

AN EXPLORATION OF
RELATIONSHIP STRUCTURES,
THEIR INTEGRATION AND VALUE IN
MARITIME LOGISTICS NETWORKS

by

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Abstract

Maritime logistics plays a critical but often unnoticed role in global supply chains. Management of buyer-supplier relationships is central to the success of SCM. Therefore, as the essential part within the global supply chain relationships, it is important to study the inter-organizational relationships in maritime logistics network. The dominant consideration of relationship management research in maritime logistics has been focused on a dyadic level, and little research has looked at this issue from a network view. In addition, bringing about higher value through the process of complex exchange in business has been recognized, but seldom been examined empirically, neither has been the relevance between service complexity and the relationship strength. This thesis thus aims to explore the relationship structure and the value generated within the maritime logistics from a network perspective, mainly considering the service complexity within a varied of influential factors.

Mixed methods approach has been adopted, using semi-structure interviews, quantitative questionnaire survey and social network analysis. The research framework based on logistics triad is established, and rich insights were obtained from industry. This leads to the evaluation of the relationship strength in maritime logistics networks, the association between service complexity and the nature of relationship in them, and the value generated in the networks, by using three-level analysis and six-dimensional measurement for relationship strengths.

In terms of the major findings, this research identifies that not every link has the same level of integration in the network. A range of contingency factors affecting relationship strength are recognised. There is generally a positive correlation between service complexity and relationship strength, although some links do not demonstrate this. Likewise, there is an affirmative correlation between service complexity and value perceived. Nevertheless, only the values perceived by freight forwarders in each types of service are statistically significant.

Until now, there has been very little consideration of using network perspective to measure and analyse the relationship dynamics and value generated in line with different service complexity in the maritime logistics, and therefore this thesis represents a clear contribution to the literature.

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Chapter 1 Introduction

As supply chains become more global and more operations are being outsourced and moved offshore, ocean container transport plays an increasingly critical role in global supply chain performance (Fransoo and Lee 2013). Over 90% intercontinental transport of goods takes place by sea, and an increasing share of this transport is containerized. Containerized ocean transport has become the lifeline of almost all global supply chains (UN-ESCAP 2005). Transportation is regarded as a main engine for logistics and supply chain management (SCM), therefore, it is important for maritime logistics service providers to be embedded well in these systems (Song and Panayides 2012). Management of buyer-supplier relationships is central to the success of SCM in firms (Harland 1996). Studies have shown that successful management of these relationships contributes to firm performance (e.g. Tan et al. 1999). Accordingly, as an essential part within the global supply chain relationships, it is significant to study the inter-organizational relationships in the maritime logistics networks.

The dominant consideration of relationship management research in maritime logistics has been focused on a dyadic level (e.g. Heaven et al. 2001; Tongzon 2009). There has been little research that has looked at this issue from a network view, and identified the values generated among the main players both theoretically and empirically. Secondly, even though the number of publications considering managing maritime logistics as an integrated network is increasing (e.g. Talley and Ng 2013; Lam 2013), few of them distinguish the different relationship structures that exist between the main players in different situations. According to the contingency perspective, relationships between relevant firms do not need to be integrated closely through the supply network (Cooper et al. 1997). The most appropriate supply network relationships should depend on different products or services (Fisher 1997; Bask 2001).

On the other hand, bringing about higher value through the process of complex exchange in business has been proposed (Aarikka-Stenroos and Jaakkola 2012), but seldom been examined empirically, neither has been the relevance between service complexity and the relationship strength (Bask 2001). Additionally, as a policy maker in the maritime department, the author's working experiences show that it is difficult to design sound policies fitting for

purpose without a deeper understanding of the maritime logistics industry's network structure. Therefore, this **thesis aims to explore the inter-organizational relationship structure and the value generated within the maritime logistics from a network perspective, mainly considering the service complexity within a varied of influential factors.**

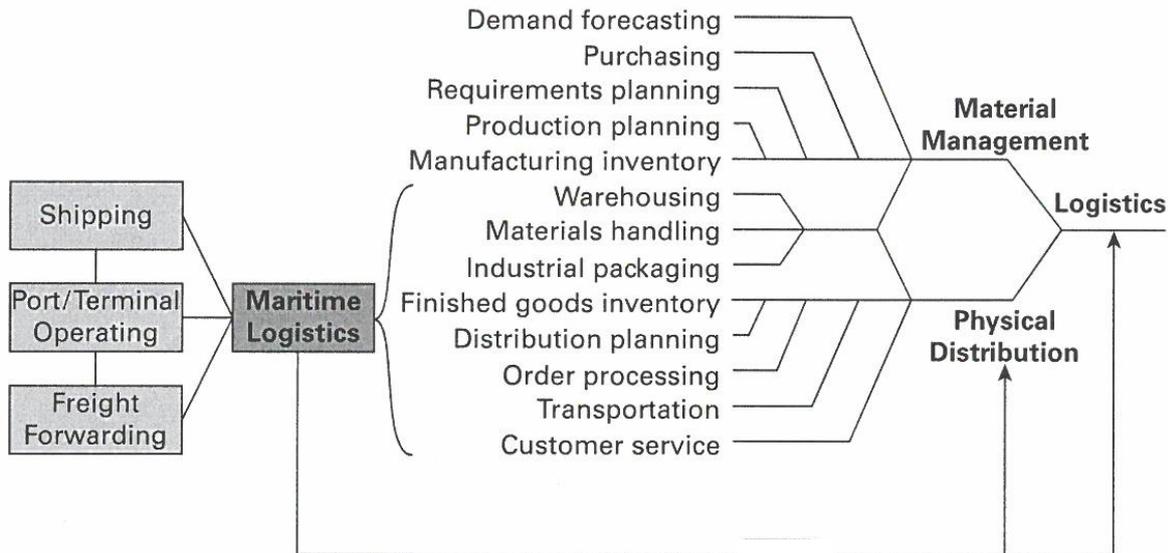
This chapter starts to establish the context for the research, which locates on the maritime logistics area. Then the main issues surrounding relationship management in logistics are summarized, including the concept of network view, contingent perspective in logistics. More details on these will be found in the literature review (Chapter 2). From this overview, the main research questions to be answered are put forward. The structure of the thesis is then outlined, showing how the chapters both link with these research questions and with each other. Finally, a summary of the methodology is provided, with some consideration as to the limitations that exist within the study.

1.1 Maritime logistics

Maritime logistics is one of the newly generated disciplines, which is currently being developed from segmented works on shipping, ports and logistics from the managerial, economic and operational perspectives (Panayides and Song 2013). According to Panayides (2006), maritime logistics is a concept that applies the principles of logistics and supply chain management to maritime transport. Maritime transportation which responds to the demands for logistics integration by offering sea transport service as well as the relevant logistics services, such as: warehousing; material handling; inventory and packaging can be referred to as a maritime logistics system.

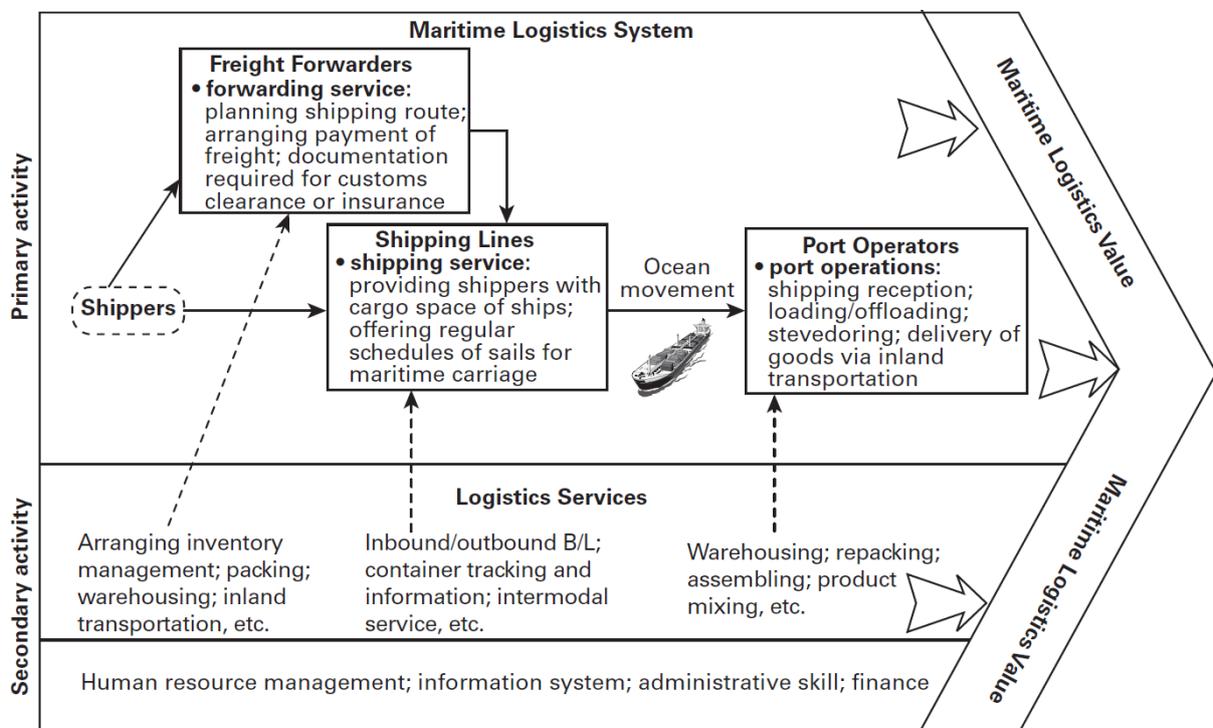
Nam and Song (2011) note that maritime logistics is concerned with maritime transport (e.g. shipping and ports), traditional logistics functions (e.g. storage, warehousing and offering distribution centre services) and integrated logistics activities (e.g. value-added services, including labelling, assembly and repairing). Song and Lee (2009) state that maritime logistics consists of the three key parts of a maritime transport operation: shipping, port-terminal operation and freight forwarding. It has also been further defined by Panayides and Song (2013) who state that it would encompass the management of the physical maritime transport flows, the management of the information flows, as well as the management of the interfaces

between the various actors in the maritime supply chain from manufacturer to the end consumer, including ports as well as transport intermediaries like freight forwarders. Song and Panayides (2012) are trying to depict the position and process of maritime logistics, and they are shown in Figure 1.1 and Figure 1.2.



(source: Song and Panayides 2012, p.14)

Figure 1.1 Maritime logistics in the whole logistics system



(source: Song and Panayides 2012, p.15)

Figure 1.2 Process of maritime logistics

The centre of maritime logistics is the concept of integration in physical (intermodal), economic/strategic (vertical integration, governance structure) or organisational (relational, people and process integration across organisations) aspects (Panayides 2006). On such basis, research would fall under a maritime logistics perspective if (i) it applies logistics and/or supply chain theoretical contexts to maritime transport and/or (ii) it adopts a supply chain perspective that includes the sea leg and/or port operations as a unit of analysis (Panayides and Song 2013). Therefore, the area of maritime logistics provides a good foundation for developing supply chain integration (SCI) research in the maritime context, and this thesis will explore the network relationship structure and the value generated based on this.

1.2 The terms of the relationship structure and main players in this thesis

While relationship management can include the management of individuals and business organization in general management area, this thesis focuses on the inter-organization business relationships. In addition, 'integration' is not just about relationships, but this thesis will explore the level of supply chain integration in the maritime logistics network from the perspective of relationship management.

Although there are several alternatives noticed, the relationship structure and main players in maritime logistics networks will be defined and termed as follows in the coming sections throughout this thesis:

(1) Relationship structure: It is defined as encompassing the main players, the linkages among them and the strength of these linkages in the networks.

(2) Main players:

- **Cargo owner (CO):** which has ever used the container shipping services and related logistics services, and also can be named as cargo owners, or consignors/consignees.
- **Freight forwarder (FF):** ocean freight forwarder, and also can be called as forwarding agent.
- **Shipping carrier (SC):** container shipping carrier, and also can be named as shipping line, or shipping company.
- **Port operator (PO):** include port company/authority, and terminal operator.

1.3 Network view in logistics

Logistics studies could be categorized as three levels of analysis, namely firm, dyadic and network (include triadic) level (Snehota and Hakansson 1995; Harland 1996). According to Selviaridis and Spring (2007), the majority of these studies focus on the firm and dyadic level, examining issues from either the individual cargo owner's viewpoint, the logistics service provider's (LSP's) viewpoint or dyadic interactions between both of these players.

Past studies in SCM have focused on dyadic relationships (e.g. buyer–supplier), as all relationships in a network begin with a dyad. However, Choi and Wu (2009) point out that dyads do not capture the essence of a network. They propose that the smallest and proper unit of a supply network research should be a triad which is made up of three nodes and the links that connect them, rather than a dyad. Daugherty (2011) suggests that relationships research is fascinating and dynamic, extending the research to look at dyadic, triadic, and even network-wide relationships is necessary. Beier (1989) initially launched the concept of the logistics triad, which involves more continuity between consignor, carrier and consignee in order to pursue more efficient transaction processing between them. Bask (2001), Larson and Gammelgaard (2001), and Naim et al. (2010) have an agreement with this notion and develop logistics relationships research based on it.

Borgatti and Li (2009) indicate that the concept of suppliers of suppliers and customers of customers and so on has always existed in supply chain practice, and the imagery and terminology of a supply network is beginning to exceed beyond that of a simple chain. Other SCM researchers have also begun to take a network view of supply chains, recognizing that the interactions between firms in a supply chain are not sequential, as a network structure would suggest (Bovel and Martha 2000; Cakravastia et al. 2002; Kemppainen and Vepsalainen 2003; Kopczak and Johnson 2003; Rudberg and Olhager 2003; Harland et al. 2004). In order to fully understand a particular inter-organizational relationship such as a buyer-supplier relationship, Choi and Kim (2008) suggest to consider it in the context of networks in which the organizations are embedded. The relatively recent incorporation of the term “network” into SCM research denotes a demanding need to view supply chains as a network for firms to gain improved performance, operational efficiencies, and ultimately sustainable

competitiveness (Corbett et al. 1999; Dyer and Nobeoka 2000; Kotabe et al. 2003, Kim et al. 2011).

Methodologically, the aggregation of the information gathered at the level of dyadic relationship gives insight into the network, and meanwhile reflects the position of dyads (Harland, 1996). Accordingly, this research applied three levels of analysis as the framework of analysis, including macro level, mixed relationship level, and micro level. In addition to adopting the network perspective analysis, the social network analysis (SNA) which has been increasingly recognized as a useful tool for investigating and explaining phenomena within supply networks (Carter et al. 2007; Borgatti and Li 2009; Kim et al. 2011), will be applied in this research and discussed in Section 4.7. In terms of the investigating content, this thesis will expand Lambert's (2001) approach which mainly investigates the supply chain's main players, key business processes and links between these players, on the network stand. Carbone and De Martino (2003) have successfully applied this approach in the analysis of the port of Le Havre in Renault's supply chain. By doing so, this research can be facilitated to analyse the relationship structure in the maritime logistics network, and capture more dynamics in it.

1.4 Contingency perspective

The business press and inter-organizational relationship literature have advocated the need for firms to build and manage closer, longer-term relationships and partnerships with suppliers and customers (Macbeth and Ferguson 1994; Golicic and Mentzer 2006). However, several researchers indicate that not all links throughout the supply chain should be closely coordinated and integrated (Cox 1995; Hausman 2001). Cooper et al. (1997) suggest that the closeness of the relationship at different points in the supply chain will differ. The reasons for such contingent consideration include the high implementation costs in terms of capital, time, and effort in order to maintain close partnership with all of the trading partners (Lambert et al. 1996; Day 2000; Mentzer et al. 2000). In addition, the complexity of the product, the number of available suppliers, the availability of raw materials, the critical level of suppliers, customers or components may influence the strategies of relationship management (Cooper et al. 1997).

Fisher (1997) submits a supply chain relationship strategy model, which shows matching supply chains depend on the nature of the demand for the products. Functional products require an efficient process and innovative products need a responsive process. Such a contingency approach was accepted in the logistics literature through identifying the most appropriate relationship strategy by different products/services with different market characteristics. Bask (2001) indicates that in order to offer services more effectively and efficiently to meet the different needs of cargo owners and different types of supply chains, the LSP needs to develop matching inter-business relationships with supply network partners. Three types of efficient logistics service relationships were distinguished, namely, routine, standard and customized service. While a loose customer relationship fits a simple type of service characterised as routine services, a close relationship fits a complex type of service characterised as customised services. The intermediate type of service is entitled standard services. Accordingly, in this research, different type of services will be identified by a different level of complexity of ocean container transport and logistics based on Bask's (2001) concept.

1.5 Value and service complexity

The terms 'value' and 'value add' have long been a salient vocabulary in management (Neap and Celik 1999), and the concept of value is also vital to SCM (Christopher 2005). The creation of value is the core purpose and central process of economic exchange. While the traditional models of value creation focus on the firm's output and price, the other school emphasizes that value is fundamentally derived and determined in use – the integration and application of resources in a specific context (Vargo et al. 2008). By the outsourcing trend, the supply chain has been regarded as the value chain, in which value is created not just by the focal firm, but by all the entities that connect to each other in a network (Christopher 2005).

In terms of service complexity, 'complex' is defined as something (i) 'Consisting of many different and connected parts or (ii) 'Not easy to analyse or understand; complicated or intricate (Oxford English Dictionary). Based on such concept, complicatedness and difficulty are established as two parameters to analyse the service complexity (Benedettini and Neely 2012). In logistics research, the complexity of service depends on the level of customisation, broader scope of services and asset specificity (Kallio 2000; Stefansson 2006).

Creating higher value through the process of complex exchange in business has been recognized (e.g. Aarikka-Stenroos and Jaakkola 2012), but seldom been examined empirically, especially through the comparison of value creation by different degree of service complexity. It is important to identify the relevance between service complexity and value creation. Aarikka-Stenroos and Jaakkola (2012) suggest that understanding such relevance can assist as a managerial tool to determine critical resources and roles for suppliers and customers, facilitate joint activities, and optimize resource utilization. The identification of value elements subsequently enables the firms to determine and develop appropriate products or service (Walter et al. 2001; Lindgreen and Wynstra 2005; Ulaga and Eggert 2006; Tuli et al. 2010).

1.6 Geographical scope of the study

The majority of data contributors for the study in this thesis were based in Taiwan. There are several reasons for such strategy of data collection. Taiwan has well-developed and global-scale manufacturing, trading and maritime sectors. According to WTO (2014), Taiwan ranked within the top 20 in world trade (in merchandise trade, exports ranked 14th and imports ranked 12th; in commercial services trade, exports ranked 15th and imports ranked 19th). With regard to the development of shipping industry, Taiwan ranks 9th in line the owned fleets in the world (UNCTAD 2014). There are five container shipping companies ranking within top 50 globally (Evergreen, Yang Ming and Wan Hai are within top 22). In addition, UNCTAD (2014) ranks Taiwan 7th out of 80 developing countries as specified by the annually total container port throughput (TEUs), and Kaohsiung Port ranks among the top 14 globally. In terms of the level of access to the global liner shipping network, Taiwan ranked at 13rd in line with the 'Liner Shipping Connectivity Index (LSCI) published by UNCTAD (2014). Furthermore, the majority of interviewees and participants of survey who were based in Taiwan were dealing with global-scale business. Therefore, contributors from the main-players' companies/organizations in this background should match the purpose of collecting valid data.

Due to the research topics in this research are surround by the business relationship structure among the main players (shippers, maritime logistics service provides and port operators) and the services they provide in the maritime logistics network, the professionals from these main players were sampled. Accordingly, the interviews and survey in this research were conducted with the heads of industrial associations, high level professionals in the leading companies

and authorities, who are directly related to these main players' industries and most familiar with the business practice in these industries which mainly based in Taiwan.

1.7 Overview of research questions

The main purpose of this thesis is to explore the relationship structure and value generated among the main players in maritime logistics networks. The research questions were derived from the gaps identified in the literature (Chapter 2), and developed inductively from the results of interview study (Chapter 4). Four major research questions along with several sub-questions are proposed, and are also presented in Table 1.1:

Research Question 1: What is the inter-organizational relationship structure in maritime logistics networks? In order to explore the relationship structure in the networks, the framework of analysis should be established. Thus, the first point needed to be known is who are the main players and integrators in this chain/network, to what extent is there a party that may control this end-to-end? Then, what is the shape of this chain/network? Can we apply logistics triad as the framework of analysis for the relationship structure in maritime logistics network? After the formation of such framework, we are interested in knowing that is the business relationship strength always closely integrated in this network, from the view of general perception? Does each link in this network have the same level of importance? If not, to what extent of the differences are?

Last, are there any perception gaps between different main players for the relationship strength, and the level of importance?

Research question 2: What factors influence the inter-organizational relationship structure in maritime logistics networks? According to literature (Bask 2001), the service complexity can affect the relationship. Except this one, are there any other contingency factors in business practice, which can influence the inter-organizational relationship structures in the maritime logistics network and how do they affect these structures?

Research question 3: What is the connection between the service complexity and inter-organizational relationship strength in maritime logistics networks? In order to solve this question, we have to know how could we measure service complexity in maritime logistics

context, and what dimension(s) are suitable for measuring the relationship strength in the maritime logistics network. Do more-customized logistics services cause closer relationship among main players in maritime logistics networks, in different dimensions of relationship strength, and from different main players' views? Are there any perception gaps between different main players for the inter-organizational relationship strength?

Research question 4: What is the connection between the service complexity and value perceived in maritime logistics networks? This could be examined from the respective views of each main player which includes both customers and suppliers. Further sub-questions related to the value are posed, including: Will more customized service create more value from different main players' views in maritime logistics networks? What is the distribution of the value generated from different links in line with different service complexity in maritime logistics networks? What is the correlation between service complexity and the degree of SCI in maritime logistics networks? What is the correlation between degree of SCI and value generation in maritime logistics networks?

Table 1.1 Research questions and chapters which address them

Research question	Sub research question	CH.2 Literature Review	CH.4 Interview Study	CH.5 Survey Study	CH.5 SNA	CH.6 Discussion
RQ 1: What is the inter-organizational relationship structure in maritime logistics networks?	RQ 1-1: Who are the main players and integrators in this chain/network?	V	V		V	V
	RQ 1-2: What is the shape of this chain/network? Can we apply logistics triad on analysing the relationship structure in maritime logistics network?		V			V
	RQ 1-3: Is the inter-organizational relationship strength always closely integrated in this network, from the view of general perception?		V	V		V
	RQ 1-4: Does each link in this network have the same level of importance?		V	V		V
	RQ 1-5: Are there any perception gaps between different main players for the relationship strength?			V		V
	RQ 1-6: Are there any perception gaps between different main players for the level of importance?			V		V
RQ 2: What factors influence the inter-organizational relationship structure in maritime logistics networks?	RQ 2-1: Except service complexity, what factors could influence the inter-organizational relationship structure in maritime logistics networks and how?		V			V
RQ 3: What is the connection between the service complexity and inter-organizational relationship strength in maritime logistics networks?	RQ 3-1: How could we measure service complexity in maritime logistics context?		V			
	RQ 3-2: What dimension(s) are suitable for measuring the relationship strength in the maritime logistics network?	V				
	RQ 3-3: Do more-customized logistics services cause closer relationship among main players in maritime logistics networks? (1) in different dimensions of relationship strength (2) from different main players' views			V		V
	RQ 3-4: Are there any perception gaps between different main players for the inter-organizational relationship strength?			V		V
RQ 4: What is the connection between the service complexity and value perceived in maritime logistics networks?	RQ 4-1: Will more customized service create more value from different main players' views in maritime logistics networks?		V	V		V
	RQ 4-2: What is the distribution of the value generated from different links in line with different service complexity in maritime logistics networks?			V		V
	RQ 4-3: What is the correlation between service complexity and the degree of SCI in maritime logistics networks?				V	V
	RQ 4-4: What is the correlation between degree of SCI and value generation in maritime logistics networks?				V	V

Note: V stands for being answered

1.8 Thesis structure

The structure of the major part of the thesis is provided in Table 1.1. This highlights the connection between the main chapters and the research questions. The order of their presentation has been determined by the development of the maritime logistics network exploration through the thesis. There now follows an overview of the content of each chapter.

Chapter 2 provides an overview of the published literature related to the core research areas of this thesis, and the inter-organizational relationship structure of the maritime logistics network. The main part of literature review aims to establish the knowledge base and identify research gaps as well as questions that can be addressed through this thesis. This highlights the relationship management in SCM and logistics; different viewpoints from dyadic, logistics triad to network level; contingency perspective; and conceptualization of service complexity and value. A dedicated part emphasizing on the context of relationship structure in maritime logistics networks is provided to lead a depth analysis. The other part of literature review aims to seek the materials to deal with the research questions, in which the measurements of inter-organizational relationship strength, service complexity and value, and the social network analysis are explored, and the selections of the measurements in this thesis are discussed and justified.

Chapter 3 outlines the methodology used to conduct the research, with justification of the techniques chosen. This not only explains and justifies the research techniques actually adopted, but also presents the awareness of the wider context of alternative methods. This research is epistemologically positioned in the realism school which advocates using mixed methods. Accordingly, in-depth semi-structured interviews were applied to undertake the exploratory task, followed by the quantitative questionnaire survey. A contemporary method in logistics, social network analysis (SNA), was adopted to complement the insight of maritime logistics network. Ethics considerations in this thesis are also outlined.

Chapter 4 demonstrates the first-stage findings from the in-depth interviews. The rich information and opinions from industrial professionals contribute to the foundation which leads to the next stage of data collection and research development.

Chapter 5 shows the second-stage findings and analysis from the questionnaire survey study. The discussion mainly includes: the anticipated importance level of each link; perceived existing network relationship strength; service complexity and relationship strength; value and the identification of its origin; and the findings from social network analysis.

Chapter 6 opens a discussion about the research findings relating to the research questions, especially brings the results from interviews (Chapter 4) and questionnaire survey (Chapter 5) together. In addition to comparing and complementing the findings from different research methods, the discussion will reflect to the relevant literature in order to bridge the gaps.

Chapter 7 makes the conclusion which summarizes what have been done in this thesis. The answers for each research questions are drawn together to provide an overall analysis of the relationship structure and value generated in the maritime logistics network. In particular, the most significant findings will be emphasized in order to identify the academic contribution to the literature as well as the contribution to practice. The industrial relevance of the findings, which include the managerial implications and government policy implications also will be discussed. The limitations will be revealed, along with the directions for further research and the vision.

1.9 Summary

This is research about exploring the relationship structure among the main players and the value generated within a supply network, which is in the context of maritime logistics. This chapter has outlined the context for the research, and provided an overview of the thesis as a whole. In particular, the main research questions and the equivalent chapters were addressed, which provides a focus for the research. The next chapter will present more detailed content for the thesis through the literature review, as well as identifying the gaps in the literature which this thesis seeks to bridge.

Chapter 2 Literature Review

The previous chapter has established the context of the thesis and the main areas of focus. This chapter will provide an overview of the published literature related to the core research area of this thesis, and the inter-organizational relationship structure in maritime logistics networks.

In order to establish the knowledge base and identify research gaps as well as questions that can be addressed through this thesis, the literature review was grounded in the wider management and developed from generic SCM, logistics to maritime area. This review includes the investigation of the core concepts in the thesis, that are: relationship management in SCM and logistics; different viewpoints from dyadic, logistics triad to network level; contingency perspective; conceptualization of service complexity and value; and relationship structure in maritime logistics networks. The context of relationship structure in maritime logistics is presented in a dedicated section in order to provide a focus and lead to more in-depth analysis.

The other part of literature review aims to seek the materials to deal with the research questions, in which the measurements of inter-organizational relationship strength, service complexity and value, and the social network analysis (SNA) are explored, and the selections of the measurements in this thesis are discussed and justified. This part is presented after some main part reviewing or in an independent section, and also flows from the wider management, SCM, logistics and narrows down to the specific maritime logistics area.

2.1 Relationship management in supply chain management and logistics

In order to construct the base for exploring the dynamics of the business relationship structure in the maritime logistics network, this first part literature review starts to look at the relevant key concepts in generic supply chain and logistics area. These include: why relationship management is important in supply chain management and logistics; relationship management in supply chain integration; the Importance of identifying relationship structure in the networks; social network analysis as an analysing tool; looking at this issue from

different viewpoints – dyad, triad and network; and contingency perspective; relationship strength; service complexity; and value in supply chain management and logistics.

2.1.1 Why relationships management is important in logistics

Interest in the impact of buyer–seller relationships in business markets has increased significantly in the recent years (Samiee and Walters 2003). This interest reflects the importance of distribution in the value chain and wide acceptance of the relevance of social networks and personal relationships for many exchange transactions (Dwyer et al. 1987). Likewise, frameworks and paradigms emphasizing the significance of the development and management of relationships with channel members have attracted growing scholarly attention (Webster 1992). Understanding how to effectively manage relationships with customers has become a very important topic to both academicians and practitioners, as implementing customer relationship management (CRM) processes has a positive association with both perceptual and objective company performance (Reinartz et al. 2004), and can offer a unique competitive advantage to firms (Dertouzos et al. 1989).

