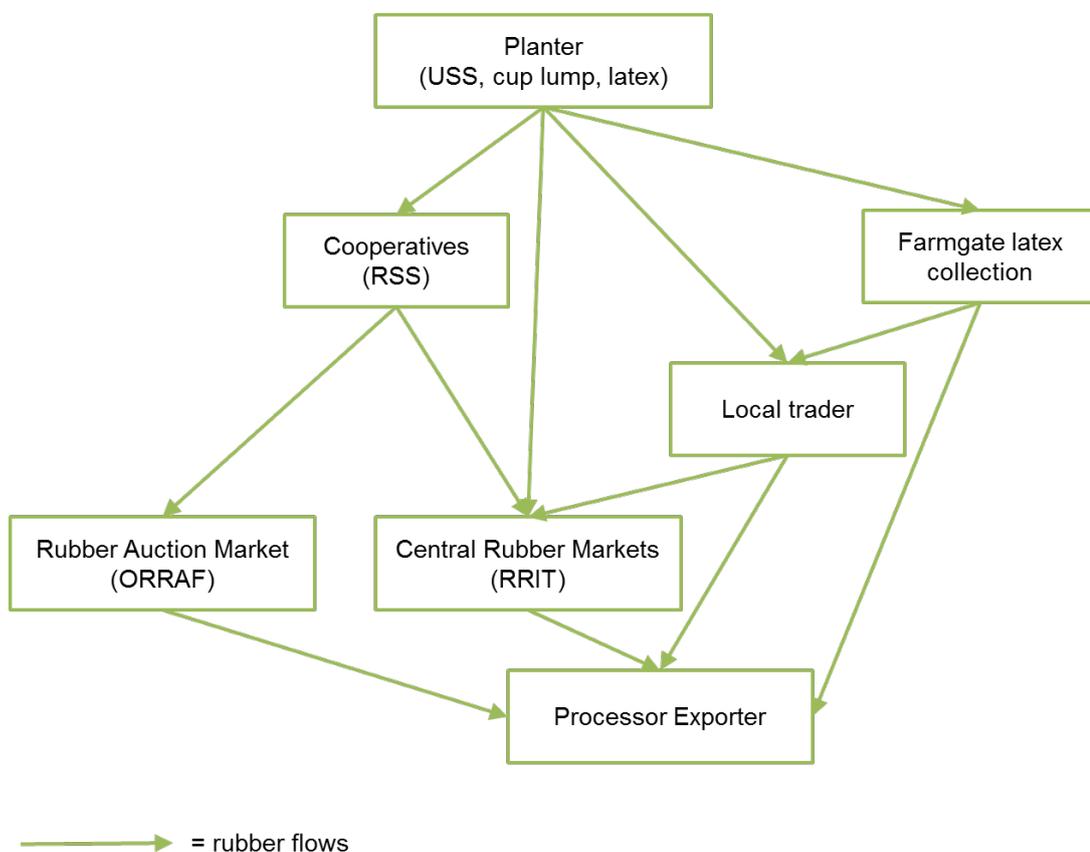


Figure A.4: Natural rubber marketing channels in Thailand (Source: Adapted from Delarue, 2011)

The structure of Thailand's domestic natural rubber market is illustrated in Figure A.4. There are five main components of the market: planters; local traders; cooperatives; central rubber markets; and processor exporters. These are explained below.

- 1) Planters have grown rubber trees that have spread throughout almost every area in the south of Thailand. Producers in the south prefer to produce rubber sheet, followed by latex and cup lump, respectively. Small planters tend to sell rubber products to local traders or cooperatives while larger planters are likely to trade products directly to large traders or processors.
- 2) Local traders can be classified into local and large traders. The local traders who trade rubber sheet, cup lump or latex collect rubber products from planters and sell them to large traders or processors. It is worth noting that some large traders have their own smoking houses so that they can add value to unsmoked sheet rubber. For large traders who do not have a smoking house, they may add value by grading rubber products and selling them to processors.
- 3) Cooperatives collect rubber sheets from their members to later sell to large traders or processors. Some cooperatives have smoking houses and, therefore, they can buy latex from their members to make smoked sheet rubber. They then sell the products through an auction market or directly to processors. Moreover, some cooperatives that concentrate on latex processing may choose to buy and then sell latex to processors.
- 4) The main central rubber markets now operate in three provinces, namely Surat Thani, Naknon and Songkhla. The markets facilitate trading mechanisms between sellers, mostly farmers' cooperatives and traders, and buyers, such as processors and large traders. The price in these markets tends to be higher than in the local markets. However, a premium grade product is required in order to receive higher prices.
- 5) Natural rubber processors are geographically distributed in the south, though they appear to concentrate in the main producing areas, such as Songkhla, Naknon and Surat Thani. It is important to note that the majority of natural rubber processors are also exporters.

Appendix B: Global transportation process

These are the two main elements within the transportation operation which is a section of the global transportation process. Coyle *et al.* (2011) explain that the global transportation process is composed of buyer-seller agreements and the management areas of order preparation, transportation and documentation. The details of this process are shown in Figure B.1.

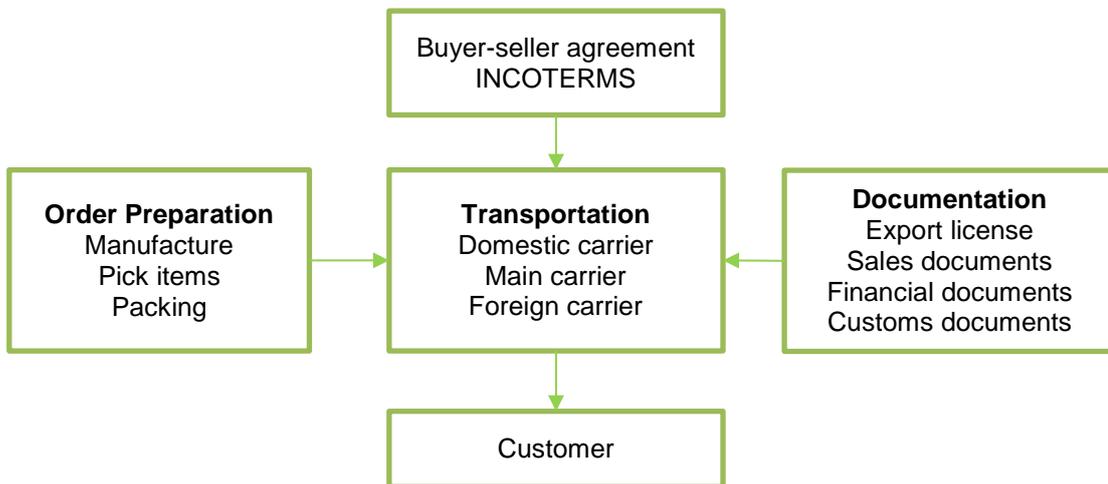


Figure B.1: Global Transportation Process (Source: Adapted from Coyle *et al.*, 2011)

To illustrate, firstly the buyer and seller make an agreement on international terms of sale known as “*INCOTERMS*” which delineates who has the responsibility for the following: export packing, inland transportation, export clearance, vessel or aeroplane loading, main transportation cost, cargo insurance, customs duties and risk of loss or damage in transit. The next step is the transportation element. This part includes at least three transport carriers: an inland, an international and a foreign carrier. Transport managers have to decide on an inland transport mode in order to transit their goods from the company location to a loading port. Additionally, a shipping line will be selected to move goods between countries, from port of loading to port of destination. Finally, the carrier delivers goods to the final destination.

Moreover, Magala and Sammons (2008) explain the logistics pathway emphasising a port-oriented supply chain, as detailed in Figure B.2. It can be clearly seen from the Figure that the international transport process consists of at least four main nodes: shipper, port of loading, port of destination and customer. There are three links among the four main nodes in the international transportation process; however, this thesis focuses the first link with regard to the movement of goods from the exporter’s location to a loading port. This is because this study intends to study the selection of transport modes based upon the shipper’s perspective in the context of the Thai natural rubber industry.

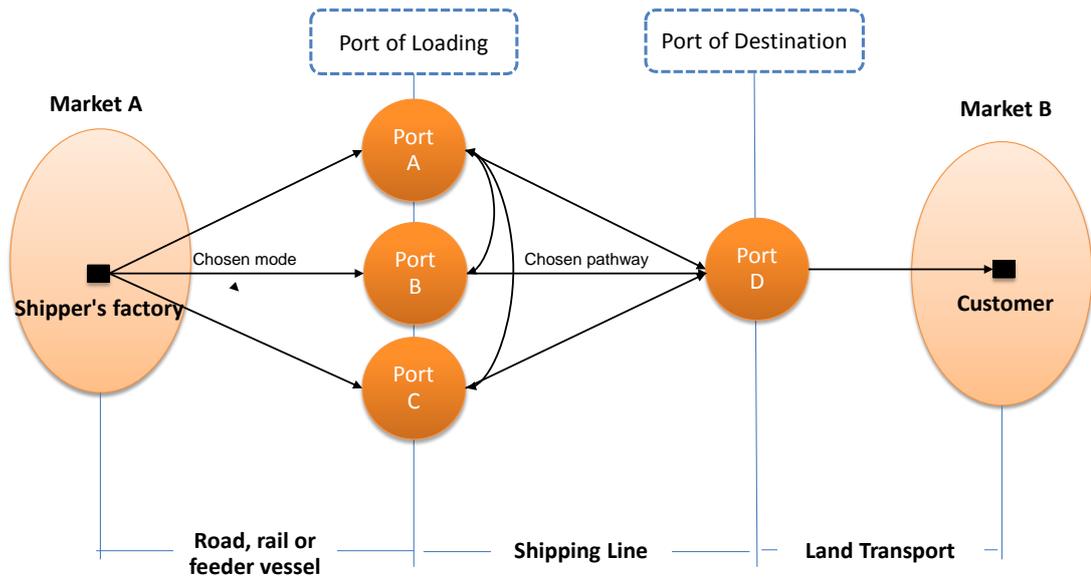


Figure B.2: Logistics pathway in a port-oriented supply chain (Source: Adapted from Magala and Sammons, 2008)

Appendix C: The three modelling approaches for the study of freight transport mode choice

Decision support is the means to enhance knowledge in making decisions related to business management on a daily basis (Chou & Chou, 2007). Decision support or decision aid can be in the form of both qualitative and quantitative approaches, though Sharda, Turban and Delen (2014) argue that such decision support is mostly modelled in a quantitative form. According to Simon's decision making process, decision support in the early stage of decision making (the intelligence stage) mainly involves a qualitative approach as a means of exploring the threats or opportunities in a business environment; in contrast, the later stages of decision making (design and choice) largely relate to a quantitative approach (Sharda *et al.*, 2014). A qualitative base tends to be used in order to gain an in-depth understanding, which in turn leads to informed decisions. On the other hand, a quantitative base is likely to be used to provide a solution or to assist decision makers to improve their decisions.

Based on the existing literature, a large amount of research in transport has been conducted in the form of a quantitative approach. As previously mentioned, such research is liable to seek for a solution (both in terms of satisficing or optimal) to complex issues found in a transport sector. A salient example of decision aiding and decision support based on a quantitative approach is using a weighted sum in order to evaluate the options in terms of transport investment which is considered as a multicriteria decision (Sayers, Jessop & Hills, 2003). Some such issues are derived from qualitative research. For instance, Ng (2010) used a qualitative approach (by interviewing) to explore the potential factors influencing managers when it comes to building a primary framework facilitating the understanding in selecting suppliers in the Taiwanese agribusiness before testing to confirm the existence of such factors in the later stages of the research.

There are a range of quantitative methods used in research in relation to transport. Examples of such methods are AHP (Bayazit & Karpak, 2013; Xiu & Chen, 2012) (see more details of AHP in Section C.2), an analytical network process (ANP) (Cooper, Tadikamalla & Shang, 2012), decision making trial and evaluation laboratory (DEMATEL) (Amiri, Sadaghiyani, Payani & Shafieezadeh, 2011), technique for order preference by similarity to ideal solution (TOPSIS) (Bayazit & Karpak, 2013) and so on. For example, Xiu and Chen (2012) utilised AHP in order to aid managers in their decision making by helping them to evaluate and choose third party logistics providers in agribusiness in China. Similarly, Najmi and Makui (2010) employed AHP for evaluating the performance of an automotive supply chain in Tehran. On the other hand, Cooper *et al.* (2012) used ANP (instead of AHP in (Xiu & Chen, 2012)) to select a third party logistics supplier. Moreover, Amiri *et al.* (2011) applied DEMATEL to the

oil industry in order to help managers to determine a location for establishment of a distribution centre by ranking the importance of particular factors influencing the location. All in all, there are various quantitative methods employed in research relating to transport, as well as similar methods for different research outcomes or different methods, but for the same purpose.

The following emerged from the literature review in relation to decision-making models. These are classified into three main groups - input-oriented, outcome-oriented and process-oriented models.

C.1 Input-oriented models

The input-oriented model is based on the classification and relative importance of factors influencing decision-making. However, it does not provide the details to understand the process of decision-making. The input-oriented model is used in a range of applications, such as calculating mean importance scores and factor analysis.

Calculating mean importance scores is the technique predominantly used to identify key attributes in the study of freight transport mode choice. A possible explanation for this might be that it is the simplest method of calculating the relative importance of factors (Mangan *et al.*, 2002). Several studies employed this method, such as Crum and Allen (1997); Kent, Parker and Luke (2001) and Murphy, Daley and Hall (1997). So indicate merit and shortcoming of its adoption.

Crum and Allen (1997) adopted a longitudinal study in order to find the solution for the relationships between carriers and shippers from 1990 and 1996. This research utilised the survey method in the USA carrier industry based on carrier managers' perspectives to understand the perception of the managers in relation to the importance of criteria in selecting carriers. The managers ranked the 22 criteria of selection. The results showed that there were some changes in the ranks of criteria during the period of study. For example, the managers ranked the reliability of transit time as of the highest importance in 1990, whereas this changed to the reliability of pick-up and delivery in 1996.

The factor analysis method (see Hair, 2010) is considered to be broadly adopted amongst the available quantitative methods by social scientists (Martínez, Marshall & Sechrest, 1998). It is commonly used in the applications where there are a greater number of measured variables, but fewer latent (but not directly observable) factors.

In terms of its use, it is generally employed to understand the structure of covariance amongst a range of factors. However, factor analysis has a limitation in analysing data as it is aggregated rather than separate; therefore, there is a risk of damage to some details of the data (Hair, 2010). For example, Tuna and Silan (2002) employed the factor analysis method in order to identify the significant criteria of transport mode choice adopted by Turkish shipping managers. The research aimed to conduct a measurement of the shipping perceptions of the managers using questionnaires with an 18.5 response rate.

Commenting on the use of survey methodologies, Carter and Easton (2011) argues: *"...a further decline in the future ...due to the difficulty of collecting large sample sizes from cross-sectional surveys and limitations associated with common method variance"* (Carter & Easton, 2011, pp. 57-58). In addition, Pisharodi (1991) questioned the usefulness of such an input-oriented model and emphasised the requirement for transport mode choice analysts to shift their approach from the analysis of factors, as in the position of input-oriented models, to the process (relevant activities) of decisions being made.

C.2 Outcome-oriented models

The outcome-oriented model is a mathematics-based model used in order to speculate the outcome of a decision related to a specific situation, at least in terms of the aggregation of relevant factors. Turban, Sharda and Delen (2011) illustrated that the main characteristic of the model is able to find the optimal solution from available choices. The model is built based on environments that have deterministic variables and focuses on prediction of the decision's result instead of explanation of the process of decision-making. Therefore, the evaluation of its performance is based on its success of prediction not on the ability to provide understanding. Mazzarino (1998) points out that the outcome-oriented model mostly has an implication for policymakers to understand the impact of a particular factor.

A review of the existing literature indicates that there are a range of techniques applied for outcome-oriented models in the context of transport; for example, the AHP (Ugboma *et al.*, 2006; Vijayvargiya & Dey, 2010), the stochastic multi-nomial probit model (Garrido & Leva, 2004), the multi-nomial logit model (de Jong & Ben-Akiva, 2007). This study reviews AHP in detail in the following example.

The Analytic Hierarchy Process (AHP) represents another modelling approach of outcome-oriented group. Subjective factor types are permitted to be included in such outcome-oriented models. AHP was first established by Thomas L. Saaty in the 1970s. AHP is one of the most appropriate methods for solving multi-criteria decision-making problems because these methods can cope with both tangible and intangible variables (D'Apuzzo, Marcarelli & Squillante, 2009). AHP can be applied in making decisions that are complex, unstructured and contain multiple attributes (Partovi, 1994). AHP is a method of dividing a complicated or unstructured situation into smaller component parts, and then organising these parts or judgments based on the relative importance of individual variables and synthesising the judgments so that the highest priority variables can be determined and the outcome of the situation can be clarified (Saaty, 1990). Within this technique, both subjective and objective factors are compared, commonly using a pairwise comparison method, in order to gain a hierarchical structure in the AHP to return as model outcome a chosen choice. The four broad steps of the process can be summarized as presented in Table C.1.

Table C.1: Four broad steps of the AHP process (Source: Saaty, 2008)

Four broad steps of the AHP process	
1)	Structure a complex decision problem as a hierarchical form containing the decision goal, the alternatives for reaching it, and the criteria for evaluating the alternatives
2)	Establish priorities among the elements of the hierarchy by making a series of judgments based on pair-wise comparisons of the elements
3)	Synthesize these judgments to yield a set of overall priorities for the hierarchy. Check the consistency of the judgments
4)	Rank the criteria based on the results of this process

According to Yan *et al.* (2009), the AHP approach is a good instrument to solve management problems. Furthermore, Sayers *et al.* (2003) point out the application of AHP to calculate the weight for the multi-criteria appraisal of transport choices, to receive the outcome of the identification of the preferred option. In addition, Wallenius *et al.*'s (2008) research has shown that there is an increasing number of publications using this method in the management science and operations research areas. An example of this is the study carried out by Kent and Parker (1998) in which AHP was used; three out of eighteen factors of importers used in the study were identified as considerably different to those of exporters. Lehmusvaara *et al.* (1999) is another

good illustration of applying this technique with linear programming in the study of truck carrier choice.

However, a variety of techniques in operations research are utilised in order to gain optimum solutions to a particular issue. These techniques rely on the available data and the associated problems being well-structured. The answer is derived from fitting the available data to the problem structure by employing such techniques. Perhaps the most serious disadvantage of this method is that the outcome-oriented model fails when an attempt is made to enhance the insight into the processes of decision-making, instead of formulating roughly derived behaviours in mathematical form.

Commenting on the outcome-oriented model, other researchers (Gray, 1982; Mangan *et al.*, 2002) argued that potentially the more advanced solutions may be derived from the enhanced understanding of shippers' and other stakeholders' behaviours, instead of attempting to build a more complex model based on mathematics. Other authors (Brugha, 1998; Pisharodi, 1991) question the usefulness of such an approach. Brugha (1998) argues that managers tend to base their decisions on subjective goals. Such objectives are related to the conditions of a specific situation, requirements, favour and value hierarchies that are all incapable of being represented in the form of mathematics. The author also pointed out that decision-making based on a holistic view is not necessarily based on a quantitative model and also suggested that the model should include decision-makers in order to investigate the process of decision-making and the interaction of influencing factors and choices. Critics have also argued that the decision-makers' profile and their learning methods based on individual experience, preferences and biases may impact on their decision-making approach (Pisharodi, 1991).

The latter point has been devastatingly critiqued by Swan (1997) who argues that there is a lack of literature in management related to managerial cognition, although it is vital in strategic management. Additionally, Swan argues that many outcome-oriented model supporters think that the variability of managerial cognition is insignificant; therefore, it can be ignored, so that it can increase its generality. As a consequence, they overlook the building of descriptive decision-making models. Hence, it is perhaps necessary to study the freight transport mode choice based on a descriptive model derived from managers' perceptions in a decision-making process.

C.3 Process-oriented models

The process-oriented model is used to understand the process of decision-making related to many factors (or the ingredients of decision-making) and the external circumstances with which the decision-making interacts. The aggregation and interaction of the related factors involved in decision-making is considered to be at the heart of the process-oriented model (D'Este, 1992). In the same vein, Turban *et al.*'s (2011) book represents the object as it is or it is thought to be. The descriptive model is commonly in the form of a mathematical formula. Perhaps, the most frequently used method of the descriptive model is the simulation method.

Turban *et al.* (2011) noted that decision-making can be represented by a range of nonmathematical descriptive models. One of them is the cognitive map model (Eden & Ackermann, 2004). A narrative model is another model that is used to describe the situation, where the important facts are able to enhance the decision-makers' memory, so that they can comprehend the situation and in turn make better decisions (Turban *et al.*, 2011).

A notable example of the process-oriented modelling approach is the study carried out by D'Este (1992) in which the market of RO/RO freight between Tasmania and Australia was analysed by the process-oriented model to describe ferry choice. As demonstrated in Figure C.1, the conceptual model presented by D'Este has two major components: the "*ingredients*" and a "*recipe*."

- 1) The first element of the model is called the "*ingredients*" which will be used in building models. Such ingredients, in the context of freight transport mode selection, comprise the factors influencing the selection and the relative importance score provided to each factor.
- 2) The second identified element of the model is the "*recipe*." It is used to specify the combination of determined ingredients, in terms of the degree of ingredients, the sequence of the process and the objective set for the combination. In the context of freight transport mode selection, the recipe refers to the underlying mechanism that governs the interaction of identified factors. It is the description of the whole process of decision-making including the theory of process of choice and its structure, combined with factors influencing the decision (D'Este, 1992).