The concept of relationship management has evolved into a network perspective, rather than a simple dyadic view. Christensen and Piihl (2004) indicate that the principal aim of relationship management is to create acceptance or legitimacy from actors controlling critical activities and resources outside the span of ownership control of the firm. Likewise, Moller and Halinen (1999) describes relationship management as “A firm’s ability to mobilize and coordinate the resources and activities of other actors”. Ritter et al. (2004) believe that relationship managers play a crucial role as decision-makers directing resources in an effort to achieve recognized aims rather than just being mediators and facilitations in an otherwise self-organizing scheme of business networks. Andersen (2006) attempts to summarize these thoughts and provides a definition of relationship management as: “the task of envisioning and configuring networks, to create access to actors and mobilize, coordinate and develop actors’ activities and resources, with the aim of creating value through collaboration”, in order to embrace the full span of management tasks relating to relationship management.

Thus, beyond relationships management with individual customers, the relationships management between different functions within an organization or among the various organizations has been recognized as one of the fundamental characteristics of integration in

supply chain (Stevens, 1989). Supply chain management (SCM) builds upon this framework and seeks to achieve linkage and co-ordination between the processes of other entities in the pipeline, such as suppliers, customers, and the organisation itself (Christopher 2011). Therefore, the essence of SCM lies in the ability to orchestrate collaborative relationships both internally and with supply chains partners (Bowersox et al., 2010). Management of buyer-supplier relationships is central to the success of SCM in firms (Harland 1996). The coordination / collaboration with suppliers and customers is crucial and one of the common themes in SCM (Mentzer et al. 2008). Studies have shown that successful management of these relationships contributes to firm performance (e.g. Tan et al. 1999). Likewise, it is essential to manage Inter-organisational or stakeholder relationships in maritime container transport chain (Wolff 2014).

Further, there is abundant research indicating relationships management skill as a critical element for increasing the likelihood that supply chain management initiatives will be successfully implemented (e.g. Kwon and Suh 2004). More specifically, inter-firm relationships are critical to the successful coordination of supply chains and improvements in the performance of suppliers' production capabilities (Lamming 1996; Handfield et al. 2000; Scannell et al. 2000). Managed supply chain relationships can also often achieve the types of performance improvement and superior competitive advantage that are not readily generated by open market transactions (Dyer and Nobeoka 2000). The SCM philosophy stresses that maximizing service to customers of choice at the lowest total cost requires a strong commitment to close relationships among trading partners (Stank and Daugherty 2001). Strategic relationships with critical suppliers must be understood in order to maximize the value creation in the supply chain (Chen et al. 2004). On the other hand, buying companies with a good understanding of their suppliers' structural embeddedness in the supply network are likely to obtain better performance in operations, finance and supplier management, compared with those without such an understanding (Choi and Kim 2008).

While relationships management has been one of the principles to overcome the challenges in the era of supply chain competition (Daugherty 2011), as part of the supply chain, attention has recently been devoted to the integration of logistics with other functions in the organization, especially marketing, operations and procurement. Managing supply chain relationships through supply chain integration (SCI) is one of factors that is forcing logistics

executives to rethink nearly every aspect of traditional organizational logic and to extend their thinking to relationships with supplier and customers (Bowersox et al. 2010).

However, while the literature related to logistics and supply chain relationships has become increasingly sophisticated over the years, there still remains many opportunities for extending the literature base. Considering the significant implications for business practice, this should be a research priority (Daugherty 2011).

2.1.2 Relationship management in supply chain integration

Supply chain integration (SCI) is the foundation of SCM (Pagell 2004). Many contemporary researchers assert SCI to be an essential attribute of modern SCM (Christopher 2011; Kim 2009; Narasimhan and Das 2001); almost going as far as using the two terms interchangeably (Childerhouse et al., 2011). Within supply chain management, the importance of integration among the various organisations has been recognised as a means of delivering enhanced supply chain performance (Daugherty et al. 1996). SCI is the alignment, linkage and coordination of people, processes, information, knowledge, and strategies across the supply chain between all points of contact and influence to facilitate the efficient and effective flows of material, money, information, and knowledge in response to customer needs. SCI is regarded as “joined up thinking, working, and decision making,” underpinned by principles of flow, simplicity, and the minimization of waste. (Stevens et al. 2015).

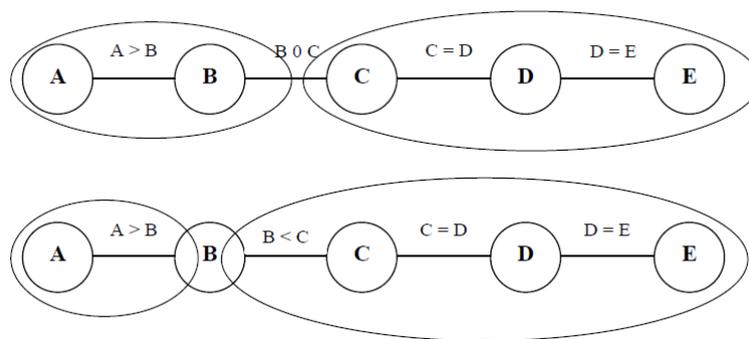
SCI may be driven by information revolution and systems (Bowersox et al. 2002; Gunasekaran and Ngai 2004; McFarlane and Sheffi 2003; Bagchi et al. 2005), but SCI is not just about technology. Integrating the supply chain refers as much to the need for strategic and operational integration within and across the business (Swink et al. 2007) as it does to relational integration with customers and suppliers (Benton and Maloni 2005). Stevens (2015) therefore advises that the scope of SCI should include governance, organization structure, systems, relationship management, business strategy, process design, and performance management. Lee (2000) suggests three dimensions by which to examine the extent of SCI: organisational relationship linkages; information integration and co-ordination and resource sharing. While emphasizing the same integrative practices, Handfield and Nicols (2002), highlight the need for relationship management that should result in more effective use of the combined resource base together with better integrated information and material flows.

Within the above scope of SCI, the concept of relationship management has long been applied by researchers, which is the need for a close, integrated relationship between manufacturers and their supply chain partners (e.g. Armistead and Mapes 1993). Further, while internal integration recognizes that the departments and functions within a manufacturer should function as part of an integrated process, external integration recognizes the importance of establishing close, interactive relationships with customers and suppliers (Flynn et al. 2010). However, only recently has there been a call for a systematic approach to SCI through such viewpoint (Flynn et al. 2010). As increasingly global competition has caused organizations to rethink the need for cooperative, mutually beneficial supply chain partnerships (Lambert and Cooper 2000; Wisner and Tan 2000) and the joint improvement of inter-organizational processes has become a high priority (Zhao et al. 2008). In summary, exploring the level of SCI in the real world from the view of relationship management is on the short list of research.

2.1.3 Importance of identifying the relationship structure

We now understand the importance of relationships management in SCM and logistics, together with its development in SCI. It is important to recognize that relationships at different interfaces in the supply chain will vary. But the question is, how many of the branches and roots of a value tree as the structure of the supply chain need to be managed (Cooper et al., 1997)? More specifically, how should the relationships between suppliers and customers in a supply chain be managed (Slack et al. 2013, p.386)? The behaviour of the supply chain as a whole is made up of the relationships which are formed between individual pairs of operations in the chain. Therefore, it is important to have some framework which helps us to understand the different ways in which supply chain relationships can be developed. Mortensen and Lemoine (2008) point out that the supply chain network structure encompasses the key supply chain members who are vital to a supply chain that creates value for the customers. Examples of such key members are original suppliers, intermediaries, TPL (third party logistics) providers, customers and the customers' customers. Together these actors form a network and the organisational structure of the supply chain. In order to maximize the success of supply chain collaboration, Barratt (2004) also points out that there is a need for a deeper understanding of where, with whom and what activities can firms collaborate in the supply chain, why should they need to collaborate and what are the elements of collaboration.

Cox (2001) provides a solution for above inquiry, suggesting that the possibility of managing a relationship crossing a boundary is limited, and firms seeking to manage relationships with their customers and suppliers need to understand where the boundaries between these sub-regimes (see Figure 2.1). This understanding is crucial to ensure that scarce management resources are not wasted in pursuit of relationship management initiatives for which there is no commercial logic. This implies that the firm might be better to direct its managerial effort towards a reconfiguration of the structure of power in particular exchange dyads so that relationship management becomes a realistic possibility.



(Source: Cox 2001)

Figure 2.1 Sub-regimes and the limits to supply chain management

On the other hand, Nassirnia and Robinson (2013) indicate that it is crucial to map the chain and the key members of the chain in the beginning for making a whole chain efficient. This can help to analyse the value propositions and core competencies within the chain, and the appropriate evaluation of existing and future supply chain relationships. Then, a successful integrated chain is able to be designed in order to increase the overall benefits for the chain and chain members.

Golicic and Mentzer (2006) states that it is critical to study the nature of inter-organizational relationship structure (i.e. magnitude and type) to fully explain and understand a growing phenomenon – the existence of various forms of relationships in the supply chain. It is equally critical for practitioners to have this understanding to better manage inter-organizational relationships. They further indicate that although the concept of relationship type has been examined, the nature of relationship magnitude, and its role with relationship type in the structure of an inter-organizational relationship, has received limited empirical investigation. Lambert (2001) suggests a model to analyse a supply chain, which consists of three inter-related elements of the supply chain: (1) the structure, e.g. the member firms and their links

(relationships); (2) the business processes, e.g. the activities (supplied services) that provide value to the customer; (3) the management components, e.g. the variables by which the integration can be realized, information and communication technologies (ICTs), and performance measurement. Therefore, given the relationship structure in this thesis is regarded as the main players, the linkages among them and the strength of these linkages, the first main research question is proposed:

RQ 1: What is the inter-organizational relationship structure in maritime logistics networks?

Within this question, firstly, it is necessary to know who the main players are and what are key relationships should be included. Secondly, what is the framework of analysis which can be applied in this network? Furthermore, does each relationship has same level of strength? More specifically, the author would like to explore how well integrated are real-world maritime logistics networks from the view of relationship management.

2.2 Different viewpoints – dyad, triad, network

In terms of the level of analysis applied by SCM and logistics studies, Snehota and Hakansson (1995) and Harland (1996) suggest three levels of classification: firm; dyad; and network level. Based on this category, Selviaridis and Spring (2007) reviewed 114 logistics articles, and conclude that the majority of studies (67 per cent, see table 2.1) focus on the firm level, examining issues from either the cargo owner’s or the LSP’s viewpoint (e.g. outsourcing decision). Regarding the dyadic level (27 per cent), the literature concentrates on different aspects of the LSP-client relationship (e.g. contracting). Very few studies (6 per cent) exist at the network level (including logistics triads).

Table 2.1 Analytical level of logistics research

Level of analysis	Percentage of studies (%)	Indicative topics
Firm	67	Outsourcing decision; selection criteria; 3PL growth
Dyad	27	3PL success factor; contracting; performance measurement
Network	6	Logistics triads; horizontal networks

Source: Selviaridis and Spring (2007)

Fynes and Voss (2005) state that the different theoretical frameworks adopted by researchers, contributed to the modelling of SC relationships both in their identification of the underlying dimensions of relationships and their selection of appropriate units of analysis (such as firm, dyad or network).

In terms of supply chain integration (SCI) research, Flynn et al. (2010) indicate that while some focus on dyadic relationships with supply chain partners (e.g. Lee and Whang, 2001), others focus on managing a supply chain as a single system, rather than attempting to individually optimize fragmented subsystems (Vickery et al. 2003; Naylor et al. 1999; Bowersox and Morash 1989; Hammer 1990; Stevens 1989). According to the summation done by Selviaridis and Spring (2007), the indicative topics of firm level research include outsourcing decision and selection criteria, which are also related to the dyadic relationships between buyers and suppliers. Further, this research tends to distinguish the logistics triad as an exclusive unit of analysis from the network level. Since this thesis focuses on the inter-organizational relationships between logistics partners, the following paragraphs will present the different viewpoints from the dyadic level, triadic level, and network level.

2.2.1 Dyadic level

Selviaridis and Spring (2007) indicate that the dyadic-level third party logistics (3PL) studies focus on the inter-organisational relationships in 3PL. There are four types of dyadic-level study relating to such topic. The first type is about the formation and evolution of 3PL relations, which emphasis on the partnerships between logistics service providers (LSPs) and manufacturers/retailers (Bhatnagar and Viswanathan 2000; Bowersox 1990; House and Stank 2001). The second type is about management of 3PL relationships, which focuses on the issues such as 3PL selection, contracting (Boyson et al. 1999; Logan 2000; Andersson and Norman 2002), information sharing between client-LSP (Stank et al., 1996; Boyson et al., 1999; Bienstock 2002; Huiskonnen and Pirttila 2002) and performance measurement systems (Stank et al. 1994; Sum and Teo 1999; Boyson et al.,1999; van Hoek 2001; Wilding and Juriado 2004; Bourlakis and Bourlakis 2005). The third type of dyadic-level 3PL study investigates the success factors for 3PL partnerships (Leahy et al. 1995; Tate 1996; Lambert et al. 1999; Murphy and Poist 2000; van Laarhoven et al. 2000). The last type research tries to propose various

perspective of logistics partnership models, which mainly include a need relationship awareness phase, planning phase and evaluation stage (Bagchi and Virum 1998).

Even though contemporary research focuses on dyadic LSP-client interactions, the boundary-spanning role of logistics and the importance of customer service for 3PL arrangements shown in many studies, have either implicitly or explicitly discuss the client's customer interface, which extends beyond the dyad to consider larger networks (Selviaridis and Spring 2007). A network is made up of nodes and links. The smallest unit that consists of both these network elements is a dyad made up of two nodes (a buyer and a supplier) and the link that connects them (a buyer-supplier relationship). Naturally, the focus of the SCM literature has been on this dyad. However, Choi and Wu (2009) submit that the smallest unit of a network should be a triad which is made up of three nodes and the links that connect them, rather than a dyad. Through such recognition, the researchers can be guided when moving forward to investigate supply chains as a network. A similar trend exists in logistics research, which is gradually moving from the dyadic view to triadic and network perspectives. Logistics triad and network perspective are also methods shown in academia to undertake the research beyond dyadic consideration, and will be discussed below.

2.2.2 Logistics triad

Beier (1989) initially launched the concept of the logistics triad, which involves more continuity between consignor, carrier and consignee in order to pursue more efficient transaction processing between them. He claims that this logistics triad appears to be the minimum unit of analysis for logistics research. McGinnis et al. (1995) point out that the 3PL provider represents the third party to a transaction (the first and second being the buyer and the seller) and fulfils part or all of the logistical needs related to that transaction in a way that a triad of exchange relations is formed. Maltz and Ellram (1997) argue that there are two important interfaces that need to be assessed before outsourcing the logistics function: the logistics service provider (LSP) - client and the LSP-final customer interface. The LSP is positioned between the client and its customers, potentially having a crucial role in handling end-customer information and feedback. Therefore, the relevant unit of analysis becomes the inter-firm triad, rather than the dyad. Larsson and Gammelgaard (2001) define the logistics triad as "a cooperative, three-way relationship between a buyer of goods, the supplier of

those goods and a logistics service provider moving and/or storing the goods between buyer and supplier.

Bask (2001), Larson and Gammelgaard (2001), and Naim et al. (2010) agree that the triad is the minimum unit of analysis required in researching, analysing, designing and reengineering supply chains. Harland (1996) points out that the triad supersedes the dyad, which is often cited as the minimum unit of analysis in supply chain research that often has a manufacturing or purchasing focus. Bask (2001) further visualizes the above concepts as a triangle shape, and highlights the three dyadic relationships between these three parties in a supply chain (see Figure 2.1).

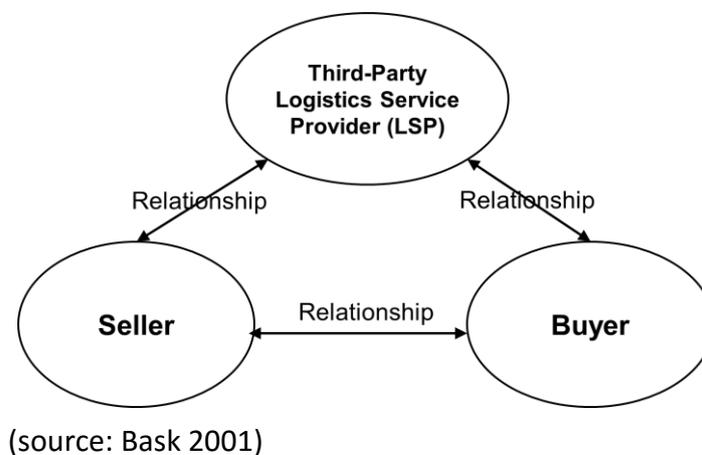


Figure 2.1 Logistics triad

However, as Alessandra (2008) notes, this triadic form of relationship cannot be considered as the normal case. Most 3PL relationships are limited either to the dyadic relationship between seller and logistics service provider or buyer and logistics service provider and, accordingly, most research addresses the two-way linkage between the logistics service provider and either the buyer or seller.

2.2.3 Network level

Borgatti and Li (2009) report that SCM could not only be dyadic, but has — through the notion of chains — implicitly considered paths through a network of firms. For the most part, the focus has been on chains of just two links: supplier to focal firm, and focal firm to customer. The concept of suppliers of suppliers and customers of customers and so on has always been there, and now the imagery and terminology of a supply network is beginning to exceed beyond that of a simple chain. Other SCM researchers have also begun to take a network view

of supply chains, recognizing that the interactions between firms in a supply chain are not sequential, as a network structure would suggest (Bovel and Martha 2000; Cakravastia et al. 2002; Kempainen and Vepsalainen 2003; Kopczak and Johnson 2003; Rudberg and Olhager 2003; Mookherjee and Tsumagari 2004; Harland et al. 2004). Further, in order to fully understand a particular inter-organizational relationship such as a buyer-supplier relationship, Choi and Kim (2008) suggest to consider it in the context of networks in which the organizations are embedded.

Supply networks contain inter-connected firms that engage in procurement, use, and transformation of raw materials to provide goods and services (Lamming et al. 2000; Harland et al. 2001). The relatively recent incorporation of the term “network” into SCM research denotes a demanding need to view supply chains as a network for firms to gain improved performance, operational efficiencies, and ultimately sustainable competitiveness (Corbett et al. 1999; Dyer and Nobeoka 2000; Kotabe et al. 2002, Kim et al. 2011). Others have examined supply networks from a strategic management perspective. Greve (2009), using supply networks in the maritime shipping industry, studied whether technology adoption is more rapid in centrally located network positions. Mills et al. (2004) suggested different strategic approaches to managing supply networks depending on whether a firm is facing upstream or downstream and whether it is seeking its long-term or short-term position in the supply network.

Methodologically, simulation models have been used to study hypothetical supply networks (Kim 2009; North and Macal 2007; Pathak et al. 2007). Others have studied real-world supply networks using the case study approach (Jarillo and Stevenson, 1991; Nishiguchi 1994; Choi and Hong 2002). Scholars in the industrial marketing have developed descriptive models of supply networks (Ford 1990; Håkansson 1982, 1987; Håkansson and Snehota 1995). Descriptive case studies in this genre illustrate how companies such as Benetton, Toyota, or Nissan attained competitive advantage through their supply networks (Jarillo and Stevenson 1991; Nishiguchi 1994). Other studies focused on developing taxonomies of supply networks (Harland et al., 2001; Lamming et al. 2000; Samaddar et al. 2006). It is worth to mention that social network analysis (SNA) has been increasingly recognized as a useful tool for investigating and explaining phenomena within supply networks (Carter et al. 2007; Borgatti

and Li 2009; Kim et al. 2011), and will be applied in this research and introduced in Section 2.3.

In addition, a complex system perspective has been used as a theoretical lens for describing supply networks (Kim et al. 2011). From a systems dynamics perspective, sub-optimization of individual members of the supply chain occurs when each operates in its own self-interest without regard for the others. This sub-optimization often results in inefficiencies in the network as well as low customer satisfaction (Lee 2005). In the operations and supply management fields, Wilding (1998, p.599) studied dynamic events in supply networks through what he referred to as “supply chain complexity triangle”. Choi et al. (2001) conceptualized supply networks as a complex adaptive system (CAS). Surana et al. (2005) proposed how various complex systems concepts can be harnessed to model supply networks. Pathak et al. (2007) discussed the usefulness of CAS principles in identifying complex phenomena in supply networks.

In logistics literature, the complex and various forms of sub-contracting relationships are considered from network perspective (Selviaridis and Spring 2007). In particular, the design of 4PL/LLP (fourth party logistics provider/lead logistics provider) solutions entails that the LSP acts as a single point of contact within the client’s supply chain (van Hoek and Chong 2001). Logistics providers also develop horizontal networks in order to gain access to complementary resources and capabilities (Carbone and Stone 2005; Lemoine and Dagnaes 2003). Through the viewpoint of network, the position of non-asset-based 4PL provider in the supply network has been identified, which makes use of its supply chain design/planning capabilities and IT solutions and acts as a single interface between the clients and multiple asset-based LSPs (Skjoett-Larsen 2000).

In summary, the research consisting of dyadic, logistics triad and network perspectives can capture more dynamics than the one with only dyadic lens in the supply network, and is more capable to analyse the network structure of supply relationships. As logistics triad has been well-applied in some logistics research as discussed in Section 2.2.2, a sub-question is proposed: Can we apply logistics triad as a research framework on analysing the relationship structure in maritime logistics network?

2.3 Social network analysis

There has been increased discussion of the benefits of adopting a network perspective in supply chain management research (Choi et al. 2001; Lazzarini et al. 2001; Lee 2004; Kim et al. 2011) in the past decade. The supply chain management and logistics literature is now becoming aware of the potential contribution of network analysis (Choi et al. 2001; Borgatti and Li 2009; Galaskiewicz 2011). Borgatti and Li (2009) suggest that it is the right time to review the key concepts in social network analysis (SNA) which could be useful to supply chain researchers in further elaborating the potential of the network concept. Therefore, the following sections firstly outline the content of SNA, and then introduce the application of SNA in supply chain management and logistics research.

2.3.1 Overview of SNA

(1) The concept of SNA

The social network study comes from wide and emerged basis through the disciplines of anthropology, sociology and mathematics. SNA has been applied to study community or friendship structures (e.g. Kumar et al. 2006) and communication patterns (e.g. Koehly et al. 2003). It has also been adopted to explore the spreading of diseases (e.g. Klodahl 1985) and diffusion of innovation (e.g. Abrahamson and Rosenkopf 1997; Valente 1996). In management studies, researchers have used it to investigate corporate interlocking directorships (e.g. Robins and Alexander 2004) and network effects on individual firms' performance (e.g. Jensen 2003; Ahuja et al. 2009). SNA is a powerful tool that allows managers to map informal networks of communication and workflow (Carter et al., 2007). As organizations increasingly compete based on their ability to manage knowledge (Hult et al. 2003), information is found and work is performed through information networks within firms.

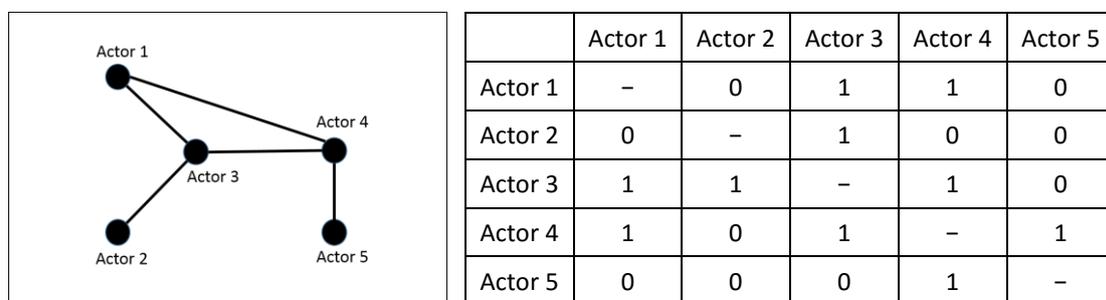
The SNA considers any system as a set of interrelated actors or nodes. It is a powerful methodology for describing and analysing the interrelationships of units or nodes within a network. The actors or nodes of the networks can be individuals, a group of individuals such as a department within an organization, organizations within a larger network such as a supply chain, communities or countries. With regards to a managerial perspective, SNA can be effectively used to study both organizational and inter-organizational phenomena. At the

organizational level, the network describes the relationships among individuals or groups within the firm, while at the inter-organizational level, SNA has examined the interrelationships of organizations within horizontal and vertical networks (Borgatti and Foster 2003; Gulati et al. 2000).

In other word, SNA can be defined as a mapping and investigation of the relations among a group of actors (Scott 2000). In contrast to most of the existing logistics and supply chain management research, SNA focuses on the relationships among actors as the unit of analysis rather than on the actors themselves (Carter et al., 2007). Therefore, SNA expresses the linkages among actors. These relations or ties can represent, for example, friendship, competition, liking, communication, workflow, or the exchange of goods among actors representing individuals, organizations, or even nations. In addition, they can be characterized along multiple dimensions, such as duration and frequency (Scott 2000).

(2) The methods of SNA

In terms of the analysing technique, SNA uses the mathematical ideas of graph theory including visualized picture and computational language to analyse the nodes and ties in the network (Scott 2000). Network data can be portrayed as a graph termed sociogram, and/or demonstrated as a matrix called adjacency matrix. The ties in a sociogram can be non-directional or directional. A non-directional graph is one in which only the presence of the connection is indicated (Lee, 2005). The ties in it are necessary reciprocated (Hanneman and Riddle 2005) and the adjacency matrix representing this network is symmetric (see Figure 4.3). In a directional sociogram, a tie from i to j does not necessarily imply a tie of the same kind from j to i , and the adjacency matrix is asymmetric (Borgatti and Li, 2009).



(source: Carter et al. (2007))

Figure 2.2 Examples of sociogram and adjacency matrix

Most social network measures are solely defined for binary situations and, thus, unable to deal with weighted networks directly (Freeman 2004; Wasserman and Faust 1994). In order to richly describe the complexity of the network which contains weighted information, there has been a growing need for network measures that directly account for tie weights. In the weighted network, ties are not just either present or absent, but have some form of weight attached to them (Opsahl et al. 2010). For social networks, the weight of a tie is generally a tie strength, such as function of duration, emotional intensity, intimacy, and exchange of services (Granovetter 1973; Newman 2001).

The metrics of SNA can be calculated at two levels—the node level and network level. Node-level metrics measure how an individual node is embedded in a network from that individual node's perspective. Network level metrics compute how the overall network ties are organized from the perspective of an observer that has the bird's eye view of the network (Kim et al., 2011). Social network scholars (e.g. Everett and Borgatti 1999; Freeman 1977, 1979; Krackhardt 1990; Marsden 2002) have developed a range of network metrics at both of these levels to characterize the dynamics inside a social network. The concept of centrality is the fundamental to node-level metrics (Borgatti and Everett 2006; Borgatti and Li 2009), which can identify the key actors in a social network. These measures mainly include degree, closeness, and betweenness. In the network level, the metrics concern the structure of the overall network, such as network density, network centralization, and network complexity. Network density refers to the number of total ties in a network relative to the number of potential ties. It is a measure of the overall connectedness of a network (Scott, 2000). A network in which all nodes are connected with all other nodes would give us a network density of one.

SNA is a formal, quantitative modelling approach to analyse the structural characteristics of supply networks (Borgatti and Li 2009; Grover and Malhotra 2003; Harland et al. 1999). Kim et al. (2011) prove that SNA can both supplement and complement more traditional, qualitative interpretation methods when analysing cases involving supply networks (e.g. Harland et al. 2001 and Choi and Hong 2002). Further, SNA can move our understanding beyond individuals, organizations, or even dyadic relationships between organizations, to a relational model (Carter et al. 2007).

2.3.2 SNA in SCM and logistics search

Looking at supply chains from social network perspective, operations and supply management scholars have noted the methodological potential of SNA. For instance, Choi et al. (2001) state that one could approach the study of supply networks from the social network perspective. Ellram et al. (2006) acknowledge social network theory as a useful tool to study influence in supply chains. Carter et al. (2007) identify SNA as a key research method to advance the fields of logistics and supply chain management. Borgatti and Li (2009) and Ketchen and Hult (2007) echoed such sentiments. While argue its imperativeness for operations and supply management to be integrated with other management disciplines such as SCM, they also recognize the difficulty of collecting network-level data in supply networks.

According to Borgatti and Li (2009), a more systematic adoption of SNA will be helpful in exploring behavioral mechanisms of entire supply networks. A SNA approach allows us to better understand the operations of supply networks, both at the individual firm level and network level—how important the individual firms are, given their positions in the network and how the network structure affects the individual firms and performance of the whole network. Galaskiewicz (2011) suggests that social network analysis is relevant for the management of inter-organizational relations as firms attempt to share information, coordinate their schedules, and develop products and services together.

Further, although the basic unit of data in network analysis is the dyad, the relationships among all dyads (pairs of nodes) are systematically considered in the network as a whole. Dyads link together into chains or paths may indirectly connect all actors with all others. These paths provide avenues through which actors unknown to each other can influence each other, and can theorize the position for the node (Borgatti and Li 2009). Thus, this key concept can provide a logical methodology to analyse the data and solve the research questions about the relationship structure of the maritime logistics network in the thesis.

Although importing concepts from the SNA has become a rising trend for supply chain researchers, the empirical SCM and logistics studies applying SNA method are still very limited to date (Lee 2005; Carter et al. 2007; Autry and Griffis 2008; Kim et al. 2011). This is due to a lack of conceptual clarification as to how the key SNA metrics (e.g. centrality) can be theoretically interpreted in the context of supply networks (Kim et al. 2011). It is also because

of the difficulties in obtaining network-level data in supply networks (Ketchen and Hult 2007; Borgatti and Li 2009; Kim et al. 2011). These exceptional studies are discussed in detail by their different research purposes as follows:

(1) Examining individuals' influence in the network

Carter et al. (2007) provide an example of an application of SNA within an organization that developed and implemented an inbound logistics reporting system that evolved in response to warehousing safety and environmental concerns. Data was collected by using semi-structured interviews with 30 members in the network of cross-functional environmental and safety initiative project. In order to assess the individuals' influence in the project, interviewees were asked to nominate the influential individuals whom they have direct or non-direct interactions with and rate the level of influence of these individuals by using a 7-point Likert scale. By applying SNA, the interrelationships among these actors in the network were displayed in a sociogram, and their centrality were calculated. The results from statistical regression and SNA in this paper suggest that individuals can derive influence based on both formal structural variables (such as rank and tenure) as well as informal relationships developed among organizational actors.

This paper suggest future research could examine the social networks surrounding buyer-supplier, manufacturer-distributor, or shipper-3PL dyads, to examine the effects of centrality on dyadic cooperation and perceptions of opportunism. For these sorts of studies, actors would consist of dyads of organizations in the supply chain rather than individuals within an organization.

(2) Measuring the SCI degree in a port supply chain

Lee (2005) proposes that in order to fully understand supply chain integration, one must first understand the relationships between the firms in the supply chain. The purpose of SNA is to understand the characteristics of interpersonal relationships, and SNA can be used to measure the extent of integration in a network of people, departments and/or organizations, and also determine whether these organizational structures are actually working. Therefore, she conducted an exploratory work on using SNA to measure the extent of network density in a port supply chain.

Lee (2005) claims that the interaction between the firms actually occurs between individual employees. She thus applies the SNA metrics related to the nature of connections between employees in collaborating departments or companies thus can be used to measure the degree of integration between them. In this paper, six organizations/firms in the port supply chain were identified, namely port authorities, shippers, shipping lines, terminal operators, customs officials and transport companies. Executives and managers of these organizations/firms were interviewed, being asked about the quality of the relationships between their organizations in a South American port supply chain. Contact frequency among the network members which is one of the relationship quality measurements in this paper, were chosen to conduct the SNA, and assess the network density and relative degree of connectedness of for each organization/firm.

The results of SNA show that the port supply chain are fairly integrated as the network density score is high. Further, the shipping line, the shipper, and the terminal operators are most connected, as indicated by their relative high degree of connectedness scores, that is, they tend to give and receive information more than other nodes. Lee (2005) concludes that SNA can help to determine how well an organization is plugged into its industry or supply chain, to determine who the brokers of information and power are, and to ascertain which organizations are well positioned in an industry. In addition, SNA results in an actual measure of integration, simplifying the analysis of the impact of supply chain integration on firm performance.

(3) Investigating the structure of automotive supply networks

Kim et al. (2011) develop a theoretical framework which relates key social network analysis metrics to supply network constructs, to investigate the structural characteristics of three automotive supply networks based on Choi and Hong's (2002) case study-based work (see table 2.2 and table 2.3). Each of the automotive supply networks is analysed in terms of materials flow and contractual relationships, and from both node and network perspectives respectively. The data of materials flow is regarded as directional, and the contractual relationships are regarded as non-directional.

Table 2.2 Node-level centrality metrics and their implication for supply networks

Network type	Centrality metrics	Supply network constructs	Conceptual definitions	Implication for central nodes		
				Role ^a	Description	Key capabilities
Materials flow	Indegree centrality	Supply load	The degree of difficulty faced by a firm in managing incoming material flows from the upstream firms	Integrator	To put together or transform different parts into a value-added product and ensure it functions well	System integration Design/development Architectural innovation
	Outdegree centrality	Demand load	The degree of difficulty faced by a firm in dealing with demands from the downstream firms	Allocator	To distribute limited resources across multiple customers, focusing on scale economies	Process/manufacturing Quality management Component innovation
	Betweenness centrality	Operational criticality	The extent to which a firm impacts the final assembler's operational performance in terms of product quality, coordination cost and overall lead-time.	Pivot	To facilitate or control the flows of supply across the whole network	Out-bound logistics Risk management In- and out-bound logistics Cross-functional integ.
Contractual relationship	Degree centrality	Influential scope	The extent to which a firm has an impact on operational decisions or strategic behavior of other firms in the supply network	Coordinator	To reconcile differences of network members and align their opinions with the greater supply network goals	Contract management SRM/CRM
	Closeness centrality	Informational independence	The extent to which a firm has freedom from the controlling actions of others in terms of accessing information in the supply network	Navigator	To explore, access, and collect various information with greater autonomy in the supply network	Information acquisition Strategic alignment with OEM
	Betweenness centrality	Relational mediation	The extent to which a firm can intervene or has control over interactions among other firms in the supply network	Broker	To mediate dealings between network members and turn them into its own advantage	Information processing Strategic alignment with OEM

(source: Kim et al. 2011)

Table 2.3 Network-level metrics and their implication for supply networks

Network type	Network-level metrics	Conceptual definition in supply networks	Implication of overall network structure ^a	
			Characteristics	Performance implications
Materials flow	Centralization	The extent to which particular focal firms control and manage the movement of materials in a supply network	Operational authority (e.g., power to make decisions on materials flow) concentrated in few central firms Centralized decision implementation process	High level of controllability in production planning Low level of operational effectiveness at the network-level (i.e., more time taken to reach a decision and take actions on issues at a local level)
	Complexity	The amount of collective operational burden born by the member firms in a supply network	More firms engaged in the delivering and receiving of materials More steps required to move the materials along	Low level of operational efficiency at the network level (i.e., longer lead time from the most upstream to the final assembler or more parts for the same product function)
Contractual relationship	Centralization	The extent to which particular focal firms exercise bargaining power or relationship management control over other firms in a supply network	Lack of interactions between central and peripheral firms in a supply network Decoupled relationships between firms at different tiers	High level of controllability in product design, product quality, and/or cost management Low level of responsiveness to or more time for resolution on issues occurring at a local level
	Complexity	The amount of load on the supply network as a whole that requires relationship coordination	More firms involved in transferring information Active interactions at a local level Slow relaying communications from downstream to the final assembler	Low level of robustness or high degree of vulnerability to supply disruptions (i.e., more time to channel information and a higher likelihood of information distortion across a supply network)

(source: Kim et al., 2011)

Three types of node-level metrics: degree; closeness and betweenness centrality were calculated to reflect the relative importance of individual nodes in a network, which can identify the key actors in a network. Meanwhile, three types of network-level metrics: network density; centralization and complexity were deliberated in order to capture the overall network structure. The size (the number of individual network firms) of these three automotive networks are 28, 34 and 27 respectively, and the findings show that each network

has different structures, and the two types of relation (materials flow and contractual relationships) within a network organize and behave differently.

By comparing the SNA results with the case-based interpretations in Choi and Hong (2002), value in two aspects are demonstrated by Kim et al. (2011). First, SNA considers all member firms in a given supply network to determine which firms are most important to the operation of the whole network. Capitalizing on computing power, SNA can generate various analytic outputs reflecting either individual- or group-level behavioural dynamics, which can facilitate gaining a more comprehensive and systematic view of network dynamics. Second, applying the widely accepted network level analytical concepts, SNA can complement and supplement qualitative methods in capturing the structural intricacy of the whole network in a more objective way.

Based on Kim et al.'s (2011) research limitations, three future directions that they suggest can be relevant to this thesis and are highlighted as follows:

- The paper of Kim et al. (2011) did not consider the variances in strength. All the links considered in the analysis were treated as having the same weight. However, for instance, different connected actors should have different involvement of information exchange. Future studies therefore can incorporate the relative strength of supply ties using SNA as the method can effectively illustrate networks with “weighted” links (Borgatti and Li 2009; Battini et al. 2007).
- Kim et al.'s (2011) work viewed supply networks only based on the materials flow and contract connections. However, there are many other relational connection types that can be considered in supply networks, such as ownership, the number of joint programs, level of trust, technology dependence, intellectual property, and risk sharing.
- SNA could be applied to advancing existing theories regarding the structure or topology of supply networks. A range of SNA metrics can serve as a useful means in this effort, and lead to the development of a portfolio of approaches to supply management.

According to these empirical works, there is no single set of SNA metrics should be followed. Using different SNA metrics are dependent on the issues at hand. Above literature and

exploratory empirical works related to SNA also provide part of the foundation to develop the research framework and to analyse the data for this thesis.

2.4 Relationship strength

Relationship strength is one of the major components of relationship structure in the thesis. As the issue of inter-organization relationship strength (relationship quality) has not yet been widely studied in maritime transport studies (Jang et al. 2013), therefore, the knowledge of relationship strength will be borrowed from the marketing, SCM and logistics literature, and will be presented below.

2.4.1 Conceptualisation of relationship strength

Relationship strength is a broad term that encompasses the ideas and research concerning the closeness of a business relationship, which can be conceptualized as the ties between relational partners and reflects their ability to weather both internal and external challenges to the relationship (Hausman 2001). Or it can be simply defined as the degree of the closeness of the ties among organizations in a supply chain (Golicic and Mentzer 2006). One of the original work related to this the concept itself stem from the literature of sociological ties put forth by Granovetter (1973) to explore the interpersonal networks, then developed in the marketing field. Donaldson and O' Toole's (2000, p.494) suggest that relationship strength combines aspects of behaviour with economic components, capturing "the economic ties and social bonds of the partners".

In marketing, the attention was initially on the consumer-focused relationship management which put emphasis on retaining existing customers and developing new customers (Xu and Walton, 2005), and then the area of interest rapidly grew in business-to-business relationship marketing (Richard et al. 2007; Ata and Toker 2012). However, unnoticed by marketing, a quiet revolution has taken place in SCM, where the traditional emphasis on least-cost transactions has given way to a focus on long-term relationships with a few key suppliers (Ryals and Humphries 2007). In SCM, the initial development focus more on an operational (time, cost, quality and process) rather than a relationship management perspective (Christopher 2005). In response to calls for a relationship perspective, researchers have employed an interdisciplinary approach that integrated SCM and marketing concepts to

understand the dynamics within supply chain relationships (e.g. Humphries and Wilding 2003; 2004; Flynn et al. 2010). Further, it has been recognized that a focus on process is insufficient to achieve success and that cooperation, trust and proper relationship management can achieve results which are greater than the sum of parts (Christopher 2005).

Besides the term 'relationship strength', other synonyms exist, which are namely 'relationship quality' and 'relationship closeness' (Palmatier et al. 2006; Golicic and Mentzer 2006). Therefore, the relevant literature which includes these terms will be included in the following discussion.

2.4.2 Measurement of relationship strength in literature

There is no universal measurement of relationship strength due to the variety of research purposes and perspectives. Researchers from different disciplines have offered a range of dimensions for measuring the relationship strength in particular areas. These measurements will be introduced from the area of social network analysis (SNA), marketing, SCM and logistics as follows:

(1) In social network analysis research

In SNA research, Granovetter (1973) indicates that the relationship strength of an interpersonal tie is a combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the link. Some researchers (e.g. Lee 2005; Carter et al. 2007) tend to use a single dimension to measure the relationship strength. Lee (2005) applied the frequency of contact among the network members to measure the relationship quality in a port supply chain. Carter et al. (2007) used the formal (such as email and meetings) or informal (including phone calls and face-to-face conversation) communication at least once per month among members in a project to measure the level of their interactions. These measurements can be classified as communication. Kim et al. (2011) analysed three automotive supply networks by using two dimensions of measurement consisting of materials flow and contractual relationships.

(2) In marketing research

In marketing research, trust and commitment are the most widely utilised measurements of relationship strength (Palmatier et al. 2006). Morgan and Hunt's (1994) research is one of the

original works to theorize that successful relationship marketing requires relationship commitment and trust, and model these two dimensions as key mediating variables. Since their work, more measuring dimensions have been added, for example, Hausman (2001) applies trust, commitment and relationalism which operationalized by solidarity (same as dependency), mutuality and flexibility as the relationship strength's latent constructs to explore the hospital supply chain relationship. Palmatier et al. (2006) report that commitment, trust and relationship satisfaction which reflects exclusively the customer's satisfaction with the relationship are relational mediators. They conclude that a multidimensional perspective of relationships can capture the full essence or depth of a customer-seller relationships. Extant research focused on a single relational mediator may provide misleading guidance.

In addition to relationship strength, some researchers tend to apply the term 'relationship quality' which actually is a composite measure of relationship strength (Palmatier et al. 2006). Crosby et al. (1990) identify that service quality which includes trust in the salesperson and satisfaction with salesperson determines the probability of continued interchange between these two parties in the future. Wulf et al. (2001) assume that a better-quality relationship is accompanied by a greater satisfaction, trust and commitment. The term relationship strength is to describe the magnitude of a relationship between two individuals in a commercial setting (e.g. a customer and service worker/salesperson) and is operationalized as the extent of a customer's trust and commitment towards a service work (Bove and Johnson 2001). Hennig-Thurau et al. (2002) upgrade the implication of relationship quality from the individual service worker level to firm level. They identify that customer satisfaction with the service provider's performance, trust in the service provider and commitment to relationship with the service firm are key components of relationship quality, and they are treated as interrelated rather than independent.

There are further different concepts to measure the relationship strength. Donaldson and O'Toole (2000) indicate that both belief and action components of a relationship should be developed to measure relationship strength. Relationship strength captures both the economic ties and social bonding of the partners: belief in a spirit of cooperation and trust as opposed to a maintenance of distance and minimum interaction, and actions taken indicate the strength of a relationship. Based on this thought, they develop a relationship matrix by using different level of belief and action components to discriminate between four

relationship structures in main buyer-supplier relationships, which are classified as: bilateral, recurrent, dominant partner, and discrete (see Figure 2.3). Johnson (1999) investigate the strategic role of interfirm relationship through the concept of strategic integration. A survey of industrial equipment distribution revealed that dependency, flexibility, continuity expectations and relationship age encouraged the distributor’s strategic integration of its supplier relationship. The dimension of relationship age also reflects the Donaldson and O’Toole’s (2000) point.

		ACTION COMPONENT	
		High	Low
BELIEF COMPONENT	High	BILATERAL	RECURRENT
	Low	HIERARCHICAL (Supplier or buyer dominant)	DISCRETE or OPPORTUNISTIC

(source: Donaldson and O’Toole’s 2000)

Figure 2.3 The relationship matrix

(3) In SCM and logistics research

There are several kinds of studies looking at supply chain relationships and their measurements, for example:

- (1) supply chain integration (SCI) from manufacturing perspective (e.g. Flynn et al., 2010; Prajogo and Olhager, 2012)
- (2) partnership, collaboration or successful relationships in supply chain (e.g Lambert et al. 2010; Fynes et al. 2005; 2008; Cao and Zhang 2011)
- (3) third party supply chain member relationship (e.g. Ellram and Cooper, 1990; Stank et al. 2001; Panayides and So 2005; Golicic and Mentzer 2006; Zsidisin et al. 2007).

For the research purpose of this thesis, the literature review will mainly focus on the (2) and (3) areas.

SCI can be defined as the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organization processes, and SCI strength is the level or extent to which SCI activities are carried out (Flynn et al. 2010). Many studies (e.g. Frohlich and Westbrook 2001; Narasimhan and Kim 2002; Flynn et al. 2010; Zhao et al. 2011; Prajogo and Olhager 2012) have measured the strength of SCI, which primarily include internal integration, external integration (customer integration and supplier integration). Besides the 'soft' measurements applied in marketing field, the SCM field adds more dimensions focusing on the 'hard' operational and technical dimensions include, for example, frequency of communication, market and production information sharing, procurement and production process integration.

In terms of partnership, collaboration or successful relationships in supply chain, Fynes et al. (2005) verify the multi-dimensional nature of supply chain relationships, and establish a set of measurements including: trust; commitment; communication; power/dependence; adaptation and collaboration. Lambert (2008) suggests that partnership elements should contain: planning; joint operating controls; communications; risk/reward sharing; trust and commitment; contract style; expanded scope and financial investment. Stank et al. (2001) apply operational information sharing, rewards and risks sharing, and supply chain partner cooperation to measure external collaboration between supply chain players. Cao and Zhang (2011) further suggest that supply chain collaboration should include seven interconnecting components: information sharing; goal congruence; decision synchronization; incentive alignment, resources sharing; collaborative communication and joint knowledge creation.

Some researchers trying to measure the third party-supply chain member relationship (Ellram and Cooper 1990; Panayides and So 2005; Golicic and Mentzer 2006) tend to borrow the measurements from the marketing field. Trust and commitment are the most used valuables followed by communication, mutuality and dependency. Zsidisin et al. (2007) enlarge the dimensions from SCM and transport to measure shipper-carrier relational closeness, which encompass the capacity flexibility, innovation and management direction. Bask (2001) suggest a service matrix which attempts to efficiently match the complexity of service and customer relationship. She does not explicitly indicate how to measure this relationship, but implies that communication, cooperation, relationship duration and relationship investment are the variables.

(4) In maritime logistics research

It was found that there is no literature explicitly measuring the relationship strength in the context of maritime transport, except two relationship closeness and quality studies by Bennett and Gabriel (2001) and Jang et al. (2013). Due to the lack of well-developed measurements in the maritime literature, both of these works have borrowed the constructs from the marketing literature. Based on the model developed by international Marketing and Purchasing Group (IMPG), Bennett and Gabriel (2001) examine the relationship between a supplier's corporate reputation, trust in the supplier, co-operation, buyer commitment, and willingness to undertake relationship-specific investments in the context of interactions between three UK seaports and their customer shipping firms (e.g. shipping companies, large shippers, major freight forwarders and business consortia). The relationship-related measurements applied in this work include trust, commitment, information sharing, relationship-specific investment and cooperation. Jang et al. (2013) explore the role of logistics service quality in generating shipper loyalty, considering relationship quality in the context of container shipping. They suggest that satisfaction, trust and commitment as the measures of relationship quality as they seem to be most commonly utilised dimensions inferred from the literature.

There are several other maritime transport studies indirectly applying the measurements of relationship strength, and are worth discussing in this thesis. Lu (2003b) investigates the impact of carrier service attributes on shippers' satisfaction and shipper-carrier partnering relationships. Commitment and strategic partnership which refers to trust are used to measure partnering orientation, and it can be said that these two dimensions are related to relationship strength. Carbone and Martino (2003) measure the relationship between the relevant members of Le Harve Port in Renault's supply chain through the type of contract they hold (short-term or long-term contract) or the degree of Renault Group's ownership in the relevant players. Hall and Oliver (2005) explore the inter-firm relationships between (ocean) car carriers and automobile importers by the types of ownership link, contractual link and the share of cargo carriage. In supply chain oriented maritime research, Tongzon et al. (2009) use trust, satisfaction and cooperation to evaluate the relationship between ports and their users. Lam (2013) measures the SCI level in container liner shipping by different levels of

engagement of supply chain activities, the core idea of which can be seen as different levels of cooperation. The main points arising from these studies are outlined in Table 2.4.

Table 2.4 Measurement of relationship strength in maritime logistics research

Authors	Study subject	Relationship strength measurement
Bennett & Gabriel (2001)	Seaport / seaport customer relations	Relationship closeness: trust, co-operation, commitment, relationship-specific investments
Jang et al. (2013)	Container shipping carrier / shipper relation	Relationship quality : satisfaction, trust and commitment
Lu (2003b)	Shipper / shipping carrier partnering relationship	Commitment and trust
Carbone & Martino (2003)	Relationship between the relevant members of Le Harve Port in Renault's supply chain	Type of contract holded or the degree of Renault Group's ownership
Hall and Oliver (2005)	Inter-firm relationships between (ocean) car carriers and automobile importers	Types of ownership link, contractual link
Tongzon et al. (2009)	Seaport / seaport user relations	Trust, satisfaction and cooperation
Lam (2013)	SCI level in container liner shipping	Different levels of engagement of supply chain activities

In summary, different researchers have provided a range of dimensions for this multi-dimensional construct as seen in Table 2.5. Eleven most-applied dimensions have been identified according to the above literature, which include: trust; commitment; mutuality; dependency; satisfaction; relationship investment; shared values; communications; relationship duration; flexibility and response; and cooperation.

Table 2.5 Relationship strength constructs in different fields

Construct	Marketing literature (Channel literature)									SCM & Logistics literature					Logistics and transportation literature				Maritime literature					SNA						
	Crosby et al. (1990)	Morgan & Hunt (1994)	Johnson (1999)	Donaldson and Toole (2000)	Wulf et al. (2001)	Hausman	Bove & Johnson (2001)	Hennig-Thurau et al. (2002)	Sin et al. (2005)	Palmatier et al. (2006)	Ellram & Cooper	Stank et al. (2001)	Fynes et al. (2005)	Lambert et al. (2008)	Cao & Zhang (2011)	Prajogo & Olhager (2012)	Bask (2001)	Panayides & So (2005)	Golicic & Mentzer (2006)	Golicic (2007)	Zsidisin al. (2007)	Bennett & Gabriel	Lu (2003b)	Carbone & Martino (2003)	Hall & Oliver (2005)	Tongzon et al. (2009)	Lam (2013)	Jang et al. (2013)	Lee (2005)	Carter et al. (2007)
Trust	V	V	V	V	V	V	V	V	V	V		V	V		V		V	V	V	V	V				V		V			
Commitment		V	V	V	V	V	V	V	V	V		V	V		V		V	V	V	V		V						V		
Mutuality (mutual trust, mutual goals)						V		V		V	V		V	V			V													
Dependency (solidarity)			V			V		V				V	V					V	V	V										
Satisfaction	V				V		V		V																	V		V		
Relationship Investment				V								V	V			V					V									
Shared values								V									V													
Communications (Information sharing) (Interaction frequency)				V		v		V		V	V	V	V	V	V	V	V				V	V							V	V
Relationship duration (contract length/type, ownership link)			V							V			V			V								V	V					
Flexibility and response			V	V		V					V					V					V									
Cooperation (collaboration)				V				V			V	V	V	V	V	V	V				V	V				V	V		V	

2.4.3 Discussion on the selection of measurements of relationship strength

According to the literature in Table 2.5, some trends of relationship measurement used in different fields were observed. In SNA literature, communication is the only dimension used to measure relationship strength. The measurements applied in marketing rely more on the soft dimensions such as trust, commitment and dependency, while SCM and logistics literature add in more hard-dimensional elements such as information sharing and cooperation. In the maritime transport field, relational measurements have not yet well developed and were mostly borrowed from other fields, however, relationship duration which encompasses contract length and ownership link, is a useful means of analysis in these industrial practices. Satisfaction, relationship investment and shared values are seldom applied compared with other measurements. Further, the number of dimension applied by these researchers ranges from one to eight, and the majority of them use from three to six multi-dimensional measurements to evaluate relationship strength.

It was discovered that some relationship strength measurements share the same core concept and could be merged, for example, shared values can be covered by commitment, trust and mutuality, as it means that partners share common beliefs that contributes to the development of commitment and trust (Morgan and Hunt, 1994). Mutuality can be merged into the trust dimension, as it means that the benefits and costs of the relationship are distributed equally over the long term (Boyle et al. 1992), which implies the risk and rewards are shared equally with mutual trust. Relationship-specific investments are likely to lead to high interdependence between customer and buyer (Bove and Johnson 2001; Palmatier, 2006), thus, it could be merged into dependency. Further, although satisfaction is one of the core variables in relationship quality research, whether it is an antecedent or outcome of the relationship strength is arguable (Parker and Mathews 2001). Satisfaction is also treated as interrelated rather than independent with trust and commitment (Hennig-Thurau et al. 2002), therefore, it will not be included in the relationship strength measurement in this thesis. Flexibility and response can be achieved through supply chain collaboration (Stank et al., 2001), hence, they are included into the dimension of collaboration.

In this thesis, the measurements of relationship strength are developed based on Fynes et al.'s (2005) work, who proposed that trust, adaptation, interdependence, co-operation,

communication and commitment complement and reinforce each other in terms of enhanced relationship and soundly tested them. Further, considering the business practice in the maritime industry, the relationship duration which has been applied by maritime scholars (Carbone and Martino 2003; Hall and Oliver 2005) are included in the measurements in this study. Accordingly, six dimensions have been selected to measure the relationship strength, which include: trust; commitment; relationship duration; dependency; communications and cooperation. ‘Hard’ contractual aspects and ‘soft’ relationship aspects factors are included to keep the balance of dimensions, as both of them are important for effective supply chain collaboration (Hofenk et al. 2011). These Multi-dimensional measurements allow for investigation of the individual components of relationship strength rather than one single latent relationship strength construct which prevents the risks of simplifying the complex relationship dynamic (Palmatier et al. 2006). Through these kind of measurements, it is possible to further examine the complex and in-depth inter-relationship among these multiple dimensions. Further, these measurements can be applied to both the customers and the suppliers’ point of view, which fit the purpose of this research. The details of these six dimensions will be discussed below and both of their definitions and measurements in this thesis for the questionnaire survey are presented in Table 2.6.

Table 2.6 Definition of each relationship strength dimension in this thesis

Relationship dimensions	Definition and measurement	Source
Trust	The confidence in the trading partner’s reliability and integrity, viewing trading partner as the strategic partner sharing risks and benefits	Morgan and Hunt (1994), Min et al. (2005)
Commitment	The enduring desire to maintain a valued long-term business relationship with trading partners	Morgan and Hunt (1994)
Relationship duration	The extent of the contract lengths between trading partners	Carbone and Martino (2003), Hall and Oliver (2005)
Dependency	The perception of the need of specific resources from trading partners to achieve desired goals	Johnson (1999), Hibbard et al, (2001)
Communication	The extent of interaction frequency and sharing quality information with trading partners	Anderson and Narus (1990), Lee (2005), Carter et al. (2007)
Cooperation	Coordinated, complementary and joint actions between exchange partners to achieve mutual goals; Work (planning, operating control) together to offer the best solution	Palmatier et al., (2006)

(1) **Trust:**

Trust is among the most frequently cited dimensions of supply chain relationships in the literature. Trust is conceptualized as existing when one party has confidence in an exchange partner's reliability and integrity, and defined as a willingness to rely on an exchange partner in whom one has confidence (Morgan & Hunt, 1994). It is also defined as "the firm's belief that that another company will perform actions that will result in positive actions for the firm, as well as not take unexpected actions that would result in negative outcomes for the firm" (Anderson and Narus, 1990, p. 45).

Sako (1992) distinguishes three types of trust: contractual trust (expectations that promises are kept); competence trust (confidence in a trading partner's competence to carry out a specific task); and goodwill trust (the sure feeling that trading partners possess a moral commitment to maintaining a trading relationship), and identifies goodwill trust is key to a true partnership. Min et al. (2005) note that mutual trust can provide a foundation between collaborative partners and can lead to sharing of critical market-based data. However, building trust is not easy, which comes only after the other party proves its abilities to offer solutions and also demonstrates loyalty.

For this thesis, trust follows prior research and is defined as and measured by **the confidence in the trading partner's reliability and integrity, viewing trading partner as the strategic partner sharing risks and benefits.**

(2) **Commitment:**

Morgan and Hunt (1994) state that commitment is a belief that the relationship is so important it warrants maximum efforts to maintain it. Commitment refers to the willingness of trading partners to exert effort on behalf of the relationship and suggests a future orientation in which firms attempt to build a relationship that can be sustained in the face of unanticipated problems (Gundlach et al. 1995). Geyskens et al. (1996) simplify its concept as the intention to continue the relationship. There are two components of commitment: (1) attitudinal or affective commitment, which is an enduring positive regard for the other party, and (2) instrumental or calculative commitment, which is actions or investments

taken that demonstrate a party's intention for the future of the relationship (Gundlach et al. 1995; Geyskens et al. 1996; Wetzels et al. 1998; Sollner 1999). Commitment is thus defined as the willingness to exert effort to continue the relationship (Golicic and Mentzer 2006).