Figure C.1: The model of D'Este (Source: Adapted from D'Este, 1992)

More recent research Mazzarino (2003) attempted to describe the process of decision-making using just a handful factors and not attempting to aggregate such factors was considered inappropriate. On the other hand, the behavioural model should include the aggregation and the interaction of every related factor to understand the overall selection practices. By further supporting the concept of Mazzarino, D'Este built the model of carriers and ports selection by shipping managers based on the survey. His goal was to comprehensively understand the process of decision-making, and he utilised a particular case study which was analysed to build a conceptual model. One of the issues that emerged from that study is that the managers in shipping are likely to periodically re-assess transport mode selection. During the period, they operate their routine tasks based on the mixture of chosen carriers and ports/customs. Finally, that research provides a behavioural framework (a conceptual model of choice process); as represented in Figure C.2. There are different steps in the process of decision-making and the interaction of factors, as illustrated in the transport service purchasing behaviours of the RO/RO ferry operating between two Australian cities: Tasmania and Melbourne.

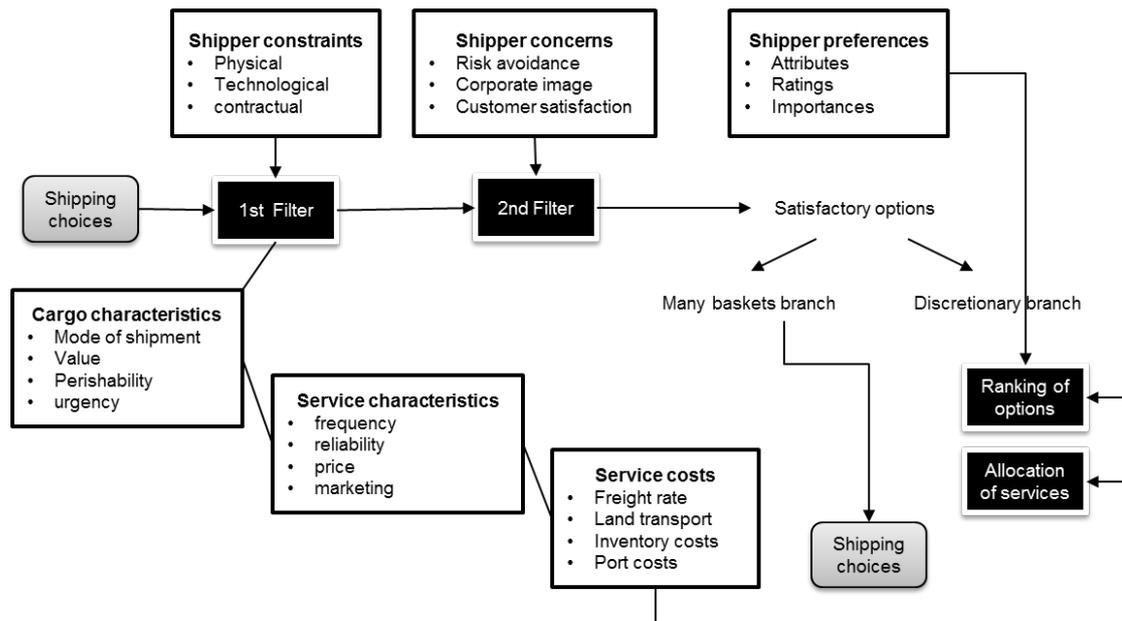


Figure C.2: Conceptual model of the ferry choice process (Source: D'Este, 1992)

Cognitive mapping is another technique classified in the process-oriented model group (Eden, 2004). The purpose of its development is to aid soft operations research in structuring complex problems. In the same vein, in Turban *et al.*'s (2011) book, cognitive mapping was raised as one of the good techniques of nonmathematical descriptive modelling. As Turban *et al.* (2011) state, the cognitive mapping technique enables a manager to draw a picture of problems; the structure is based on the relevant qualitative determinants and the causal relationships amongst them.

The cognitive mapping technique is useful when the study seeks to explain an individual's perspective on a particular problem. The mapping technique assists a manager or group of managers to differentiate factors related and unrelated to a decision. The derived map is ongoing and evolves as the problem becomes more understood. The technique often crafts the resulting map from interviews that provide insight of the issue based on an interviewee's perception (Eden, 2004). The technique also provides the benefits of better understanding and focusing of problems. Ultimately, the derived map represents the participants' thinking in relation to the problem after following the mapping process (Eden, 2004).

This section reviews the choice of modelling approach based on two different perspectives: unit of analysis and expected outcomes; plus some techniques for analysis included for the study of freight transport mode choice.

Appendix D: Questionnaire

16th July 2012

Dear Sir/Madam

This questionnaire is part of my doctoral thesis entitled: "Developing a model of intermodal freight transport choice: A case study of Thailand rubber exporters", which is a project based in the information management innovation (IMI) research group at Northumbria University based in Newcastle upon Tyne in the UK (www.northumbria.ac.uk/imi). The aim of the project is to investigate the factors influencing decision makers in selecting transport modes and loading ports in raw rubber processing plants in Thailand. We anticipate that the results of this research project will make a significant contribution to the development of the Thai economy and the logistics and transport sector as a whole.

Answering the questionnaire should take approximately twenty to thirty minutes to complete. Please answer the questions in the spaces provided. All ethical guidelines and procedures (as defined by Northumbria University) relating to research data confidentiality and anonymity of respondents will be followed. All information provided will be treated with absolute confidentiality and your responses will only be used in aggregate form in combination with all other survey participants. No specific details about companies or respondents will be reported. Your completion of the questionnaire will greatly help to research this area and your responses are vital to the accuracy of my research findings and its contribution to the Thai transport and logistics industry sector.

I hope that you will be enjoyable in completing the questionnaire. Please return the completed questionnaire to me, Sangrawee Witoonpan, by 30th July 2012 in the preaddressed return envelope with postage. If you have any further questions on any aspect of this study, please do not hesitate to contact me on +44 7429136369 or e-mail me at sangrawee.witoonpan@northumbria.ac.uk

Thank you very much in advance for your kind support and cooperation.

Yours sincerely,

Sangrawee Witoonpan
PhD student
E-mail: sangrawee.witoonpan@northumbria.ac.uk

Questionnaire

“The factors influencing decision makers in selecting transport modes and loading ports: A case study of Thailand rubber exporters.”

Section A: Profile of the respondent and the company.

Explanation: Please answer all the questions by putting a mark in the appropriate box or writing in the space  provided.

About the respondent

1. Your position in your current job: *(Tick one box only)*
 Shipping Manager
 Marketing Manager
 Managing Director
 Export Manager
 General Manager
 Other (please specify).....
2. Duration of work in the current firm: *(Tick one box only)*
 < 1 year
 5-8 years
 1-4 years
 > 8 years
3. Duration of work in the industry: *(Tick one box only)*
 < 1 year
 5-8 years
 1-4 years
 > 8 years

About the company

4. Company's number of years in the business: *(Tick one box only)*
 < 5 years
 11-15 years
 6-10 years
 > 15 years
5. Number of employees in your company: *(Tick one box only)*
 < 50 people
 101-200 people
 51-100 people
 > 200 people
6. The amount of capital your company: *(Tick one box only)*
 < 50 million baht
 101-200 million baht
 51-100 million baht
 > 200 million baht
7. Number of people involved in selecting freight transport modes: *(Tick one box only)*
 1
 4-5
 2-3
 > 6
8. Total number of goods sold in each month (estimated monthly sales volume):
20ⁿ units (Twenty-foot Equivalent Units)
40ⁿunits (Forty-foot Equivalent Units)
9. Company location: *(Tick as many boxes as appropriate)*
 Trang
 Surat Thani
 Other (please specify).....
 Song Khla
 Nakhon Si Thammarat
10. Major destinations: *(Tick as many boxes as appropriate)*
 China
 Japan
 Other (please specify).....
 Malaysia
 USA

Section B: The current practice of freight transport usage in the context of the Thai rubber industry.

Explanation: Please answer all the questions by putting a mark in the appropriate box or writing in the space .....provided.

1. The major ports of loading or custom houses used as export gateway and domestic transport modes or combination of them which are used for transit of the goods from your company to the gateway such as trailer/truck, train at Ban Thung Pho Station, barge/feeder at Bandon Port: *(Tick as many boxes as appropriate and write in space provided)*

Ports/ Custom Houses	Domestic transport modes	
	Transport modes	Terminals
<input type="checkbox"/> Laem Chabang Port	 By.....	At (station/ port).....
<input type="checkbox"/> Bangkok Port	 By.....	At (station/ port).....
<input type="checkbox"/> Padang Besar Custom House	 By.....	At (station/ port).....
<input type="checkbox"/> Kantang Port	 By.....	At (station/ port).....
<input type="checkbox"/> Song Khla Port	 By.....	At (station/ port).....
<input type="checkbox"/> Sadaul Custom House	 By.....	At (station/ port).....
<input type="checkbox"/> Other (please specify).....	 By.....	At (station/ port).....

2. In the case of domestic transport modes, the most common main transport modes used for transit of the goods from your company location to the loading port: *(Tick one box only)*
- Road transports
 - Rail transports
 - Sea/water transports
 - Other (please specify).....
3. The type of transportation management used for transit of the goods from your company to ports of loading: *(Tick one box only)*
- In-house transportation
 - Outsourcing transportation
4. The type of container loading used by your company: *(Tick one box only)*
- FCL (Full container load)
 - LCL (Less than container load)
 - Both types (FCL and LCL)
5. An buyer-seller agreement INCOTERM 2010 used by your company: *(Tick one box only)*
- C Term e.g. CIF, CFR
 - F Term e.g. FOB
 - Both terms (C and F Term)
6. The term of sale (INCOTERM 2010) used in your company: *(Please specify in per cent)*
- | | |
|--|-----------------|
|  Free On Board (FOB) | Estimated.....% |
|  Cost Insurance and Freight (CIF) | Estimated.....% |
|  Cost and freight (CFR) | Estimated.....% |
|  Other (please specify)..... | Estimated.....% |

Section C: The sequence of decision making among element of freight transport including transport modes, ports and shipping lines

Explanation: Please answer all the questions by putting a mark in the provided box which is closest to your opinion. Only one answer is required in each question.

		Agree	Disagree
Shipping Lines vs. Ports			
1.	I decide the shipping line to serve first, and after that select the port of loading from those served by the shipping line.	<input type="checkbox"/>	<input type="checkbox"/>
2.	I choose the loading port first, and after that select the shipping line only from those serving that port.	<input type="checkbox"/>	<input type="checkbox"/>
3.	Neither the items 1 nor 2 because the shipping line and the loading port are considered separately.	<input type="checkbox"/>	<input type="checkbox"/>
Ports vs. Transport Modes			
4.	I decide the port of loading first, and after that select the transport modes for transit of the goods from the company to that port.	<input type="checkbox"/>	<input type="checkbox"/>
5.	I choose the mode of transport first, and after that select the loading port only from those that can access that port.	<input type="checkbox"/>	<input type="checkbox"/>
6.	Neither the items 4 nor 5 because the loading port and the transport mode are considered separately.	<input type="checkbox"/>	<input type="checkbox"/>

Section D: Please answer the question below.

1. What do you think are the important factors contribute to domestic transport modes selection (road, rail, or sea/water) for delivery of natural rubber products from your company to loading ports? Please give reasons.

➤ Road transport

➤ Rail transport

➤ Sea/water transport

2. What do you think are the important factors that contribute to port selection for the delivery of natural rubber products? Please give reasons.

3. What are your favourite transport modes used? Please give reasons.

4. What are your favourite loading ports used? Please give reasons.

5. What is the objective of your company in the management of outbound transport? Please give reasons.

Thank you very much for completing this questionnaire.

Anonymity is guaranteed and your responses will be used purely for academic purposes.

Please mark ✓ on the appropriate provided, if you agree:

I. I would like to receive an executive summary of the results of this survey

II. I would like to take part in a further interview, if need.

If marked box I/II, please provide me with information/contact details for future communication

Appendix E: A brief guide to the analysis of open-ended survey questions



Cerritos College

Office of Research and Planning

A Brief Guide to the Analysis of Open-Ended Survey Questions Open-ended questions on questionnaires elaborate responses to closed questions and offer insights or issues not captured in the closed questions. Generally, techniques developed for analyzing qualitative data are used to analyze the responses to open-ended questions. Through the analysis, researchers examine patterns and trends in the responses so that they reach certain conclusions. Here, we provide several general steps that you would attempt for the analysis of your open-ended responses.

- 1. Read carefully the responses.**
- 2. Develop coding categories.**
- 3. Label each response with one or more coding categories.**
- 4. Look at what you have and do sub-coding.**
- 5. Think about what the responses mean and identify the patterns and trends.**
- 6. Write up the analysis.**

Source: http://cms.cerritos.edu/uploads/ResearchandPlanning/Brief_Guide_to_Open-Ended_Survey_Questions.pdf

Appendix F: The list of interview questions

Section 1: Individual perception and past experience	Interview questions
Individual skills/ experience	<ul style="list-style-type: none"> • Do you consider yourself to have sufficient information, skills, knowledge, and experience to make decisions on this issue? • In your opinion, how important is the transport mode selection? • Tell me about your motives, goals or objectives in the management of freight transport.
Importance of problem	<ul style="list-style-type: none"> • How important is freight transport management for your business? • How do you evaluate the success of decision-making in intermodal freight transport?
Risk perception	<p><u>The risk of delay in delivery</u></p> <ul style="list-style-type: none"> • How great a risk of delay in delivery can you take? In what situation, please explain. Tell me about the possible direct and indirect effects of delivery delays.
	<p><u>The risk of damage</u></p> <ul style="list-style-type: none"> • How much risk is there that the goods may be lost or damaged in transit? Tell me about the risk aspects associated with the different transport modes.
	<p><u>Risk reduction</u></p> <ul style="list-style-type: none"> • Do you think it worthwhile to take risks on some occasion? Which situations? • Is there anything you do in order to avoid risk? Tell me about the way you manage to avoid risk. E.g. Allocate your choice to all feasible alternatives.
Past experience on each transport mode	<ul style="list-style-type: none"> • Tell me about your opinions on the following: <ul style="list-style-type: none"> - Rail managed by a monopoly operator - Road managed by a highly competitive market - Inland water managed by a highly competitive market • When you are unsatisfied with delivery options, which actions do you take first? • Does that route affect your consideration of future feasible alternatives? How? Tell me how you deal with any unfavourable choices? • Did you find the way to avoid this kind of problem? If so, what? • Do you record any past experiences about purchasing transportation services? Why? How did you use these records in the decision making process? • Tell me about any unfavourable experiences you have had with shipment. What did you learn from that situation? What actions did you take to prevent repeat occurrences?

Section 2: Organisation variables		Interview questions
Organization structure	<ul style="list-style-type: none"> • How many departments are involved with transport mode selection? • How does it involve the following departments: Transportation, Purchasing, Marketing, Production • How did you manage the choice process? Was it a group or individual decision? How did you manage to get the transport mode and loading port to match your needs? What methods did you use? 	
Outsourcing transportation	<ul style="list-style-type: none"> • Why does your company prefer to use professional hauliers instead of using their own vehicles? 	
Transport policy/resource in your company	<ul style="list-style-type: none"> • Does your company have logistics policies or plan for transport management? Tell me about the policy related to transport mode and loading port selection. Is it considered as short, intermediate or long term planning? • What do you expect to receive after purchasing transport service? • How do such policies affect your choice of transport mode? • How often do you review transport choice or investigate new alternatives? 	
Product characteristics	<ul style="list-style-type: none"> • What size of consignment do you usually transport? • Do your customers have any special requirements? • Do “<i>terms of sale</i>” result in using different loading ports? • Do the differences in “<i>terms of sale</i>” lead to different freight transport management plans? How? Why? 	
Transport infrastructure/ Usage	<ul style="list-style-type: none"> • What is the most frequent mode of transport that you use? Why do you choose that mode? What affects your consideration? Why? • Why do you prefer to use road transportation? • Why don't you use rail or inland water? What are the barriers to using these? • Why do you prefer to use Penang port? 	

Section 3 : Business environmental and operational factors		Interview questions
Business environmental factors	<ul style="list-style-type: none"> • What factors do you consider when determining the set of feasible choices (transport modes and loading ports)? Please describe how you define the feasible set of alternatives. What aspects do you consider? • What did you do when you are faced with the changes of situation that may lead to reconsider of transport modes such as interesting in new route or increasing fuel cost? 	
Operational factors	<ul style="list-style-type: none"> • How do each following decision evaluator components affects your decision: <ul style="list-style-type: none"> - Cost/Rate/Price; - Service reliability; - Transit time/Transit time reliability; - Loss and damage; - Fast response to problems (Why?) • Tell me about the factors that affect final decisions on transport mode selection. How do you deal with it, please explain (e.g. trade-off, ranking)? • Prompts: Cost/Rate/Price, Service reliability, Transit time/Transit time reliability, Loss and damage, Fast response to problems 	

**Appendix G: Mapping of
interview questions to the literature**

Section 1: Individual perception and past experience			
	Question	Explanation	Underpinning areas of literature
Individual skills/ experience	Do you consider yourself to have sufficient information, skills, knowledge, and experience to make decisions on this issue? In your opinion, how important is the transport mode selection? Tell me about your motives, goals or objectives in the management of freight transport.	To explore manager's skills and confidence in their abilities. In addition, these questions will give an insight into how managers pay attention to mode choice selection and their feelings about the choice process regarding expectations, attitudes and perceptions towards freight transport management.	Samimi, Kawamura and Mohammadian (2011) Pisharodi (1991) Webster and Wind (1996) Granzin, Jackson and Young (1986) Simon (2005)
Importance of problem	How important is freight transport management for your business? How do you evaluate the success of decision-making in intermodal freight transport?	To gain insight into the perspective of managers related to this kind of problem. To explore what decision evaluators they used to identify the successfulness of choosing mode.	Lewin and Donthu (2005)
Risk perception	<u>The risk of delay in delivery</u> How great a risk of delay in delivery can you take? In what situation, please explain. Tell me about the possible direct and indirect effects of delivery delays.	These questions aim to gain insight into the effects of risk perception on the choice process.	Garrido-Samaniego and Gutiérrez-Cillán (2004) D'Este and Meyrick (1992) Evers <i>et al.</i> (1996)
	<u>The risk of damage</u> How much risk is there that the goods may be lost or damaged in transit? Tell me about the risk aspects associated with the different transport modes.	These questions aim to gain insight into the relationship between risk perception and the nature of transport modes.	Rushton, Croucher and Baker (2010)
	<u>Risk reduction</u> Do you think it worthwhile to take risks on some occasion? Which situations? Is there anything you do in order to avoid risk? Tell me about the way you manage to avoid risk. E.g. Allocate your choice to all feasible alternatives.	To gain insight into which type of risk shipping managers will accept and to investigate the way they act to either avoid or accept risk.	Campitelli and Gobet (2010) Kotler <i>et al.</i> (2002) Cooper, Wakefield and Tanner (2006) Vitale, Giglierano and Waldemar (2011)

Section 1 (cont.): Individual perception and past experience	Question	Explanation	Underpinning areas of literature
Cost and service requirements	Is reliability or cost the greater concern for you? Why? How and when do prices or service factors begin to affect the buying decision?	To understand the way these two factors trade-off and at which stage they affect the choice process.	McGinnis (1990)
Past experience on each transport mode	Tell me about your opinions on the following: - Rail managed by a monopoly operator - Road managed by a highly competitive market - Inland water managed by a highly competitive market	To examine manager's perspective on each transport operator.	Samimi, Kawamura and Mohammadian (2011) Evers <i>et al.</i> (1996) Garrido-Samaniego and Gutiérrez-Cillán (2004) Rushton <i>et al.</i> (2010)
	When you are unsatisfied with delivery options, which actions do you take first? Does that route affect your consideration of future feasible alternatives? How? Tell me how you deal with any unfavourable choices? Did you find the way to avoid this kind of problem? If so, what?	This helps to explain and understand what managers do and how they learn from past experiences. To explain how past or bad experiences affect their future consideration.	Evers <i>et al.</i> (1996) Garrido-Samaniego and Gutiérrez-Cillán (2004) Rushton <i>et al.</i> (2010) Simon (1997)
	Do you record any past experiences about purchasing transportation services? Why? How did you use these records in the decision making process?	To find out about stored relevant information and to understand the routine process for finding needed information and the patterns of information search.	
	Tell me about any unfavourable experiences you have had with shipment. What did you learn from that situation? What actions did you take to prevent repeat occurrences?	To gain insight into the consequence of unfavourable experiences with transport modes.	