Committed parties are willing to invest in transaction-specific assets, demonstrating that they can be relied upon to perform essential functions in the future (Anderson and Weitz 1992). Such investments help stabilise associations and alleviate the uncertainty of continually seeking and developing new exchange relationships. A positive correlation between commitment and partnership success was found by Mohr and Spekman (1994). Commitment can be regarded as the expectation of relationship continuity, which results in great flexibility and increase relationship quality (Johnson 1999).

In this work, trust follows prior research and is defined as and measured by **the enduring desire to maintain a valued long-term business relationship with the trading partners.**

(3) **Relationship duration:**

The duration or age of the relationship is a temporal dimension to commitment (Fynes et al. 2005). It can be defined as the length of time that the relationship between the exchange partners has existed (Anderson and Weitz 1989; Kumar et al. 1995; Doney and Cannon 1997).

Relationships of longer duration are more likely to promote strategic integration by participant firms (Johnson 1999), because they provide a more stable, familiar, adjusted and comfortable relationship situation (Anderson and Weitz 1989; Doney and Cannon 1997).

According to maritime logistics research, the type of contract between the relevant players, which can be regarded as the relationship duration, is useful for analysing relationship strength, fitting the industry practice and easily to be measured (Carbone and Martino 2003; Hall and Oliver 2005). Therefore, for the purpose of this thesis, relationship duration is defined as and measured by **the extent of the contract lengths between trading partners.**

(4) Dependence:

Dependence refers to a firm's need to maintain an exchange relationship to achieve desired goals (Frazier 1983). It can also be defined from the perspective of resource-based strategy approaches, for a firm, the inter-firm relationship can be considered in terms of the links it provides to strategically resources (Johnson 1999). For a customer, it can be illustrated as customer's evaluation of the value of seller-provided resources for which few alternatives are available from other sellers (Hibbard et al. 2001). In any dyad, both members are dependent upon the relationship to some degree. When one party is dependent upon another, that party wants to continue the relationship. However, when one party is not dependent upon the other, there is little motivation to develop a strong cooperative relationship (Ganesan 1994). Therefore, this reciprocal dependence illustrates the level of interdependence in the relationship and has important implications for interaction (Mohr and Nevin 1990). Further, empirical evidence support for the proposition that interdependence is a key dimension of effective SC relationships (Fynes et al. 2005).

El-Ansary and Stern (1972) claim that dependence between two firms is a function of three elements. Firstly, the percentage of one Firm A's business conducted with a Firm B and the proportion of Firm A's profit contributed by Firm B. Secondly, the commitment Firm A has to Firm B in terms of the latter's marketing strategies. Thirdly, the difficulty in effort and cost faced if either firm decides to exit the relationship. These ideas are often measured through importance, the number and attractiveness of alternatives, and switching (Andaleeb 1995; Ganesan 1994; Gundlach and Cadotte 1994; Heide and John 1988; Wetzels, de Ruyter, and van Birgelen 1998).

In this case of the study, dependence follows prior research and is defined as and measured by **the perception of the need of specific resources from the trading partners to achieve desired goals.**

(5) Communication:

Communication can be defined as "the formal as well as informal sharing of meaningful and timely information between firms" (Anderson and Narus 1990,

p.44). There are three aspects of communication behaviour that are important in relationships. Firstly, the quality of the communication which includes aspects such as accuracy, timeliness, adequacy and credibility. Secondly, the form of information sharing or the extent to which critical, and sometimes proprietary, information is exchanged. Thirdly, participation, or the extent to which both parties jointly engage in planning and goal setting (Mohr and Spekman 1994). Effective communication is essential for successful collaboration (Monczka et al. 1995).

In SNA research, communication usually is an important and the unidimensional measurement to describe and analyse the interrelationships of units or nodes within a network. It can be measured by frequency of contact (Lee, 2005), or the degree of interaction frequency among network members (Carter et al. 2007).

Considering more comprehensive concept of communication, the issue of number of questions noted in Section 3.7.1, and one measurement for each dimension, the interaction frequency and sharing quality information thus were combined as one measurement for communication. Consequently, communication follows prior research and is defined as and measured by **the extent of interaction frequency and sharing quality information with the trading partners** in this research. On the other hand, the 'participation' aspect is considered in the context of cooperation dimension as follows.

(6) **Cooperation:**

Cooperation can be defined as coordinated, complementary and joint actions between exchange partners to achieve mutual goals (Anderson and Narus 1990; Morgan and Hunt 1994). Coordination and joint actions can be its synonyms (Palmatier et al. 2006). From the view of supply chain collaboration, cooperation develops to coordination, and then evolves to collaboration (Spekman et al. 1998). Collaboration in business practices can be regarded as working (include planning and operating control) together to offer the best solution. Cooperation in exchange higher level information on such as production schedules, new products/processes and value analysis can both reduce product costs and improve product/process innovations (Landeros and Monczka 1989).

Cooperation encompasses the concept of collaboration and is defined as and measured by **working, planning, operating and controlling together with the trading partners to offer the best logistics solution** in this thesis.

2.4.4 Contingency perspective

This section discusses around contingency perspectives in order to show whether it is always true that the players along supply networks should keep close relationship, and what factors that could influence this relationship strength. Then, this section makes it clear why service complexity is chosen as the focus in this study.

(1) Contingent relationship management in SCM

Much business press and inter-organizational relationship literature have claimed to be beneficial for firms to build and manage closer, longer-term relationships and partnerships with suppliers and customers (Bowersox 1990; Macbeth and Ferguson 1994; Gardner et al. 1994; Skjoett-Larsen 2000; Golicic and Mentzer 2006). However, the other school suggests that not all logistics service businesses should be managed through close relational LSP provider–customer exchanges (Bask 2001; Knemeyer et al. 2003; Makukha and Gray 2004). Likewise, Hausman (2001) indicates that not all inter-organizational relationships must be strong ones, and efforts to move along the continuum of relationship strength toward a stronger end might be wasteful in certain instance. Childerhouse et al. (2011) concludes that full SCI is not commonly accepted as an ideal state for every value stream. Cox (1995) states that not all relationships should be partnerships – rather it is more a case of ‘horses for courses’ with an appropriate type of relationship being selected for a particular set of circumstances. Cooper et al. (1997) indicate that the closeness of the relationship at different points in the supply chain will differ. The most appropriate supply chains are determined by the nature of product (Fisher 1997), matching relationships should be developed by firms with their trading partners in order to provide (Bask 2001), and logistics relations need to be contingent to their environment (Mason et al. 2007).

Cannon and Perreault (1999) found that some buyer firms do not want or need close ties with all of their suppliers. Their research shows that different types of inter-organizational relationships dominate in different situations, and each relationship requires different types

and degrees of investment and produces different outcomes. One reason for this is that it is not possible to pursue partnerships with all suppliers or customers because of the too high implementation costs in terms of capital, time, and effort. Therefore, similar to maintaining a portfolio of different investments, a firm is involved in a wide range of different relationship structures with suppliers and customers (Day 2000; Mentzer et al. 2000; Lambert et al. 1996).

(2) Factors influencing relationship strength within the general management literature

There are a number of factors that may influence the relationship strength have been previously considered in the wider management literature. Palmatier et al. (2005) implies that the stronger individual relationships could positively contribute to the strength of organizational relationships from the salesman's case. Lee and Humphreys (2006) suggest that guanxi (informal interpersonal contacts) have an important role to play with regard to the management of the relationships between a buying firm and its suppliers. In addition, Park and Luo (2001) point out the importance of guanxi by suggesting that while a relationship follows successful transactions in the West, transactions often follow successful guanxi in China. They further assert that given the uncertainty and confusion in China's transition economy, firms can use guanxi as an entrepreneurial tool to bridge gaps in information and resource flows between unlinked firms and between firms and important outside stakeholders. Walder (1986) has noted that the term blat in Russia and pratik in Haiti refer to the same type of concept of guanxi. Firms use such informal interpersonal connections to facilitate business transactions, especially when the business environment is uncertain and an adequate legal system is not available (Lee and Humphreys 2006). Hence, relationship strength may be especially relevant in cases where there is a high degree of perceived risk or increased interpersonal contact (Bove and Johnson 2001).

Moore et al. (2012) identifies three mechanisms which form the business relationship strength, namely: emotional attachment (Thomson et al. 2005), structural ties (Tuli et al. 2010) and loyalty bonds (Liljander and Strandvik 1995). Attachment research in marketing has its roots in the psychological literature focusing on close relationships, which is greatly grounded in understanding emotional and physical proximity bonds between caregiver and child (e.g. Bowlby 1979; Hazan and Shaver 1994). Tuli et al. (2010) indicate that firms maintaining multiple structural ties (e.g. one firm holding equity in another) are likely to experience

greater economic benefits. Kenis and Knoke (2002) indicate that relationships with multiple value-laden ties are likely to be strong.

Fournier (1998) suggests that the bond is an important component to form a relationship, and identifies important categories of bond dimensions, such as substantive, emotional, and family. Additionally, Liljander and Strandvik (1995) conclude ten different types of bonds which can influence the relationship between customers and service providers. These bonds are legal, economic, technological, geographical, time, knowledge, social, cultural, ideological and psychological bonds (see Table 2.7). The five first bonds are contextual factors that cannot easily be influenced by the customer but can be observed and managed by the service firm. The remaining five bonds represent more positive connotations for the consumer. They are also perceptual factors, which are difficult to measure and manage by the service firm.

In addition, Palmatier et al. (2005) comment that this closer interaction between customers and sellers may make customer–seller relationships more critical for services. Anderson and Weitz (1989) state that channel researchers tend to distinguish between channel partner exchanges and direct seller–customer transactions. Exchanges between channel partners have higher levels of interdependence, require coordinated action, and rely on the prevention of opportunistic behavior. Palmatier et al. (2005) therefore remark that coordination improvements and the reduction of opportunistic behaviors through strong relationships should be more important in a channel context, which should lead to a greater impact of relational mediators on performance compared with their impact in direct exchanges.

In some prior research (e.g. Brown et al. 1995; Morgan and Hunt 1994), a committed relationship has typically been considered predominately a “monogamous” relationship – that is, the buyer in the exchange partner relationship gives most of its business to one key seller. Moore et al. (2012) criticize that this assumption is reasonable in the business-to-business domain where a limited number of suppliers and distributors are to be found. However, with service-oriented firms, consumers may have much more alternatives and utilize different providers for different needs or products. Zeithaml et al. (1985) claim that services generally are perceived as less tangible, less consistent, and more perishable, and customers and sellers are more involved in the production and consumption of services than they are for products.

Table 2.7 Different types of bonds between customers and service providers

No.	Type of bond	Examples
1	Legal bond	A contract between the customer and service provider (e.g. telephone company, cable TV,
2	Economic bond	Lack of resources may force the customer to buy a service that fits the customers budget, price reductions based on relationship
3	Technological bond	The purchase of a specific brand which requires the use of a specified dealer for repairs/maintenance and/or original spare parts from manufacturer or retailer
4	Geographical bond	Limited possibilities to buy the service from other than one or a few service providers because of distance and/or lack of transportation.
5	Time bond	A service provider may be used because of suitable business hours or because of a flexible appointment system. Customers are limited by business hours set by service providers (e.g. child care from 8-16) or employers (office hours and limited lunch hour).
6	Knowledge bond	The customer may have an established relationship with a doctor who knows the customer's medical history. A customer's relation to a bank clerk may be strong because of the clerk's knowledge about the customer's business, which facilitates the transactions. It also works the other way, so that the customer gains knowledge about the service provider (e.g. the scripts of how to behave are known to the customer, which reduces uncertainty).
7	Social bond	Social bonds exist when the customer and the service personnel know each other well, contact is easy, there is mutual trust (services can be handled by phoning the bank, the customer does not have to go there personally).
8	Cultural bond	Customers may identify themselves with a subculture (e.g. language, country) and therefore relate more strongly to certain companies or products made by certain countries
9	Ideological bond	Customers may be inclined to prefer some service providers because of certain personal values (e.g. green products, avoiding companies that exploit the nature, support home country products)
10	Psychological bond	The customer is convinced of the superiority of a certain service provider (brand image)

(source: Liljander and Strandvik 1995)

(3) Factors influencing relationship strength within SCM and logistics literature

Cooper et al. (1997) suggest that the level of the supply relationships need to be managed depends on several factors, such as the complexity of the product, the number of available

suppliers, and the availability of raw materials. More partnership characteristics will probably be exhibited with key suppliers or customers. On the other hand, critical components may need closer management further up the channel to avoid shutting down production lines. Likewise, from a logistics service provider's perspective, the relationship with the customer is influenced by whether the customer will be a preferred customer, whether the logistics service provider aims to extend the business with the customer, whether process integration will have positive outcomes, or whether joint projects will be initiated at the logistics service provider–customer interface (e.g. Knemeyer and Murphy 2005; Panayides and So 2005; Skjoett-Larsen 2000).

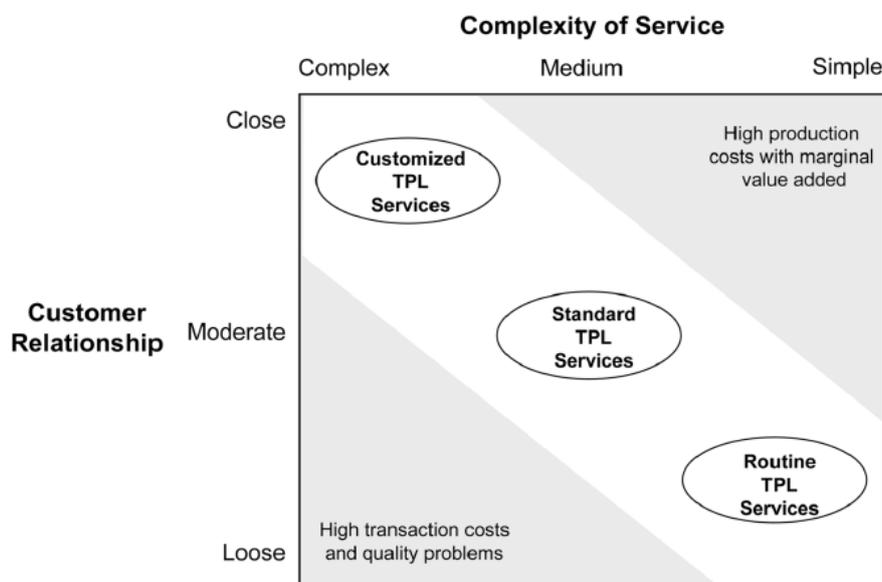
Full SCI is not commonly accepted as an ideal state for every value stream (Childerhouse et al. 2011). For example, van Donk and van der Vaart (2005) argue that integrative practices should be more fully exploited during circumstances of high demand uncertainty. Similarly, de Treville et al. (2004) conclude that integration can be limited to physical flow and stock management when customer demand is relatively certain. Cox (2001) indicates that not every relationship should be fully integrated and involve partnerships, but rather the relationship type should be matched to the level of supplier and customer dependency.

Service (or product) complexity is one of the contingent factors which is increasingly considered in the SCM and logistics study. Fisher (1997) suggests before devising a supply chain, the nature of the demand for the products need to be considered. An ideal supply chain strategy model was devised by him, which shows matching supply chains with products, namely: functional products require an efficient process and innovative products need a responsive process. In terms of such matching relationships, the contingency approach to logistics, through identifying the most appropriate supply chain for different products with different market characteristics, has been accepted in the literature.

Bask (2001) indicates that in order to offer services more effectively and efficiently to meet the different needs of cargo owners and different types of supply chains, the LSP needs to develop matching inter-business relationships with supply chain and industrial network partners. She distinguishes three types of efficient service relationships (see Figure 2.4): routine service, standard service and customized. While a loose customer relationship fits a simple type of service characterised as routine services, a close relationship fits a complex

type of service characterised as customised services. The intermediate type of service is entitled standard services.

Bask's (2001) approach has been applied successfully in general transport and logistics. Naim et al. (2006) developed three logistics service types in terms of their flexibility, and highlight the contingency of collaboration approaches to relationships between carrier, supplier and customer in a steel supply chain. They also argue that the degree of collaboration is actually dependent on the type of supply chain (efficient versus responsive) and the type of competitive outcome sought.



(source : Bask 2001)

Figure 2.4 Service matrix

To sum up, according to the view of contingency perspective, relationships between relevant firms do not need to be coordinated or integrated closely through the supply network. There is no one relationship that is appropriate or necessary for all, and the most appropriate supply network relationships is the one that best fits the specific set of circumstances. According to literature, there are a number of factors which could influence the relationship strength in supply networks, including: interpersonal relationships; emotional attachment; loyalty bonds between customers and service providers; the strategic role of the suppliers or customers in the network; firm's capabilities, level of dependency between networks players; and the complexity of products/services and so on.

Contingency perspective in maritime logistics

There is little research looking at maritime logistics from a contingency perspective. Heaver (2006) is one of the few scholars who addresses a contingency consideration in the liner shipping. He indicates that the elements of a logistics service may be conceived in different ways. Difference may be a result of different types of business and processes or they may be product of different visions, histories and preferences. The shipping function by its nature is not as tightly bound to other logistics activities, as may be trucking or air transport. The length and uncertainty of time involved in the movement of goods by sea prevents such tight integration of transport and logistics operation. Evangelista and Morvillo (2000) demonstrate a descriptive model of the various forms of cooperative relations undertaken by shipping lines, in order to identify different types of strategic behaviour. They conclude that shipping lines respond to the needs of service differentiation through more or less broad levels of integration among partners.

Literature in maritime logistics still treats container shipping as a homogenous sector without the awareness that different factors, such as service complexity (e.g. dry cargo, refer cargo and project cargo) could lead to different relationship strengths between logistics partners (Lam et al 2012; Panayides and Song 2013). Based on the contingent-fashion research of SCM and logistics (Bask 2001; Naim et al. 2006), Lagoudis et al. (2010) identify four different types of ocean transportation which include liquid market, dry market, container market and ferry market, and conclude that shipping carriers have to be responsive to a range of different customer demands. The above-mentioned points encourage this research to further explore more contingency factors which may affect relationship strength in the maritime logistics networks, leading to the next main research question:

RQ 2: What factors influence the inter-organizational relationship structure in maritime logistics networks?

On the other hand, comparing with all the other factors which are well studied in supply relationships, Benedettini and Neely (2012) indicate that very limited attempts have been made at either conceptually or empirically substantiating the classifications between simple and complex services, not to mention the influences it could have on relationship strength. In

addition, Aarikka-Stenroos and Jaakkola (2012) indicate that complex exchange and collaboration is of critical importance in value co-creation, but the mutual processes of value co-creation have seldom been empirically studied. For that reason, 'complexity of service' is particularly chosen as the focus to be further explored how it can affect the relationship strength and create value in this thesis, and will be discussed in the next section.

2.5 Service complexity

The purpose of this section is to provide the meaning of service complexity in service contexts, measurement of service complexity provided by the prior literature, and the application of the measurement in this thesis.

2.5.1 Conceptualisation of service complexity

In regard to the generic meaning of complexity, it is a feasible starting point to look in a dictionary. The Oxford English Dictionary defines 'complex' as something (i) 'Consisting of many different and connected parts (e.g. a complex network of water channels)' or (ii) 'Not easy to analyse or understand; complicated or intricate (e.g. a complex personality)'. Based on this perspective, literature demonstrate several definitions of complexity. Jacobs (2008) eventually identifies complexity as a property that stems from the characteristics of multiplicity (high number of components) and relatedness (high degree of interconnection between components). Wang and Tunzelmann (2000) and Özman (2007) advise that complexity is revealed by breadth and depth properties. While breadth complexity is the case of a subject that involves many different areas, depth complexity refers to a subject that is analytically sophisticated.

Based on the conceptualisations of complexity introduced above, Benedettini and Neely (2012) established a parameter for analysing the practical dimensions of service complexity: complicatedness and difficulty. Complicatedness was defined as embodying both properties of multiplicity and relatedness discussed by Jacobs (2008). Complicatedness may lead to difficulty, which includes, but is not limited to, difficulty in understanding and sophistication. Difficulty was associated with significant material or immaterial resources being required/employed in order to achieve a desired outcome. In addition, difficulty was also intended to reflect uncertainty, which was defined in the framework as inability to predict

accurately or rely on something. Difficulty is not necessarily a function of complicatedness in line with the assumption of Wang and Tunzelmann (2000) and Özman (2007) approach. In this regard, in the interest of avoiding overlaps between types of complexity, Benedettini and Neely (2012) prioritised complicatedness over difficulty – e.g. in those instances when difficulty is a reflection of complicatedness, the relevant property had to be only complicatedness.

There are few studies obviously looking at the relevance between service complexity and relationship strength. Bask (2001) suggests a matching relationship strategy in which the firms only need to keep close relationship with the customers when offering complex service in order to work more effectively and efficiently. However, her work doesn't really test this concept empirically. Therefore, the following main research question is investigated:

RQ 3: What is the connection between the service complexity and inter-organizational relationship strength in maritime logistics networks?

More specifically, does more customized logistics service cause closer relationship among main players in maritime logistics networks in different dimensions of relationship strength, and from different main players' views? With the purpose of dealing with this research question, **the way how service complexity in maritime logistics context could be measured should be studied**, and discussed in the following sections.

2.5.2 Measurement of service complexity

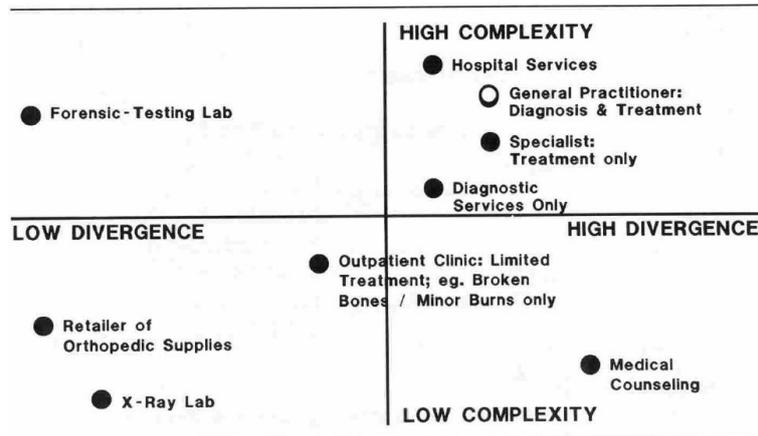
There is little literature explicitly looking at the service complexity measurement issue. Several researchers explore service complexity topic from the perspective of service classification (e.g. Bowen, 1990), service positioning or service strategies (e.g. Shostack 1987). For example, Bowen (1990) classifies services into three distinct groups:

- (1) High contact customized service: High contact customized service providers, such as beauticians and family physicians, are extremely important to consumers because they offer unique services. Employee knowledge and attitudes are most critical in providing satisfactory service for these providers, since each client customizes the service experience (Jones et al. 2003).

- (2) Moderate contact non-personal service: this kind of service providers can include: for example, a dry cleaner; laundry mat or film processor, offering services directed at customer's property. Consumers still perceive that they control the creation of the service offering, such as picture sizes or photo finishes at a film-processing centre. For such providers, it is important that employees are knowledgeable about service offerings and have a positive attitude toward the company and its customers.
- (3) Moderate contact standardized service: fast-food restaurants, hotels and movie theatres are classified as moderate contact standardized services. Consumers typically perceive these services to be more standardized and find it difficult to differentiate offerings between service providers. Employees should be well trained and efficient, as consumers are more concerned with the speed, consistency, and price savings related to the service offering rather than employee knowledge and attitude.

Ward and Dagger (2007) also determine different types of service by the level of involvement. Five different services were presumed as three different groups according to their involvement, which include high involvement services (doctor and hairdresser), medium involvement (bank) and low involvement (electricity supplier and cinema).

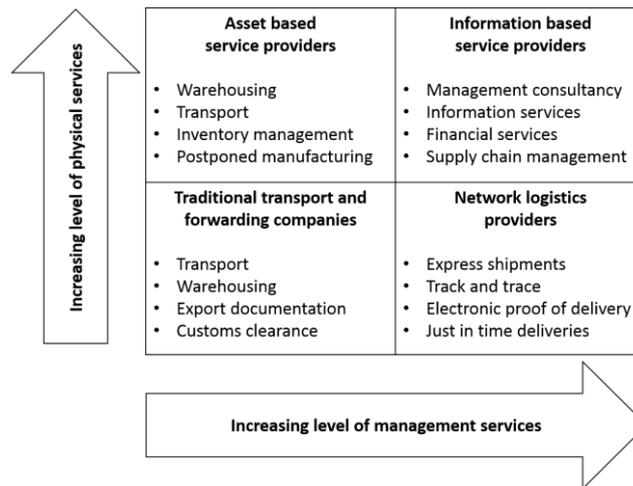
Shostack (1987) suggests two ways to describe the service process which includes complexity and divergence. Service's complexity is analysed by the number and intricacy of the steps required to perform it, which means the more complex service, the more functions and more steps it will involve. The degree of freedom allowed or inherent in a process step or sequence can be thought of as its divergence, which means a highly divergent service would provide a unique service process, while a service of low divergence would be one that is largely standardized. He illustrates this concept by showing the relative structural positions held by a number of medical service providers (see Figure 2.5).



(source: Shostack, 1987)

Figure 2.5 Relative positions based on service complexity & divergence

In the logistics field, Berglund et al. (1999) develop a useful typology to categorise different types of 3PL, depending upon both the different level of management services they provide and the assets that they own (see Figure 2.6).

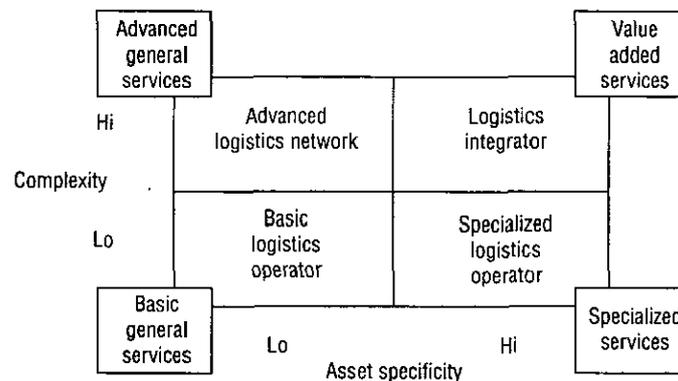


(source: Adapted from Berglund et al. 1999)

Figure 2.6 Typology of logistics services

Asset based logistics service providers were typical of early players that appeared from the late 1970s. Owning assets such as trucks, containers and warehouses, they expanded their core business to offer wider logistics services (Potter and Mason 2015). Likewise, Persson and Virum (2001) demonstrate different types of logistics service providers by service complexity and asset specificity. Advanced services stand for high complexity, while general services mean low complexity (see Figure 2.7). However, the detailed content of each type of service

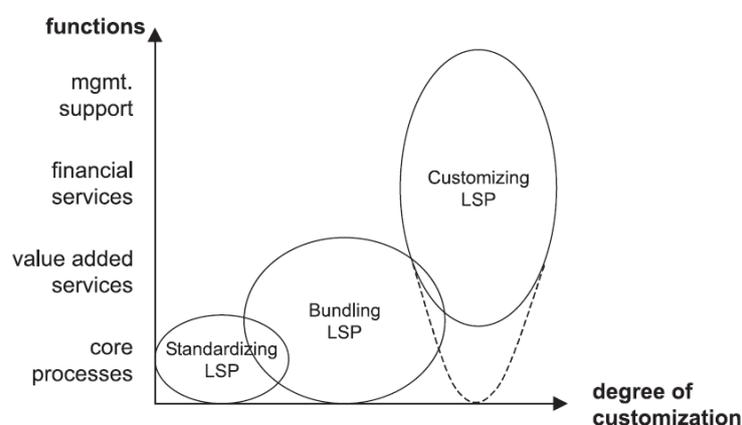
complexity has not been presented, which make it difficult to turn into the workable measurement.



(source: Persson and Virum, 2001)

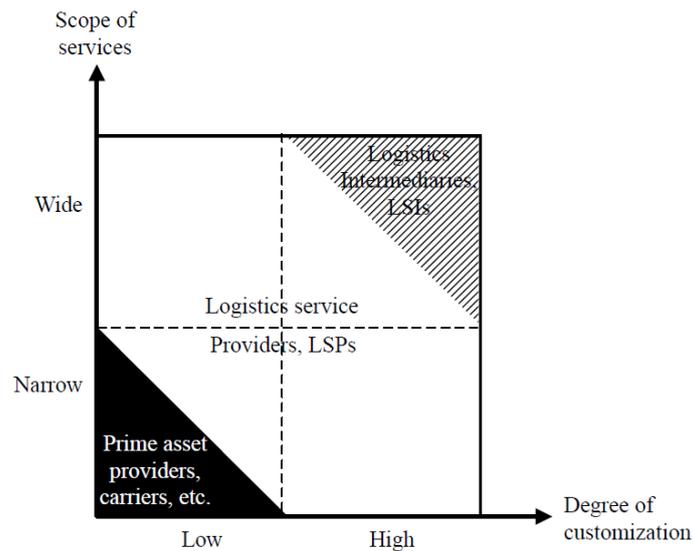
Figure 2.7 Different types of logistics service providers

Further, Delfmann et al. (2002) clusters logistics service into three different categories, standardized, bundled and customized service, based on the degree of customisation and scope of functions provided (see Figure 2.8). Similarly, Stefansson (2006) suggests three types of logistics service provision according to the degree of customisation and the scope of the service provision. Figure 2.9 shows the general relation between the types of service and the degree of customisation, and positions the different LSPs' nature of service provision. Based on Stefansson's (2006) suggestion, third-party service providers should be regarded as three different types: carrier; LSP (logistics service providers) and LSI (logistics service intermediaries) according to the level of their assets ownership, scope of service and degree of customization they offer.