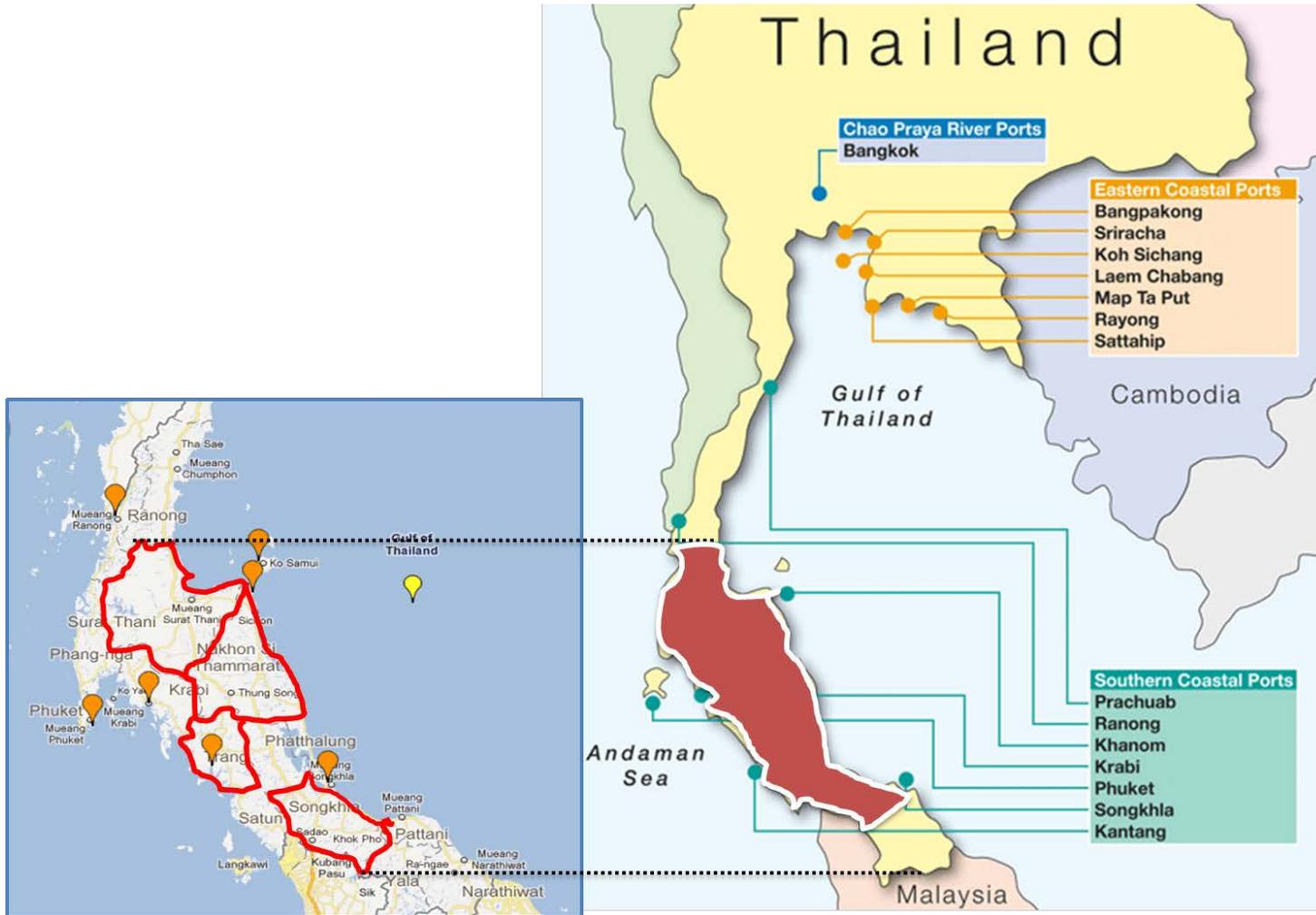
Section 2: Organisation variables	Question	Explanation	Underpinning areas of literature
Organization structure	How many departments are involved with transport mode selection? How does it involve the following departments: Transportation, Purchasing, Marketing, Production How did you manage the choice process? Was it a group or individual decision? How did you manage to get the transport mode and loading port to match your needs? What methods did you use?	This question can gain insight into how the organization structure is involved in the choice process.	Lysons and Farrington (2012) Webster and Wind (1996) Sheth (1973) Johnston and Lewin (1996) Sanderson <i>et al.</i> (2015) Tolbert and Hall (2008)
Outsourcing transportation	Why does your company prefer to use professional hauliers instead of using their own vehicles?	To understand reasons for using outsourced transportation.	Barney, Wright and Ketchen (2001) Barney and Clark (2007) Peteraf and Barney (2003) The evidence from research phase I indicates that 92% of the respondents who took part in the survey indicated that outsourcing transportation is generally used for outbound transportation. Only a small number (8%) of respondents indicated that their company uses their own transport vehicles (in-house transportation).
Transport policy/resource in your company	Does your company have logistics policies or plan for transport management? Tell me about the policy related to transport mode and loading port selection. Is it considered as short, intermediate or long term planning? What do you expect to receive after purchasing transport service? How do such policies affect your choice of transport mode?	This question helps to gain clear understanding of organization policy, long term planning and goals. It also investigates how policy affects transport choice decisions.	Vitale <i>et al.</i> (2011) Webster and Wind (1996) Lysons and Farrington (2012) Johnston and Lewin (1996) Shook <i>et al.</i> (2009)
	How often do you review transport choice or investigate new alternatives?	To investigate types of problem: short, intermediate, or long term.	Stank and Goldsby (2000)

Section 2 (cont.): Organisation variables	Question	Explanation	Underpinning areas of literature
Product characteristics	<p>What size of consignment do you usually transport? Do your customers have any special requirements? Do “<i>terms of sale</i>” result in using different loading ports? Do the differences in “<i>terms of sale</i>” lead to different freight transport management plans? How? Why?</p>	<p>To examine the potential size of consignment that the company usually ships. To understand how “<i>terms of sale</i>” or marketing power affect the decision process.</p>	<p>Tolbert and Hall (2008) Coyle, Novack, Gibson and Bardi (2011) Sanchez-Rodrigues, Potter and Naim (2010) Perdersen and Gray (1998)</p>
Transport infrastructure/ Usage	<p>What is the most frequent mode of transport that you use? Why do you choose that mode? What affects your consideration? Why? Why do you prefer to use road transportation? Why don't you use rail or inland water? What are the barriers to using these?</p>	<p>This helps to identify what transport modes are either usually or never used and explains the reason for these choices.</p>	<p>The evidence from research phase I indicates that the majority of those surveyed (70%) indicated that transport is mostly by road, while 14% deliver by rail and inland waterways. Only two percent (one respondent) indicated that his company use all three means of transport equally.</p>
	<p>Why do you prefer to use Penang port?</p>	<p>This helps to identify what loading ports are either usually or never used and explains the reasons for these choices.</p>	<p>Padang Besar Custom House is the most predominant gateway used, at 27%.</p>

Section 3 : Business environmental and operational factors			
	Question	Explanation	Underpinning areas of literature
Business environmental factors	What factors do you consider when determining the set of feasible choices (transport modes and loading ports)? Please describe how you define the feasible set of alternatives. What aspects do you consider?	To understand how they define the set of feasible alternatives.	Björklund (2011) Rushton <i>et al.</i> (2010) Sanchez-Rodrigues <i>et al.</i> (2010) Shook <i>et al.</i> (2009)
	What did you do when you are faced with the changes of situation that may lead to reconsider of transport modes such as interesting in new route or increasing fuel cost?	To find out about business environment factors. This question expects to explain how managers deal with the changes of situation.	
Operational factors	How do each following decision evaluator components affects your decision: <ul style="list-style-type: none"> - Cost/ Rate/Price; - Service reliability; - Transit time/ Transit time reliability; - Loss and damage; - Fast response to problems (Why?) 	To understand insight into factors affecting each component.	Cullinane and Toy (2000) Kim (2014) Lu (2003) Mitra and Leon (2014) Moschovou and Giannopoulos (2010) Punakivi and Hinkka (2006) Tongzon (2009)
	Tell me about the factors that affect final decisions on transport mode selection. How do you deal with it, please explain (e.g. trade-off, ranking)? Prompts: Cost/ Rate/Price, Service reliability, Transit time/ Transit time reliability, Loss and damage, Fast response to problems	To understand the way each factor interacts in transport mode selection and how they trade-off determinants affecting selection of modes.	Tuna and Silan (2002) Ugboma, Ugboma and Ogwude (2006)

Section 3 (cont.): Business environmental and operational factors			
	Question	Explanation	Underpinning areas of literature
Cost consideration	Tell me about cost consideration. Tell me about inland freight rate and freight rate for shipping line choice and which one is more important for you. Why?	To investigate how managers consider cost.	Kim (2014) Mitra and Leon (2014) Moschovou and Giannopoulos (2010) Punakivi and Hinkka (2006) Tuna and Silan (2002) Ugboma, Ugboma and Ogwude (2006)
Transit time/ Transit time reliability	Why is transit time reliability more important than transit time? Please explain. Is speed important in the transportation of your type of goods? How would transport costs impact on your expenses? How do you deal with a route that is often delayed? Do you include it within your set of alternatives in your future consideration?	To identify importance between transit time and transit time reliability.	Cullinane and Toy (2000) Kim (2014) Moschovou and Giannopoulos (2010) Punakivi and Hinkka (2006) Tuna and Silan (2002)
Service reliability	Which is more important between “delivery operation” (e.g. damage, on time pick up, and transit time reliability) and “cost advantage” (e.g. low-cost domestic freight rate)? Why?	This question can gain insight into how important delivery operation and direct and indirect costs are. This question expects to explain how delivery operation is related to risk avoidance and indirect costs which may be result from delivery operation.	Cullinane and Toy (2000) Kim (2014) Lu (2003) Punakivi and Hinkka (2006) Tongzon (2009) Tuna and Silan (2002)

Appendix H: Map of Thailand



Source: Adapted from http://www.maritimesynergy.com/main/?page_id=127

**Appendix I: The chronology with details of duration
and dates of interviews**

Date	Interviewee	Duration of Interview	Years of Experience in The Industry	Education	Position	Manufacturing Locations		Sales Volume (TEU)	Product Types		
									STR	RSS	Conc. Latex
15-Jun 2013	IP1	02:09:46	15 yrs..	Bachelor	Export manager	North	Surat Thani	50-100 'small sales volume'			✓
17-Jun 2013	IP2	03:41:40	5 yrs.	Bachelor	Assistant shipping manager	North	Surat Thani	55 'small sales volume'	✓		
17-Jun 2013	IP3	02:39:39	5 yrs.	MBA (UK)	Marketing manager	North	Nakhon	40-50 'small sales volume'			✓
24-Jun 2013	IP4	01:26:36	> 10 yrs.	MBA (UK)	General manager	North	Nakhon	400-1000 'medium sales volume'		✓	✓
24-Jun 2013	IP5	02:40:31	> 10 yrs.	Bachelor	Export division manager	North	Nakhon	20-50 'small sales volume'		✓	
26-Jun 2013	IP6	03:37:32	10-15 yrs.	Bachelor	Shipping manager	> 1 Branch	> 1 Branch	500-900 'medium sales volume'	✓		
27-Jun 2013	IP7	02:29:54	20 yrs.	MBA (USA)	General manager	> 1 Branch	> 1 Branch	500 'medium sales volume'	✓		
28-Jun 2013	IP8	03:27:51	16 yrs.	Bachelor	Assistant shipping manager	South	Trang	100-150 'small sales volume'	✓		✓
04-Jul 2013	IP9	02:06:12	20 yrs.	MBA	General manager	South	Trang	80-100 'small sales volume'		✓	✓
10-Jul 2013	*IP10	01:00:28	12 yrs.	MBA (UK)	Managing director	South	Songkhla--Sadao	500-1000 'medium sales volume'	✓		✓
10-Jul 2013	*IP11	01:53:00	18 yrs.	Bachelor	Chief operating officer (coo)	South	Songkhla (Rattaphume, Sabayoi)	100-150 'small sales volume'	✓		✓
11-Jul 2013	*IP12	02:09:08	12-15 yrs.	MBA (AUS)	Managing director	South	SongKhla (Sadao)	50-70 'small sales volume'		✓	
12-Jul 2013	*IP13	02:43:41	10 yrs.	MBA (USA)	International marketing manager	South	SongKhla (Chana)	80 'small sales volume'	✓		✓
15-Jul 2013	*IP14	01:25:03	5 yrs.	MBA (USA)	Executive director	> 1 Branch	> 1 Branch	4000 'large sales volume'	✓	✓	✓
16-Jul 2013	*IP15	02:03:53	10 yrs.	BBA	Marketing manager	South	Krabi Branch	100-150 'small sales volume'			✓
17-Jul 2013	IP16	03:53:37	11 yrs.	MBA (USA)	Deputy vice president	> 1 Branch	> 1 Branch	3000-3500 'large sales volume'	✓	✓	✓
18-Jul 2013	*IP17	02:44:48	> 20 yrs.	Vocational certificate	Factory manager	> 1 Branch	> 1 Branch	700-900 'medium sales volume'	✓	✓	
19-Jul 2013	*IP18	03:15:39	16 yrs.	BBA	Export manager	> 1 Branch	> 1 Branch	3000-4000 'large sales volume'	✓	✓	✓
24-Jul 2013	IP19	01:34:28	3 yrs.	MBA (Thailand)	Operation department	North	Surat Thani	90-100 'small sales volume'		✓	
01-Aug 2013	*IP20	02:45:17	> 4 yrs.	MBA (China)	Logistic manager	> 1 Branch	> 1 Branch	1000 'large sales volume'	✓	✓	✓
02-Aug 2013	IP21	02:09:40	24 yrs.	Vocational certificate	Export manager	North	Nakhon	30-50 'small sales volume'	✓	✓	✓

Note: *: Participants recruitment by snowball sampling; and
STR: Standard Thai Rubber, RSS: Ribbed Smoked Sheet, and Conc. Latex: Concentrated Latex

Appendix J: Snapshot of NVivo

PhD Data analysis Phase II.nvp - NVivo

File Home Create External Data Analyze Query Explore Layout View

Navigation View Find Quick Coding Dock All Undock All Close Bookmarks Layout List View Coding Stripes Highlight Annotations See Also Links Relationships Links Framework Matrix Classification Report Previous Next Color Scheme

Sources Look for: Search In Transcribe Find Now Clear Advanced Find

Internals

- Audio record file
- Journal
- Literature
- Logistics context in Thailand
- Transcribe
- Externals
- Memos
- Framework Matrices

Sources

Nodes

Classifications

Collections

Queries

Reports

Models

Folders

Transcribe

IP11 IP16 IP21

IP1

IP2

IP3

IP4

IP5

IP6

IP7

IP8

IP9

IP10

IP11

IP12

IP13

IP14

IP15

IP16

IP17

IP18

IP19

IP20

IP21

SW: สิ่งที่มา ส่งผู้ไม่กลับ ถามว่าทำไม ตัวเรา main
เมื่อไรจะมา เพื่อไรผู้มาซึ่ง ใช้เวลาเดินทาง 2 วัน จากกรุงเทพฯ
ที่เราไม่ได้ คือเนื่องจากกลัวการใช้เงินทำเรื่อง
ทางที่เราไม่สนใจที่จะใช้เงินทางนั้น อันนี้ถูก
CT: อย่างที่เราไม่สนใจ เราไม่ได้ focus ที่จะต้องนั้น แล้ว
เมื่อก่อนเราก็ใช้มากกว่านั้นนะ เวลาที่เราไป จะตกชื่ออยู่ใน
รับคือชอบอะไรไม่ได้ก็ เพราะมันเป็นเรื่อง nature มันทำ
SW: เหมือนเคยเจอเหตุการณ์ที่ไม่ดีในการใช้เงินทางนั้น
CT: ไม่พูดกันตรงๆ นะ ที่เราไม่ใช้รถตู้
SW: เหตุผลหลักๆ เราที่ไม่ใช้ SC
CT: เมื่อก่อนเรา support เรามากกว่านี้ วันดีคืนดีช่วงนั้นราคา
ล่วงหน้า มันก็ manage ได้ถูกเปล่า มัน manage ได้ มัน
เราทำปุ๊บก็ง้อมาก่อน เพราะเรารู้ว่า ว่ายังใจของเรา
เราทำปุ๊บก็ง้อมาก่อน มาเดี๋ยวนี้ใช้ให้ก่อน เราที่
บอกว่าคุณราคา มีผล immediately effect เลยขึ้น cor
service นั้นที่ เรือไม่วิ่ง ตู้เอามา เรือของคุณ ขึ้นไม่แคร์

customer purchasing behavior
Risk Reduction or Sharing
Production
Customer importance
Product Characteristic
Commodity price movement
Risk Management
Shipping line
Cost and Service Requirement
Culture or Management Style
Cost Consideration
Location for the Selling
Overall business strategy
Situation factors
Term of sale preference
Customer Characteristics
NF Industry Trading
Attitudes towards Cost, Service, and Risk Aspects
Logistics Strategy and Policies
Organizational Characteristics
The context of NF industry and freight transportation
Operational Characteristics
Transport decision makers in NF
Perception on a certain mode and
Image and Service of Transport C
Expert and knowledge of staff

In Nodes Code At

SW / 21 Items Nodes: 138 References: 748 Editable Line: 2046 Column: 29 100%

Appendix K: An example of data translation

Original quotation from the interviewee (in Thai)	Translation the original quotation in Thai into English (by the researcher)
<p>คนเราเวลาทำงานกันนานๆ มันจะลงลึอก มันจะโทรก กริ่งเดี่ยวบางที่ไม่ต้องละเอียดอะไรมาก มันแบบอ้อย เท่านี้ะวันนี้ 10 ตู้ วันนี้ 5 ตู้ เออทำงานมาวันไหน รู้เลยว่าเจ้านี้มันชอบทำงานก่อนในช่วงนี้ เจ้านี้ชอบ ทำงานหลังรู้ คาแรกเตอร์ ของเขาเลย แล้วเวลาเอา เอกสารมาให้ เอา บีแอล มา เราก็จะรู้หมดว่ามา ประมาณไหนอะไรอย่างไรรู้หมด มันลงลึอกแล้ว แต่ถ้าอยู่ๆ คุณเปลี่ยนปีบคุณต้อง ดีล ใหม่ คุณเปลี่ยนเจ้าใหม่คุณต้องดีลใหม่นะ หากคนดีลใหม่ เอกสารส่งตรงไหนอะไรแบบไหน มาทำงานก็วัน เหมือนโปรเซสต้องเริ่มเรียนรู้อีกครั้งหนึ่ง ต้องเรียนรู้ ใหม่อีกสักพักถึงจะลงลึอก เพราะตอนนี้เราใช้อยู่ หลักๆ ก็ 2-3 เจ้าก็ใช้สลับๆ กันไป เพราะราคามัน ใกล้เคียงกัน</p>	<p>When we work together for long time, it will be compatible. I just give a quick call to inform them what I want without too many details. For example, I just give the number of containers, like 10 or 5 units. I know the way they usually work, such as supplier A likes to work early, while supplier B prefers to work near to the deadline. They are already experienced at the job, so they know the details of the work and when they should take action on each step; let's say when the BL documents must be sent to us. If you change it, you have to restart the working process with them. You have to learn how to work with new suppliers for some period of time until we can co-operate well. So, now we use 2-3 main suppliers alternatively because these prices are similar.</p>
<p>เราไม่ได้มองในเรื่องของความไม่ประทับใจ มองว่า การที่เราจะทำอะไรก็แล้วแต่ เราอย่าไปฝืนธรรมชาติ เราอย่าไปฝืนในสิ่งที่มันเป็น ผู้ประกอบการแต่ละ ผู้ประกอบการก็มีสไตล์มีวิธีการทำธุรกิจและก็มี ปัญหาเฉพาะหน้า อาจจะต้องด้วยสิ่งแวดล้อม ตัวพื้นที่ ตัวโลเคชั่นของเขาที่อยู่ ณ ตรงนั้น ข้อจำกัด เราแค่ ทำความเข้าใจสิ่งที่มันเกิดขึ้นกับมัน ถ้าถามว่าจะ เป็นปัญหาจริงๆ สุดท้ายมันขึ้นอยู่กับว่าทัศนคติหรือ แนวทางในการดำเนินธุรกิจของผู้ประกอบการแต่ละ เจ้า มีปัญหา คุณรับมือปัญหานั้นๆ อย่างไร</p>	<p>We ignore the issue of the unimpressed events. We have to follow along with what they are. Each supplier has their own way of managing the business and dealing with immediate problems. They may have constrained on the business environment and suitable location. We just understand what is going on with it. The important issue that impacts the final decision is the attitude or approach to the operation of the individual entrepreneur when confronting problems.</p>

Original quotation from the interviewee (in Thai)	Translation the original quotation in Thai into English (by the researcher)
<p>ประสบการณ์มันก็ต้องขึ้นอยู่กับว่า เกิดอะไรขึ้น พี่มองว่าปัญหา ทุกคนทำงานทำธุรกิจ มีใครบ้างไม่มีปัญหา เรามองในเรื่องการรับมือ มีปัญหา คุณปิดโทรศัพท์ โทรไปก็ไม่รับ คุณหนีแต่คืออันนี้มันพูดถึง คอมมอน ทั่วไปในของธุรกิจ มันก็มี บางคนเข้าใจใหม่ ก็เข้าใจ คุณอาจจะยังตั้งตัวไม่ได้ มีแต่คนรุมโทรมา แต่สรุปแอท ดี เ็นด์ คุณรับมือยังไง คุณหนีได้วันหนึ่งสองวัน แล้วคุณจะยังไงต่อ ถ้าคุณหนีในอันนี้เราจะไว้ใจในการทำธุรกิจกับคุณหรือเปล่า เพียงแต่อาจจะเป็นเรื่องของ ดีเทล ปลีกย่อยมองว่า เราก็ต้องมองว่าปัญหามันเกิดจากอะไร แล้วทางเลือกที่ในการรับมือ มันมาจากอะไร จากพฤติกรรมของคนหรือจาก แอตติจูด ของเมเนจเม้นท์ สไตล์ว่าคุณจะรับมือยังไง บริหารเอสพี เหตุผลที่ไม่ได้ คือถ้าคุณจะบอกว่าคุณหยุดเรือ แต่คำสั่งผู้จัดการเรือ เป็นไปไม่ได้ ถูกเปล่า คุณต้องระดับ บิ๊กเมเนจเม้นท์ ในเมื่ออาจจะระดับเจ้าของ คุณเลือกที่คุณจะทำแบบนี้ เราทำงานกับคุณไม่ได้</p>	<p>It depends on what is really happening. I think the problem is common for everyone who does business. So, we focus on the approach to deal with the problem. If you turn the mobile off, or do not answer the call in order to escape from the problem, it is common in business. It is possible for this to happen, even when you do not have the solution yet. There are many people who keep on trying to contact you. The important thing is how you deal with it, finally. You can ignore it for one or two days but what next? If you are irresponsible in it, do we have confidence in doing business with you or not? ... We need to believe that the problem was caused by something and then the choice of coping is derived from the behaviour or attitude of the management style of how you handle it. If SP Ltd. told us that the reason for stopping the service is because of the manager's command that is impossible. It must be at major manager level or the owner. If you decide to do it like that, thus we will stop working with you.</p>
<p>สงขลาปัจจัย คอนโทรล ได้มากกว่าปีนังคือ เคทีเอ็มบางที่เรา คอนโทรล ไม่ได้ ตู้มาไม่มา แล้วกว่าจะแบบรอลุ้น เราคืนตู้ไปเสร็จ เราต้องไปรอว่า ช่วงนี้ป่าดงมีปัญหาไหม ตู้แจม ใหม บางทีเครนในการยกตู้เสียตู้หนักไปไม่ได้ ยกขึ้นรถไฟไม่ได้ ทุกสิ่งอย่างที่พยายามเร่งโรงงานแทบตาย ไปตายอยู่ตรงนั้น คือเขาต้องให้ประเด็นนี้มากกว่า ปัจจัยที่เรา คอนโทรล ไม่ได้มากกว่า</p>	<p>Songkhla port is more controllable than Penang. For example, sometimes we cannot control container deliveries from KTM Ltd. We have to speculate whether it will have arrived. After we return the fully loaded containers, we have to wait to see whether there is a problem. For instance, sometimes there was congestion or the crane was broken, so, it could not lift the heavy containers into the rail wagons. Everything we had done, including increasing the production rate, meant nothing. So, we choose a port where we can have more control of it.</p>