(source: Delfmann, 2002)

Figure 2.8 LSP cluster



(source: Stefansson, 2006)

Figure 2.9 Customization of third-party services

Bask (2001) addresses a point that keeping matching customer relationship in line with equivalent complexity of service can achieve efficient relationships. She introduces three types of service, namely routine, standard and customized service, according to the degree of complexity. The further explanation of these services is presented below.

- (1) **Routine services** are simple services that do not contain any specific arrangements. The reasoning behind routine services is economies of scale and the services are volume-based. These operations include all types of basic transportation and warehousing services. Often the most important reasons in decision making are competitive price, ease of service procurement, reliability and requested transport time.
- (2) **Standard service** contains some easy customized types of operations. The rationale behind routine services is economies of scale and scope. An example of a standard service is transportation with a terminal service such as sorting products out by customer needs. This requires closer co-operation and co-ordination of operations with the third party logistics (TPL) providers than what should be done in the routine service. A standard service also includes, for example, special transportation where products need to be cooled, heated or moved in tanker trucks.
- (3) **Customized service** relationships are in their closest form. Close partnerships with open information are often needed. An increasing level of customization increases the

possibilities that customers have to influence services “output” and services flexibility. The rationale behind the offer of customized services is economies of scope. There are often only a few, or there may be just one service provider, co-operating with sellers and buyers. This type of service often causes high transaction costs because of investments in IT systems, information flows, co-ordination of work, joint planning, or other resources, to name but a few.

Kallio et al. (2000) use a similar categorisation as Bask (2001) to distinguish three types of delivery process (routine, normal, and custom process), and develop a performance measurement system that enables the different objectives of divergent distribution channels to be met. Based on Bask’s (2001) research, Naim et al. (2006) add more elements to describe these three logistics types in terms of their flexibility, collaboration and information sharing characteristics in the land transport context. The higher service complexity, the more service flexibility, collaboration and information sharing are needed. This framework was later applied in the maritime context by Lagoudis et al. (2010) to examine the ocean shipping carriers’ strategic choices. In addition, Marlow and Paixão (2003) exert above Kallio et al.’s (2000) concept to measure ports performance. They develop a conceptual framework for PM and highlight the importance of port management deciding whether to offer a routine, normal or customised service in determining the importance of these metrics.

To sum up, if you look across all three above figures, service complexity depends on the level of customisation, broader scope of services and asset specificity.

2.5.3 Discussion on measuring service complexity in the thesis

According to the above discussion, the descriptive classifications instead of the quantitative scales are usually applied to the measurement of service complexity. The criteria of these categories are mainly based on the involvement of service providers, scope of service steps, functions and degree of customization. This thesis uses the concepts developed by Bask’s (2001), Naim et al. (2006) and Lagoudis et al. (2010) to conduct the research, as these works provide more clear statements for each type of service complexity in the logistics and transport context. Moreover, this concept is adapted in line with the maritime logistics context in order to represent the different service complexity to fit the research purpose (see Table 2.8).

Table 2.8 Three service types corresponding to service complexity

	Literature content (Bask 2001; Naim et al. 2006; Lagoudis et al. 2010)	Maritime context
Routine service	There are limited flexibility requirements, and merely provides for the carriage of goods involving a single mode of transport.	Simple services that do not contain any specific arrangements, and include all types of basic transportation, warehousing services and cargo handling, e.g. dry cargo transport.
Standard service	There is some degree of customisation, for example by providing transport for specialist products on dedicated vehicles, or by using more than one mode of transport.	Services which contain some easily customized types of operations. Examples of standard service are special transportation, warehousing services and cargo handling, where products need to be cooled, heated or dealt by the specific equipment, e.g. reefer cargo transport; and transportation with a terminal service such as sorting products out by customer needs.
Customized service	A fully-customised service is provided and the full range of flexibility types is offered. As well as some of the routine and standard features mentioned above various other services may be provided such as: warehouse provision and its management, inventory control and ordering, product tracking and value-adding activities.	An increasing level of customization increases the possibilities that customers have to influence services "output" and services flexibility. This type of service often causes high transaction costs because of investments in IT systems, information flows, co-ordination of work, joint planning, or other resources and so on, e.g. project cargo transport, final assembly, consultation.

2.6 Value in supply chain and logistics

The terms 'value' and 'value add' have long been a salient vocabulary in management (Neap and Celik 1999), and the concept of value is also vital to SCM. Under various types of academic disciplines, value appears to have different meanings. This thesis will focus on the value in the supply chain relationship, logistics service and maritime logistics context, and will discuss from the wider management context.

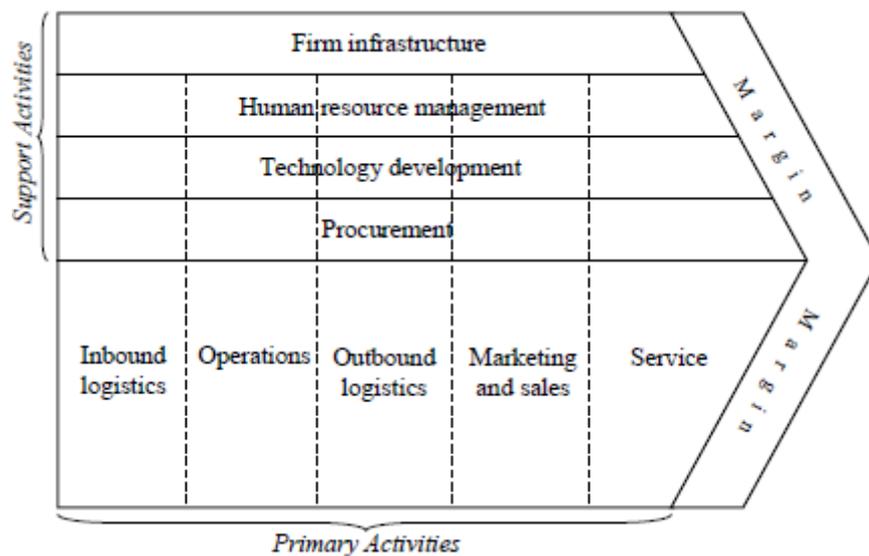
2.6.1 Conceptualisation of value

Regarding to the concept of value in literature, Fisher et al. (2012) have a comprehensive review as following. Value as a subject matter has a long lineage of study across a number of social science disciplines; most notably Philosophy, Sociology and Economics. The earliest conceptions of value can be traced to Philosophy, and particularly its sub-disciplines of Ethics (morality and the principles of right and evil conduct) and Axiology (the nature of values and value judgements). In Sociology, the Value Theory has been a theme of study of the personal values that are held by different social communities, and how those values are modified under different influencing conditions. Value Theory in these disciplines could be considered the collective term for the various conceptions developed by academics to aid understanding of what, and to what extent, items are valued by different stakeholders and groups under different circumstances.

Vargo et al (2008) state that the creation of value is the core purpose and central process of economic exchange. Traditional models of value creation focus on the firm's output and price. Fisher et al. (2012) further indicate that a number of theories of value have been developed within Economics to explain the exchange value (price) of a good or service, whereby value is linked to price via the mechanism of exchange between a buyer and a seller. Such theories can be divided into two categories. In summary then, such theorising within Economics has developed a useful and specifically defined vocabularies of value. It also provides a further useful distinction between value in exchange (e.g. price) and value in use (e.g. utility), whereas value added (per unit) is defined as the sale price of that good/service minus its production cost. Also, Payne and Holt (2001) claim that the concept of value evolved from exchange, utility and labour value theories in the context of economics.

Vargo et al (2008) present an alternative perspective. They argue that value is fundamentally derived and determined in use – the integration and application of resources in a specific context – rather than in exchange – embedded in firm output and captured by price. Similarly, some scholars look at the concept of value evolved from the service and retail marketing (Ravald and Grönroos 1996; Woodruff 1997). By the outsourcing trend, the supply chain has been regarded as the value chain, in which value is created not just by the focal firm, but by all the entities that connect to each other in a network (Christopher 2005).

Fisher et al. (2012) suggest that perhaps the most widely conveyed and influential invocation of the concept of value within the general management literature has been Michael Porter's (1985) Value Chain Analysis (VCA) model. From the perspective of competitive advantage of a firm, Porter (1985) suggests two ways to demonstrate value. Firstly, value can be perceived as the amount of cost that buyers are willing to pay for a firm's 'output' in yielding its competitive advantage. Secondly, value is created through a value chain encompassing nine separate activities. Within these activities, inbound logistics, operations, outbound logistics, marketing & sales and service are regarded as the five primary ones (see Figure 2.10). Thus, Fisher et al. (2012) note that Porter's conception of customer value is the perceived stream of benefits that accrue from obtaining and using that product or service. Value is measured by total revenue, which is a reflection of the price a firm's products command in the marketplace and the number of units sold. Porter's conception of value includes both value in exchange and value in use, and is rooted in the Economics conception of the Utility Theory of Value.



(source: Porter 1985)

Figure 2.10 Generic value chain

Furthermore, there are the other descriptions of value (or added value) in the business context. According to the official definition of value by Chartered Institute of Marketing (2012), Added value is defined as 'The increase in worth of a product or service as a result of a particular activity - in the context of marketing, the activity might be packaging or branding'. On the other hand, Chartered Institute of Purchasing & Supply (2000) defines value added as

'The increase in realisable value resulting from an alteration in form, location or availability of a product or service, excluding the cost of the purchased materials and services'. Value is defined by consumers as: whatever they want in a product, what they get for the price they pay, and what they get for what they give (Zeithaml 1988, p. 13). Value is an evaluation of the benefits received versus the costs that were paid to obtain the benefits (Monroe 1990). Likewise, value is a trade-off between a customer's evaluation of the benefits and costs (Novack et al. 1995). Golicic and Mentzer (2006) summarize these into an overall assessment of the utility of a product based on perceptions of what is received and what is given.

Payne and Holt (1999) indicate that the previous perspectives are largely customer-centric approaches, and the developments show the need for a broader approach to value creation and delivery, which should also consider about the stakeholder value and relationship value. For example, Lindgreen et al. (2009) state that from service suppliers' perspective, value is seeking better value for money and lower overall operating costs.

2.6.2 Relationship value

Relationship value is defined as the perception of benefits received versus costs sacrificed from the relationship (Golicic and Mentzer 2006). There is an agreement in the literature that value is an outcome of the structure or type of relationship (Barringer and Harrison 2000; Nevin 1995; Nooteboom 1999; Stern, El-Ansary, and Coughlan 1996). This was supported by Palmatier et al. (2006) through a meta-analysis of 17 years of relationship marketing research. Golicic and Mentzer (2006) present the united position through empirical testing by survey, but highlight the fact that this positive association may vary under different conditions.

Doz and Hamel (1998) state that inter-organizational relationships help firms create value by sharing resources, sharing knowledge, and gaining access to markets. Gentry (1996) states that closer relationships between suppliers, buyers and carriers in the supply chain (e.g. logistics triads) lead to operating improvements that can increase the likelihood of maximizing supply chain efficiency and improve the competitive position of the entire supply chain in the marketplace.

However, while practitioners consider the trade-off between benefits and costs when evaluating different relationships, there is not necessary a positive correlation between value

and the structure of the relationship. In some cases, collaboration within the supply chain would not create any further added value or benefit (Lambert and Burduglu 2000; Horvath 2001). According to the interviews conducted by Novack et al. (1995), some interviewees argue that they do not get the most value from their closest alliance but from what they considered to be a lower level of relationship, as a cost along with the commitment of additional resources, the decrease in leverage over the other party, information security, and other risks. These counterintuitive points may be explained by Cannon and Perreault (1999) and Cox's (2001) comment which suggests that firms do not always purposefully structure their relationships and rarely measure the value of their relationships, therefore, they do not always know if they are getting value from their relationships. Moreover, Barratt (2004) provides another point of view that integration at an operational and tactical level can deliver significant benefits, although it is not clear as to the impact of gaps in the strategic levels of integration.

Golicic and Mentzer's (2006) survey data demonstrated that higher levels of relationship type result in the perception of higher value and lower levels of relationship type result in lower value, however closer examination of this is needed in future research to determine whether this positive correlation holds true under all relationship conditions.

On the other hand, Kinard and Capella (2006) empirically explored the impact of consumer involvement on perceived relational benefits across various service types and concluded that greater benefits are perceived by customers when they are engaged in a relationship with a high contact, customized service versus a more standardized, moderate contact service. This is an interesting point worth further exploring in the maritime logistics context in this theses.

2.6.3 Logistics service value

As discussed in the section 2.6.1, logistics plays an important role in the value creation in Porter's (1985) VCA model. Rushton et al. (2004) state that the traditional view has been that the functions within logistics are merely a cost burden to be minimised regardless of any other implications' (p.10), but that the different elements of logistics could add value to a product as it is made and distributed to the final user, and should not be conceived merely as adding cost. Thus, Researchers in the field of logistics seek to identify what value is created by logistics (Mentzer et al. 1997; Rutner and Langley, Jr. 2000).

Through a comprehensive review of logistics value, Mentzer et al. (1997) conclude that a subtle definition of logistics value has been just as difficult to define as the term 'logistics'. They indicate that the cognition of value between cargo owners and MLSPs may be different, as three different themes can create logistics value, which include customer service, cost/profit and quality. Likewise, Wang et al. (2008) also suggest that the concept of total customer value is complicated and includes four main categories, namely service, quality, lead time and cost. In the recent literature review study (Fisher et al. 2012), the issue of ill-defined 'value' within the logistics and operations management area is still reported. Definitions of logistics value vary from one firm or customer to the next, based on types of industries and their responses to identification of key operational components (Mentzer et al. 1997; Rutner and Langley Jr 2000).

According to Rutner and Langley Jr (2000), logistics service value (LSV) has been defined as "meeting customer service requirements while minimising supply chain costs and maximising partners' profits. Lambert and Burduroglu (2000) indicate that LSV which focuses on customer satisfaction was originally developed in the marketing literature, and expect customer value are measured by perceived benefits over perceived sacrifice. Moreover, value are added whenever an activity in essential, and logistics value is created through time and place utility, which implies that if goods or services do not arrive at the right time or at the right place, no value will be created. When applied correctly, logistics service can also add additional value to the manufacturing process (Shen and Chou 2010; Vermeulen 1993).

While it is critical to measure value from the customer's perspective (Lambert and Burduroglu, 2000), it is important to investigate the value that suppliers can experience (Smals and Smits 2012). For customer's perspective, Mentzer, et al. (1997) indicate that LSV is an important component of customer service, which provides competitive advantage in the market place. Their study identifies three key themes, namely: customer service; cost/profit and quality can create logistics value. For firms' perspective, Kent and Flint (1997) suggest that logistics has been a key source of strategic advantage for firms. Firms are encouraged to understand the importance of material flow integration and how it is linked to value creation, as a part of the firm's objective. In order to create value, it is crucial for service providers to match the requirements of customers with their capability to provide service.

Recent studies have showed the trend that behavioural oriented supply chain relationship and collaboration have compelled logistics service providers to venture new intrusion into their offerings to create value-added benefits (Li 2011). In addition, the logistics performance is maximised when all of the logistics activities are performed in a highly integrated manner (O'Leary-Kelly and Flores 2002). Therefore, the value generated from supply chain relationship and logistics service seems to merge.

2.6.4 Value in maritime logistics

Based on the idea from marketing (Anderson and Narus 1991), Song and Lee (2012) indicate maritime logistics value can be created when customers of maritime operators perceive the service as valuable enough to willingly purchase. The more the customers are satisfied with the service, the higher the maritime logistics value. Accordingly, maritime logistics value can be defined as the extent to which the maritime logistics system responds to the customer demands through successfully managing the flow of goods, service, and information in maritime logistics. They further report that maximising maritime logistics value has recently become a significant strategic issue that maritime operators need to consider in their operation. Panayides (2006) addresses two key questions include how companies add value in maritime logistics context and what are the characteristics of those organisations that can add higher value. Some implications of maritime logistics value from different perspective are presented as below.

Robinson (2002) suggests that as members in the supply chain, ports must deliver value to shippers and third party service providers, and capture value for themselves and the chain in which they are embedded, because the competition takes place to between different value chains rather than individual ports. Weston and Robinson (2008) argues that members in the port-oriented freight system should realize the trend of value migration (from sea) to landside in order to play a system integrator and capture value in this supply chain. Robinson (2010) further argues that the new imperative for ports and port owners, as well as for shipping actors, is to define and implement strategies for delivering value into, and appropriate value from, supply chains in which the port or shipping actor are embedded.

In terms of shipping carriers' perspective, Lam (2013) examines the relationship between the level of supply chain integration and supply chain value in liner shipping. She found in general

that the level of SCI is positively related to supply chain value, and customer service is the most significant area in contributing to the total supply chain. This work is a rare one which attempts to measure value in the maritime logistics network to date.

In terms of obtaining value from the SCI in maritime logistics networks, Heaver (2001) suggests that the balance between advantages and disadvantages of the integration with trading partners vary among regions and industries and with the condition and characteristics of particular firms. Adolf (2012) points out that firms looking for value from integration strategies in maritime logistics networks, should consider about the following points: (a) whether additional savings could cover the extra costs triggered; (b) possible reduction in flexibility due to higher switching cost; (c) the possibility of a longer and more complicated decision-making process; and (d) the possible organizational complexity and different management cultures between different firms. Further, Robinson (2005) recognises that value generation from different players should go through a specific function or procedure, for example, the value in ports migrates towards functional integration with landside logistics markets.

2.6.5 The relevance between service complexity and value creation

There is little research explicitly comparing the value creation by different degree of service complexity, but more research implies the complex business exchange could create value. Wikström (1996) indicates that dynamic company-consumer interaction occurs when solving a complex problem, by which value will be created. Because this interactive learning between company and consumer enhances the innovative capability of the producer and the competence of the user (Lundwall 1993, p.56). Aarikka-Stenroos and Jaakkola (2012) depict value co-creation occurring through knowledge intensive business services which is mainly a dyadic problem solving process, comprising activities such as diagnosing needs, designing and producing solutions, organizing the process and resources, managing value conflicts, and implementing the solution.

Several researchers also point out that value creation arises from a process of complex exchange in business. For example, Nordin and Kowalkowski (2010) indicate that across industries and markets, firm marketing products and services are increasing offering 'solutions', to enhance the potential for value-creation and thereby improve competitiveness and profitability. They describe solutions, which are included integrated solutions, business

solutions, full services, and customer solutions. Likewise, Foote et al. (2001) point out that high-value solutions are intended to solve a complete customer problem. Davies et al. (2007) define high-value integrated solutions as tailored combinations of products and services that address the specific needs of large business and government customers. The wide scale and scope of these offerings seem to distinguish such complex solutions from offerings of a lower value. In addition, for solutions, the provider's charges are often based more on the customer's value-in-use than on the monetary exchange value (Nordin and Kowalkowski 2010). Vargo and Lusch (2004) argue the normative marketing goal should be customization and the maximization of customer involvement in the creation of value. These all more or less denote that complex exchange could bring about higher value or more added value.

The importance of identifying the relevance between service complexity and value creation has been recognized. Aarikka-Stenroos and Jaakkola (2012) suggest that understanding such relevance can assist as a managerial tool to determine critical resources and roles for suppliers and customers, facilitate joint activities, and optimize resource utilization. Lindgreen et al. (2009) state that a cornerstone of offering high-tech, innovative products is to pinpoint, determine, and develop appropriate value elements from the perspective of customers (Anderson and Narus 1999; Doyle 2000; Möller 2006). The identification of value elements subsequently enables the manufacturer to determine and develop appropriate products of which services and relationships could be important elements (Walter et al. 2001; Lindgreen and Wynstra 2005; Ulaga and Eggert 2006; Tuli et al. 2010).

In summary, bringing about value through complex exchange in business context has been recognized conceptually, however, empirical tests have not been frequently conducted, especially through the comparison of value perceived from different degree of service complexity and from different stakeholders' perspectives. Therefore, the final main research question is proposed:

RQ 4: What is the connection between the service complexity and value perceived in maritime logistics networks?

Accordingly, this research question should be addressed from the respective views of each main player which includes both customers and suppliers. More specifically, the author would

like to examine **whether more customized service create more value from different main players' views in maritime logistics networks**. Furthermore, the distribution of value generated from different links is significant for managerial implication, but has remained largely unexplored in maritime logistics networks. So does the unclear situation of the change of the value generation by different service complexity from different links between main players. Consequently, a sub-question about **what is the distribution of the value generated from different links in line with different service complexity in maritime logistics networks** needs to be addressed as well. On the other hand, while the positive relevance between the level of SCI and value generated is identified conceptually, the empirical evidence is still limited to date (Lam 2013). Thus, the other sub-questions will be examined in the maritime logistics context: **what is the correlation between service complexity and the degree of SCI in maritime logistics networks?** And followed by **what is the correlation between degree of SCI and value generation in maritime logistics networks?**

2.6.6 Discussion on the measurement of value in maritime logistics network

There exist various conceptualisations of what makes-up 'value' in maritime logistics networks, but the research attempting to measure value in this network is still limited to date. A quantifying measurement scale of 'value' is needed to examine empirically a number of permutations including the contributions of value to supply chain performance as well as the relationship between value and issues pertaining to port governance and port characteristics. In addition, with the quantification of value there would be scope for ranking and comparing value network (Panayides 2006).

There are two studies suggesting the ways to measure the maritime logistics value. First, as today's customers expect maritime logistics operators to provide a more efficient and effective service (Lai et al. 2002; O'Leary-Kelly and Flores 2002; Baudin 2004), therefore, Song and Lee (2012) suggest that maritime logistics value can be reflected in the operational efficiency and effectiveness of the maritime services offered. Logistics efficiency depends on how an organisation can provide their service with lower costs and shorter time, and the service effectiveness may be reflected in how the organisation delivers the goods in a more flexible, responsive, and reliable manner. Second, Lam (2013) regards supply chain value as supply chain surplus, which is the difference between the revenue generated from the

customer and the overall cost across the supply chain (Nagurney 2006; Chopra and Meindl 2007). However, it is difficult for most firms to measure this, due to the complexity of isolating the costs and benefits specific to a relationship or link (Golicic and Mentzer 2006).

As the measurements of maritime logistics value have not been well developed, there is a need for applying the measurement from other fields. According to literature discussed above, the concept of logistics value is complicated, and some of the measurements could be too complicated to participants for the research. Thus, the most straight-forward determinant of value, which is the difference between perceived benefits and perceived cost were applied to be the measurement in the research. This concept has been used as an effective measurement of relationship value by some researchers (e.g. Golicic and Mentzer 2006; Ulaga and Eggert 2006). In addition, this measurement can evaluate the perception of value from both the customers' and the suppliers' point of view, which can fit well the research purpose in hand. Therefore, this thesis will adopt Golicic and Mentzer's (2006) measurement (see Table 2.9).

Table 2.9 Measurement of value in logistics and maritime research

Literature	Subject measured	Measurement methods
Golicic and Mentzer (2006)	Relationship value: the perception of benefits received versus costs sacrificed from the relationship	<ol style="list-style-type: none"> 1. My firm receives a great deal of benefits from the relationship with the provider. 2. The costs to my firm for the relationship with the provider do not justify the benefits we receive. 3. My firm receives a great deal of benefits from the relationship with the provider. 4. My firm gets a lot of value from the relationship with the provider
Song and Lee (2012)	Maritime logistics value: operational efficiency and effectiveness of the maritime services offered	No specific content
Lam (2013)	Supply chain value (supply chain surplus): the difference between the revenue generated from the customer and the overall cost across the supply chain	No specific content

2.7 Relationship structure in maritime logistics networks

Based on the key concepts from generic SCM and logistics area introduced in the above sections, the main players, different levels of relationships structure and contingency considerations in the maritime logistics should be identified in the context of maritime logistics in the coming sections. By doing so, the research frame will be established and the research questions will be addressed.

2.7.1 Main players in maritime logistics

The composition of main players in maritime logistics varies from different perspectives, this feature is outlined in Table 2.10. From shipping carriers' view, Carbone and De Martino (2003) indicate that shipping and ports are a vital component in linking international supply chains, providing the backbone to distribution networks as a natural transshipment site. Lam (2013) suggests that in ocean shipment, cargo owners, carriers and port/terminal operators are major members in the chain. From ports' view, Robinson (2002) suggests that ports are elements embedded in a value-driven chain system and it is important for the port and its partners to offer greater value to their users compared to other competing chains. Main players in maritime logistics are determined by ports themselves and who are ports' important clients (Woo et al. 2011a) which are shipping companies, freight forwarders and cargo owners in sequence. While the maritime literature emphasizes the crucial role in the supply chain, Pettit and Beresford (2009, p. 255) argue that in order to develop an effective supply chain requires the integration of all companies in the supply chain, and the port is just one of those partners. Some literature points towards shipping lines being the key players in determining port choice by providing integrated global logistics services (Slack et al. 1996; Fleming and Baird 1999; Brooks 2007). On the other hand, some researchers indicate that cargo owners are the main decision makers on port selection (Robinson 2002; Tongzon 2002).

From a broader such as chain or network perspective, Notteboom and Winkelmanns (2001) state that globalization and outsourcing open new windows of opportunity for the actors in the transport chain, which include shipping lines, forwarders, terminal operators, road hauliers, rail operators and barge operators. In the process of maritime logistics (see figure 1.2), cargo owners are considered as the beginning player, and freight forwarders, shipping

lines as well as port operators are identified as performing the primary activities (Song and Panayides 2012, p.15).

Table 2.10 Main players in maritime logistics

Perspective	Major players	Representative literature
Shipping carriers' view	cargo owners, carriers and port/terminal operators	Carbone and De Martino (2003), Lam (2013)
Ports' view	Ports and ports' most important clients: shipping carriers, freight forwarders and cargo owners	Slack et al. (1996), Fleming and Baird (1999), Robinson (2002), Tongzon (2002), Brooks (2007), Woo et al. (2011a)
A broader view	Cargo owners, shipping lines, forwarders, terminal operators, road hauliers, rail operators and barge operators	Notteboom and Winkelmans (2001), Song and Panayides (2012)

2.7.2 Integrators in maritime logistics

Besides the main players introduced by the above sections, it is also important to identify the integrator in a supply chain or network when exploring the relationship structure in this chain or network, as they are tasked with organizing and incorporating a range of parts from various suppliers to maintain the overall integrity of the product or service (Parker and Anderson 2002; Violino and Caldwell 1998). System integrator in maritime logistics is defined as who is able to coordinate network factors (resources, actors and activities) within the maritime logistics chain by Robison (2002). Weston and Robinson (2008) reiterate the role of 'integrator' and emphasizes its importance in the maritime supply chain. They argue that the 'integrator' is not defined by type of firm or necessarily by the firm's position in the chain, but it is defined, critically, by the firm's 'ownership' of privileged and priority information about the end-user, by its core competency of high level management skills to leverage control throughout the chain effectively, and by control over the end points of the chain.

There is several literature discussing about the role of integrator in maritime logistics. Which player can be integrator in maritime logistics network varies from different perspectives. For shipping lines, Heaver (2006) and Frémont (2009) indicate shipping lines carrying high-volume cargo could obtain bigger bargaining power and integrating power with for example, terminal operators and rail transport operators. For freight forwarder, Notteboom and Winkelmans

(2001) indicate that in the European forwarding business, a significant level of vertical integration is achieved by freight forwarders, who have a long enough tradition and large enough volumes to play a leadership role. In addition, important information of cargo owners is usually in the hands of freight forwarders, thus, they can be integrators. For port operators, there is several research emphasizing port operators can be the integrators as they are the important platform between sea-leg and hinterland in the maritime transport chain (e.g. Rodrigue and Notteboom 2001; Song and Panayides 2008; Woo et al. 2011a).

Although there are several alternatives noticed, the main players will be defined and termed as follows in the coming sections in this thesis:

- **Cargo owner (CO):** which has ever used the container shipping services and related logistics services, and also can be named as cargo owners, or consignors/consignees.
- **Freight forwarder (FF):** ocean freight forwarder, and also can be called as forwarding agent.
- **Shipping carrier (SC):** container shipping carrier, and also can be named as shipping line, or shipping company.
- **Port operator (PO):** include port company/authority, and terminal operator.