Original quotation from the interviewee (in Thai)	Translation the original quotation in Thai into English (by the researcher)
<p>เรามองว่ามันคุยกันได้ สมมติว่าจะเข้าไปเกิน โอ ที หน้อยหนึ่งหรือเกิดอะไรขึ้นมามันคุยกับทาง ผู้ประกอบการได้ เพราะว่าคนไทยด้วยกัน แต่ถ้า คุยกับคนมาเลเซียคุยยากมาก เพราะคน มาเลเซีย คัทออฟ ของเขาตัดคือเขาตัดเลยนะ แล้วมาเลเซียไม่ได้สนใจนะ คุณจะไปหรือไม่อยู่ คุณจะไปหรือไม่ไปฉันไม่สนใจ นี่จะหยุดก็หยุด นี่จะประกาศเปิดท่าหรือว่าตอนนี้ปิด เกตประตู ก็ปิด อะไรวะตู้เราไปถึงแล้วอยู่หน้าท่าทำอะไร</p>	<p>We consider that we can negotiate with Thai officers. For example, sometime fully loaded containers have to be returned a little bit past their due time or some other problem occurs. We are capable of communicating directly with the supplier because we are Thai, but it is difficult to talk with Malaysian officials. Therefore, a Thai company can reach a compromise but it is difficult to deal with a Malaysian one. Malaysian companies are quite strict. They do not care if you are about to leave; if they want to close the port, they will close it with little or no notice. Sometimes, our containers have already been in front of the gate but it was closed. What can we do?</p>
<p>ปัญหาที่เจอหนักสุดที่บอก คือถุงน้ำยางแตก สินค้าเสียหายไปทั้งหมดล้านกว่าบาท ตรงนี้คือ เราไม่ประทับใจ แต่จินาโชคเขาก็ต้อง รับผิดชอบให้เรา เพราะเขาเป็นผู้ประกอบการ ขนส่งซึ่งรับขนส่งสินค้าให้เรา</p>	<p>The biggest problem I have ever faced is that a flexi bag was broken. All our goods were damaged and we lost more than a million Baht. We are disappointed about it. However, Jitt- Namchok Ltd. had responsibility for it. This is because he is our key logistics supplier.</p>
<p>เรามีทางเลือกเพิ่มขึ้นจากที่เคยใช้มาว่าแต่ละ เส้นทางเป็นอย่างไรเพราะประสบการณ์มากขึ้น เราอาจจะมีความรู้มากขึ้น แบบนี้ก็ทำได้ๆ คือ ตอนหลังก็ทำได้หมด ถ้ามีปัญหาเราก็ทำแบบนี้ๆ แต่ช่วงแรกๆ เราอาจจะไม่มีประสบการณ์ใช้ใหม่ ทำไม่ได้ปุ๊บหงิกเลย รอลอยตันเลย แต่ตอนหลัง เรารู้แล้วศึกษามาเพิ่มละทำอย่างนี้ได้เข้าตู้ที่ กรุงเทพเลยก็ได้ใช้ใหม่ ขนส่งแต่สินค้าขึ้นไปหรือ เข้าตู้ที่โรงงานก็ได้มันก็มีหลายแบบ</p>	<p>We have more choices in each route because of gaining more experience. We may gain more knowledge that we could do it this way. Later on, we have more alternatives. If we have a problem in the first choice, then we can change it immediately to another. At the beginning, we are inexperienced. If we cannot use transport via the first choice, everything becomes deadlocked. After that, we know more from studies. For example, we can load rubber into a container at BKK port by transporting only goods to there or just bringing empty containers to our production plant for stuffing into a container here.</p>

Original quotation from the interviewee (in Thai)	Translation the original quotation in Thai into English (by the researcher)
<p>เมื่อก่อนเราซัพพอร์ตเขามากกว่านี้ วันดีคืนดีช่วงนั้นราคาผันผวน หลายปีแล้ว ราคาน้ำมันขึ้น เราเอาตู้มา เรื่องที่บอกว่าจะต้องใช้แพลนล่วงหน้า มันก็เมเนจได้ถูกเปล่า มันขึ้นอยู่กับเทคนิค ต้องใช้เวลาใช้ใหม่ ลูกค้าไม่ใช่ใหม่ เราทำบู้คกิ้งออกมาก่อน เพราะเรารู้แน่ๆ ว่ายังงของเราต้องออกไปให้ได้ แล้วเราค่อยมาแตกมาชอ่ยว่าอันไหนเราให้ใคร ลูกค้าท่านไหน เราทำบู้คกิ้งเพื่อเอาตู้มาก่อน มาเตรียมตู้ไว้ให้ก่อนเราทำได้ เราทำมา 30 ตู้ วันดีคืนดีราคาน้ำมันขึ้น ท่าเรือบอกว่าเรือเอสซีบอกว่าขอขึ้นราคา มีผล อิมมิเดียทลีโอเฟค เฮยฉั่นคอมมิท แล้ว คุณทำธุรกิจแบบนี้ไม่มีใครให้ขึ้นสต็อกเซอร์วิสทันที เรือไม่วิ่ง ตู้เอามา เรื่องของคุณ ฉั่นไม่แคร์ นี้คือวิธีการทำธุรกิจของคุณหรือ คือ แอตติจูดแบบนี้รับไม่ได้</p>	<p>We had to support them more. One day during a period of price volatility, the oil price rose and we already stocked 30 units of containers at our factory. SP Ltd. said that prices had increased that would have an immediate effect, despite the committed agreement we had. You do business like this and nobody will allow the price to increase. It does not matter, suppliers can take action by the stopping service immediately—so the ship did not run. This [shipment delay] is your problem; they do not care. This is not how to do your business, this attitude is unacceptable.</p>
<p>เรื่องของ อิมเมจ โดยเฉพาะพูดถึงโหมดภายในประเทศจริงๆ อิมเมจ พี่ว่าอาจจะยาก เพราะว่ามันไม่ได้มีเป็นแบรนด์ใหญ่ๆ เหมือนอย่างสายเรือที่มันเวลด์ไวด์มันจะแบบสามารถมีเรพริเซ็นเททีฟมีอะไรต่างๆ ที่สามารถเช็คประวัติได้ยาวนาน อันนั้นนี้อาจจะเป็นค่อนข้างข้างหลังประวัติข้างหลัง ต้องมีการดำเนินธุรกิจมาซักระยะหนึ่ง แล้วเช็ค อาจจะมีเรื่องทางการเงิน มีการติดเงินโน่นนั่นนี่อะไรหรือเปล่านั้นไป มันเป็นแค่เหมือนกับบอกว่าบริษัทนี้จะดำเนินธุรกิจต่อได้ อย่างยั่งยืนหรือเปล่า</p>	<p>I think the topic of image, especially in domestic freight transport, is difficult to measure because there are no big brands like there are with worldwide shipping lines, which have historical data that can be checked. It is about their previous history; so, they must do business with us for some period of time. It may be their financial history: whether they have big debts and whether they have been operating the business for a long time.</p>

Appendix L: An example of a coding tree

PhD Data analysis Phase II.nvp - NVivo

File Home Create External Data Analyze Query Explore Layout View

Navigation View Find Quick Coding Dock All Undock All Close All Annotations See Also Links Relationships Node Node Matrix

Workspace Window List View Coding Stripes Highlight Links

Nodes Look for: Search In Nodes Find Now Clear Advanced Fin

Nodes

- Cases
- Interview Transcribe
- Relationships
- Node Matrices

Sources

- Nodes**
- Classifications
- Collections
- Queries
- Reports
- Models
- Folders

Name	Sources	References	Created On	Created By
Customer Characteristics	7	139	21/10/2013 16:02	SW
Customer importance	7	41	18/11/2013 14:10	SW
customer purchasing behavior	7	63	18/11/2013 14:53	SW
Customer service level requirement	6	32	18/11/2013 13:55	SW
Operational Characteristics	7	242	03/10/2013 17:46	SW
Cost Aspect	7	50	03/10/2013 17:42	SW
Delivery Operations	7	73	03/10/2013 17:38	SW
Ease of Access	7	40	03/10/2013 17:40	SW
Image and Service of Transport Operator	7	62	03/10/2013 17:35	SW
Organizational Characteristics	7	112	03/10/2013 16:53	SW
Existing transport system	6	23	03/12/2013 00:39	SW
Logistics Strategy and Policies	7	80	18/11/2013 14:05	SW
Organisation structure	4	9	18/11/2013 14:13	SW
The context of NR industry and freight transportation	11	126	21/10/2013 15:13	SW
Infrastructure	5	29	11/12/2013 13:36	SW
NR Industry Trading	8	71	22/11/2013 17:39	SW
Situation factors	8	25	21/01/2014 15:14	SW
Transport decision-makers in Natural Rubber Industry	7	177	03/10/2013 18:17	SW
Attitudes towards Cost, Service, and Risk Aspects	7	116	15/12/2013 16:36	SW
Perception on a certain mode and or Suppliers	5	48	19/11/2013 00:09	SW
Vision on Freight Transport management	7	13	15/12/2013 15:13	SW

SW 179 Items

**Appendix M: The CEIS Research Ethics Sub-
Committee CONSENT FORM – C**

**Northumbria University
CEIS Research Ethics Sub-Committee
CONSENT FORM – C**

Project Title:

Name of the Researcher or Project Consultant:

Name of participant:

Participating Organisation:

I consent to take part in this project.	<input type="checkbox"/>
I have had the project explained to me by the researcher/ consultants and been given an information sheet . I have read and understand the purpose of the study.	<input type="checkbox"/>
I am willing to be interviewed.	<input type="checkbox"/>
I understand and am happy that the discussions I will be involved in may be audio-taped and notes will be taken.	<input type="checkbox"/>
I understand I can withdraw my consent at any time, without giving a reason and without prejudice.	<input type="checkbox"/>
I know that my name and details will be kept confidential and will not appear in any printed documents.	<input type="checkbox"/>
<ul style="list-style-type: none">• The tapes and any personal information will be kept secure and confidential. They will be kept by the researcher/project consultants until the end of the project. They will then be disposed of in line with Northumbria University's retention policy.• Anonymised summaries (if required) will be produced from the discussions to be used in the project report and in other publications. None of the participants will be identified in the project report or in other publications based on this project. Copies of any reports or publications will be available on request to participants.	
I have been given a copy of this Consent Form.	
Signed:	Date:

Researcher/Project consultant: I confirm that I have explained the project to the participant and have given adequate time to answer any questions concerning it.

Signed:

Date:

Appendix N: A project information sheet

Participant Information Sheet



Faculty of Engineering and Environment
Department of Mathematics and Information Sciences

RESEARCH INTO DEVELOPING A MODAL OF INTERMODAL FREIGHT TRANSPORT CHOICES: A CASE STUDY OF RUBBER EXPORTS IN THAILAND

What is the nature of the research project?

I am Sangrawee Witoonpan, a PhD scholar in the Faculty of Engineering and Environment, Northumbria University, United Kingdom. My project is under the supervision of Professor David Wainwright and Dr. Andrew Robson. The research project is entitled: *“Developing a model of intermodal freight transport choices: A case study of Rubber Exporters in Thailand”*, which is a project based in the information management innovation (IMI) research group and Department of Mathematics and Information Sciences: www.northumbria.ac.uk/imi. My research interests include transport mode choice, decision-making and natural rubber industry.

Aims of the research project

The aim of the project is to investigate, analyse and model key factors influencing decision makers in choosing underlying transport modes and loading ports by natural rubber exporters in Thailand.

Research objectives

- To investigate the current practice of freight transport usage in the context of the rubber industry in southern Thailand;
- To explore the feasible range of alternatives in terms of intermodal freight transport pathways in southern Thailand;
- To examine factors that could affect the choice process with regard to selecting transport modes; and
- To propose a conceptual model aimed at understanding the factors influencing the intermodal freight transport choice from a Shipper’s perspective

What are benefits to participants in involving in the research?

This project will enhance a more comprehensive understanding of the determinants of managerial decision making processes for mode choice selection for exporters in rubber industries in southern Thailand. Furthermore, a conceptual model of the intermodal freight transport choice process from the shipper's perspective will be developed within the context of natural rubber processing companies. The results of this research project will provide another significant contribution to the development of the Thai Economy, and the Logistics and Transport sector as a whole.

What are the participants being asked to do?

The volunteer participants will mainly be asked to participate in:

- An interview about their experiences on making decisions concerning the selection of transport modes and loading ports

Data and participant confidentiality

The interview will be audio recorded. The audio files will be stored on personal laptop with access control; completed questionnaire will be stored in a locked cabinet. Only I as the researcher will be permitted access and the data will be destroyed permanently after a period of two years after the completion of the PhD. Hard copy information will be destroyed by shredding, while electronic data will be deleted from hard drive/ network as well as the recycle bin. All data and information collected will be managed confidentially. All names will be changed to a coding system to make sure that no participants and companies can be identified from the raw data. A written summary of the research findings will be posted to you if you request these. The university staff member who is the principal supervisor of my research is:

Professor David Wainwright

Director of the Information Management Innovation (IMI) Research Group
Department of Mathematics and Information Sciences
Faculty of Engineering and Environment
Northumbria University, Pandon building, Camden Street, Newcastle upon Tyne, NE2 1XE, UK
Email: david.wainwright@northumbria.ac.uk, Telephone: +44 (0)191 243 7634

Thank you very much for your kind support and cooperation.

Miss Sangrawee Witoonpan

PhD student
Information Management Innovation (IMI) Research Group
Department of Mathematics and Information Sciences
Faculty of Engineering and Environment
Northumbria University, Pandon building, Camden Street, Newcastle upon Tyne, NE2 1XE, UK
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**Appendix O: A formal letter asking for permission
from the owners of the rubber companies to take part
in this research**



Faculty of Engineering and Environment

Sri Trang Agro-Industry Public Company Limited

10 Soi 10 Petchkasem Road
Hat Yai District
SongKhla
90110

This matter is being dealt with by:
Professor David Wainwright
Principal Supervisor

Pandon Building
Camden Street
Newcastle upon Tyne
NE2 1XE

17th May 2013

Dear President,

I am writing this letter on behalf of Miss Sangrawee Witoonpan, who is currently pursuing her PhD at the Faculty of Engineering and Environment, Northumbria University. She is under the supervision of Professor David Wainwright, Dr. Honglei Li and Dr. Andrew Robson. Miss Witoonpan is conducting a research project entitled: *"Developing a model of intermodal freight transport choices: A case study of Rubber Exporters in Thailand"*, which is a project based in the information management innovation (IMI) research group and Department of Mathematics and Information Sciences: www.northumbria.ac.uk/imi

The main aim of the research is to investigate, analyse and model key factors influencing decision makers in choosing underlying transport modes and loading ports by natural rubber exporters in Thailand. The results of this research project will provide another significant contribution to the development of the Thai Economy, and the Logistics and Transport sector as a whole.

In this connection, it would be highly appreciated if your company could permit Miss Witoonpan to interview your employee, who is involved in leadership and making decisions concerning the selection of suitable transport modes and loading ports. This is a fundamental source of information to be utilised in the above mentioned Doctoral research. All ethical guidelines and procedures (as defined by Northumbria University) relating to research data confidentiality and anonymity will be followed.

Thank you very much for your kind support and cooperation.

Yours sincerely,

Professor David Wainwright
Principal Supervisor
Northumbria University
Email: david.wainwright@northumbria.ac.uk
Telephone: +44 (0)191 243 7634

Miss Sangrawee Witoonpan
PhD student
Northumbria University
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Appendix P: Demographic profile of the surveyed respondents

P.1 Summary of the surveyed respondents' profile

Figure P.1(a) shows the current role of survey respondents; export managers (24%) and managing directors (24%) were the two largest respondent groups and the total of these two positions comprises 48% (nearly half) of survey respondents. The next two respondent groups are marketing managers and general managers: each was represented by the same percentage of respondents, 14%. Other (24%) responses to this question included executive director, shipping executive, shipping officer, factory manager, export officer and shipping and marketing staff. As can be seen in Figure P.1(b), in response to the question: 'duration of work in the current firm' and 'duration of work in the industry', the majority of the respondents - 39 out of 50 - have been working in the rubber industry for more than eight years and thirty respondents have experienced work in other firms over the recent period (during the last eight years). Only a relatively small number of respondents (3) have less than four years' work experience in rubber industry.

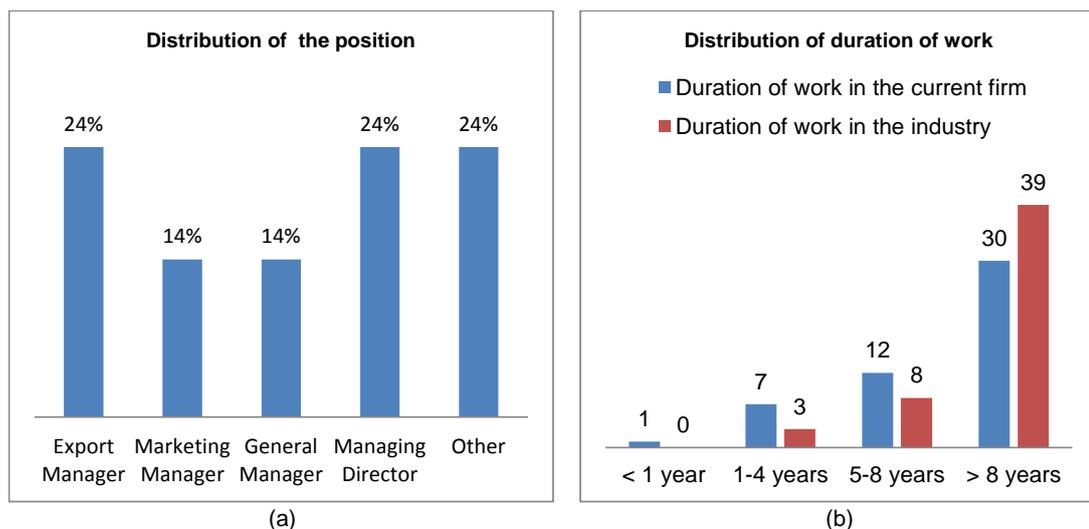


Figure P.1 (a): Sample characteristics categorised by role; **(b):** Sample characteristics categorised by duration of work in the current firm together with duration of work in the industry.

P.2 Summary of the surveyed companies' profile

This section describes the surveyed respondents regarding their companies' profiles, which are divided into four main aspects: the number of years spent operating in rubber export; number of employees and the amount of capital employed in any organisation; total number of goods sold in each month; and company's locations and major destination country.

In response to the number of years operating in rubber export, the detailed results regarding the period of years that each company has run their business are displayed in Figure P.2. Half (50%) of the companies have been established more than fifteen years, while only 14% of surveyed respondent businesses have been operating for less than five years. 20% and 16% of those surveyed respondents working with companies have been operating in the business for 6-10 years and 11-15 years respectively.

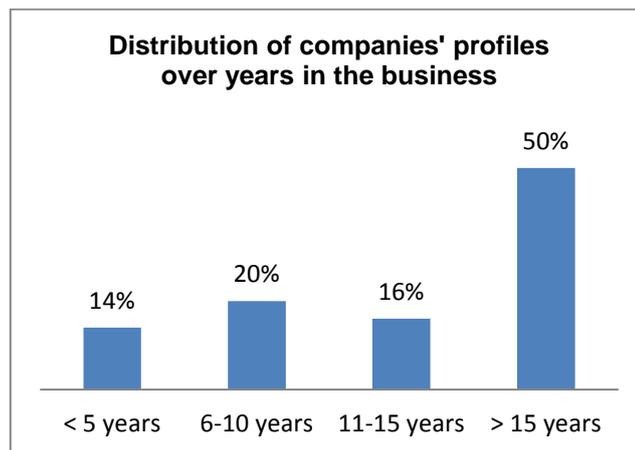


Figure P.2: Company characteristics categorized by number of years in the rubber business.

Table P.1: using the number of employees and amount of capital employed in the business, these two demographic profiles make it possible to imply an overview of the scale of respondent organisations. The survey responses indicated that the majority of survey participants are small to medium size, while only approximately 9 out of 50 respondents (18%) are considered to be big scale organisations.