2.7.3 Dyadic relationships in maritime logistics

According to the above discussion about main players in maritime logistics, the following sections will focus on reviewing different levels of relationship structure among these main players. This section starts the discussion from the dyadic relationships between cargo owners, shipping carriers, port operators, and freight forwarders respectively.

There is not much research explicitly discussing the inter-organization relationships between main players in maritime logistics. The relevant dyadic research was predominantly conducted under the themes of requirements for partner choosing (e.g. Lu 2003a; Tongzon 2009), enhancement of competitiveness (e.g. Yuen et al. 2012) and integration strategies from the shipping carrier, port operator and cargo owner's perspectives respectively (e.g. Heaver 2001; Frémont 2009; Carbone and De Martino 2003). On the other hand, SCI is an emerging trend where manufacturers strategically collaborate with their supply chain partners to manage

intra- and inter-organizational processes, in order to achieve effective as well as efficient flows of products and services, and to provide maximum value to the customer. As shipping is a vital component in global supply chains, it is important for maritime logistics service providers to be embedded well in this system. Thus, there are more and more maritime studies looking at inter-organizational relationships from SCI's perspective (e.g. Song and Panayides 2008; Lam 2013).

2.7.3.1 Shipping carriers – Port operators

Shipping carriers are broadly identified as the most important customers for ports (e.g. Slack 1996; Heaver 2001; Woo 2011a). The terminal operators in ports view their main customers as the shipping carriers as the contracts with them are single largest determinant of their business volume (Heaver 2001). Thus, there is abundant research looking at the business interactions between shipping carriers and port operators in the maritime logistics field. The relevant research themes could include shipping carriers and terminal operation, port choice by shipping carriers, supply chain integration between port operators and shipping carriers, and the changing of relationship between these two players (see Table 2.11). Each of them is now discussed in detail.

Table 2.11 Different themes of SC-PO relationships research

Research themes	Representative Literature
Terminal operations	Nortteboom (2001), Heaver (2002), Slack and Frémont (2005)
Port choice by shipping carriers	Lirn et al. (2003), Ng (2006), Tongzon and Sawant (2007)
Supply chain integration between port operators and shipping carriers	Panayides (2002), Bichou and Gray (2004), Lam (2013)
The evolution of relationship between these two players	Martin and Thomas (2001), Notteboom (2004), Woo et al. (2011a), Adolf (2012)

Shipping carriers and terminal operations

Martin and Thomas (2001) point out that the closer relationship that has developed between the shipping line and the terminal operator has been primarily limited to improving physical

and operational information interfaces, rather than long term strategic business development issues. Slack and Frémont (2005) analyse the differences between shipping carriers running terminal and terminal operating companies running terminal, and suggest that shipping carriers' interest in terminal operations is traffic dependent, and thereby high throughput volume meets the mutual benefits of carriers and terminal operators. Lam (2013) proves that the highest level of integration between shipping carriers and terminal operators is in operational level transport which includes transport, loading and unloading. She states that in the context of containerized shipment, the reasons for shipping carriers' involvement in terminal operations are found to be largely linked to cost and technical efficiencies.

Port choice by shipping carriers

Tongzon (2009) indicates the important role played by the shipping carriers in the port selection, as most of the freight forwarders in his research comment that the decisions on port choice are primarily made by shipping carriers rather than freight forwarders (or cargo owners) themselves. He suggests that ports should focus more on the shipping carriers than the other port users. This point is supported by a number of studies that have examined port choice from the perspective of shipping carriers (e.g. Lirn et al. 2003; Ng 2006; Tongzon and Sawant 2007). In terms of shipping carriers' view, Yuen et al. (2012) indicate that costs at port is consider the most important factor in port competitiveness followed by hinterland connections, customs and government, and terminal operator.

SCI between port operators and shipping carriers

More and more studies look at the relationship between shipping carriers and port operators from the SCI view. Panayides (2002) suggest that it is essential to have an appropriate governance structure in the relationship between ports and shipping carriers in order to achieve intermodal operational synchronization. Bichou and Gray (2004) indicates that the majority of ports are interested in collaborating and integrating with other companies. This integration was mainly between shipping carriers and ports resulting in dedicated terminals to fit the requirement for organizations to achieve efficiencies and to establish more effective operations. Shipping carrier - terminal operator integration can enhance efficiency in the management of shipping carriers' global supply chains, achieving greater flexibility and reliability, shorter turnaround times, cost savings and creating differentiation (De Souza et al.

2003; Midoro et al. 2005; Adolf 2012). Lam (2013) states that carriers are able to gain control of more links in the supply chain, providing economies of scope for door-to-door services by integrating with terminal operators. This also presents an opportunity for terminal operators to increase market share as carrier-terminal operator integration is a means to bind shipping carriers to terminals, secure more investment and obtain a guaranteed source of cargo (Heaver et al. 2001).

The changing relationship between shipping carriers and port operators

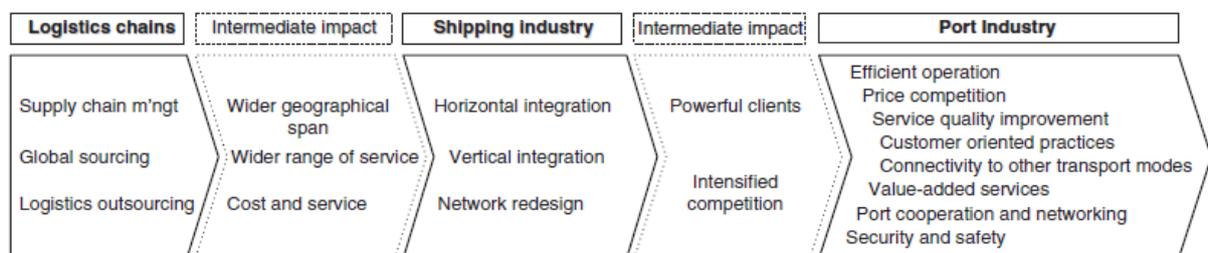
The relationships between shipping carriers and port operators keep changing. Martin and Thomas (2001) indicate that although these two players have close relationship on operation level, the oversupplied terminal capacity of ports have leads to a highly competitive environment for ports themselves. The increasingly strong negotiating position of the shipping line has discouraged them from developing a strong sense of loyalty towards the terminal operator. On the other hand, despite terminal operators' desire to establish long term arrangements with shipping lines, many terminal operators have been forced to adopt a transaction based marketing strategy.

Further, the standardization of container handling facilities, relevant information and procedural interactions between port community members, not just within a port but at the national regional level, has greatly reduced the risks of shipping carriers' switching ports of call (Martin and Thomas 2001). These points reveal the footloose nature of shipping carriers for port operators reported by other researchers (Heaver et al. 2001; De Souza et al. 2003; Nortobbon 2004; Woo et al. 2011a).

Another manufacturing-driven trend is observed, in which ports face an even more severe challenge from this indirect influence. Manufacturing companies have adopted SCM strategies, global sourcing and the outsourcing of logistics (e.g. Lambert and Cooper 2000; Cho and Kang 2001) to respond to the globalisation of the economy and intensifying competition. These new strategies mean that container shipping carriers are required to cover wider geographical spans, and to provide a wider range of services to meet increasingly diversified demand patterns with a lower price and higher quality than before (e.g. Slack et al 1996; Heaver 2001). Shipping carriers' following strategies include: horizontal integration through mergers, acquisitions and strategic alliances; vertical integration through the

operation of dedicated terminals and the provision of integrated logistics and intermodal services with other players within the container transport chain; deployment of mega-sized vessels and establishment of trunk-and-feeder system (Martin and Thomas 2001; Notteboom 2004; Adolf 2012).

These changes that shipping carriers have made have eventually affected every facet of the maritime industry, especially concerning port operations which face even more intensified competition. One example is that the trunk-and-feeder shipping services system creates a hierarchy of hub and feeder ports (Slack et al. 2002; Adolf 2012). Woo et al. (2011a) demonstrate port evolution from such perspective of the dynamics among cargo owners and shipping carriers (see Figure 2.11).



(source: Woo et al. 2011a)

Figure 2.11 Port evolution in changing logistics environment

In total summary, most shipping and port literature assumes that the players within the container transport chain should work together to gain the joint benefits, and the performance or competitiveness will increase by adopting integration strategies. Especially cooperate for enhance operational efficiency, this is the reason why so many big shipping carriers tend to run their own dedicated terminal. Shipping carriers may deploy different supply chain integration strategies with ports, and port operators and port authorities have to carefully consider container shipping carriers' reaction and make more and appropriate efforts to survive.

2.7.3.2 Shipping carriers – Cargo owners

The previous studies focused on shipping carrier selection criteria or on cargo owners' satisfaction with the service attributes. In order to fill the gaps revealed in the current understanding of shipping carrier–cargo owner relationships, Jang et al. (2013) investigate cargo owners' future intentions to use the same shipping carrier. Their findings show that

container shipping carriers should develop a high level of logistics service quality as well as relationship quality in order to attain beyond mere satisfaction levels of cargo owners' loyalty.

Lam (2013) notes that major cargo owners are shipping carriers' important customers, and shipping carriers – cargo owners integration is under a broader topic of customer integration. There are a lot of studies identifying the importance and benefits of customer integration in the SCM field (e.g. Stank et al. 2001; Zhao et al. 2008; Flynn et al. 2010). Further, Brooks (1993) suggests that cargo owner-shipping carrier partnership with full monitoring systems is an attractive strategy for the service differentiation of shipping carriers. Lu's (2003a) survey shows that different perceptions between cargo owners and shipping carriers for the importance of the service attributes. In another study, Lu (2003b) examines the impact of shipping carrier service attributes on cargo owner-shipping carrier partnership relationships. This research concludes that the timing related service factor is the most significant in affecting cargo owners' satisfaction from such partnership. Lam's (2013) survey suggests that cargo owners and shipping carriers are most engaged in the operational level activities, which is basic and essential for retaining customers with lower commitment.

In theory, ocean cargo shipments go to LSPs (e.g. freight forwarders) before shipping carriers (Stefansson 2005; Fransoo and Lee 2012), but except freight forwarders, shipping carriers also have direct clients who most often are large cargo owners in practice (Frémont 2009; Panymid and Song 2013). Shipping carriers have developed direct contacts with large cargo owners who provide them with regular and large volumes of FCL (full container load) cargo. This privileged relationship between a shipping line and one or more large cargo owners can account for up to half of the activity of a shipping agency in a given port. For shipping carriers, this has many advantages, for example: the guaranteed and regular filling up of vessels over a long period since the contracts are generally for one year; identical origins and destinations of containers over time, which make it possible to ensure the continuity of maritime service; the establishment of large volume inland transport for pre- and post-shipment carriage, such as block trains and barges; and full control of the container fleet (Frémont 2009).

Islam et al. (2005) report that large cargo owners and consignees with in-house expertise are less dependent on freight forwarders' specialist expertise because large shipments give them direct access to main line carriers. Heaver (2006) indicates that large cargo owners have

preferred to negotiate liner rates and traffic volumes with shipping lines separately from logistics services run by LSPs. The reasons include: keeping more flexibility; securing confidential information and regarding this as strategic importance for cargo owners. Larger cargo owners also exercise the substitutability among shipping carriers. Therefore, it seems that the relationship between shipping carriers and cargo owners could depend on the size of the cargo owners. The types of cargo owners – shipping carriers relationship and relevant comments are presented in the Table 2.12.

Table 2.12 Different types of cargo owners – shipping carriers relationship

Comments	Representative literature
Major cargo owners are shipping carriers’ important customers, and shipping carriers – cargo owners integration is under a broader topic of customer integration.	Lam (2013)
Cargo owner-shipping liner relationship is partnership.	Brooks (1993), Lu (2003a), Lu (2003b)
Cargo owners and shipping carriers are most engaged in the operational level activities.	Lam (2013)
Relationship between shipping carriers and cargo owners could depend on the size of the cargo owners and cargo owners’ needs.	Islam et al. (2005), Heaver (2006), Martin and Thomas (2001)

2.7.3.3 Cargo owners – Freight forwarders

Martin and Thomas (2001) indicate that freight forwarders no longer act as agents of the cargo owner but are principals in their own right. They offer groupage services and increasingly provide integrated logistic packages to the many less than container load (LCL) and full container load (FCL) cargo owners who still do not have a transport or shipping department of their own. On the other hand, because of globalization, companies running international trade are more or less use international freight forwarders (IFF) (Lambert et al. (1998) which refer to international trade specialist who can provide a variety of functions to facilitate the movement of cross-border shipments (Murphy et al. 1992) and mainly evolved from freight forwarders. Therefore, this section also discusses the relevant IFF literature.

Murphy and Daley (1997) investigate selection criteria for IFF from customer perceptions, and suggest that expertise is top rated rather than prices which is only sixth rated. Lu and Dinwoodie (2002) conduct comparative analysis of perceived gaps between cargo owners' requirements and forwarders' service provision, revealing that cargo owners appreciated

value-adding services including warehousing, payment, advice and tailored services more than forwarders, but doubt the capability of asset-based providers. Cargo owners perceived lower utilities from using forwarders to facilitate the flow of goods and information, but greater benefits from reduced investments in logistics activities. A long-term cooperative relationship is considered as desirable for both shippers and IFFs, leading to higher utilities in: reduced investment in logistics activities; increased competitive power in core business activities; reduced overall cost in the international logistics process. However, there is no long-term contract between the majority of the shippers and freight forwarders.

Islam et al. (2005) report that small and medium-sized cargo owners and consignees typically receive load aggregation and knock-down services, customs clearance and documentation service through freight forwarders. Heaver (2006) indicate small cargo owners benefit from the rates offered by LSPs and NVOCCs. Martin and Thomas (2001) note another example that many cargo owners, however, perceiving the shipping carrier as facing a conflict of interest when recommending the most appropriate maritime service, will continue to prefer to employ an independent freight forwarder. Accordingly, it seems that the relationship between cargo owners and freight forwarders could depend on the size of the cargo owners, expertise, preferential freight rates and value-added service provision of freight forwarders. The types of COs – FFs relationship and relevant comments are presented in the Table 2.13.

Table 2.13 Different types of cargo owners – freight forwarders relationship

Comments	Representative literature
Freight forwarders no longer act as agents of the cargo owner but are principals in their own right. They offer groupage services and increasingly provide integrated logistic packages to many LCL and FCL cargo owners who still do not have a transport or shipping department of their own.	Martin and Thomas (2001)
Expertise of IFF is top rated factor rather than prices which is only sixth rated from customer’s IFF selection criteria.	Murphy and Daley (1997)
Cargo owners appreciated value-adding services more than forwarders. Cargo owners perceived lower utilities from using forwarders to facilitate the flow of goods and information, but greater benefits from reduced investments in logistics activities. Long-term cooperative relationships, considered beneficial but not commonplace for yielding perceived cost, competitive, and investment benefit.	Lu and Dinwoodie (2002)
Relationship between shipping carriers and cargo owners could depend on the size of the cargo owners and cargo owners’ needs.	Islam et al. (2005), Heaver (2006), Martin and Thomas (2001)

2.7.3.4 Shipping carriers – Freight forwarders

There may be different types of business relationship between shipping carriers and freight forwarders up to different situations. Theoretically, the relationships between shipping carriers and freight forwarders are upstream and downstream cooperative relationships (e.g. Stefansson 2005; Fransoo and Lee 2012). Veenstra et al. (2012) indicate that under merchant haulage, a third party (often a freight forwarder or logistics service provider) will take care of inland transport and delivery of the container to a customer's warehouse. Under carrier haulage, the shipping carrier will assume this responsibility, but they will often contract out to a local party (freight forwarder or logistics service provider). In other words, shipping carrier make money by providing a maritime transport service that they control and that that extends to the inland segment essentially through outsourcing agreements with land-based partners (Frémont 2009).

In practice, ocean container shipping can be performed in two different ways (Zeng 2003; Dallari et al. 2006), namely shipment with full container load (FCL) and shipment with less than container load (LCL). Frémont (2009) states that freight forwarders make a profit mainly by carrying out consolidation/deconsolidation operations on freight. As specialists in LCL containers, freight forwarders reconsolidate consignments in a single container for various cargo owners and consignees, and charge a commission on maritime freight. According to the annual reports of the top global freight forwarders, freight forwarding contributes the most turnover to them, rather than intermodal and logistics activities. The other traditional ability of forwarding forwarders is to manage all customs operations. Besides this direct relationship with cargo owners, the other main clients of shipping carriers are forwarding agents, since shipping carriers are not interested in LCL containers which is not their business. They prefer to leave this task to forwarding agents, with whom they do not wish to compete directly for fear of losing business, which would immediately lead to lower load factors for their vessels. According to the survey conducted by McCalla et al. (2004) and Frémont (2009), around 30% to 60% ocean cargo go through freight forwarders before shipping carriers.

The other trend that has been reported by researchers (Martin and Thomas 2001; Heaver 2001; Notteboom 2004; McCalla et al. 2004; Frémont 2009; Adolf 2012), which is some large shipping carriers have started to run the logistics business through their subsidiaries and may cause a hostile relationship with freight forwarders. In order to differentiate services and gain

a competitive advantage through the provision of value added services, shipping carriers are attempting to bypass the freight forwarders by developing direct relationships with the cargo owner, which will be brought into competition with freight forwarders (Martin and Thomas 2001; Notteboom 2004). It appears that shipping carriers are aggressively expanding their scale and scope of operations to become global operators on land. However, not all are doing so to the same degree or with the same success as professional logistics operators (Heaver 2001, MCCALLA et al. 2004; Frémont 2009; Adolf 2012). Martin and Thomas (2001) point out that the degree of mistrust that overshadows the shipping carrier - freight forwarder relationship will continue to be dependent on the volume of business controlled by the freight forwarder and the strength of their relationship with the cargo owner. Frémont (2009) suggests that shipping carriers should, nevertheless continue to be careful to maintain good relations with forwarding forwarders, for they cannot do without the volumes of business that they provide.

Such relationships between shipping carriers and freight forwarders may be caused by their different nature. Frémont (2008) indicates that there is one major difference between forwarders and shipping lines or cargo handlers. The business of the former requires primarily human resources to strengthen a network of agencies that facilitate contact with client shippers while the latter must first make heavy capital investments to be able to ensure maritime and landside links or large-scale handling operations. For many shipping lines, logistics remains an activity that is limited and at the very least uncertain. It has more to do with publicity slogans than with reality.

In summary, according to the above literature, the relationships between shipping carriers and freight forwarders may be not only that of a cooperative upstream-downstream model, but also a competitive relationship in the market place. The freight forwarder, however, will thus retain a major role within the port community and their conflicting customer-competitor relationship with the shipping carrier will remain. Shipping carriers will continue to acknowledge the freight forwarder as an important part of their customer base and will, therefore, refrain from aggressively competing for cargo owners' business routed through freight forwarders that have nominated them as a preferred shipping carrier (Martin and Thomas 2001). These different types of relationships between these two players will be outlined in Table 2.14.

Table 2.14 Different types of shipping carriers – freight forwarders relationship

Relationships	Representative literature
Partners with upstream and downstream cooperative relationships	Stefansson (2006), Frémont (2009), Fransoo and Lee (2012), Veenstra et al. (2012)
Freight forwarders are good at dealing with LCL cargo, and both direct cargo owners and they are shipping carriers' main clients	Frémont (2009)
There is a customer-competitor relationship between shipping carriers and freight forwarders	Martin and Thomas (2001), Notteboom (2004), Mccalla et al. (2004), Frémont (2009), Adolf (2012)

2.7.3.5 Cargo owners – Port operators

There is little literature explicitly discussing the inter-organisational relationships between cargo owners and port operators, but several studies attempting to identify and explain the various factors in cargo owners' port choice (e.g. Willingale 1984; Branch 1986; Murphy et al. 1991, 1992; Gibson et al. 1993; Murphy and Daley 1994; Mangan et al. 2002; Nir et al. 2003; Tiwari et al. 2003; Malchow and Kanafani 2001, 2004; Yeo et al. 2004; Ugboma et al. 2006).

Ugboma et al. (2006) summarize the related literature and assume the following factors having a significant impact on the choice of ports among cargo owners in their study: frequency of ship visits; efficiency; adequacy of port infrastructure; location; competitive port charges; quick response to port users' needs and port's reputation for cargo damage. Yuen et al. (2012) suggest one more important factor which is customs and government regulation. Moreover, Nir et al. (2003) indicate that cargo owners' last choice experience will influence their future port choice behaviour. Tiwari (2003) points out that cargo owners' own characteristics also influence their decision regarding port choices. Three variables for these characteristics are considered: distance between cargo owner and port which is expected to have be negatively related to port choice; type of trade that is exports or imports; length of the sea-leg journey between departure port and destination port. Cargo owners choose seaports where their cargoes can be most reliably, efficiently and economically handled. Pires da Cruz et al. (2013) suggest seaport operators and policymakers should award top priority to improving their overall level of vessel turnaround time relative to other factors in order to attract more cargo owners to their seaports.

In spite of the fact that many studies emphasize the important role of cargo owner in the port selection, Heaver (2001) indicates that the port terminals do not sell major services directly

to cargo owners. Therefore, several studies (e.g. Tongzon 2002; Olivier and Slack 2006) point out the concept of port-blindedness, namely “many container cargo owners are port blind, leaving the choice of port and routing to the carrier they have chosen” (Brooks 2000, page 63). These imply that there may be limited direct business relationship between cargo owners and port operators.

Based on the emerging applying SCM concept, several researchers suggest (Woo et al. 2011a; Adolf 2012; Nassirnia and Robinson 2013) that port providing value-added service could increase competitiveness and attract more cargo from cargo owners. The above-mentioned discussions from different angles are summarized as Table 2.15.

Table 2.15 Different types of shipping carriers – freight forwarders relationship

Main ideas	Representative literature
Cargo owners are important roles in port selection	Willingale (1984), Branch (1986), Murphy et al. (1991, 1992), Gibson et al. (1993), Murphy and Daley (1994), Mangan et al. (2002), Nir et al. (2003), Tiwari et al. (2003), Malchow and Kanafani (2001, 2004), Yeo et al. (2004) ; Ugboma et al. (2006)
Cargo owners are port-blind through ocean carriers’ service	Brooks (2000), Heaver (2001), Tongzon (2002), Olivier and Slack (2006)
Port providing value-added service could increase competitiveness	Woo et al. (2011a), Adolf (2012), Nassirnia and Robinson (2013)

2.7.3.6 Freight forwarders – Port operators

There is little literature that explicitly discusses the business relationship between freight forwarders and port operators. The majority of these studies look at this issue of the choice of calling ports from the freight forwarder point of view and the management of their stakeholders from the port operator point of view. The summary of these studies are presented in Table 2.16.

Regarding to the port choice made by freight forwarders, Slack (1985) surveyed port end users (exporters and freight forwarders) engaged in trans-Atlantic container trade between the American mid-West and Europe to identify port selection criteria. He concludes that the choice of port is more affected by the costs and levels of service of the land and ocean carriers than by considerations of port facilities and other port-related economies. Bird and Bland’s (1988) study on the perceptions of European freight forwarders suggests that frequency of

shipping service is a main reason for choice of seaport in cargo movement, time on the route and labour problems at ports are also major concerns of freight forwarders. Yuen et al. (2012) indicate that port location, hinterland connections and shipping services are the three most important factors in port competitiveness from freight forwarders' view.

Murphy et al. (1992) indicate that freight forwarders value the cargo handling capacity of port when selecting ports, more than cargo owners do. De Langen (2007) compared the port selection criteria of Austrian cargo owners and freight forwarders. He concludes that cargo owners and forwarders have similar view on port selection, but cargo owners have a less price-elastic demand as they more concern about the overall costs to the supply chain rather than the direct effect on transport costs. Further, freight forwarders control a large share of transport flows, thus, relevant research deserve particular attention.

Table 2.16 Port choice by freight forwarders

Source	Geographic scope (samples)	Comments for PO-FF relationship (findings)
Slack (1985)	exporters and freight forwarders in trans-Atlantic container trade between the American mid-West and Europe	the choice of port is more affected by the costs and levels of service of the land and ocean carriers than by considerations of port facilities and other port-related economies
Bird and Bland (1988)	the perceptions of European freight forwarders	frequency of shipping service is a main reason for choice of seaport in cargo movement, time on the route and labour problems at ports are also major concerns of freight forwarders
Yuen et al. (2012)	East Asia	port location, hinterland connections and shipping services are the three most important factors in port competitiveness from freight forwarders' view
Murphy et al. (1992)	the U.S.	freight forwarders value the cargo handling capacity of port when selecting ports, more than cargo owners do
De Langen (2007)	Austrian cargo owners and freight forwarders	cargo owners and forwarders have similar view on port selection, but cargo owners have a less price-elastic demand as they more concern about the overall costs to the supply chain rather than the direct effect on transport costs.
Tongzon (2009)	Southeast Asian freight forwarders' perspective	efficiency is the most important factor of port selection, followed by shipping frequency, adequate infrastructure and location.

Tongzon (2009) tries to evaluate the major factors influencing port choice from the Southeast Asian freight forwarders' perspective, their decision-making style and port selection process. He finds that efficiency is the most important factor followed by shipping frequency, adequate infrastructure and location. Regarding the port selection process, 68.1% participant freight forwarders have relied on personal contacts, knowledge and experience. Further, 74.5% of the participant freight forwarders choose the shipping carrier first and then choose the port from those served by the shipping carrier. Only 23.4% decide the port to ship from before selecting the shipping carrier. This emphasises the important role played by the shipping carriers in the choice of ports as most of the freight forwarders in the sample select among the ports that the shipping carriers of their choice have selected for them.

In terms of the view from port operators to manage their stakeholders, several studies (e.g. Woo et al. 2011a) state freight forwarders are ports' important customers but seldom discuss the concrete interactions between port operators and freight forwarders.

According to these above literature, it seems the business relationship between freight forwarders and port operators remains in 'select and been selected' relationships, and have quite been influenced by shipping carriers' service frequency. There are not direct operational relationships between them, compared with the interactions between freight forwarders, cargo owners and shipping carriers.

2.7.4 Triadic relationships in maritime logistics

As Section 2.2.2 noted, logistics triad has been applied as the minimum unit of analysis successfully in some general transport and logistics research. However, majority of these logistics triad research mainly focusses on the triadic structure, rather than triadic relationship (Bask, 2001). Mason et al. (2008) have ever pointed out that in some cases an extended aligned partnership across the logistics triad may overcome inherent weak links and support sustained performance improvement, but have not look into very details of triadic relationship.

In the maritime context, except the notion of shipper-port-carrier transactional triad addressed by Slack (1993) in order to position the port as a weakening link within a global system, there is no further and explicit maritime logistics research applying this concept of logistics triad so far.

There are a number of possible reasons why logistics triad or the triadic concept research does not exist in maritime logistics. It could be because of the significant difference between domestic logistics and international maritime logistics which take account of more complex process and need more main players involved. The logistics triad which only consist of a buyer of goods, the supplier of those goods and a logistics service provider in the middle, cannot include all of the main players and their relationships dynamics. In addition, as Daugherty (2011) indicates that although relationships present a fascinating and dynamic research area, the challenges are many which could influence the development of the research that goes beyond the dyadic perspective. These challenges include: creating theory-driven models to guide the research; maintaining analytical and methodological rigor; convincing people to fill out the complicated surveys; extending the research to look at dyadic, triadic, and even network-wide relationships. This point needs to be verified in the coming research stages. Thus, it is worth exploring the relationship structure within maritime logistics network based on this logistics triad and beyond. Table 2.17 highlights the empirical triadic logistics research, and the following paragraphs will discuss the details.

There are a few studies that explicitly discuss the formation of logistics outsourcing triads. Bask (2001) argues that the term 3PL implies a triadic link among suppliers, their customers and LSPs. Larson and Gammelgaard (2001) investigate the preconditions, benefits and barriers to the formation of collaborative relations among buyers, sellers and 3PL providers. Carter and Ferrin (1995) have illustrated the impact of trilateral collaboration on the reduction of transport costs. Moreover, Gentry (1996) has studied the role of carriers in strategic buyer-supplier alliances and concluded that LSPs mainly have operational responsibilities and are not involved in strategic planning of the supplier-customer alliance. Several studies (e.g. Bask 2001; Larson and Gammelgaard 2001; Naim et al. 2010) have empirically applied this logistics triad as a fundamental unit to analyse the logistics provision and supply chain practice.

Table 2.17 Empirical triadic logistics research

Topic	Industry	Authors
Supply chain strategy	Computer on-line retailing, communication equipment manufacturing, internet supermarket, post service, clothing retailers	Bask (2001)
Logistics triad formation	Danish logistics industry	Larson and Gammelgaard (2001)
Collaborative logistics management and the role of third-party service providers	Carriers and LSPs' services for Dell Computers in Ireland, IKEA in Sweden, and warehouse services for Kimberly-Clark in the Chicago area.	Stefansson (2006)
Aligning relationship goals and measures within a logistics triad	Steel producer, logistics provider, steel tubes manufacturer	Mason et al. (2007)
To generate a performance model for an order-to-delivery (OTD) process in delivery scheduling environments.	The studied customer is an OEM in the automotive industry, the supplier is a component manufacturer and their LSP completes the triad.	Forslund et al. (2009)
Evaluating the causes of uncertainty in logistics operations	UK logistics practitioners and policy makers	Vasco et al. (2010)
Determining a logistics provider's flexibility capability	Steel supply chain	Naim et al. (2010)
The logistics services outsourcing dilemma: quality management and financial performance perspectives	A company deals with an online business information platform	Gotzamani et al. (2010)
Interconnectedness of actor bonds in service triads	Public transport (systems & components), rail infrastructure (systems & components), public transport (operator), home automation (components), transport vehicles (OEM), DIY-Retail stores, logistics services, furniture trading	Hartmann et al. (2015)

2.7.5 Network relationships in maritime logistics

Supply chain integration (SCI) is a central theme in SCM. The maritime logistics research looking at the inter-business relationship beyond dyadic view tends to apply the analysing framework from the SCI angle. Lam (2013) points out that there are many papers highlighting the significance of maritime transport in supply chains, but most of them mainly address on a

single entity (e.g. shipping carriers or ports, and study how it relates to the supply chain). The publications in managing container shipping as an integrated chain are still limited to date.

There are few works explicitly applying the SCM approach to analyse the inter-business relationship structure within the maritime logistics from a dyadic-beyond view (Martin and Thomas 2001; Carbone and De Martino 2003; Lam 2013). Therefore, this chapter will include the relevant literature on the supply chain aspects of container shipping in order to enrich the background knowledge. Lam (2013) indicates that such literature can be grouped under three categories, namely: shipping carrier in the supply chain, ports/port community in the supply chain and the overall transport chain. Above features can be outlined in Table 2.18 below.

Table 2.18 Summary of network relationships research in maritime logistics

Perspective	Representative literature
shipping carrier in the supply chain	Heaver (2001), Frémont (2009), Lam (2013)
ports/port community in the supply chain	Martin and Thomas (2001), Carbone and De Martino (2003), Demirbas et al. (2013), Notteboom (2006), Yuen et al. (2012), Bichou and Gray (2004), Song and Panayides (2008), Seo et al. (2014)
Overall maritime transport chain	Frankel (2001), Islam's (2005), Notteboom (2004), Magala and Sammons' (2008), Talley and Ng (2013)

2.7.5.1 Shipping carrier in the supply chain

Heaver (2001) analyses the evolving roles of shipping carriers in international logistics through their vertical integration strategies. He applies a descriptive economics analysis based on the secondary data to view the organisation strategies of shipping carriers in relation to terminal management, intermodal services and logistics services. Conclusions imply that shipping carriers attempt to meet the concerns of cargo owners in various ways, only close integration with shipping in the management of dedicated terminals and intermodal services, and there may be conflicts between shipping carriers and freight forwarders when the former develop logistics services.

Frémont (2009) explores the empirical evidences of integration and disintegration of maritime shipping, port and logistics activities by using secondary data and interviewing professionals from the top 20 shipping carriers and leading global freight forwarders. He shows that: there is a strong horizontal integration dynamic, but limited the vertical integration in container

transport chain; the prime concern of shipping carriers is to fill vessels to generate sufficient revenues to cover their costs. Everything else such as logistics services are secondary; and shipping carriers should be very careful to maintain good relationships with freight forwarders when they develop a logistics activity.

Lam (2013) conducts semi-structured interviews with professionals from the top thirty shipping carriers to examine these shipping carriers' integration level with major cargo owners as well as terminal operators, and test its association with supply chain value. The findings show that the shipping carriers' level of SCI with major terminal operators is higher than the SCI level with major cargo owners in statistics. The integrations with both players are mainly implemented by operational activities. Further, it is found that the level of SCI is positively related to supply chain value. These features can be outlined in the table 2.19 below.

Table 2.19 Network research about shipping carriers in the supply chain

Representative literature	Methods	Geographic coverage	Main finding
Heaver (2001), Heaver (2006)	descriptive economics analysis based on the secondary data	secondary data focused on main shipping market	only close integration with shipping in the management of dedicated terminals and intermodal services
Frémont (2009)	secondary data and interviewing	professionals from the top 20 shipping carriers and leading global freight forwarders	there is a strong horizontal integration dynamic, but limited the vertical integration in container transport chain
Lam (2013)	semi-structured interviews	professionals from the top thirty shipping carriers	the shipping carriers' level of SCI with major terminal operators is higher than the SCI level with major cargo owners in statistics. The integrations with both players are mainly implemented by operational activities.

2.7.5.2 Ports/port community in the supply chain

Martin and Thomas (2001) present two inter-organizational interaction models for traditional breakbulk berth and container terminal community, based on over 200 in-depth interviews with senior managers representing terminal operators, shipping carriers, feeder operators,

ship agents, road hauliers, freight forwarders and cargo owners serving the UK-Far East trade. They descriptively analyse the trends in key inter-organizational relationships which include the relationship between shipping carrier and road/rail operator, relationship between terminal operator and shipping carrier, and relationship between shipping carrier and freight forwarder. He identifies there are different type of relationships between different players.

Carbone and De Martino (2003) explore the role of each major operator in the port of Le Havre in automotive (Renault's) supply chain at macro-economic level. They adopt a SCM approach (Lambert tri-dimensional model) as their analysing framework, which is based on supply chain's structure (actors), key business processes and links between actors. The semi-structured interviews with crucial actors which include Renault, logistics and port operators, and the Le Havre Port Authority were conducted. The findings show that Renault presents two different governance structures in the management of the supply chain: vertically integrated in the inbound logistics while more flexible in the outbound. Demirbas et al. (2013) explore the role of ports within supply chains through a case study of UK ports and steelworks. Findings suggest that, even though the steelworks and the ports utilise a common system, this does not have to interface with the port's systems or the steelwork's consumers. E-mails and telephone conversations are sufficient, together with a common terminal to enhance visibility and relations. Accordingly, ICT integration interfacing with other members of the supply chain network is not a prerequisite to integration and can be dependent on the type of product being produced and shipped. Accordingly, a port cannot rely on one main customer or partner, and need to maintain flexibility to adapt changing market requirements like any other business.

Notteboom (2006) provides a bird's-eye view to explore the relationship dynamics between ports and their various stakeholders based on the economic and logistics market development. He comments that in the contemporary logistics-restructured port environment it has become more difficult to identify the port customers who really exert power in the logistics chain or who are driving port selection. The powerful players in this chain dependents on type of cargo involved, cargo generating power of the cargo owner, the characteristics related to specific trade routes and terms of trade and terms of sale. While cooperation at the operational level between the actors in the supply chain may have increased, this has not necessarily resulted in increased commitment to a long-term future relationship with the port. Port choice has

become more a function of network costs and port selection criteria are related to the entire network, in which the port is just one node. The ports being chosen are those that will help to minimise the sum of sea, port and inland costs.

Yuen et al. (2012) explore the relative importance of factors that determine container port competitiveness from users' perspective through focus group, interviews and AHP methods. Findings show three groups of port user namely: shipping carriers, forwarders and cargo owners have different have different emphasises on the factors of port competitiveness.

There are several researchers starting to introduce the SCM and logistics approach into port performance measurement. Bichou and Gray (2004) attempt to conceptualize ports from a logistics and SCM approach. An action research was conducted, in which a combination of interviews and questionnaires were used to collect data from 73 participants in 3 panels (ports panel, international institution panel, and academics and consultants panel). They measure the channel relationships and co-operation by asking the respondents to recognize and rank their customers/suppliers in order of importance. The result shows shipping carriers as the most important, following by freight forwarders and NVOCCs, cargo owners, inland transport providers and port operators. Song and Panayides (2008) further develop a set of measurements of port/terminal SCI level and performance based on SCM concept. The port SCI measurements include using ICT, relationship with shipping carriers, value added service, integration of transport modes, relationship with inland transport operators, and channel integration practices and performance, which mainly relate to the level of integration with their direct supply chain partners. Base on this research trend, Seo et al. (2014) measure port supply chain collaboration in container logistics, and develop the following measurements: information sharing, knowledge creation, goal similarity, decision harmonisation and joint supply chain performance measurement.

2.7.5.3 Overall transport chain

Frankel (2001) explores the economics of total trans-ocean supply chain management, and emphasize the importance of looking at the maritime transport as a whole in order to reduce the link uncertainties. Islam (2005) presents a normative model of multimodal transport system for an integrated supply chain, in which all cargo owners have access to door-to-door services from factory premises to port or through inland clearance depots. This model was

applied in a case study to review a particular national transport problem which the developing country Bangladesh were facing.

From the perspective of overall transport chain, Notteboom (2004) indicates that the competition within container transport industries (including port industry) have been not only relying on the single player, but on the whole chain. Magala and Sammons' (2008) statement which the choice of a port made by the shipping carrier could be interrelated to the choice made by the cargo owner, and both choices are only one part of the supply chain selection process. Likewise, the choice of a maritime transport chain by shipping carriers, ports and cargo owners is considered to be jointly rather than independently determined (Talley and Ng 2013).

In summary, the majority of literature looking at the dyadic-beyond inter-organisational relationships in maritime logistics is from port's standing. While works based on shipping carriers' view is limited, the research from the view of overall transport chain without focus firm is even less. These gaps could be bridged in the future.

2.8 Research Questions

The literature outlined in this chapter has identifies some research gaps and raised a number of research questions (see Table 2.20). According to the literature reviewed in Section 2.2 and 2.7, inter-organizational relationship research in general logistics and maritime logistics is dominated by analyses on the basis of the dyadic relationship between two of the major members in the chain. In maritime logistics field, these studies are limited for example: either to shipping carriers and cargo owners; shipping carriers and port operators; freight forwarders and cargo owners; or port operators and cargo owners, which might lead to a sub-optimisation bias.

Section 2.7.5 shows that the number of publications considering managing maritime logistics as an integrated chain is increasing but limited to date. These papers identify the importance of relationship management with trading partners and the values which could be generated from the maritime logistics network. However, few of them distinguish the different relationship structures that exist between the main players in different situations.

In terms of research methods, the maritime logistics studies reviewed in Section 2.7 mainly apply economics methods or descriptive methods to analyse the inter-organizational relationship in the maritime logistics network, but very few of them use logistics triad and social network analysis (SNA) which have been well-developed in the SCM and logistics field, as an analytical tool. In addition, many of these studies have been developed on the basis of past experience rather than empirical survey. Therefore, the research question 1 is addressed:

RQ 1: What is the inter-organizational relationship structure in maritime logistics networks?

Within this question, we also would like to know what is the framework of analysis which can be applied in this network and what are the main players and key relationships should be included (Lambert 2001).

Literature in Section 2.4.4 shows that contingency consideration in maritime logistics research is still rare. Even though some of these studies notes the contingency factors, none of them make a clear and comprehensive presentation. The research question 2 thus is introduced:

RQ 2: What factors influence the inter-organizational relationship structure in maritime logistics networks?

In addition, according to Section 2.4.4 and 2.5, knowledge of the effective and efficient extent and forms of integration relationships between main players within the maritime logistics network remains scarce in the literature. In terms of the evaluation of relationship strength in maritime logistics, there are no comprehensive measurements in literature in line with Section 2.4.2. Therefore, the research question 3 is examined:

RQ 3: What is the connection between the service complexity and inter-organizational relationship strength in maritime logistics networks?

At last, although value is discussed in the maritime research in Section 2.6, few of this research can identify the association between logistics service complexity and value perceived by the main players in the network. Further, there is no study identifying the origin of the value generated from different links, and the change of the value generation from different links between main players in line with different service complexity in the maritime logistics network. Hence, the following question is investigated:

RQ 4: What is the connection between the service complexity and value perceived in maritime logistics networks?

This research question includes several sub-questions about: whether more customized maritime logistics service creates more value; the distribution of the value generated from different links in the maritime logistics network; the change of the value generation from different links between main players in line with different service complexity; the correlation between service complexity and degree of SCI; and the correlation between degree of SCI and value generation.

Table 2.20 Summary of the research questions derived from literature review

Research question	Sub-question
RQ 1: What is the inter-organizational relationship structure in maritime logistics networks?	Who are the main players and integrators in this chain/network?
	What is the shape of this chain/network? Can we apply logistics triad on analysing the relationship structure in maritime logistics network?
	Is the business relationship strength always closely integrated in this network, from the view of general perception?
	Does each link in this network have the same level of importance?
RQ 2: What factors influence the inter-organizational relationship structure in maritime logistics networks?	Except service complexity, what factors could influence the inter-organizational relationship structure in maritime logistics networks and how?
RQ 3: What is the connection between the service complexity and inter-organizational relationship strength in maritime logistics networks?	<ol style="list-style-type: none"> 1. Does the relationship strength rise with the increase of service complexity? 2. How could we measure service complexity in maritime logistics context?
RQ 4: What is the connection between the service complexity and value perceived in maritime logistics networks?	Will more customized maritime logistics service create more value?
	What is the distribution of the value generated from different links in line with different service complexity in maritime logistics networks?
	What is the correlation between service complexity and the degree of SCI in maritime logistics networks?
	What is the correlation between degree of SCI and value generation in maritime logistics networks?

2.9 Summary and conclusions

As described in the beginning of this chapter, two parts of literature will be reviewed. With regards to the main part of review, this chapter has studied the prominent literature surrounding the concepts of network consideration in SCM, contingent perspective in logistics, notions of service complexity and value, and the inter-organizational relationship structure of major players in the maritime logistics network. It has been shown that the dominant consideration of research about inter-organizational relationships in maritime logistics has been focused on dyadic relationships between two of the major players in the chain. There has been little research that has looked at this issue from a systems view, and identified the network benefits among all the major players, both theoretically and empirically. As a result of this literature review, a number of research questions have been derived based on these research gaps, and also suggests that the logistics triad and contingency consideration could be usefully applied to bridge these gaps.

In terms of the other part of literature review, six-dimensions measurement of relationship strength, one-dimension measurement of relationship value, and the measurement of service complexity are identified, in order to explore the relationship structure and value creation between the major players in the maritime logistics network. The detailed investigation of the literature in this chapter has provided a basis for later research stages of this thesis. Following this, Chapter 3 will address the methodological issues and justification for the choice of the method adopted in this work.

Chapter 3 Methodology

The previous chapters have established the context of the thesis and identified the main areas of focus. Through the contents of this chapter, it is intended to present how the research will be carried out and why, according to academic trends and the nature of the research questions. Not only is it necessary to explain and justify the research techniques actually adopted, but these should be placed within the wider context of alternative methods.

This chapter proceeds by firstly overviewing the research paradigms, and then introduces the paradigmatic trends in the SCM and logistics fields. Secondly, the paradigmatic stance of this thesis has been positioned in line with the field trends and the nature of research questions. Thirdly, the suitable methods have been determined from the broad method areas, justifying the choice of research techniques. Ethics consideration and specific details on these methods are then outlined.

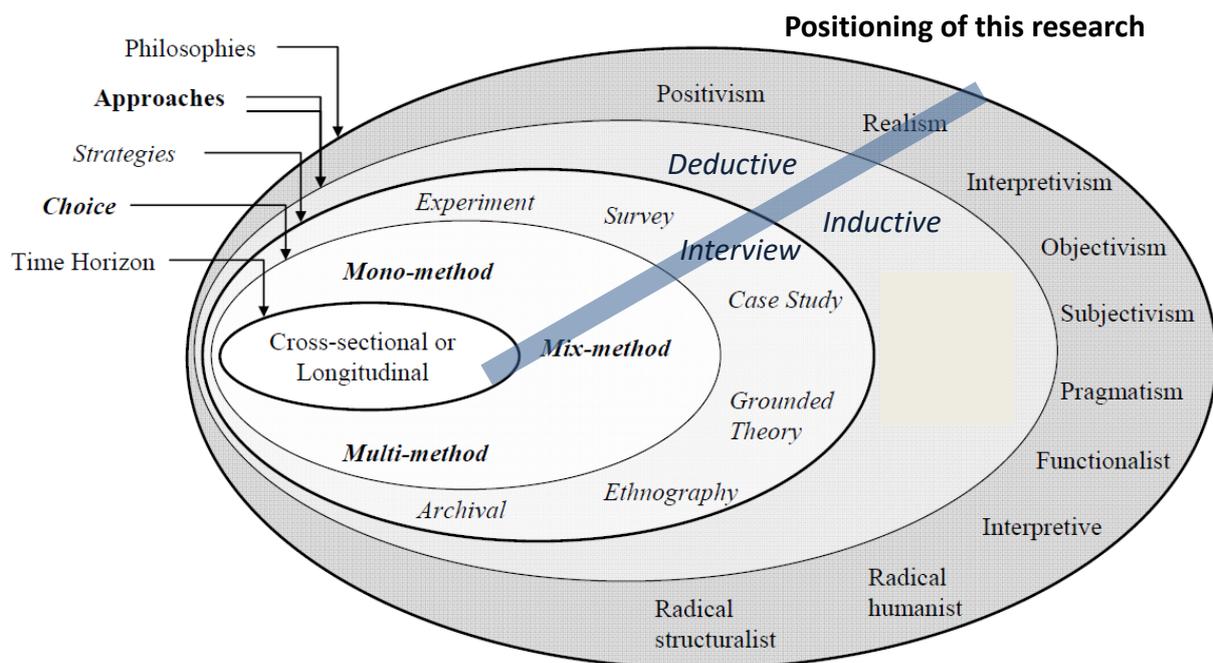
3.1 Overview of research paradigms

Research paradigms can be explained into three elements: ontology, epistemology and methodology. The epistemology will help to generate knowledge and explanations about the ontological components of the social world. Different research strategies will be influenced by different philosophical stances and methodological considerations (Denzin and Lincoln 1994; Guba and Lincoln 1994). The relationship among these elements can be appreciated through the “Iceberg” as a metaphor given by James (2015):

“Research paradigm can be seen as an iceberg. When we do social research, the ‘obvious’ bits, the tip of an iceberg, are the techniques for data gathering (usually ‘methods’). Just below this, often hard to see is the fact that there has been debate, and theorised choices have been made about methods and design (methodology). Deeper still, all research comes with a view of knowledge, or what is knowable and worth knowing (an epistemology); deepest of all, there is some idea of what it is to be human/social/a being...so an ontology.” (James, 2015)

By such metaphor, we can realize that the methods used to collect and analyse the data is just the small perceptible part of a much larger research paradigm that remains hidden. The revealed research methods are supported by the deeper philosophical stance under the water surface. Therefore, it is essential to understand the implication of the different philosophical stances when selecting an appropriate research strategy and method to conduct the social studies.

There are various philosophical positions, and Saunders et al. (2012) portray a research ‘onion’ (see Figure 3.1) as a route map to link all the components of research paradigm. The following sections will introduce the most-noted three research paradigms from the perspective of ontology, epistemology, methodology and methods. These paradigms will be termed as positivism, interpretivism and realism, although there are several alternatives noticed.



(source: Saunders et al. 2012)

Figure 3.1 Research ‘onion’ and research positioning

3.1.1 Positivism

The term “positivism” was coined by nineteenth-century French philosopher and sociologist Auguste Comte (1798-1857). Bryman and Bell (2011) indicated positivism in social science can be generally understood as the application of natural science to the research of social world.

Therefore, positivism takes a view of social reality as an external as well as objective reality, attempts to be value-free (objective). Social life may be explained in the same way as natural phenomena (May 2011), and humans are assumed as natural objects, like stones or fishes. As such, they have an existence and possess properties that exist independently of any observer. The world presumed by positivist could be thought of as a set of interacting variables, and the whole world could be thought of as a massive variable net. The underlying image is of the universe as a great machine whose workings are to be identification of relations between the variables (Thomas 2004). There is often a focus on hypothesis testing, using deductive approaches to test theories (Gill and Johnson 2002). Observations on social phenomena are expected to be generalized to make statements about the behaviour in terms of the population as a whole (May 2001). Consequently, positivism typically incorporates research that involves quantitative data (Punch 2005), which emphasizes quantification in the collection, measurement and analysis of data (Bryman 2012). In business research, relevant research methods for example, are questionnaire and experimentation under controlled.

Nonetheless, positivism has faced a number of criticisms, such as the “empirical” is not as simple as it seems, we need theory to break up reality into “empirical data”; positivist quantification method may just describe but not explain anything; the interdependence within concepts and data should be considered; and social phenomena much depends on who you are, your culture, expectations and so on, which cannot be over-looked by the simple positivistic method of research (Mason 2005).

3.1.2 Interpretivism

Interpretivism is given to a contrasting epistemology to positivism. Interpretivism views the subject matter of social science (people and their institutions) is fundamentally different from that of the nature sciences, and uses a different logic of research procedure (see Table 3.1). The ‘reality’ is determined by people rather than by objective and external factors (Cuba and Lincoln 1994). The metaphor of theatre suggested by Saunders et al. (2012) indicates that:

“Actors play a part of which they interpret in a particular way (which may be their own or that of the director) and act out their part in accordance with this interpretation. In the same way, we interpret our everyday social roles in accordance with the meaning we give to these roles. In addition, we interpret

the social roles of others in accordance with our own set of meanings.”

(Saunders et al. 2012)

Interpretivists consider each research situation is unique, and its meaning is of function of the circumstances. Consequently, interpretivists display a commitment to describe and explain behaviour from the view of the people being studied (Bryman 2012). The researchers seek rich descriptions which are the basis for developing arguments and reasoning (Remenyi et al. 1998). The interpretivist thus takes an inductive approach; whereby qualitative methods are employed.

Table 3.1 Contrasting implications of positivism and interpretivism

The observer	must be independent	is part of what is being observed
Human interests	should be irrelevant	are the main drivers of science
Explanations	must demonstrate causality	aim to increase general understanding of the situation
Research processes through	hypotheses and deductions	gathering rich data from which ideas are induced
Concepts	objective, need to be defined so that they can be measured	subjective, should incorporate stakeholder perspectives
Units of analysis	should be reduced to simplest terms	may include the complexity of 'whole' situation
Research strategies	quantitative methods	qualitative methods
Research methods	experiment, modelling, simulation, questionnaire survey	interview, case study, ground theory, ethnography
Generalization through	statistical probability	theoretical abstraction
Sampling requires	large numbers selected randomly	small numbers if cases chosen for specific reasons

(source: adapted from Smith et al. 2012)

Based on interpretivism, qualitative research attempt to explore the deep understanding of human behaviour. Interpretivists are good at dealing with the problems about “why” and “how”, rather than “what”. In addition, the multiple data-collection methods of qualitative research mainly include observation, interviewing, documentation and so on, which is more diversified than quantitative research. To put it briefly, qualitative research is an empirical, socially located phenomenon, defined by its own history, not simply a residual grab-bag comprising all things that are “not quantitative” (Kirk 1986).

However, the inductive tradition of qualitative methods usually generates high volumes of data, which could bring about problems during the analysis stage, making it difficult to form clear cause and effect relationships (Eldabi et al. 2002). Positivists usually regard interpretivism as unscientific, criticizing its lack of objective criteria (Bryman 2012), too personal, too subjective, only exploratory, lack of transparency and biased (Frankel et al. 2005), and the absence of generalization (Bryman 2012), replication and testability (Meredith 1998).

3.1.3 Realism

Realism can be described as the reconciliation of positivism and interpretivism approach (Wass and Wells 1994). Realism like positivism which assumes there is an outside world that exists independent of our knowledge of it. However, unlike positivism, it does not assume that this world can be known directly without any interpretation on the knower’s part. Whereas positivist assumes that explanations must be based on observable regulations, realists seek to explain what can be observed in terms of causes and explanations (Thomas 2004). Realism is seen by some as a bridge linking alternative philosophical schemes. Realist epistemology supposes that because reality cannot be fully understood through perception, theory can help reveal what is not directly observable. Giddens (1984) argues that a synthesis between apparently opposing philosophical paradigms is occurring in practice, and if there is an underlying relationship between methodology and epistemology, then some sort of reconciliation at the philosophical level is required. A realist interpretation of science may offer this solution (Wass and Wells 1994).

Methodological pluralism and triangulation of data are typical of a realist. All data which are relevant to subject including quantitative, qualitative, observable and interpretive data can be applied by the realists. Complete tool kit of techniques can be used. Bias can be reduced

through combining methods with a view to compensate for weaknesses in a single method (Wass and Wells 1994).

In conclusion, we all view the world in different way. Researchers' preferred paradigm can help understand the reality and research methods they are comfortable with. The paradigm guides the researcher in choices of method, ontologically and epistemologically (Guba and Lincoln 1994). However, even if a researcher identifies with a particular research perspective, it does not necessarily mean that the researcher must employ one particular research paradigm such as positivism or interpretivism stance. All kinds of research perspective are needed for fulfilling different research purposes, solving different social research problems, and explaining diverse social phenomenon.

3.2 Overview of Research paradigms in SCM and logistics

The research theme of this thesis is associated with maritime logistics which is located within the field of logistics and supply chain management. The following paragraph thus outlines the research paradigms and the trends in these relevant fields.

3.2.1 In SCM research

Wolf (2008) points out that, actually there is rather limited academic discussion on the issues of philosophical consideration, paradigmatic, and the theoretical state of supply chain management research. Burgess et al. (2006) analysed a total of 100 randomly selected refereed journal articles related to supply chain management field, and found there is a very strong tradition of the positivist research paradigm with 97 percent of the articles based on this paradigmatic stance, and only a small percentage of articles used the interpretivist and realist paradigms. Hence, the research paradigmatic stance from positivist is prevalent in this field, and academic works with realism as well as interpretivism are comparatively inadequate. This dominance means that knowledge in this field has being conceptualized as a rational function and investigated as a “science” because of the nature of this discipline. Supply chain management involves creating value-adding networks or optimizing system performance, which mainly employs quantitative methodologies to describe or explain phenomena and utilizes research methods such as mathematical models, simulation modelling, statistical survey methodology, and laboratory experiments (Christopher 2005). Therefore, the

positivism research paradigmatic stance is prevalent in this field, and works with realism as well as interpretivism are comparatively rare.

SCM has an interdisciplinary nature which is evident from the various fields of researchers and practitioners involved. A number of scholars find that quantitative measures are insufficient in dealing with the emerging complicated problems in the field of SCM, and indicate that more diverse research methods like qualitative ones are needed. Thus, despite the fact that positivism-based quantitative methods dominate the field of SCM, more and more researchers are now trying to introduce different research philosophy and methods into this field to look for greater depth and breadth of knowledge within it.

For example, Mouritsen and Dechow (1999) tried to interpret the process as a fabrication by means of the actor-network theory based on the stance of interpretivist analysis. Voss et al. (2002) indicates that many of the breakthrough concepts and theories in SCM, from lean production to manufacturing strategy, have been developed through qualitative research and case research. Some researchers employed qualitative methods such as case/field study and empirical observation to conduct SCM studies (Näslund 2002; Gammelgaard 2004; Voss et al. 2002; Towers and Chen 2008). In response to the calls for more qualitative case studies, Barratt et al. (2011) report that the field of operations management (OM) which is within the SCM area has seen a slowly but steadily increasing trend since 1992. Soltani et al. (2014) indicate that a qualitative middle-range research approach can bridge the system of science and practice and its potential to contribute to the advancement of OM field.

On the other hand, Aastrup et al. (2008) present a thorough and systematic justification for using case studies as a research approach in logistics based on the consideration for realism. Dennis (1993) and Marsh (1993) conducted field studies, collected statistical data as well as fairly extensive qualitative documentation and then ran regressions and cluster analyses with the statistical data to supplement their qualitative findings in their SCM research. This is a type of adoption of both quantitative and qualitative methods which is based on the realistic paradigm in SCM research. Instances where researchers employ such mixed methods design are on the rise (McCutcheon and Meredith 1993; New and Payne 1995; Meredith 1998; Voss et al. 2002; Mangan and Christopher 2005).

More recently, SCM researchers, MacCarthy et al. (2012) show a strong view to support the above points that qualitative and quantitative empirical studies are complementary and potentially provide a reinforcing cycle to generate robust theory. The soundness of the principle is valid, but current and future realities may require that conscious efforts be made to adopt this reinforcing cycle. They highlight that the profession must not assert supremacy of either approach, a rich diversity of methods (which reflects to realism) is available and beneficial, and should persist.