Table P.1: Cross-tabulation of number of employees in the business and amount of capital employed.

		The amount of capital				Total
		< 50 million Baht	51-100 million Baht	101-200 million Baht	> 200 million Baht	
Number of employees	≤ 50 people	13	2	1	0	16
	51-100 people	3	1	3	0	7
	101-200 people	1	5	6	0	12
	>200 people	1	1	4	9	15
Total		18	9	14	9	50

Note: £1 = 47 Baht

With its subject the overall volume each company sold in each month, the analysis results can be seen in Figure P.3. Only a small number of respondents – 7% – indicated that their companies exported in excess of one thousand twenty-foot equivalent units (TEUs) a month. Another 7% recorded that their companies trade a number falling between 501-1000 TEUs each month. In contrast, over three quarters (48%+25%+14%=87%) of respondents indicated that less than 200 TEUs are distributed per month by their company, consistent, arguably with the small- to medium-sized status of these organisations.

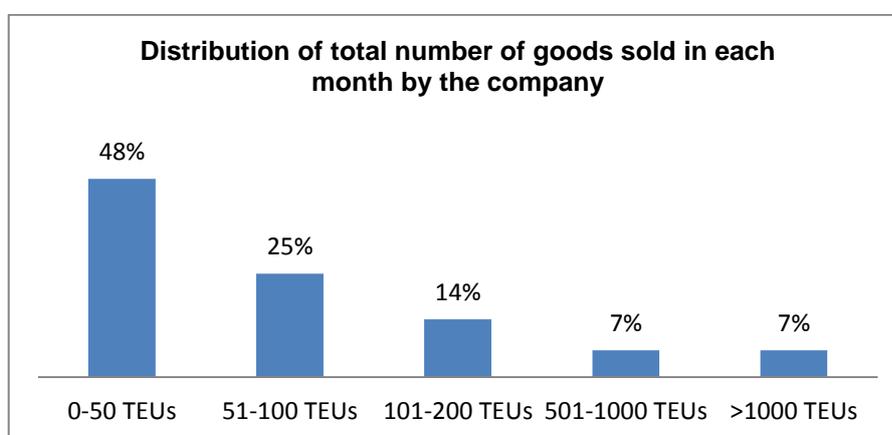


Figure P.3: Company characteristics categorized by total number of goods sold in each month.

The pie chart shown below in Figure P.4(a) shows the breakdown of company locations. Survey results indicated that the majority of companies are situated in Song Khla (56%), while the other three provinces, Nakhon Si Thammarat, Surat Thani and Trang, housed 18%, 16% and 10% of companies respectively. Figure P.4(b) provides the summary percentages for the distribution of product destinations by the companies. When the respondents were asked about the port of destination, the main place where those surveyed export natural rubber products to, just under fifty percent

of the participants (46%) trade with China, followed by Malaysia, Japan, and 'other', comprising 30%, 16% and 8% of survey respondents respectively. Responses in the 'other' category included ports of destination in EU countries, the United States, Brazil and Korea.

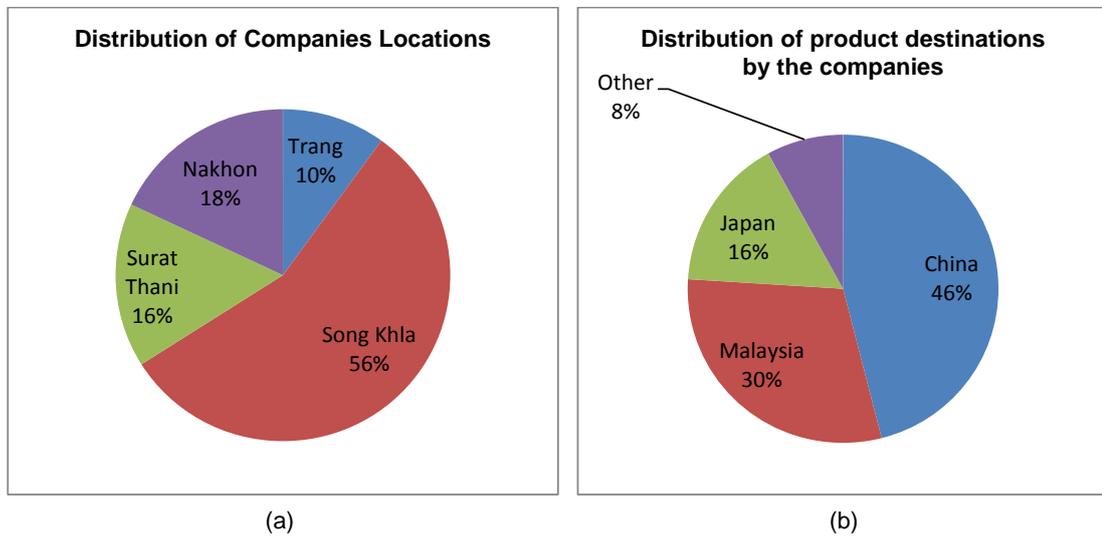


Figure P.4(a): Company characteristics, category Company Location; **(b):** Company characteristics, category Major Destinations.

Appendix Q: Quotations in Chapter Five

Q.1 Quotations from interview transcripts for Section 5.2, environmental characteristics

Quotation No.	Quotations from Interview Transcripts
QTE5.2_01	<p><i>“The choice of transport mode seems to depend more upon the environment. The environment is regarded as the most important factor in determining the price of natural rubber and the ability to procure raw materials... Price volatility considerably influences on the selection and rubber supply is a cornerstone of the choice of transport mode. Although I have carefully chosen a transport mode, the supply option is not followed. Sometimes it is hard to say which factor is greater. When selecting a transport mode, multiple external factors seem to affect the decision.” (IP16)</i></p>
QTE5.2_02	<p><i>“There are no cheaper options which serve Songkhla than Penang port. I have to create relationships which have to be maintained for the future when problems such as protest, a damaged crane or limited locomotive services occur at the other port. Nonetheless the amount of usage is not 100%, and may be just 10% to retain the original liners. I have to do this otherwise, one day when I really want to use that port it will be occupied by other users. They told me that your company has not even used the port once and ‘why I could serve yours’. That is because this business now happens on the basis of relationship and partnership.” (IP18)</i></p>
QTE5.2_03	<p><i>“I do not worry at all about external factors. This is because all rubber exporters must stop due to them not just my company. If one is unable to transport, it is impossible for the entirety of Thai rubber exporters to make deliveries. I do not care about external factors, even strikes, lightning, fires or flooding. When others are able to transport, but my cargo cannot be, I take action immediately ‘why is my stuff still here.’” (IP3)</i></p>
QTE5.2_04	<p><i>“...The main market of company X is China, and one of the warehouses is located in China....These days, other economic conditions and factors, e.g. volatility in the price of rubber or a ‘grey bank’ in China, complicate the process of delivery. As this company has a warehouse in China, therefore I do not have to worry about the delivery, as our stock is available in the Chinese warehouse.” (IP18)</i></p>
QTE5.2_05	<p><i>“...this policy absolutely fails. This intervention on rubber prices by limiting the quantity of rubber export by 10%. This policy is collaboration amongst the world's three biggest exporters of natural rubber: Thailand, Malaysia and Indonesia and all use the same policy. By the time, it took more than that. The world economy tends to have a higher impact on rubber price movements.” (IP10)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.2_06	<i>“Another difficulty faced by shippers beyond the usage of the coastal Port, is the obstacle of water level in Surat port. In the past, I used that service a great deal. When I was in a hurry, feeder vessels cannot carry their normal loads the shipments are delayed. No one is responsible for this situation as it is caused by nature. This problem concerns the control and influence on the flow of goods.” (IP19)</i>
QTE5.2_07	<i>“The level of risk must be zero, it cannot be 100%. For example barges running into a rainstorm during transit and then capsizing. The value of rubber contained in 1 TEU is equal to 3 million Baht. It is clear to see that some damage may cost a lot of money (up to 3 million even if the insurance coverage is 100%). However I do not want our transport operators to have continuous damage. Otherwise, who will work with us?” (IP18)</i>
QTE5.2_08	<i>“During the rainy season the lost weight of rubber content is even more problematic. This is because vehicle condition is often poor so water can leak into the body of vehicle causing the weight of the vehicle to become higher than the original weight. This results in an increase in the weight on the scale. But when that vehicle reaches the clients’ factory, the total weight has already become lighter. So there is the problem of lost weight.” (IP20)</i>
QTE5.2_09	<i>“Import/export must follow the law and the most important of these are customs legislation.” (IP16)</i>
QTE5.2_10	<i>“Rubber businesses are exempted from basic customs duty; however, under the rubber control act (the Rubber Control Act and Rubber Plantation Aid Fund Act) Thai rubber exporters must have two documents granted by the authorities. Such documents related to the shipping and export department as the order is passed to us to prepare the related export documents. Prior to the document issue, officers physically inspect the goods and count the stock at our factory. In case of an urgent shipment the government officials not operate for us. As this shipment cannot be exported until the essential information is collated in export declaration via a paperless electronic program at customs. I must have 2 copies of the document (a cess receipt and an export control license) otherwise I cannot export.” (IP18)</i>

Quotation No.	Quotations from Interview Transcripts
QTE5.2_11	<p><i>“...there is a fund charged on rubber exports known as the cess rate that needs to be paid frequently. The cess rate will be directly proportional to the price of rubber. Administration may have a significant impact on the product cost. The tax charges are revised every 15 days—divided on 1-15 and 16-30 every month. If prices have changed during this period, I have to manage carefully when products are delivered i.e. whether this occurs early or late in the month. The most appropriate action depends upon the predictions of the cess rate.” (IP20)</i></p>
QTE5.2_12	<p><i>“Sometimes, the rubber prices rose to nearly Baht 100. At that time, it had been over Baht 90 per kilogram for a long time and the trend was predicted to exceed Baht 100. The majority of exporters wanted to export before the change in the cess rate. I was confronted with shortage of empty containers as there was a high demand for rail transport; exporters fought each other for limited containers. So, I managed deliveries by the most convenient mode. That was transport by road via the Sadao border to avoid the increase in the tax rate. Rubber moved via Sadao, although the transport cost became more expensive than the other routes.” (IP6)</i></p>
QTE5.2_13	<p><i>“Due to high prices, rubber exporters want to deliver as much as possible. They all faced with the same condition that has incentives to accelerate exports. So, rail transport at Padang Besar regularly gets congested. ” (IP11)</i></p>
QTE5.2_14	<p><i>“It is linked to taxation privileges, regulations need to be reviewed before export; especially concerning the requirements and the laws that benefit preferential taxation of rubber products. For example, countries who have already concluded FTAs with Thailand (Free Trade Agreement); if exporters apply the right form will be exempted from tax to become 0%. In order to eliminate tariffs, all procedures have to be processed before the rubber is sent out.” (IP16)</i></p>
QTE5.2_15	<p><i>“Iranian customers say that if products have not been monitored, the customs will not allow that shipment entry their country. This particular issue is perhaps because of more volatile political situations which might be at risk as well.” (IP16)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.2_16	<i>“Rubber is a high-value commodity and is affected by price fluctuations that link to the ability in investment of two parties, both sellers and buyers need high capital. Will I have the ability to invest a lot of money in buying a number of raw materials to stock for a long time? From another angle, I have to question whether customers have enough money to pay for a large order. I must make sure that they will not break an agreement. In reality this is not always the case and the business is not straightforward.” (IP14)</i>
QTE5.2_17	<i>“On average, a 5 TEU/shipment is equal to 100 tonnes was purchased...In rubber trading, one cannot determine the export volume for each month it may be 100, 200 or only 50 TEU month. The final amount cannot be predicted. In my company, some months there is no sell or export at all. The volume of export fluctuates quite a lot.” (IP12)</i>
QTE5.2_18	<i>“Small companies may have only five vehicles that can work for us and at only three vehicles per job. So I let them take charge of a small shipment and the price is standard for them. But for customers who purchase ten units/shipment. A small firm may take up to three days to finish the process, so I need a larger company to complete larger shipments.” (IP3)</i>
QTE5.2_19	<i>“In practice, do not use only any single transport operator because the volume of rubber exports is not stable throughout the year. Rubber is seasonal and dependent on climactic conditions. In some periods like the close tapping period, export volume is very low.” (IP16)</i>
QTE5.2_20	<i>“In the rubber business, almost all containers are 20 feet (TEU: twenty-foot equivalent unit) short containers. This is because of the weight of the cargo itself. It would be useful for us to utilize 40 feet containers but under laws and regulations rubber not allowed to be transported like this as the total weight would be over the limit.” (IP20)</i>

Quotation No.	Quotations from Interview Transcripts
QTE5.2_21	<p><i>“There are many factors that might cause an accident such as containers being dropped or flexi bags leaking. These issues may not be caused by me, so why should I need to sign a letter. Upon talking to shipping liners I discovered that there is a company accepted to sign for us. So, I prefer to spend more money but have a letter of consent from the bag service that they are responsible for security.” (IP9)</i></p>
QTE5.2_22	<p><i>“The basic concept is that the rubber is placed on wooden pallets and covered by plastic so that the plastic holds all the pieces of rubber together. The aim is to provide an item that is easy forklift and stack in stores.” (IP16)</i></p>
QTE5.2_23	<p><i>“Let's say you sell freight to rubber and electronic customers. Containers usually contain 20 tons of cargo for rubber whilst another customer exports electronics which are not heavy in weight. Supposing both customers send items to the same destination and pay the same price. Electronic customers always get a high quality of container whilst rubber receives a lower quality.” (IP16)</i></p>
QTE5.2_24	<p><i>“Container condition for flexi bags must be the same grade as RSS. My company uses grade A because the rubber itself does nothing to protect the product. I put pure rubber on to the container floor so painted containers may not mark the rubber or cause contamination. Suppose cargos take a long time to be delivered over the main leg of transport. For example the shortest route time may be 7 days. Heat or humidity may cause paint to diffuse into the rubber, if that occurs the customer may return the product.” (IP18)</i></p> <p><i>“STR can use container grade B, but often do not as these containers are unsightly and contain wooden burr. Since almost all STR is shrink wrapped. The bottom base has rubber placed upon it; the burr will therefore impact plastic body. During transit, cargos on vessels may sway up and down and that may cause tears in plastics. In these cases serious clients may claim for contamination.” (IP18)</i></p>
QTE5.2_25	<p><i>“Perhaps there was an effect of certain problems, such as packaging, which means some types of rubber (STR) have to wait until packaging was delivered, otherwise the company cannot start production line. As it takes time to repackage STR into certain packaging—35 kg per bale in metal crates, I would say that this is a risk of packaging because the packaging is defined by the customer.” (IP16)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.2_26	<p><i>“Metal crates will be given to us 14 days before shipping for example if it is supposed to ship on the 14th, containers will be delivered to the company on 1st. Sometimes this is delayed which means the containers do not arrive until the 1, 2, 3, or even 4. In cases where the vessel leaves on the 14th, the company has to store before the 7th. The manufacturing process takes at least 7 days; there is a need to start produce on the 1st. However, if the crates have not come this leads to a delay.” (IP2)</i></p>
QTE5.2_27	<p><i>“Loading of a container is a significant issue and ship agents rarely provide this service because of labour shortage issues. Sometimes, the company prefers to pack at a container freight station in a particular port as that is the cheapest option. If ship agents will not allow the company to load cargo into containers as there are no workers, the company has to switch to another area.” (IP16)</i></p>
QTE5.2_28	<p><i>“In my view, loding of a container at Laem Chabang is not as convenient as at Bangkok Port. At Bangkok, there are a number of workers for loading goods for each of the shipping lines.” (IP21)</i></p>
QTE5.2_29	<p><i>“I will manage the load at my factory instead of at container freight station or at the port because it is out of control throughout the process. The rubber is loaded into a container in a shady area as a consequence our products are less likely to become wet or contaminated. At the other facilities, who will look after our products? What if it is raining during loading of a container or will the cargo is loaded into a container in a shady area or outside shelter, I cannot know.” (IP4)</i></p>
QTE5.2_30	<p><i>“Rubber trading like is often like playing in a casino or gambling as prices can go up or down all the time. In 1976 when I entered the rubber business, rubber price movement changed by up to 0.01-0.02 Baht/day. At the present time prices may change by between 5-10 Baht a day. Moreover, a commodity is almost no margin. If you miss a small detail, millionaires may become a pauper.” (IP21)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.2_31	<p><i>“It is clear to see that the issue of price is ranked number one and has an impact on whether or not a customer will refuse the product. Thus, whenever lower prices occur [when they are bought in comparison to current prices], customers automatically demand more rubber products. If I am unable to deliver, customers start to complain about how they need the products. In a period of higher prices [when they are bought relative to current prices], customers tend to default on contracts. So, as a result, I have to send out deliveries on time and as quickly as possible.” (IP18)</i></p>
QTE5.2_32	<p><i>“In periods when the price is very volatile, the issue of transit time reliability may be an issue in the decision as to whether a customer will refuse rubber products or not. In such a situation, the committed delivery date is very important.” (IP16)</i></p>
QTE5.2_33	<p><i>“Supposing the period agreed for the delivery is by the end of July and at the market is volatile. I cannot fail or delay the delivery. If delivery is overdue, customers shall be entitled to blame, cancel the order or even refuse the products. Why should they need to accept the order because they can purchase at spot price which is a lot cheaper? These times are very important. I am very strict on every step and correct all mistakes—cannot miss the schedule or even delay to prevent customer excuse. Whenever the cargos arrive within the end of July, customers have to agree to accept it.” (IP3)</i></p>
QTE5.2_34	<p><i>“Moreover, clients who have already purchased have the right to cancel the contract with us if the company cannot deliver it on time. So, I am really concerned with the accuracy of the delivery date which is settled with customers. If the company agrees to deliver by the 15th of this month and it appears that the rubber prices are going down. If the company do not do as agreed, customers may have an excuse to cancel your contract. This may damage the company, so the punctuality of the delivery is quite important.” (IP20)</i></p>
QTE5.2_35	<p><i>“The main trade market is China and the company has a warehouse located in China. Whenever the company runs into problems or customers refuse the products upon original delivery attempt. These days, other economic condition factors i.e. volatility of rubber price or gray areas of China's bank make the process of delivery complicated. As having the warehouse in China; there is no need to worry about the delivery.” (IP18)</i></p>
QTE5.2_36	<p><i>“Can factories purchase raw materials in period of price fluctuations? It is not only our view in the rubber market. All in the chain including intermediary, exporters, or end users look at the same data. They all receive similar information from the same source. For example, I thought the price was more likely to go up. As a result I have already sold the rubber but when delivery was due, I was unable to send it out because of a lack of raw materials.” (IP16)</i></p>

Q.2 Quotations from interview transcripts for Section 5.3, organisational characteristics

Quotation No.	Quotations from Interview Transcripts
QTE5.3_01	An export manager who manages for transport activities mentioned that: <i>“I hold the equity of the company as well. My uncle trusts me that when I decide something I will be aware of the company’s benefit as the first priority. If a problem occurs, I am always responsible for it and it is always solved. So, he [owner] did not have to do it himself.” (IP5)</i>
QTE5.3_02	<i>“Transport function is under my control. There is only one person above my position, who is my father, in the position of Managing Director. However, he is not interested in any details of transport related functions. I was commissioned to manage; I just pick up the most reasonable route. But he does not go into detail, so I able to select whatever route I want and change everything without permission. All power belongs to me and any transport related decision is under my control, because he doesn’t know and isn’t interested in the details. The only one thing he is really concerned with is customer satisfaction. He just says that if a customer calls to complain to him, the problem will move on to me... This Company is similar to a family business.” (IP3)</i>
QTE5.3_03	<i>“Departments involved in transportation management are marketing, logistic, purchasing, shipping and transport sector. Those influence the decision process. To come up with the final summary table, those five units must meet together. That is because sometimes marketing believes this cost will be a bit more expensive, so they ask purchasing to negotiate. Alternative suppliers may be offered, to be considered and compared with the active sources. Logistics may suggest another alternative mode. Transport operators might say that the offered prices cannot compete with the current market price. I will discuss with the operators in order to create the guide prescription, to which only managerial positions of marketing, shipping, logistics, purchasing, and transportation can get.” (IP14)</i>
QTE5.3_04	<i>“I [an export manager] do not work alone. I have a team and also staff in our shipping department. Our team cooperates well. I would have to cost for choices A, B, C, and D as I was told and give other details for each alternative. In other words, I provide at least four land costs for every production plant. Then, logistics will choose an appropriate option.” (IP18)</i>
QTE5.3_05	<i>“Those three [marketing and logistic, and production sectors] are mainly linked with transport functions. Production plants tend to request needed transport modes or specific times, while marketing must deal with different customers. So, shipping and logistics works like an intermediary to fulfil what marketing and production want.” (IP20)</i>

Quotation No.	Quotations from Interview Transcripts
QTE5.3_06	<p><i>“People who give priority to cost-saving are likely to look at cost as a key performance indicator... ocean freight is an important cost for them because it is an indicator of gain or loss. Ocean freight is the main factor of transport cost. If you have low-priced freight, it is equal to profit...From the point of view of logistics, they look primarily at freight rates. That is because the potential of the logistic section is considering cost saving...but I work at an operation unit. Thus I look at the big picture, particularly infrastructure—everything must be available including adequate containers, ready availability of vehicles, and the flow of products.” (IP18)</i></p>
QTE5.3_07	<p><i>“The main responsibility is to plan the logistic system. I mainly control logistics activity. Logistics focused on three points: 1. being on time, 2. cost, and 3. finding a way to cut expenses or seek new transport alternatives... Delivery is not a mainly profitable unit as its position isn’t in the marketing sector. The logistics department has a duty to control costs.” (IP20)</i></p>
QTE5.3_08	<p><i>“It may depend on logistic and marketing decisions, if it is necessary to delay for whatever reason under the business situation. You [logistics staff] have a duty to inform the factory there is a need to use this mode only, so it is the responsibility of the plant to be waiting around... I am working as an operations unit. The ocean freight rate is not the only factor, as all factors impact on the decision. You use the volume to negotiate and all you get is the sales wanting to sell you ocean freights. However, do you monitor after-sales service? How different is in the service level from the committed conversation before to after the purchase date? It is up to us to provide answers.” (IP18)</i></p>
QTE5.3_09	<p><i>“The decision is mine alone. I was thinking alone... For my company, I chose an appropriate mode with our company since I was in charge of managing delivery. I routinely followed that route until I was familiar with it.” (IP3)</i></p>
QTE5.3_10	<p><i>“If it is not actually necessary, it will not be changed. If I change, I have to find an alternative choice and then try it. Like I mentioned before, the first shipment is very important. If any problem occurs, it may have an impact on all the following stages of shipment. That’s the reason why I said that it is difficult to change it; just \$10-20 cannot change our mind if it still works well. However, if they have a problem even once, I am ready to change it immediately if they are irresponsible.” (IP13)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.3_11	<p><i>"In some cases, if we have a new mode that we consider has potential, we walk it through to be observed by our team and then request a price quotation from the supplier. Although the cost may be high, sometimes we want that option. Why do we want it? We want to try it on. We then pilot test this route, in order to see what our shipment would undergo. Is it the same as the supplier is telling us or not? ...For plant A, if we go by this route, we must pay Baht 10, but we prefer to spend Baht 15, increasing by Baht 5, for another route. Why are we increasing the cost? We have from Baht 5 more value in that 1) we are the first leader, 2) we have an additional channel so in the case that channel A, B, C and D suffer from problems, we have a spare option, and 3) we want to create a new contractor to be part of our business partnerships." (IP18)</i></p>
QTE5.3_12	<p><i>"The strong point of an SME is that I recognize the advantages of the company such as what this company is good at, what the company is expert at. If the company is not good at shipment and so on, I should let others do it. Then I can focus more on what the company is expert at, like concentrating more on marketing or production planting..." (IP13)</i></p>
QTE5.3_13	<p><i>"Let's say that Songkhla port is cheaper, but if I use only this port; it may lead to capacity limitation. I cannot use only one port; it has to be distributed... It's the issue of working time. If only one shipping liner or port is used, I will have limited working time for moving containers from factories to arrive at ports [before closing time]. I have to use many vehicles and staff at the particular point of time. Shipping schedules need to be distributed to at least 2-4 liners so that a number of jobs are divided into other working days, so that jobs can be circulated. Big container ships usually run on a weekly basis. If I use just a single one, our goods can be transported just once a week. They cannot deliver on time...If several shipping liners are used and departure dates are spread across Penang and Songkhla port, operation is not overloaded within a day, which is not easy to manage in aspect of finite facility." (IP16)</i></p>
QTE5.3_14	<p><i>"Hauliers have a number of customers; in other word they serve not only us but also other businesses. If the company has an own-account vehicle as part of a rubber trade, sometimes they are left idle after finishing shipments. It may be 3-4 days before the next shipment so our lorries are not used. Whereas those of the road hauler business can be used almost every day. So, I think that third party logistics enables them to be more efficient in term of facility than us. Furthermore, the matter of delivery in the rubber business is not often but in big lots, around 20 units on alternative days." (IP7)</i></p>
QTE5.3_15	<p><i>"If I have a large volume which is a fixed at least 200 TEU/month, running an own-account vehicle could be worthwhile from the aspect of transport cost. In such conditions, the turnover trend is probably no more than 2-3 years. I may break even in part of the fleet investment, and that may be equal to the total cost of spending to hauliers." (IP8)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.3_16	<i>"It is ease of use, for which the company pays for third party whenever as needed. This way doesn't need to invest in transport facilities such as trailers, staff, insurance, and maintenance. It is considered as a difficulty. The most significant point is the limited volume, which has not reached the cut-off point at which is worthwhile to invest. It is going to take quite a long time until the company can recover that money back to the system." (IP3)</i>
QTE5.3_17	<i>"Our concept is that the company runs 100% of all vehicles, but it does not need to have 100% of vehicles to cover all the work." (IP16)</i>
QTE5.3_18	<i>One participant provided an insight into cost advantages, stating that: "I recognized from a group of friends who work in the haulers' business, that they became richer and richer. So, I studied it. If I do it myself, it would not be too much effort. The key principle is that I have to know the real costs. How much the actual costs are. Beforehand, if suppliers asked for Baht 6000, I had to pay such an amount. They always have reasons for increasing the price such as that the fuel cost is expensive. However, when I have my own information, I can negotiate a fair price. If anyone is overpriced, I will try an alternative one. One might not accept it, but it does not matter. I told them that our vehicles use 100% Thai fuel and I can manage to do it. But you use just 20% of fuel from Thailand and 80% from Malaysia [cheaper but illegal] Why can't you do it? The fuel costs are quite different." (IP17)</i>
QTE5.3_19	<i>"Using our own vehicle is better; especially it can prevent goods from damages or loss... This company was established to export goods. In order to achieve such a goal, I need a transportation service as a link. Therefore, the road haulage sector and goods exporters are interdependent." (IP18)</i>
QTE5.3_20	<i>"The reason for running own-account vehicles is for affiliating the group to mitigate risk and reduce pressure from others. If this company all depends on others, it reduces bargaining power. The significant benefit is helping time management of urgent shipments." (IP16)</i>
QTE5.3_21	<i>"Medium production plants are located across the south, while V Company may have only 3 to 4 branches, which are not many but have a large production capacity. That company may possibly define an enormous capacity of each plant. For example, Surat Thani plant is about 20,000 tonnes/month (equal to 1000 TEUs), whereas our company in the area of Surat produces 3,000 tonnes a month. It is totally different. How can I negotiate in term of bargain prices?...Our production plant in that area is quite small compared with V Company which is several thousand tonnes, whereas our company is one thousand tons." (IP16)</i>

Quotation No.	Quotations from Interview Transcripts
QTE5.3_22	<p><i>"I absolutely would not sign a contract which has the condition of predetermined minimum volume; because the total exported volume in each production plant is not clear. Marketing has traded products before I know exactly the volume of rubber product I am going to export...I must first know how many units from Surat Thani factory are added into the total volume of Surat zone. It is difficult to specify. The rubber business depends on a seasonal harvest, which quick fluctuates. In the Surat region, either there are a number of raw materials in some months, or no products in some periods. Production factories may not reach their targets due to lack of raw materials in some periods. No one can guarantee the whole volume of each production plants..." (IP18)</i></p>
QTE5.3_23	<p><i>"I do not have the same concept as the V Company. For V, the plant distribution is not great, but each plant has a very large factories. While this company is not very big, about a quarter the size of his site, our plants are spread around the south area." (IP16)</i></p>
QTE5.3_24	<p><i>"I do not need to cooperate with several service providers. I use only a company providing 'one stop service' for both shipping and forwarding. But with the condition that they must serve us without any problem... I understand that transportation is sometimes a problem. Sometimes it's the ones with the real power who must manage such problems. Transport operators need to have enough volume to be used in the negotiation. What they want is large volume; therefore the company needs to have a huge volume to meet their needs. Our supplier has enough volume; therefore he can use the certain volume to negotiate for bargains of even hidden power. It is an undeniable fact that the line system in the body is important for the transport business in Thailand. If the total volume has been spread out, having small volume or no volume, with the problem that perhaps the operator is not interested in helping. They may reject an urgent shipment. Moreover, big firms will have the power to make amends, while some small transportation firms may not have the ability." (IP7)</i></p>
QTE5.3_25	<p><i>"Regarding manufacturing locations, our production plant at Surat Thani, for example, emphasises mainly domestic selling, not export. Hat-Yai factory is devoted to export. So I chose to use mainly product stock from the Hat-Yai plant at South zone for export. Products are placed in a container transport by truck via Sadao customs and then on board at Penang Port... Marketing objectives of the Southern zone (Hai-yai factory) will focus on export. That is because the cost of shipping is less than others as it is near Sadao customs...I choose not to aim for Phuket or Surat for export." (IP20)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.3_26	<p><i>An export manager commented: "...by using all our volume in collective bargaining. The volume is divided into two groups: group one is the volume of the south zone and group two is the volume of Bangkok zone. I use this volume to work with the carrier. Depending on zone, each one will be split into either to Laem Chabang or Bangkok, and go to Penang or Songkhla. I use the total volume in negotiations with the carrier to secure the same price; this is what I must do." (IP18)</i></p>
QTE5.3_27	<p><i>"Reliability comes first since I emphasise that the company must provide good quality. Quality means quality of products and transport services. Then I consider how to achieve that... because of the huge volume of our company compared with others in the rubber industry, I am able to have partnerships with the transport operators which provide best quality but lower prices. Because of the huge volume, our partnerships could complete with other transport operators that may not yet be sure of the quality. So they could be able to manage better in economy of scale. As a result, it would be win-win for both" (IP14)</i></p>
QTE5.3_28	<p><i>"In order to gain extended detention-free days [before returning full containers to the port], I have to fix the minimum volume with suppliers. I cannot control sold volume because it is under the marketing department and marketing cannot control our customers either. ... If there were only one production plant at Surat Thani without the other plants at Trang, Songkhla and Nakhon Si Thammarat, the appropriate overall volume could be identified. So the large amount could be used to negotiate...." (IP18)</i></p>
QTE5.3_29	<p><i>Talking about limited choices an interviewee said: "The factory is located in this zone. Though I reconsider new routes, there will not be any more alternatives. It has to be the route already used. There is a limitation." (IP4)</i></p>
QTE5.3_30	<p><i>"This company export approximately 100 TEUs per month which is not much compared with others in the same industry. The whole volume is given to a transport operator for negotiation and all volume is divided between 3 firms. Prices should not significantly differ. But the second option may result in better service... Our strategy is to maintain a current group of suppliers and the company also provides a much more moderate volume with each partnership. It is a matter of power; the company is also given good service... In order to retain good service, I evaluate our suppliers' performance monthly. I continue to use them but if their performance drops in the month, I will suspend or reduce... That reduces the volume down to let them know as a little signal that a problem has occurred. Then they need to fix it, if not it may be less. If an amendment makes it better, the volume will be gradually extended back." (IP9)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.3_31	<i>“The freight cost depends on the bargaining power of each person and I also have features to handle it. If I am satisfied with the freight rate but usually confronted with problem when using the service, I am not happy.” (IP16)</i>
QTE5.3_32	<i>“The main trade market is China and the company has a warehouse located in China... As the warehouse is in China, I do not need to worry about the delivery as the stock is available at the Chinese warehouse.” (IP18)</i>
QTE5.3_33	<i>“KPIs have been identified to reduce logistics costs by Baht 4,800,000 within a year. The target has been determined. They [management team] have launched the policy. Consequently, the logistics department has to plan and implement it. I have to sign forward contracts with haulers and try to use the capacity as much as possible.” (IP6)</i>
QTE5.3_34	<i>“The time it takes [to prepare for Natural rubber products] depends on the policy of keeping stock of each company. How to maintain the stock level is different for each company. Some companies do not prepare a stock set while some may produce products beforehand since there are obviously customers, or for selling in advance [forward contract]. Therefore there are stocks available for delivery quickly after receiving an order.” (IP16)</i>
QTE5.3_35	<i>“Some months I do not sell rubber. If I believe that the rubber price in the world market is in a climbing trend, I stock bulk of rubber and continue buy it, I do not sell.” (IP12)</i>
QTE5.3_36	<i>“Transportation management is important, but not very. For my business, the core is the natural rubber products. Business profits or losses depend on the product itself. So, however you manage the costs of transportation, it cannot save much. Moreover, the standard transport costs pass completely onto the customers. Our customers will be responsible for all of them... Delivering goods to my customers to their satisfaction is my objective. Moreover, it must not be over-priced. It has to be an average price which I can accept. It does not have to be the cheapest.” (IP3)</i>

Q.3 Quotations from interview transcripts for Section 5.4, customer characteristics

Quotation No.	Quotations from Interview Transcripts
QTE5.4_01	Regarding CIF and CFR term: <i>“...all transport-related activities are under our control. A shipping liner is selected by us. This means the shipping liner is considered with regard to both quality and price. What does the word ‘quality’ mean? It means a sufficient quantity of containers and sufficient space as well. In addition, the after-sales service has to reach our standard level such as an after-delivery service—checking from the accuracy and on-time of bill of lading documentations [documents presented for request payment].” (IP8)</i>
QTE5.4_02	In the other term, FOB: <i>“...some transport activities are beyond our control because shipping liners are nominated by customers. Thus, I lose the negotiation power as customers contact directly with shipping carriers. If I do not receive containers or receive low quality ones or even if I come across any mistake caused by shipping liners, I only have a duty to follow along what happening and solve problems. But sometimes the solution cannot address the problem. Therefore, I have to inform our clients to deal directly with shipping liners. If our action is postponed, its effect may become bigger.” (IP8)</i>
QTE5.4_03	<i>“As a basic principle of management, it would be easier to deal with CIF or CFR than FOB because everything is my responsibility. While with FOB, customers deal with shipping carriers and then the essential information of a designated vessel is forwarded to me in order to follow along. Sometimes, I am confronted with the difficulty of communication in different time zones, for European customers for example, an error on letter of credit or the unavailable for delivery in some period. Further, sometimes I must wait until nearly the last minute before buyers inform a shipping liner.” (IP1)</i>
QTE5.4_04	<i>“...Exception is on the particular period that the high risk of ocean freight fluctuations in Europeans. Freight rates to China vary just a small amount, ranging from \$100 to \$200— not much when divided per kilogram. In Europe, it is up to 500 dollars.” (IP6)</i>
QTE5.4_05	<i>“Bridgestone is a company with a good management system. If a shipment is due for delivery next month (September), shipping instructions will be given to me about mid-August. The essential details for an individual contract would have to ship with that shipping carrier and when is going to be shipped. Customers provide me with all necessary information in advance. It is quite convenient to work with.” (IP21)</i>

Quotation No.	Quotations from Interview Transcripts
QTE5.4_06	<i>“European customers rather like to nominate their own vessel. They usually select and directly contact liners themselves, so that they able to control freight rates. Other parts of China, Korea, or Pakistan would be characterized as a sale of CFR or CIF.” (IP10)</i>
QTE5.4_07	<i>“In practice, it turns out that the FOB condition is more detailed than you [the interviewer] think. For example, in the rubber industry, sellers are responsible for the cargo until it is on board a vessel. Formally, sellers must pay for transportation of goods until goods are actually on board the vessel. Rubber trading determines that THC (Terminal Handling Charges) must be a duty of buyers. If THC will not be paid, the goods cannot be picked up on board a vessel. This becomes an exception.” (IP8)</i>
QTE5.4_08	<i>“Time can be managed and planned in advance. Even though there may not be a written rule, in practice, a delivery schedule is at least 2 weeks from the date which the order placed in the case of a spot contract [prompt shipment]. Two weeks is considered to be sufficient time to manage the allocation of cargo from factory to port.” (IP16)</i>
QTE5.4_09	<i>“Rubber procurement is planned work. No one purchases for delivery within three days after the order is submitted. It cannot be like that. Most customers usually buy in advance for a month or half month. Why cannot I deal with it? Purchasing behaviour is always like this, thus I choose a mode which I am familiar with and trust in the transport operators. I usually manage like this [the concept mentioned above]. If there are no modifications, it is not necessary to change.” (IP3)</i>
QTE5.4_10	<i>“Our selling behaviour is that customers place an order this week so that they [Korean customers] want the shipment on board next week. Normally, 2-way return rail operated by J company takes around 10 days. If so, the cargo cannot be transported by rail for Korean case, thus concentrated latex packaged in drums is transported by one way truck for loading into a container at container yard [outside their factory].” (IP21)</i>
QTE5.4_11	<i>“Proportion usually spot contract rather than long term contract because most clients are a group of Chinese customers. China tends to be a spot contract while customers in the European or American Zones are likely to be long-term contracts because the style of contract preference is not the same.” (IP15)</i>

Quotation No.	Quotations from Interview Transcripts
QTE5.4_12	<p><i>“China, this company do not sell to China. If you are not big enough, there are a lot of problems resulting from the sale. The company is a medium size. Naturally, our main customer is not from China. To be honest, I don’t want to do business with Chinese. China is a country that does not trade straightforwardly with customers. Koreans or Japanese are quite honest. After the rubber is traded and the offer has been accepted then the action is bound by agreement.” (IP21)</i></p>
QTE5.4_13	<p><i>“Chinese requirements always change. Sometimes, forward contracts are not acceptable or do not meet the customers’ needs, so this company only does spot contracts.” and “Chinese characteristics are difficult to deal with. It’s not like the western style which was quite standardised. But Chinese vary in what they want at certain times. Today they may like this but one month later they may like another. As entrepreneurs, the company need to adapt to fit what customers want. Not to let them adapt to us.” (IP18)</i></p>
QTE5.4_14	<p><i>“Chinese customers or Middle Eastern clients are quite serious on the issue of rubber price volatility. Most rubber exporters face a similar problem. European customers seem to honour contracts no matter whether the rubber prices situation rises or falls.” (IP20)</i></p>
QTE5.4_15	<p><i>“Our main customer is Korea which has a nationalism similar to Japan. So, the main ships which Koreans use are mainly vessels of Korean origin. There are varieties of Korean liners in service in Thailand therefore; almost Korean orders don’t need to change anything.” (IP21)</i></p>
QTE5.4_16	<p><i>“Chinese is the most difficult to deal with while Japanese or Koreans respect the contract. China is a big country and a mixture of people. People just want to look for opportunities. There are a lot of new companies starting, and some firms owned by adolescents. They work like they are gambling so I cannot trust them.” (IP3)</i></p>
QTE5.4_17	<p><i>“It seems to me that whatever customers want, I must support it all. However, it should be possible and reasonable to do that. Otherwise, customers may ask for impossible things, which is not the right concept. I am responsible for supporting my company and my duty is mainly as an operator behind the scenes. If I see any strange contracts, I have a duty to indicate the red signal for warning. That now this order is weird and please carefully monitor.” (IP18)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.4_18	<p><i>"I was confronted with whatever problems result in being unable to send the products to customer 'A'. Basically, I need to check with Customer 'A' if the shipment delay is any issue. If Customer 'A' says that the impact of a delay in the shipment is that the production line is going to discontinue, as sellers I may possibly switch to the product stocked for customer 'B'. I have to clear with customer 'B' that they are not in a hurry. In other words, I request permission to delay shipment with customer 'B' instead of customer 'A'. It is about solving the problem under the current situation that evolves with either low or high risk factors. What option is seen to be satisfactory and the most perfect with everything?" (IP16)</i></p>
QTE5.4_19	<p><i>"Overall, in the natural rubber business sector, our company is ranked number one at the moment. This is because I do not focus on the end user market but also focus on the trading market as well." (IP18)</i></p>
QTE5.4_20	<p><i>"It is broadly understood within the rubber industry that falling rubber prices period and delay in delivery always lead to some difficulty for selling to traders but not too much trouble for a big 5 tyre company. In other words, they are acceptable for a few days' delay. Nonetheless if they are in short supply and the shipment is delayed, they may complain because of the inadequacy of raw material. Almost all big companies procure raw materials from a number of suppliers so it is not too difficult to cope with. Sometimes, a supplier delays shipment and then the customer requests express delivery. The issue can be managed by them, so it's rarely become a problem." (IP14)</i></p>
QTE5.4_21	<p><i>"Assume a metal hook has fallen and contaminated the rubber bulk, thereby it cause damage. I have heard that our products are not loaded into the machine for a bale/time may be pouring loads (a bulk of rubber bale/times). And then, a big blade cuts small pieces from a big chunk of rubber. The blade itself is very expensive, if there is just a piece of steel fall into cutting facilities. Customers claims for damaged blades cost millions." (IP12)</i></p>
QTE5.4_22	<p><i>"It is understood that it can be plus or minus 1-2 weeks... If he does not lack rubber, I can typically arrange a modification to a convenient week which can cause a delay up to two weeks." (IP14)</i></p>
QTE5.4_23	<p><i>"There are a number of players in the rubber industry. For example, traders who have already ordered in anticipation of the rubber price going up. If at that moment their warehouse space is nearly full, a long transit time will be preferred. In contrast, in the case of traders who have already sold to another and shorted customer supply, a short transit time is preferred. Nothing is certain." (IP16) and</i></p> <p><i>"If buyers think that the price has fluctuated slightly and have more chance to grow up, they can wait. They are traders who buy it for resale. If they are still waiting for resale at the higher price to make profit from what they have bought, I can delay shipment." (IP16)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.4_24	<p><i>“If I delay shipment, customers will feel dissatisfied. In particular in the case of rubber, if the delay occurs on the period of a price downtrend. Our customer is usually confronted with the issue of reselling to others. In other words, the current value of rubber is decreasing and it is difficult to resell and still get the profit; therefore, if I delay shipment in a falling price period, I will have a big problem with customers such as asking for reduced price or defaulting on that contract.” (IP21)</i></p>
QTE5.4_25	<p><i>“Some companies do not deliver to customers but transport for stocking at their warehouse at China. Little delays do not matter because they are buyers themselves. Such companies may take a risk in something occasioning a delay. One of the warehouses is located adjacent to the main customer area in China, so that they deliver the rubber in advance. This strategy allows them to take risks on delayed shipment.” (IP7)</i></p>
QTE5.4_26	<p><i>“In practice, there are many factors influencing the transport mode I choose especially customers. My question is who the main customer for concentrated latex is. Is it a Chinese customer? Most Chinese take quite long time until I receive the letter of credit. It is a risk to send the goods before receiving the document. The use of inland water at Surat port takes at least two weeks from preparation for shipment to ready to departure. This is because it takes time to survey, receive, and track the empty container and move the loaded container back. In addition, schedule of feeder is not daily route (around 2-3 times/week). A schedule needs to be matched, when the container arrive and spend two days from BKK to Surat and then move to factory for filling of a container, then, wait for matching schedule to send it back.” (IP16)</i></p>
QTE5.4_27	<p><i>“For the large volume shipment or new customers, I manage to prevent any error by using other transport operators who may be more expensive, around Baht 300 to 500. I choose the one which is higher cost but I feel more comfortable in using because of the efficiency of transport operators.” (IP15)</i></p>
QTE5.4_28	<p><i>“The price is agreed upon a standards range which is not necessarily the cheapest. On some occasion, happiness is a trade-off at a Baht 500 higher cost. For new customer, I tend to choose a transport operator which makes me feel happy. In the case of new customers, the first shipment cannot miss and I have to keep my word thus I select another option to work with. For normal shipments (which can be delayed up to 2 weeks), I may choose a small transport operator to work with because I can help them; however, these companies are not necessarily the cheapest.” (IP3)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.4_29	<p><i>"I export rubber for a long period of time [work experience more than 30 years]. Sometimes, mode selection is not necessary to consider anymore. I know my customer so well that I know each existing customer will want their goods exported to what city. If CIF contracts, I will use the same shipping liner they are used to. Delivery to existing customers using the same shipping liners as I commonly used is convenient for our customer. So, customers can request more free time for late returned containers. If I frequently change carriers, it is difficult in commutation and negotiation for our customers. Therefore, I would not change the shipping carriers, if it isn't necessary." (IP21)</i></p>
QTE5.4_30	<p><i>"For example, some customers are serious about the loading process which has to be CY term (Container Yard: loading of a container takes place at shipper's factory), no matter where goods are collected from. Containers have to be dragged to shipper's location so that the goods are loaded into a container at the factory. It is a condition that I have received." (IP15)</i></p>
QTE5.4_31	<p><i>"The customers need the goods loaded into a container at the factory. This is the way to prevent a strange thing contaminating pieces of rubber. In contrast, the rubber is loaded and sealed a container at the port—perhaps workers carry rubber bales the same way with carrying sacks of rice. That means workers stand next to a truck and laid a large rubber bale on the shoulders. Then walk to accumulate into containers. But sometimes they cannot bear a rubber bale, they dropped it on the floor, maybe it contains stones. Perhaps unexpected bumps impact rubber contamination. Bridgestone is very strict on such problem and gravel is regarded as foreign matter in rubber bales. If products reach the destination and they took them into grinder then there is the rock in it. It is a big problem." (IP21)</i></p>
QTE5.4_32	<p><i>"...the use of rail or not depends on how much serious is the product quality required by the particular customers. A simple example would be clear that if the cost between 2-way return rails is similar to the expense on one way trailer or truck for tracking the goods from factory to filling into containers at port. I may track the empty container by rail so that the cargo is loaded into containers at our factory to avoid the contamination of products. This case has to be carefully managed for a long transit time so that security of the cargo is maintained. Otherwise, I aim for cost saving by the goods is delivered by truck to load into a container and then seal at port of shipment." (IP16)</i></p>
QTE5.4_33	<p><i>"I must know who our customer is and if they have a determined place of origin. First of all, customer requirements must be considered. Assuming the customer not define anything, I am more flexible to manage. So, factory located in south is the first choice which the goods are collected from, otherwise a defined source by customers." (IP20)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.4_34	<i>"It is quite surprising for rubber goods that the short transit time is not always the correct answer because of the diversity of customers. The nature of rubber is that it is a commodity, the price of which can go up or down all the time. In periods of price volatility, the issue of transit time reliability may be an issue in the debate over whether or not a customer will refuse the product. In such situations, the committed delivery date is very important. Why is it important? Before the company delivers the goods, the delivery window reviews whether the delivery date is acceptable or not acceptable. If it confirms, a short or long transit time is not an issue." (IP16)</i>
QTE5.4_35	<i>"If a plan is good enough, I may go a route that is quite slow but cheaper. However, I have to manage carefully by delivering goods earlier to make sure that they would arrive on time" (IP20)</i>
QTE5.4_36	<i>"Some routes, even I have to take quite a long time, are no problem at all. I can plan in advance. It is based on the technique of each company. In order to prepare for transport operation, I manage to book spaces and containers in advance without identifying exactly which empty containers belong to which orders. So that containers are prepared for ready use, this technique helps in reducing lead time" (IP16)</i>
QTE5.4_37	<i>"Customer request to make the delivery date earlier. Customers said the shipment needed to be shipped a week before the delivery date. If a customer begs, I need to send the cargo right away. I cannot wait to negotiate for increasing Baht 10,000 per TEU by using the excuse that I must use a trailer for delivery. I will not do like that to increase price, others may do." (IP15)</i>

Q.4 Quotations from interview transcripts for Section 5.5, transport decision-making in the natural rubber industry

Quotation No.	Quotations from Interview Transcripts
QTE5.5_01	<p><i>"I have more choices in each route because of gaining more experience. I gain more knowledge that this company could do it this way. Later on, I have more alternatives. If I have a problem in the first choice, then I can change it immediately to another. At the beginning, I am inexperienced. If I cannot use transport via the first choice, everything becomes deadlocked. After that, I know more from studies. For example, I can load rubber into a container at BKK port by transporting only goods to there or just bringing empty containers to our production plant for loading into a container here."</i> (IP3)</p>
QTE5.5_02	<p><i>"After I have worked with transport providers for a long time, we will be compatible. I just give a quick call to inform them what I want without too many details. For example, I just give the number of containers, like 10 or 5 units. I know the way they usually work, such as supplier A likes to work early, while supplier B prefers to work near to the deadline. They are already experienced at the job, so they know the details of the work and when they should take action on each step; let's say when the B/L documents must be sent to us. If you change it, you have to restart the working process with them. You have to learn how to work with new suppliers for some period of time until I can co-operate well. So, now I use 2-3 main suppliers alternatively because these prices are similar."</i> (IP9)</p>
QTE5.5_03	<p><i>"I have to consider what the problem is. If it is a solvable problem, I will continue using it. However, the one I gave up to use the service is Asia logistics. Their containers were not of good quality. Whenever they delivered them to us, I ended up having to repair them. I warned them several times, but the results were the same. I don't like to change suppliers because it takes time to establish relationships. Once I alter it, I have to modify the way to do business to match the new one. This is because it is about the service; so, knowing each other is important. I need to know the way they work, and their pattern. I have to reorganize it by getting to know them for some period of time."</i> (IP5)</p>
QTE5.5_04	<p><i>"For example, at the date it was planned for us to receive five containers, but they could only provide us with just three containers and the other two on another day. It makes our costs higher because the company has to pay twice for loading labour. If five containers are loaded within a day, I will pay for a day's labour. However, if hauliers send us three containers and then another two, I have to pay for two days. At this point, if they [hauliers] are not thoughtful enough, they will not understand it. If I make a schedule for five TEU, they have to deliver all of them and then the contract will be accomplished. If they provide us with two lots of three and two units, an additional cost will be incurred. I have to be responsible for it. What I can do is to inform them. However, if it happens again and again, I will reduce the volume of their service or change to other hauliers."</i> (IP3)</p>

Quotation No.	Quotations from Interview Transcripts
QTE5.5_05	<p><i>“Overall, there are the issues of their performance or management systems. I have to co-operate in dealing with it until it reaches the limit of our ability. For example, I discussed it several times but the problem still exists. So, how could I deal with it and wonder whether I should continue to use such a service?” (IP16)</i></p>
QTE5.5_06	<p><i>“...I think the problem is common for everyone who does business. So, I focus on the approach to deal with the problem. If you [suppliers] turn the mobile off, or do not answer the call in order to escape from the problem, it is common in business. It is possible for this to happen, even when you do not have the solution yet....The important thing is how you deal with it, finally. You can ignore it for one or two days but what next? If you are irresponsible in it, do I have confidence in doing business with you or not?” (IP16)</i></p>
QTE5.5_07	<p><i>“... I need to believe that the problem was caused by something and then the choice of coping is derived from the behaviour or attitude of the management style of how you handle it. If SP Ltd. told us that the reason for stopping the service is because of the manager’s command that is impossible. It must be at the top manager level or the owner. If you decide to do it like that, thus I will stop working with you... Generally, I want to use this mode but I don’t have the bravery to have the same behaviour. I did not dare do the same as I have already been wounded. It may happen again like it used to, or not.” (IP16)</i></p>
QTE5.5_08	<p><i>“The main reason I stopped the service with SP Ltd. was that I had to support them more. One day during a period of price volatility, the oil price rose and I already stocked 30 units of containers at our factory. SP Ltd. said that prices had increased that would have an immediate effect, despite the committed agreement I had. You do business like this and nobody will allow the price to increase. It does not matter, suppliers can take action by the stopping service immediately—so the ship did not run. This [shipment delay] is your problem; they do not care. This is not how to do your business, this attitude is unacceptable... but then I remember that this policy is seen as coming from the management team, it means that you choose to do business this way.” (IP16)</i></p>
QTE5.5_09	<p><i>“The biggest problem I have ever faced is that a flexi bag was broken. All our goods were damaged and the company lost more than a million Baht. I am disappointed about it. However, Jitt-Namchok Ltd. had responsibility for it.” (IP21)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.5_10	<p><i>“The main [issue in transport] is the congestion at customs clearance because many containers are stacked there. It is usually as a result of a broken handling crane. It occurs at least once a year. There has been an improvement recently; however, delays are quite common at the customs. I experienced this myself. It is difficult to access the collect and return points because long queues of trailers are waiting to collect empty containers... However, I chose to use it, as it was the most efficient alternative for us and it was the nearest. As a result, it was the cheapest. If the first choice malfunctioned, I would use trailers [from Thai border to Penang port] as an alternative choice.” (IP20)</i></p>
QTE5.5_11	<p><i>“Songkhla port is more controllable than Penang. For example, sometimes I cannot control container deliveries from KTM Ltd. I have to speculate whether it will have arrived. After I return the fully loaded containers, I have to wait to see whether there is a problem. For instance, sometimes there was congestion or the crane was broken, so, it could not lift the heavy containers into the rail wagons. Everything I had done, including increasing the production rate, meant nothing. So, I choose a port where I can have more control of it.” (IP16)</i></p>
QTE5.5_12	<p><i>“However, the owner will have a guideline that the suppliers would be classified as people who have worked with him for a long time. It is ‘I have to keep him’; it is not that the company grow and then the company stepped on him. It is necessary for us to retain a good relationship with our commercial partner. It is not that we grow, then we forget our partner who used to support us at the beginning... If we do not have them, our products cannot be delivered. According to our working performance, we need to describe to a supplier so they understand that they should grow as we grow. But if you do not, you will receive a reduced volume, compared with the amount you used to be given before... However, we will still cooperate with the supplier so that the export volume may be reduced because some volumes need to be divided by another alternative instead.” (IP18)</i></p>
QTE5.5_13	<p><i>“There are two or three suppliers that I use. They were introduced by connection. Moreover, they all offer a similar price and standard. For example, supplier one offered 7,500 Baht per TEU and supplier two offered 7,500 Baht as well. Sometimes, they ask for volume. They have just a small profit margin. On some occasions, my Dad’s friends ask for help by using their services. I can do nothing except to accept it if it is not over-priced. I have known many businessmen and some of them have a transport business. Sometimes, they need help and ask for it from my Dad. So, my Dad directs me to provide some work for them. It is good if they offer the same price as I currently use. However, I will not withdraw all of the work from my current suppliers. I will just rearrange it.” (IP3)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.5_14	<i>"It is a small company with which I have good relationship. If there are 3 TEUs per shipment, I will decide to use their service. This is because it was not far from my location and they were easy to get in touch with. I told him that I would let him deliver these three TEU, so I didn't miss it." (IP3)</i>
QTE5.5_15	<i>"Better control over delivery and lower cost is the main objective in the management of outbound transport." (IP14, the mean sales volume is 4,000 TEU/month)</i>
QTE5.5_16	<i>"Logistics focused on three points: 1. being on time, 2. cost, and 3. finding a way to cut expenses or seek new transport alternatives" (IP20, the mean sales volume is 1,000 TEU/month)</i>
QTE5.5_17	<i>"Products are going to be delivered on time at a cost that I consider acceptable." (IP16, the mean sales volume is 3,000-3,500 TEU/month)</i>
QTE5.5_18	<i>"To meet customers' needs in terms of delivering quality products consistently and on time." (IP11, the mean sales volume is 100-150 TEU/month)</i>
QTE5.5_19	<i>"To construct maximum satisfaction to customers in terms of quality, delivery, customer convenience, clarity of the information and shipping documents and to try to solve problems for customers if there are any errors in delivery time." (IP1, the mean sales volume is 50-100 TEU/month) "Product safety because I want products to be delivered to our customers efficiently and with punctuality." (IP9, the mean sales volume is 80-100 TEU/month)</i>
QTE5.5_20	<i>"On time delivery and no damage to the product itself." (IP2, the mean sales volume is 55 TEU/month)</i>
QTE5.5_21	<i>"The main goal is to deliver products according to customer requirements. First, it is the satisfaction of our customers. The second is market expansion. I need to send quality products to increase customer satisfaction so that helps to expand our market. Then, customers may also order more and more with us so our market share will increase automatically." (IP21, the mean sales volume is 30-50 TEU/month)</i>
QTE5.5_22	<i>"The aim is delivery according to a planned schedule, without damage. I don't consider the cost but make sure that goods will be delivered to our customers with no problems, that is my criteria of transport performance. What I want is to make sure our goods are on board the ship in time, without having any damage. Just this will make me satisfied. As for the price, it can be negotiated as the standard." (IP3, the mean sales volume is 40-50 TEU/month)</i>
QTE5.5_23	<i>"It is the issue of a fussy job in many details, the routine tasks, and problem-solving tasks. I must know factories' locations, Thailand's ports and alternative routes to access the ports. The best option can be changing all the time, depending on the situation. However, I mostly use the currently used route in the normal situation... I believe that they are the most convenient and cheapest. So, the decision is not difficult in the normal situation." (IP20)</i>

Quotation No.	Quotations from Interview Transcripts
QTE5.5_24	<p><i>My business is rubber; so, profits or losses are mainly the result of rubber prices. The delivery method is just a service which can operate without any profit. If my customers want me to deliver to Wuzhou port, I don't mind if what I charge is equal to what I have to pay. However, if they change their minds and want to go to the port of Shanghai instead, I will be happy because I can make some profit. I cannot make profits from the delivery service from customers because it is too little when compared to the rubber product's value...Some other companies charge more if customers change the ports to be delivered to, but it's not for me." (IP15, a marketing manager)</i></p>
QTE5.5_25	<p><i>"I focus much on logistics costs, otherwise I cannot achieve the goals that I have already set. This is because the cost of our transport, both domestic and international, is almost 100 million Baht yearly. So, if the company can save just 10% of our transport costs, the company can save around 10 million a year." (IP20, logistic manager)</i></p>
QTE5.5_26	<p><i>"Cost of transport is the main cost of rubber business operations. So, if the company can save this cost more, it will then make us gain a more competitive advantage than our competitors. Now, every company has the same performance—raw materials are bought at the same price and have similar operational costs. So, to be better than others, the company can just do a few things, such as provide a good service, improve customer relationships and consider cost reductions. It may be transport costs or other expenses reductions that lead us to have advantages over our rivals. So, the company may be able to sell our products at slightly cheaper prices." (IP14, executive director)</i></p>
QTE5.5_27	<p><i>"Prices tend to go up and down all the time. Moreover, there is a fund charged on rubber exports known as the cess rate that needs to be paid frequently. The cess rate will be directly proportional to the price of rubber. Administration may have a significant impact on the product cost. The tax charges are revised every 15 days—divided on 1-15 and 16-30 every month. If prices have changed during this period, I have to manage carefully when products are delivered i.e. whether this occurs early or late in the month. The most appropriate action depends upon the predictions of the cess rate." (IP20)</i></p>

Q.5 Quotations from interview transcripts for Section 5.6, operational factors

Quotation No.	Quotations from Interview Transcripts
QTE5.6_01	<p><i>“There are several zones in the south: the upper south or the lower south. I have to consider the options that can be accessed. Our purchasing team and I have a duty to find possible solutions whether it is inland waterways, railways or roads. When it finished, I have to summarise the cost for the whole loop of transport in a one page table. ...For example, if the location is Trang, there are 3-4 factories there. I have to find where the nearest port or customs border is. In this area it is Kantrang port. So, I have to research who are the best suppliers in the port. Then, I can choose among them.” (IP18)</i></p>
QTE5.6_02	<p><i>“...Feeder vessel transport is ok; considered as good. Water transport is probably now used to transport the highest percentage of goods for our firm. Meanwhile, our plant’s located in the Surat zone and I believe that transport via the coastal sea port is more convenient for us” (IP14)</i></p>
QTE5.6_03	<p><i>“At Hat-Yai factory, the company focus on exports...This is because of its location near a custom border [the Padang Besar customs border] for the crossing to Penang. ...Moreover, the distance out of the way from Hat-Yai [the shipper’s location] to the customs border is a little more than a few kilometres.” (IP20)</i></p>
QTE5.6_04	<p><i>“The route that is close to our location is by rail because Trang station is there. I already surveyed it; however Trang station is located in the city centre. So, when the train arrives, it is usually in the early morning. This is a busy time as there is a fresh food local market at the time. As a result, road hauliers take a long time to gain access in order to collect the empty containers to bring them back to the factory for filling. When I tried it, I had to wait until the fresh food market was less busy. Although it is not far from our factory, I decided to not use it.” (IP8)</i></p>
QTE5.6_05	<p><i>“Small local companies are easy to contact. I just call them, and then they can come immediately to sit and talk out a problem with us, whereas at the Hat-Yai location I need to communicate by means of the phone or by e-mail. Emotionally, this doesn’t feel as good as talking at the coffee shop. It is a small company with which I have good relationship. If there are 3 TEUs per shipment, I will decide to use their service. This is because it was not far from my location and they were easy to get in touch with. I told him that I would let him deliver these three TEU, so I didn’t miss it. ...But for customers who purchase 10 units/shipment. A small firm may take up to 3 days to finish the process, so I need a larger company to complete larger shipments.” (IP3)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.6_06	<p><i>"I just consider those options for delivery that mostly match with booked delivery slots based on customers' requirements. Then, I manage it the best. First, I try to choose feeder vessels or the railway but if they are not suitable to the schedule, I will select trailers instead. I try to use one that is the cheapest and meets the schedule. If it does not, I will choose another alternative. ... For example, roads can be used when it is close to the time schedule deadline; I can arrange it today and tomorrow it departs." (IP14)</i></p>
QTE5.6_07	<p><i>"There is the rail route from Thung Song to Penang. I used to use it five years ago, but it did not work for me. There was an experience when a big customer, Von-Bundit, delayed the delivery. This company is a small company and deliver just 4-5 TEUs per shipment, but the rail capacity is 40 TEUs. As a result, I had to delay as well. Von-Bundit is big enough to negotiate with the railways.... Finally, I decided not to use it. Instead, I use trailers from Thung Song to Padang Besar and then transfer to the railway for the rest of the journey [from Padang Besar to Penang Port]. (IP5)</i></p>
QTE5.6_08	<p><i>"...delays are quite common at the customs. I experienced this myself. It is difficult to access the collect and return points because long queues of trailers are waiting to collect empty containers... However, I chose to use it, as it was the most efficient alternative for us and it was the nearest. As a result, it was the cheapest. If the first choice malfunctioned, I would use trailers [from Thai border to Penang port] as an alternative choice." (IP20)</i></p>
QTE5.6_09	<p><i>"Actually, the most important thing, that is rarely mentioned, is safety. It is the requirement that any route has to meet. I usually choose not to talk about it because I am already aware of it. Next, I need a quick service to deliver the goods, and then to consider the cost of it. There are at least two basic criteria: safety and speed. If these two criteria are not met, even it is cheap I will not consider using it. ...For example, in the past I used to use Laem-Chabang and BKK port, but now I have stopped this service because of the need for long distance road use which is very dangerous and expensive." (IP7)</i></p>
QTE5.6_10	<p><i>"I thought of increasing our usage of Port Klang; however, when considering the entire process, this route needs to transport the goods by trailer for quite a long journey to access to the port and that leads to a high risk of theft because of the high value of our cargoes. So, I decided not to change." (IP20)</i></p>
QTE5.6_11	<p><i>"...I don't want to take any risks in the process of loading the containers twice. There is a risk of damaging the goods [concentrated latex], when the containers are loaded, moved or repositioned in the ship, or unloaded from the ship. They are exposed to a higher risk of damage." (IP3)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.6_12	<i>"If they are block rubber, using lorries to carry the goods for loading into a container at a container freight station is acceptable. However, if they are flexi-bags of concentrated latex, I think it rather dangerous. When latex is carried in short containers of 20 tons, it is unbalanced. If the drivers are not careful enough, containers can turn over. In my opinion, using road hauliers cannot compete with using the railway. So, the railway is best when the goods are packaged in flexi-bags." (IP15)</i>
QTE5.6_13	<i>"Generally, if goods are loaded into a container at the factory, the level of loss is not high. This is because I can manage to reduce that risk. In terms of losses, they occur quite often, especially when rubber prices are high. It happens both within the country and between countries. ...For example, there was a case happened with Bridgestone. He exported via the Sadao border to Penang port by trailer. They only realized the theft when the container arrived at Penang port." (IP16)</i>
QTE5.6_14	<i>"I get them to adhere to our conditions. It is necessary to take photos of the arrival of the trailers, of the plastic covers, the front of the trailers, the trailer's registration number, its driver and when the cover is opened. This company has a process to follow. After uncovering the trailer, there is the process of unloading the rubber from the trailer and into a container. They have to take photos of the empty containers, the top, the floor and both doors inside. Moreover, they have to take photos of the sky and the ground to demonstrate the weather conditions. Everything is monitored during loading: when the first forklift carries the rubber inside, a photo must be taken ... then after closing one of the container's doors and when both doors are closed. They have to send the report to us every day with the details of loading at the port." (IP18)</i>
QTE5.6_15	<i>"It cannot be prevented 100% because of climate. I cannot clearly see all of the goods just from a photo, so if our customers complain or make a claim, it is your duty to answer it because you work for us. If you cannot answer any question, you will be claimed against, not us." (IP18)</i>
QTE5.6_16	<i>"Transit time is already known. If it is loaded [into a container] at the port, it will spend no more than two days in transit, if it is taken by rail for loading into containers at the shipper's factory, it will spend ten to twelve days in transit. I already know the total transit time from the origin [at our factory] to the destination ports. It does not affect the quality of the goods." (IP21)</i>
QTE5.6_17	<i>"Clients who have already purchased have the right to cancel the contract with us if I cannot deliver it on time. So, I am really concerned with the accuracy of the delivery date which is settled with customers. If I agree to deliver by the 15th of this month and it appears that the rubber prices are going down. If I do not do as agreed, customers may have an excuse to cancel your contract. This may damage the company, so the punctuality of the delivery is quite important." (IP20)</i>

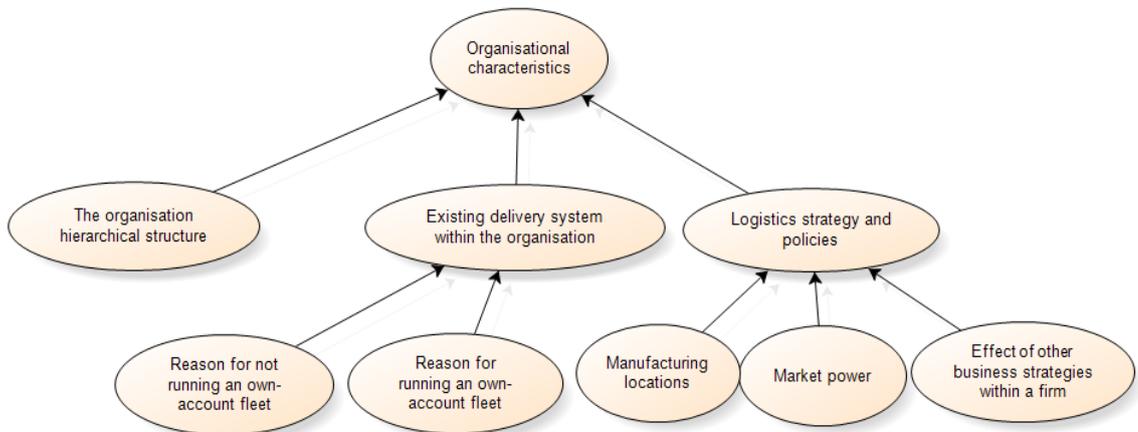
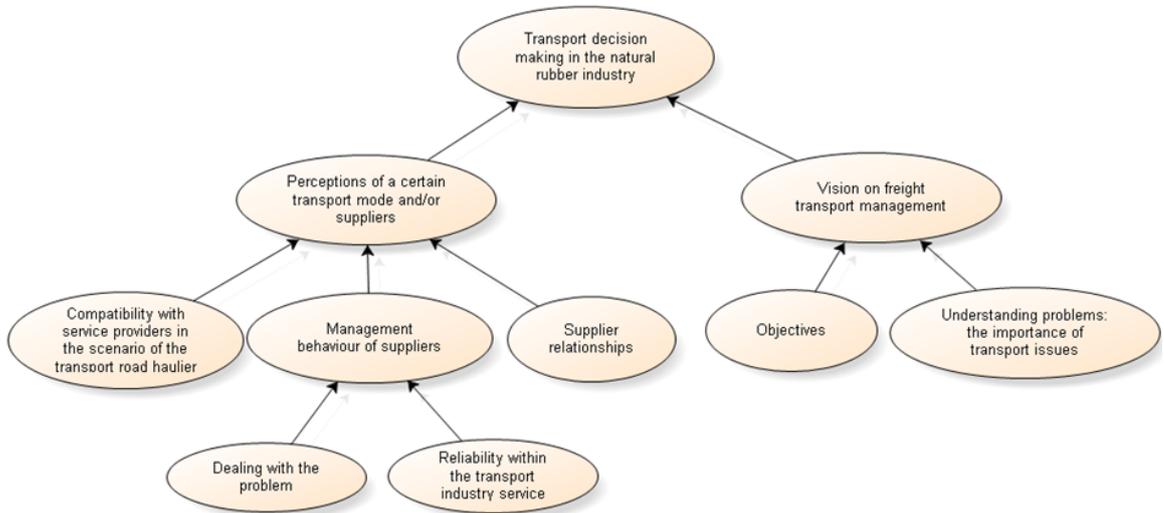
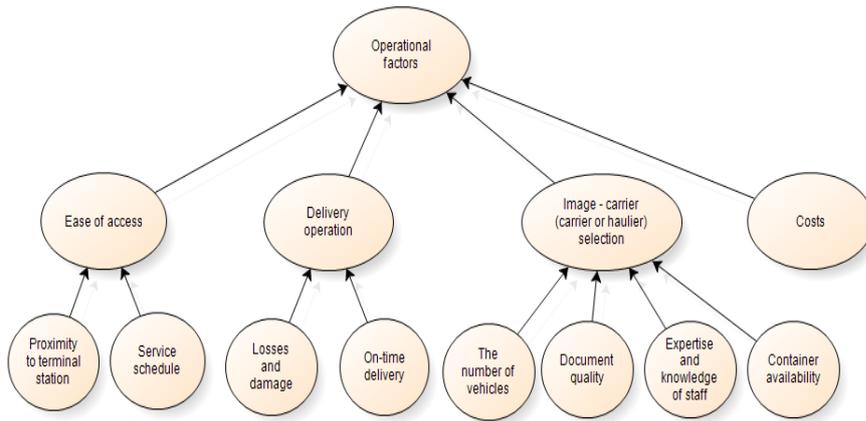
Quotation No.	Quotations from Interview Transcripts
QTE5.6_18	<p><i>"I focus on international trading. The credibility of our company (including that of Thai exporters) is important. Order fulfilment is important because if there is a problem with transportation (e.g. a delay in delivery), the company will lose credibility. Our company is the middle of the rubber supply chain. So, if the company delays delivery, it will affect other companies' production plans. Nowadays, many companies such as Toyota need to reduce costs, I already know that they adopt a Just-in-Time philosophy. The capacity of their tyre manufacturing averages thousands a day, but they have to stop the production line if the company cannot deliver the raw materials in time."</i> (IP16)</p>
QTE5.6_19	<p><i>"If I delay shipment, customers must feel dissatisfied. In particular rubber, if the delay occurs on the period of price downtrend. Our customer is usually confronted with the issue of reselling to others. ...If I delay shipment in the falling price period, I will have a big problem with customers such as asking for reduced price or defaulting on that contract."</i> (IP2)</p>
QTE5.6_20	<p><i>"It has to be consistent with our company receiving payment. I think that, however, 'on-time delivery' has an impact on getting paid. Finally, it is about the payment, that the company is paid on time. ...In the case that I miss the ship (I miss one contract, to deliver in the next timetable), it means our delay will postpone the payment for at least a week. I have to consider to overall picture before I make a decision whether to use that route or not."</i> (IP18)</p>
QTE5.6_21	<p><i>"When drivers come to collect our goods, I request that they are punctual because this is linked to a factory plan for loading it [by our manual labour]. For example, I have an appointment at noon. They are allowed to be a little bit late; I understand that there may be traffic jams. However, the total delay cannot be more than one hour."</i> (IP4)</p>
QTE5.6_22	<p><i>"I think that everyone who uses railways has to compromise on punctuality. There is not a delay on all shipments but it is quite frequent. I haven't had a good experience with them, so, I decided that it not worth using them. It wastes time having to wait for passenger trains to pass first. It is not consistent with our policy. I am unable to produce goods in advance to compensate for the time delay. Using railways may save us some costs but I am not sure that our goods will be delivered on time."</i> (IP16)</p>
QTE5.6_23	<p><i>"I develop an image of my suppliers by considering whether or not they provide a good service. This includes their previous service record: how many errors occurred in their jobs with us? It is also their reliability; if they do not have a bad record for breaking contracts. On the issue of responsibility, some suppliers, when faced with a problem, then abandon the task. I think the after-sales service also has to be good. Overall, it must be at a satisfactory level."</i> (IP20)</p>

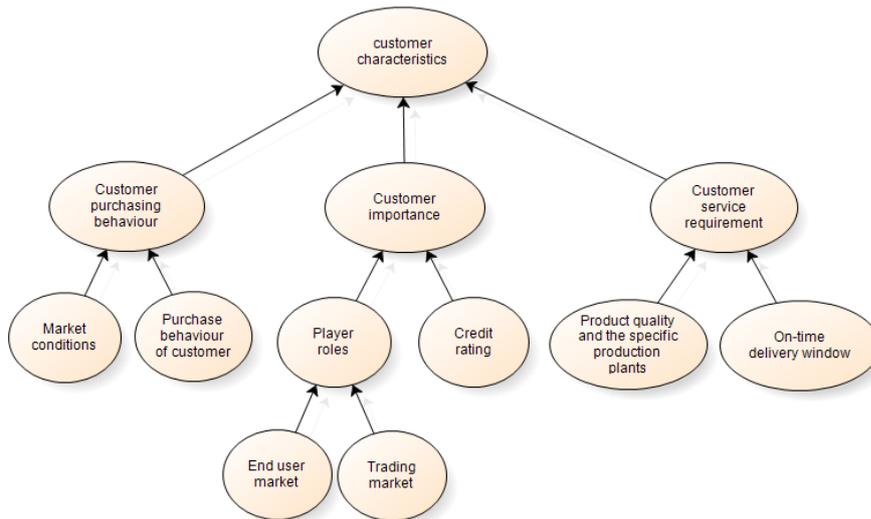
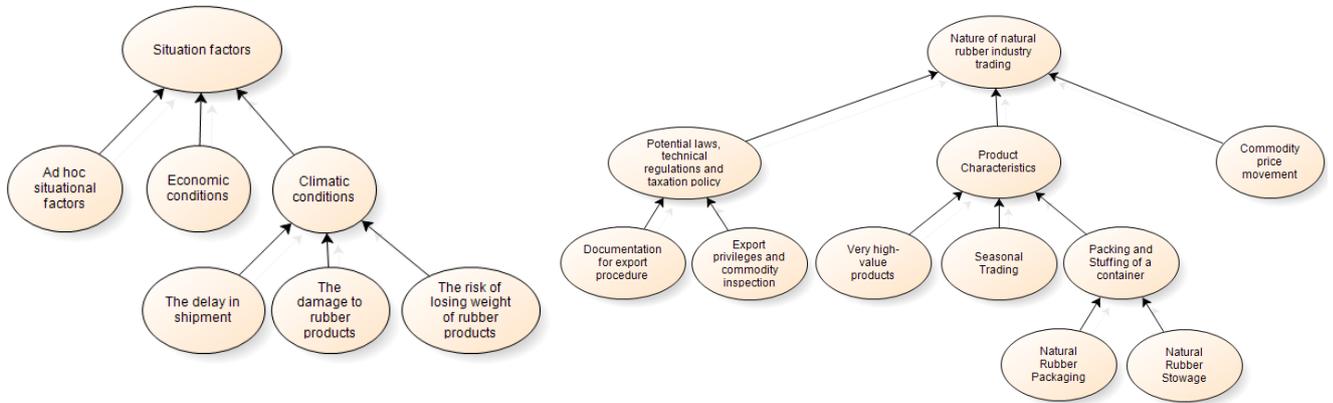
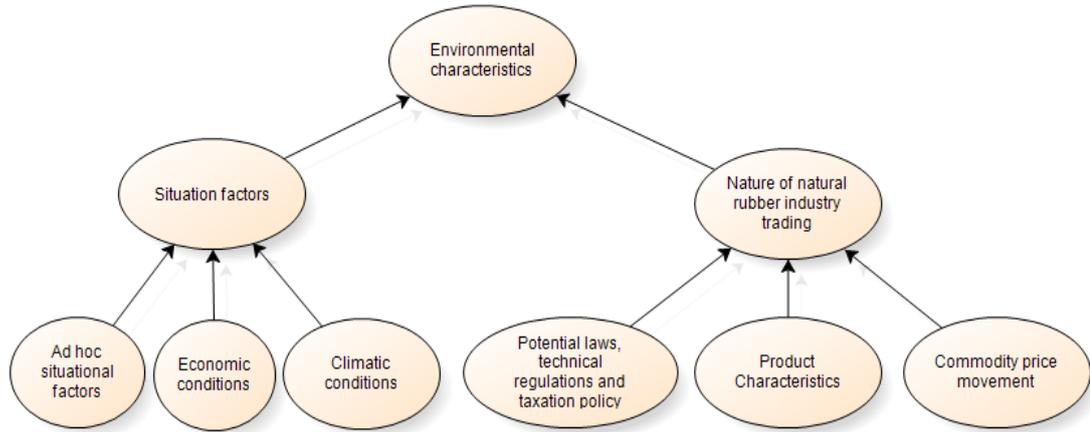
Quotation No.	Quotations from Interview Transcripts
QTE5.6_24	<p><i>"I think the topic of image, especially in Thai freight transport, is difficult to measure because there are no big brands like there are with worldwide shipping companies, which have historical data that can be checked. It is about their previous history; so, they must do business with us for some period of time. It may be their financial history: whether they have big debts and whether they have been operating the business for a long time. ...If they are new to us, image issues do not affect our decision. The new comer has no image." (IP1)</i></p>
QTE5.6_25	<p><i>"There is a difference between big and small road hauliers. A small haulier may have three trailers but I have to delivery five TEU a day. So, they need to hire another two units and this is complex. On the other hand, big companies may have up to twenty trailers; so they can promise to deliver big loads every day." (IP10)</i></p>
QTE5.6_26	<p><i>"Small companies may have only five vehicles that can work for us and at only three vehicles per job. So I let them take charge of a small shipment and the price is standard for them. But for customers who purchase ten units/shipment. A small firm may take up to three days to finish the process, so I need a larger company to complete larger shipments." (IP3)</i></p>
QTE5.6_27	<p><i>"...Honestly, the accuracy and timeframe of bill of lading documents are evaluated as the basis for supplier selection. How do I consider the aftersales service? There is a group of staff in our department who are responsible for tracing a bill of lading or a truck receipt or airway receipt after loading the goods on board. Such documents have to be used in the future. ...One of the KPIs is that no more than three days after the goods are on board, all shipping documents must be complete..." (IP5)</i></p>
QTE5.6_28	<p><i>"There is the issue of the shipping liner's support. For example, in the Port of Kantang, this was widespread before container shipping was established. When it changed to a container system, Kantang [inland port] had to stop providing a service because no shipping liners sent empty containers to be stocked at the port. The port suspended service for a period of time, so exporters in the Trang area had to use trailers for export via the Padang Besar border instead, until Penang Port cooperated with the liners to promote Kantang. They managed to stock empty containers at the port. There is an image of the service of transport providers where I can see their cooperation... Actually, the shipping agent is quite small; so, they cannot change anything. They need support from liners and the mother port." (IP7).</i></p>
QTE5.6_29	<p><i>"If there are containers available, I don't have to worry about road hauliers as it is just twenty kilometres from here to the station. However, the question is how often that service will be available, are there enough containers? I have to try it out first. If I use it and there are not enough containers, it will be of no benefit at all." (IP3)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.6_30	<p><i>"Cost has to be the first priority because if cost is too high, finally the company will have losses. I consider cost first, and then I try to manage total operational costs to be in the acceptable range. If it can be managed, I will accept it. However, if the cost is too high but I am interested in it, I have to negotiate or reduce cost from some section, so that an operation can happen." (IP16)</i></p>
QTE5.6_31	<p><i>"...considering inland transportation, in reality, how much should the cost be? If I cut their price too much, they may be able to operate only in the short-term at the start. Then I have to find a new one. Is it worth it to do it like that? Alternatively, I have to take risks; for example, there are road hauliers in this area operating by using cheap fuel in Malaysia. However, there are the following questions: 'is it risky?', 'is it available all the time?', 'is it legal?', and 'is there the following problem?'" (IP16)</i></p>
QTE5.6_32	<p><i>"I do not choose the cheapest one and not the highest one either. I used to choose the cheapest carrier, but the cheap prices are likely to have hidden costs. They tend to add more costs later or refuse to provide some service. Sometimes, they just want jobs for reserving purposes. Our policy is not to select the cheapest or the most expensive. I am going to choose the appropriate one in the lower middle of the offered prices." (IP20)</i></p>
QTE5.6_33	<p><i>"I decided to use four suppliers whose prices are just different by Baht 500-700. It is not a big deal. I prefer having many connections with them. So I can easily switch to others when I have a problem with one of them. Generally speaking, the cheapest may not be a good choice when it is considered with other factors such as delivery services. All four carriers have individually their own advantages and limitations." (IP3)</i></p>
QTE5.6_34	<p><i>"I cannot take the risk of giving all our volume to a single transport provider. If that company is confronted with a problem such as financial problems, the company will be in difficulty. I think using 3-4 companies increases the benefits to our company. That is the competition amongst them. So, I think that I seem to get the best thing from them." (IP20)</i></p>
QTE5.6_35	<p><i>"I understand that transportation is sometimes a problem. Sometimes it's the ones with the real power who must manage such problems. Transport operators need to have enough volume to be used in the negotiation. What they want is large volume; therefore the company needs to have a huge volume to meet their needs. Our supplier has enough volume, therefore he can use the certain volume to negotiate for bargains of even hidden power." (IP7)</i></p>

Quotation No.	Quotations from Interview Transcripts
QTE5.6_36	<p><i>“Our company manages to divide the proportion of each mode (inland ports, railways and road); although road is considered more expensive than others, it is also used. The company have large volumes to manage and to maintain an average volume to our suppliers so that our transport operators can continue their business and I have greater flexibility in transport operations. It can be changed constantly. For example, recently Lamchabung port was at full capacity, thus I had to increasingly export via BKK port or Penang port. Or another situation was the period of time when no containers were available at Penang port because rubber exporters used them all. However, I keep using all [all possible options] resulting in easier circulation.” (IP14)</i></p>
QTE5.6_37	<p><i>“... If I consider only costs, I have to accept the potential risks that may occur. For example, is there any problem to deliver goods in the rainy season, or any road accidents that will occur. Finally, I have to agree to take the trade-off between costs and risks. For instance, if the barge sinks, the company will lose 60 million Baht in total compared to a transport saving of just 1,000 Baht/TEU. When I consider it, I have to save so much from delivery to recover it ...It is called management of cost and risk at acceptable point.” (IP16)</i></p>
QTE5.6_38	<p><i>“Currently, I am faced with a problem which is uncontrollable. So, I decided to stop using the service. Now, I do not supply our volume to the rail route (from Thung Song to Padang Besar). Instead, I use Thung Song -Bangkok. I admit the higher cost but at least our goods can be delivered in time to be loaded on ships. Our customers can receive their goods on time. As a result, I receive the payment according to the terms of payment identified.” (IP18)</i></p>
QTE5.6_39	<p><i>“...inland cost is important because inland costs are more expensive than ocean freight costs. Moreover, ocean freight rates can be negotiated by supplying huge volumes, so I do not mind. For example, I deliver 10 TEUs and its cost is 10 dollars (=10*1\$). However, if I deliver 100 TEUs instead, the cost is just 70 dollars (<100*1\$). But for inland costs, if it is a 100 TEU lot, I have to pay for 100 multiplied by a unit cost (100*a unit cost). ...if it is a small company, he is more concerned about the cost of ocean freight as an important issue. However, I rather consider the possibilities of access to it; for example, can it be accessed, are there enough empty containers, is there a ship liner running to the port of destination. Not many people mention ocean freight rates.” (IP18)</i></p>

Appendix R: Final template





Glossary

3PL	Third-party logistics
AHP	Analytic Hierarchy Process
BKK	Bangkok Port
CAQDAS	Computer Assisted Qualitative Data Analysis
CFR	Cost and Freight
CFS	Container Freight Station
CIF	Cost Insurance and Freight
CSCMP	Council of SCM Professionals
CY	Container Yard
ERTC	Economic Research and Training Center
FCL	Full Container Load
FOB	Free on Board
FTAs	Free Trade Agreements
ICD	Inland Container Depot
INCOTERMS	International Commercial Terms
IPA	Interpretative Phenomenological Analysis
KPIs	Key Performance Indicators
LCB,	Laem Chabang Port
LCL	Less Than Container Load
NESDB	National Economic and Social Development Board
OBB	Organisational Buying Behaviour
ORRAF	Office of the Rubber Replanting Aid Fund
PBC	Padang Besar Custom House
QTE5.X_YY	Quotation Number YY of Section 5.X in Chapter 5
RRIT	Rubber Research Institute of Thailand
RSS	Ribbed Smoked Sheet
SCM	Supply Chain Management
SDC	Sadaul Custom House
SKP	Song Khla Port
SMEs	Small and Medium Enterprises
STR	Standard Thai Rubber
TEU	Twenty-Foot Equivalent Unit

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