3.2.2 In logistics research

For exploring the contemporary state of logistics research methods under the field of supply chain management, Frankel et al. (2005) examined 108 articles published in the Journal of Business Logistics (JBL) within the last six years before 2005, and found that the majority of logistics research is based on methods within the detached, objective, external perspective with surveys (51%) as the primary research method. On the contrary, very few research methods take the form of an involved, subjective and cognitive perspective. The dominance of surveys point to the conclusion that a positivist paradigm and, consequently, mainly quantitative methods, are preferred in logistics research in general. Mangan et al. (2005) also indicate that the majority of logistics research is primarily populated by quantitative research viewed through a positivist lens. A similar investigation was performed by Dunn et al. (1993). Meredith (1998) indicated that the relative paucity of case and field research in operations management may be due to the unfamiliarity with the nature of theory building using case and field study methods.

Although logistics research is dominated by positivist with quantitative methods, Mangan et al. (2005) report that there are increasing calls for logistics research to more frequently employ qualitative methodologies. The trend is to use methods and approaches which can provide a middle ground between the contrasting positivism and interpretivism paradigms. Further, by using quantitative and qualitative methodologies which is based on the realism consideration to achieve methodological triangulation can yield greater insights than would have been the case if a single research methodology had been employed.

Liao-Troth et al. (2012) evaluate research trends observed in the International Journal of Logistics Management (IJLM) during its first 20 years of publication, and prove the above

arguments. The results of their research display that the multi-method research design has increased from 4 percent before 1999 to 22 percent by 2009. Within this category, 40 percent of multi-method studies involve a combination of survey and interviews. Additionally, 12 percent involve combinations of more than three methods. An example was given that Lawson (2002) in a study regarding the operational cost of offshore sourcing strategies, employed a combination of survey, interview, math model, and case study.

3.2.3 In maritime logistics research

Woo et al. (2011b) investigate how seaport research has been conducted from the methodological perspective for the last three decades (1980–2000s). Their study suggests methodological bias in port research to a positivistic paradigm, following a quantitative path moving from conceptual to empirical studies. This study suggests multi- or interdisciplinary approaches should be increasingly used to tackle the problems that are becoming more complicated in port research in the future.

From a philosophical view, Mangan et al. (2005) identify the benefits of methodological triangulation which combine quantitative and qualitative methodologies in logistics research. Accordingly, they make an attempt to view the maritime logistics issue about choice of ports/ferries under investigation from both positivist and phenomenological perspectives, rather than from either extreme viewpoint only. An appeal is upheld to urge logistics researchers to think about the paradigm through which they view the world and to explore the use of alternative methodologies.

3.3 Research paradigms in the thesis

Because research questions drive everything, including research methods (Teddlie and Tashakkori 2009; James 2015), the research questions in this thesis are revisited before the introduction of paradigm position and methods selection.

3.3.1 Revisit research questions

There are four core research questions in the thesis:

- (1) RQ1: What is the inter-organizational relationship structure in maritime logistics networks?
- (2) RQ2: What factors influence the inter-organizational relationship structure in maritime logistics networks?
- (3) RQ3: What is the connection between the service complexity and inter-organizational relationship strength in maritime logistics networks?
- (4) RQ4: What is the connection between the service complexity and value perceived in maritime logistics networks?

As reported in Chapter 2, the literature of the relationship structure and the influential factors in the maritime logistics network from a network perspective is still limited up to date. The knowledge should be further explored from the maritime logistics industry. Therefore, for answering the core research questions RQ1 and RQ2, the information from industry members' opinion is needed, in order to gain insights into maritime logistics network practice and realities. On the other hand, both research questions RQ3 and RQ4 are the mainly cause-effect type of questions, quantitative data therefore needs to be collected and analysed to test the correlations.

3.3.2 Position the paradigmatic stance of the thesis

As already noted in Section 3.2, the discipline nature of SCM and logistics plays a strong part in determining the paradigm adopted. SCM and logistics research is dominated by positivism, but the trend shows that the mixed methods led by realism are applied increasingly in order to deal with the more complicated questions and provide more insights. Further, the research questions revisited in previous section reveal the need of both exploratory as well as confirmatory information, and qualitative as well as quantitative data. The paradigmatic stance of the thesis was determined by these two facts.

The research 'onion' portrayed by Saunders et al. (2012) is a good tool (see Figure 3.1) to visually position the research paradigm of this thesis. In figure 3.1, a bold section line was drawn to show the position of this research. According to the above-mentioned two facts, the thesis philosophically locates at realism, using mixed method consisting of qualitative interviews, quantitative questionnaire survey and social network analysis (SNA). In addition,

a cross-sectional research design was adopted, because more than one sample needed to be collected at a single point in time without consideration about the time ordering variables.

3.4 Research methods selection

In terms of methodology selection, the options of research method related to two main research paradigms have already been noticed and outlined in Table 3.1. The Research methods in this thesis have been determined in Section 3.3.2. Hence, the research started from semi-structured Interviews with a small number of relevant cases, which are then analysed to inform questionnaire items for a broader survey. The SNA was applied to supplement the typical methods of analysis by qualitative and quantitative approaches. The methods selection of semi-interview and questionnaire survey are justified below, the part of their implementation and all the relevant parts of SNA will be discussed in Section 3.6 to 3.8.

(1) Interview

Interviewing is a frequently used method in social research. It is the interactional exchange of dialogue (Mason 2005), and it is the most natural thing in the world (Silverman 2010). The fundamentals of interviews and interviewing are maintaining and generating conversations with people on a specific topic or range of topics and the interpretations which social researchers make of the resultant data. In addition, interviews also yield rich insights into people's biographies, experiences, opinions, values, aspirations, attitudes and feelings. This method of data collection is highly suitable for exploratory and inductive types of study as it matches very well with their purposes. Interviews are often considered the one of the best data collection methods (May 2011). In business and management context, in-depth interview aims to use language data to gain insights into social and organizational realities, from organizational members whether they are managers or employees. This takes place through discovering the views, perceptions and opinions of both individuals and groups through the language they use (Easterby-Smith 2012).

There are multiple typologies for qualitative interviews but very little consensus among those typologies (Flick 2007). The most recognized formats of interview include structured, semi-structured and unstructured interviews (ESDS 2012). It is important to be aware of the advantages and disadvantages of the different ways of conducting interviews. While

structured interviews follow high degree of standardization of questions and answers, semi-structured and unstructured interviews tend to be flexible about interviewees' responses but more difficult to interpret (Ghauri and Grønhaug 2002; Bryman 2012). This thesis applied semi-structured interview method to collect the exploratory data, because this method can well meet the needs of answering the research questions RQ1 and 2 RQ2 revisited in Section 3.3.1.

Semi-structured interview sits between the unstructured and structured methods, and utilizes techniques from both. Semi-structured interviewing is more flexible than standardised methods such as the structured interview or survey, this method allows for the exploration of emergent themes and ideas rather than relying only on concepts and questions defined in advance of the interview (ESDS 2013). On the other hand, semi-structure questions are normally specified, but the interviewer is freer to probe beyond the answers in a manner which would appear prejudicial to the aims of standardization and comparability (May 2011). The assumptions underlying semi-structured interview are that questions need to be worded differently for different respondents if they are to have the same meaning for all respondents, and that the order in which questions are presented should depend on the specific context of each interviewer-respondent interaction (Thomas 2004). Thus, the interviewer would usually exploit a standardised interview schedule with set questions which will be asked of all interviewees. The questions tend to be asked in a similar order and format to make a form of comparison between answers possible (Bryman 2012). Besides, the interviewer is allowed to formulate unplanned questions to follow up ideas that appear during the interview, pursue and probe responses, and ask participants for clarification, further elaboration or providing relevant information, through such additional questions (Arskey and Knight 1999).

(2) Questionnaire survey

Questionnaire survey can be a good way of collecting data about the opinions and behaviour of large numbers of people, as long as it is done well. Survey research employs a methodology that has logical similarities to that used in the nature sciences (Williams 2000). Questionnaire survey involves asking each interviewee the same set of standardised questions. The order of questioning is fixed and wording is usually specific, in which there is little scope for probing or deviating from the specified agenda. The questions and the responses given tend to fit into

predetermined categories, confirming or disconfirming the hypothesis the researcher is pursuing (ESDS 2012). Unlike the limitation of interview, the questionnaire survey can measure facts, attitudes or behaviour, through which the hypotheses can be operationalized by the quantifiable data collected (May 2001). Survey data can be collected either through self-completion questionnaire, or can be administered by interviewers face-to-face or over the telephone. More recently, advances in communications technology have brought a variety of new options within the scope of researcher in business and management. For example, survey can be undertaken through e-mail or web-based software. The choice between them will depend on many factors, so that there is no single best way (Easterby-Smith 2012).

This thesis applied self-completion questionnaire method through e-mails and posts to answer the research questions (3) and (4) revisited in Section 3.3.1, because this method is more efficient and can well confirm and further explore the information received from the semi-structured interview. The correlation between service complexity, business relationship strength and value generated, which cannot be objectively analysed in the interview, can be measured through questionnaire survey. By doing this, SNA can also be operationalized to provide multiple research outcomes.

On the other hand, the research started from semi-structure Interviews with a small number of expert participants and gained some initial conclusions. By applying questionnaire survey which aggregates the information from a broader population can often result in a better outcome. This point can be supported by the concept of “Wisdom of Crowds” came from a book written by James Surowiecki. It is about the aggregation of information in groups resulting in decisions, which are often better than could have been made by any single member of the group, even better than expert’s decision. The book presents an interesting case that:

“... the crowd at a county fair accurately guessed the weight of an ox when their individual guesses were averaged. Unexpectedly, the average was closer to the ox's true butchered weight than the estimates of most crowd members, and also closer than any of the separate estimates made by cattle experts...

“(Surowiecki 2004)

However, not all crowds (groups) are wise. Consider, for example, mobs or crazed investors in a stock market bubble. According to Surowiecki (2004), the key criteria separate wise crowds from irrational ones can be summarized as: diversity of opinion; independent opinion; and some mechanism exists for turning private judgments into a collective decision. Accordingly, care related to these points was taken in the implementation and analysing stages of the questionnaire survey.

(3) Mixed methods and triangulation

Mixed methods combining qualitative semi-structured interview and quantitative questionnaire survey were applied in the thesis. By applying such combined qualitative and quantitative methods, the research can obtain several benefits as Bryman (2012) notes:

- Quantitative and qualitative research might be combined to triangulate findings in order that they may be mutually corroborated.
- The research methods associated with both quantitative and qualitative research have their own strengths and weaknesses so that combining them allows the researcher to offset their weakness to draw on the strength of both.
- Quantitative and qualitative research can each answer different types of research question. The researchers can bring together a more comprehensive account of the area of enquiry in which they are interested if both quantitative and qualitative research are employed.
- One of the two research methods is used to help explain findings generated by the other.
- When one method generates surprising results that can be understood by employing the other method.

Triangulation was conceptualized by Webb et al. (1966) as an approach to the development of measures of concepts, whereby more than one method would be employed in the development of measures, resulting in greater confidence in findings. There are principally four types of triangulation (Patton 1987; Denzin 1989) including: data, investigator, theory and methodological triangulation. However, the emphasis has tended to be on methods of investigation and sources of data (Bryman 2012). Triangulation can operate within and across research strategies. Increasingly, triangulation is also being used to refer to a process of cross-checking findings deriving from both quantitative and qualitative research

(Deacon et al. 1998). Moreover, through triangulation with multiple means of data collection, the validity can be further increased (Bryman 2012).

This research has included two main types of triangulation, which are methodological triangulation and data triangulation. Semi-structured interviews lead to new and creative concepts, followed by questionnaire survey and SNA to confirm and measure these concepts. Further, the source of data (samples) investigated by questionnaire survey are more diverse than the ones examined by interviews. Such two types of triangulation will rise the validity of the research.

3.5 Research ethics

Ethical issues cannot be ignored, as they relate directly to the integrity and quality of a piece of research and of the disciplines that are involved (Bryman 2012). Therefore, before moving to the details of research methods of this thesis, the research ethics-related issues need be discussed.

3.5.1 Overview of research ethics issues

The ethics issues are of particular concern in the medical sciences because of the harm that experiments might bring to participants, and also because of the enormous financial power of commercial funding bodies such as drug companies, which might seek to influence results to pursue their own advantage (Easterby-Smith et al. 2012). Likewise, it is inevitable during the course of any social research project that the research will face ethical and possible legal dilemma, which arise out of competing obligations and conflicts of interest. Therefore, it is crucial that the researchers consider the ethical aspect during the research process, anticipate the ethical issues involved and think through how these can be overcome (Punch 1998:281).

Bell and Bryman (2011) conducted a content analysis of nine well-known ethics codes produced by academic social research associations in the UK and USA. They identified ten principles of ethical practice defined by at least half of the associations. These principles are summarized below by Easterby-Smith et al. (2012) and presented in Table 3.2. The first seven of these principles are about protecting the interests of the research subjects or informants; the last three are intended to ensure accuracy, and lack of bias, in research results.

While the research ethics issues have been well considered in other discipline such as medicine, comparatively little has been reported in the supply chain management research (Svensson and Bååth 2008). Within the limited publication, Karlsson (2008) points out four key principles of ethics in operation management, include: emphasis should be placed on consent; research should have clear utility; caution should be exercised and risks should be evaluated; justice should be obeyed and benefits should be shared (with intellectual property rights upheld). These principles show a similar consideration in the above-mentioned social science research.

Table 3.2 Key principles in research ethics

1	Ensuring that no harm comes to participants.
2	Reporting the dignity of research participants.
3	Ensuring a fully informed consent of research participants.
4	Protecting the privacy of research subjects.
5	Ensuring the confidentiality of research data.
6	Protecting the anonymity of individuals or organizations.
7	Avoiding deception about the nature or aims of the research.
8	Declaration of affiliations, funding sources and conflicts of interest .
9	Honesty and transparency in communicating about the research.
10	Avoidance of any misleading or false reporting of research findings.

(source: Easterby-Smith et al. 2012)

3.5.2 Ethical consideration in this study

The parts in the study, which were involved in the ethical issues are mainly the conduct of interviews and questionnaire survey. In order to deal with the ethical considerations raised by these parts, relevant steps rigorously followed the Association Business Schools (ABS) ethics guide throughout the duration of the research. Both interview and questionnaire survey in this research have processed through the Research Ethics Committee in Cardiff Business School and gained approval, before they were undertaken in the field.

For consent gaining, consent from participants were sought by telephone and e-mail prior to the start of both interviews and survey. Both within the interview and survey process, a brief introduction to the research purpose and plan were given. This also ensured the clarity of ethical considerations for the participants. Participation in this research is entirely voluntary and each participant can withdraw from the research at any time without giving a reason. The summary of the research findings will be available to the participants at the end of the entire research work. The invitation letter and the consent form which were given to prospective participants are shown as appendix A.1 and appendix B.1.

For participants' other benefits, appropriate anonymity and confidentiality will be guaranteed for the participants. Respondents will be informed that their details will be kept anonymous in the final version of the thesis. Respondents will have the right not to answer any questions in the questionnaire. If required, the respondent is able to answer "no comment" at any time if they feel uncomfortable about the question.

In terms of the accuracy of research results, this research has adopted valid and reliable research methods to collect and analyse the data, and the results were presented neutrally.

3.6 Semi-structured interviews

The first research method used was semi-structured interview. Details in the approach adopted are now provided, and the outcomes from this are reported in Chapter 4.

3.6.1 Developing an interview guide

(1) Principle of interview guide design

Although qualitative interviews usually are flexible, interviewers should have some level of understanding prior to the interview of the research surrounding the interview topic (Jones, 1985), and researchers should at least specify a research focus (Bryman 2012).

Semi-structured interview should have a fairly clear focus in the beginning of the investigation, addressing more specific issues, rather than a very general notion of wanting to do research (Bryman 2012). Further, researchers who use semi-structured interviews need frameworks from which to plot out the developing themes, but should not be tied up by these frameworks. Consequently, a topic guide of interview, which address a loose structure for the questions can be apply to achieve this (Easterby-Smith et al. 2012). There may be some deviation from the sequence in order to follow interesting lines of inquire and to facilitate an unbroken discuss, but the interviewer should attempt to cover all the issues mentioned (Easterby-Smith et al. 2012).

In this semi-structured interview study, the author was interested in the extent to which key concepts were understood and therefore started initially with very general questions. If it was unclear for interviewees, then the interviewer explained the concept in more detail before moving on through the rest of the questions. As well as considering general understanding, this approach also helped to inform the questionnaire design in terms of the required clarity of the questions. Accordingly, an interview guide of this study which includes a loose-structured checklist of questions was prepared in advance (see Appendix A.2).

(2) Interview questions setting

The semi-structured interview starts with a self-introduction which reveals the research purpose and ethical issues (see section 3.5), then followed by the questions posed in the interview guide. The first part of questions enquires the interviewee's information. The second part focuses on the series of specific research questions, and the last part seeks the unplanned or open comments if there is any.

Within the interview protocol, the second part of questions is the main research interests which were asked in line with the research questions proposed in Chapter 2. These interview questions were asked based on the concepts of the Lambert's (2001) and Bask's (2001) models. These consist of several inter-related elements of the supply chain, which can apply

on the maritime logistics network: (1) the major players (firms) and their links (relationships); (2) the proposed network structure based on logistics triad framework; (3) the business processes and service types by complexity, that provide value to the customer; (4) the management components, e.g. the variables by which the business relationships can be influenced or the integration can be realized, and the value can be generated. The Interviews were started initially with very general and open questions, and then were narrowed down to more specific questions in order not to bias the respondents. The links between questions in the interview protocol and individual research questions / sub-questions are highlighted in Table 3.3.

Table 3.3 Interview protocol link to individual research questions

Questions in interview protocol		Linking to research questions	
Research themes in Interview protocol	The number of interview questions	Main research questions	The number of sub-questions
Part 2-1 Major players in maritime logistics chain	(1)	RQ 1: What is the inter-organizational relationship structure in maritime logistics networks?	RQ: 1-1
	(2)		RQ: 1-1
	(3)		RQ: 1-1
	(4)		RQ: 1-1
	(5)		RQ: 1-1
Part 2-2 Relationships between major players in maritime logistics chain	(1)	RQ 1: What is the inter-organizational relationship structure in maritime logistics networks?	RQ: 1-2
	(2)		RQ: 1-2
	(3)		RQ: 1-2
	(4)		RQ: 1-3
	(5)		RQ: 1-4
	(6)	RQ 2: What factors influence the inter-organizational relationship structure in maritime logistics networks?	RQ: 2-1
Part 2-3 Service provided by MLSP and port operator	(1)	RQ 3: What is the connection between the service complexity and inter-organizational relationship strength in maritime logistics networks?	RQ: 3
	(2)		RQ: 3
Part 2-4 Matching relationship and triadic benefit	(1)	RQ 3: What is the connection between the service complexity and inter-organizational relationship strength in maritime logistics networks?	RQ: 3
	(2)		RQ: 3
	(3)		RQ: 3
	(4)	RQ 4: What is the connection between the service complexity and value perceived in maritime logistics networks?	RQ: 4

3.6.2 Sampling in interview

In this interview study, purposive sampling which is the major sampling approach in the qualitative research (Bryman 2012) was applied. The goal of purposive sampling is to sample participants in a strategic way, so that those sampled are relevant to the research questions. On the other word, the research questions should give an indication of what categories of people need to be the focus of attention and therefore sampled (Bryman 2012). Further, gaining access is an important issue, and creating the situation where the interviews willingly offer time and make respondent sufficiently motivated to answer the questions for interviews should be carefully considered as well.

Based on the purposive sampling approach, the highly-experienced professionals who are most familiar with the research topics were selected. Due to the research questions in the interview are surround by the business relationship structure among the main players (shippers, maritime logistics service provides and port operators) and the services they provide in maritime logistics networks, the professionals from all these different group of main players were sampled. Accordingly, the interviews were conducted with the heads of industrial associations, high level professionals in the leading companies and authorities, who are directly related to these main players' industries and have most knowledge with the business practice in these industries. Therefore, participants sampled from the main-players' companies/organizations in this background should match the purpose of purposive sampling and provide valid and rich data.

The majority of interviewees were based in Taiwan. There are a number of reasons for the choice of Taiwan as context for investigation in the interview study as follows. Taiwan has well-developed and global-scale manufacturing, trading and maritime sectors. According to WTO (2014), Taiwan ranked within the top 20 in world trade (in merchandise trade, exports ranked 14th and imports ranked 12th; in commercial services trade, exports ranked 15th and imports ranked 19th). With regard to the development of shipping industry, Taiwan ranks 9th in line the owned fleets in the world (UNCTAD 2014). There are five container shipping companies ranking within top 50 globally (Evergreen, Yang Ming and Wan Hai are within top 22). UNCTAD (2014) also ranks Taiwan 7th out of 80 developing countries as specified by the annually total container port throughput (TEUs), and Kaohsiung Port ranks among the top 14 globally. In

terms of the level of access to the global liner shipping network, Taiwan ranked at 13rd according to the 'Liner Shipping Connectivity Index (LSCI)' published by UNCTAD (2014). Furthermore, although within the overall 41 interviewees, the majority were based in Taiwan, they were dealing with global-scale business. In addition, seven participants were working in the overseas branches of Taiwanese companies, and two were working for the non-Taiwanese companies. These will help to enrich the source of participants and overcome the possible biases caused by specific geographic context.

3.6.3 Implementing interview

Before running formal interviews, the pilot interviews were conducted with two senior professionals in the shipping industry. The topic guide of interview was revised in line with their suggestions, including: use a language that is comprehensible and relevant to the interviewees from industry, and avoid using too-academic terms; have to consider about the time constraints of interviewees from business field, thus interviewing questions should be emerged to a reasonable amount and flow well.

The formal interviews were conducted between the autumn 2013 and the autumn 2014. The total numbers of interviewee are 41, who are cross-section representatives respectively coming from 23 leading ocean carriers, freight forwarders, port operators and port authorities, and shippers which involve the services or business with global scale. Some interviewees are based in overseas branches.

Voss et al. (2002) suggest that the researcher may consider interviewing multiple respondents, when there are questions for which no one person has all the required knowledge, or the events being studied may have different interpretations or viewpoints, how and why questions may be subject to different interpretations. Lam (2013) explored the supply chain integration in liner shipping, and interviewed single or multiple management executives who were in charge of supply chain solutions from according to the different regional offices they based and the effective access in each company. Hence, in this thesis, some companies interviewed had multiple respondents, while others had a single respondent. The multiple responses are from different sections (e.g. management section and reefer container operation section) and overseas office (e.g. Taiwan based head quarter and overseas branch) in the same company in order to provide more comprehensive opinions from cross-functions

and cross-geographic context, so may help. Where only one respondent in the same company are often linked to its scale and access.

The interviews were supplemented with three site observations and documentary evidence. The site observations include the handling of a container ship in a port, and advanced warehouses which provide vendor-managed inventory, multi-temperature storage and value-added services.

The interviews were conducted by face to face, and followed up by Skype or e-mail. The role of the interviewer is to facilitate the interviewees to talk about their views and opinions in depth but to be non-judgement through limited reciprocal engagement or disclosure (Kvale 1996). The length of interviews varied from one to three hours, and the average is two hours which can help to gain the rich insights. Interviews were undertaken based on appropriate anonymity and confidentiality for the participants (also see Section 3.4). As the consideration of industry culture and many informants show their concerns about feeling intimidated by the presence of the recorder, the interviews were recorded by note taking, instead of tape recording (Rose 1994).

3.6.4 Analysis of interview data

The basic concept for qualitative data analysis is categorization and characterization (Saunders et al. 2003). One of the most common approaches to qualitative data analysis is often refer to thematic analysis (Bryman 2012). Simultaneously, content analysis which is for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns can be employed to analyse the transcript of this interview (Hsieh and Shannon 2005). Therefore, the data from interviews are presented in relation to the key themes and areas identified, as a result of undertaking a thematic content analysis (Smith 1992). If the identification of themes is not clear, one possible factor may be in operation is the frequency of the occurrence of certain incidents, words, phrases, and so on that denote a theme (Bryman and Burgess 1994). Further, qualitative researchers can have some idea of the relative frequency of phenomena being referred to by engaging in 'quasi-quantification' through the use of terms such as 'many', 'frequently', 'rarely', 'often', and 'some' (Silverman 1984).

Accordingly, in the thesis, the interview was mainly analysed by the thematic content analysis and 'quasi-quantification' method. The various themes emerged in line with the interview questions which links to research questions (see Section 3.6.1), and the unexpected findings from the interviews. In such, some checklist matrices (or graphs) were created, and the analysing matrix designs ranged from simply counting the occurrence of various phenomena, to those that simply display qualitative data. These checklist matrices (or graphs) can facilitate the data analysis, make it more systematic and encourage comparison. This is also important for justifying for the selection of quotes and how rankings of research subjects are made (Easterby-Smith 2012). Specific quotes and instances from the field (interview) notes were used to illustrate analytic points and outstanding issues (Wolcott 1990). Further, a table summarizing different existing relationship structures caused by different attributes were presented. In such table, the relationship strengths were assessed by the interviewees' descriptions based on the principle of 'quasi-quantification'. These relationship strengths are marked and termed as: '0=No relationship'; '+=Loose relationship'; '++= Medium relationship'; '+++=Close relationship'.

Although there are some advantages of using qualitative data analysis software, no computer software was used in the analysis of interview. This is because the concerns include: increasingly deterministic and rigid processes; increased pressure on researchers to focus on volume and breadth rather than on depth and meaning; and the unsuitability of the package for the research questions and research design (Winsome St. and Johnson 2000).

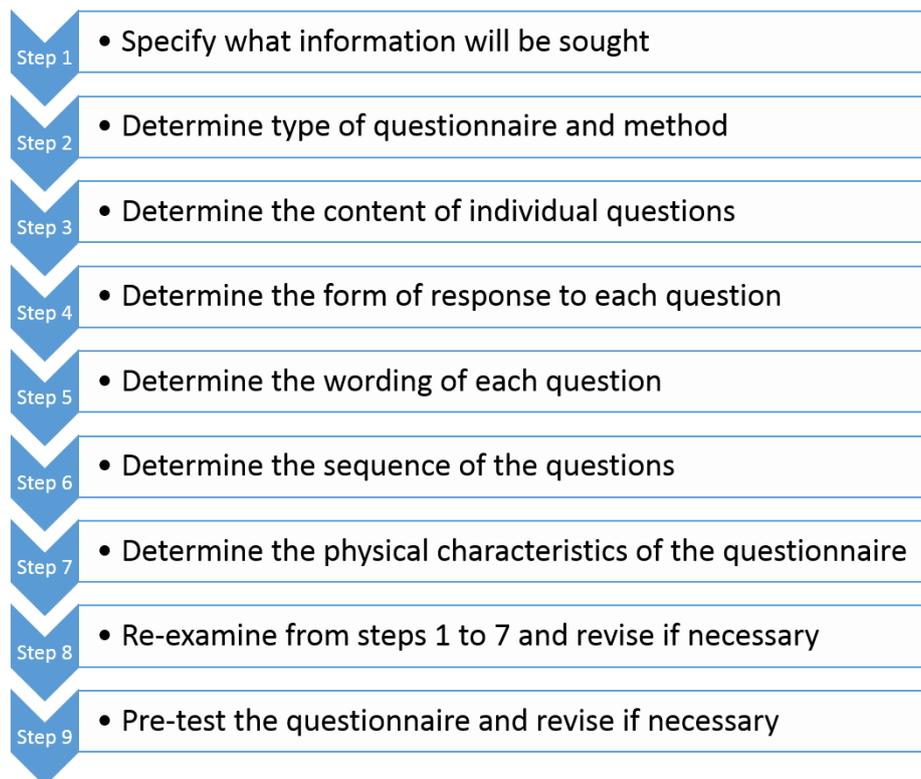
Consequently, the results of this interview study were presented by different themes with outstanding quotes, tables and figures correspondent to the research questions, mainly including: identifying the main players in the maritime logistics network; shaping the proposed research framework; dyadic, triadic and network business relationships among the main players; different attributes which can cause different relationship structures; and three types of maritime logistics service by different service complexity. As well as considering general understanding, this analysis also helped to inform the questionnaire design in terms of the required clarity of the questions.

3.7 Questionnaire survey

The second research method used was questionnaire survey. Details in the approach adopted are now provided, and the outcomes from this are reported in Chapter 5.

3.7.1 Questionnaire design

A standard format of structured questionnaire survey is used with an emphasis on fixed response categories, systematic sampling and loading procedures combined with quantitative measures and statistical methods (Ghauri and Grønhaug 2002). In this questionnaire survey study, the nine-step procedure developed by Churchill (1991) was followed to assist in the design of the questionnaire (see Figure 3.2), and the application of this procedure is presented step by step as follows:



(source: Churchill 1991)

Figure 3.2 Procedure for developing a questionnaire

(1) Steps of questionnaire design

Step 1: Specify what information will be sought

The descriptive information about the relationship structures among main players in the maritime logistics network has been obtained from prior interview study. The purpose of the questionnaire survey is to learn about to what extent the relationship strengths are existing among the main players, and the value generated. Hence, the relevant information which can be analysed through quantitative methods will be sought by the questionnaire.

Step 2: Determine type of questionnaire and method

A self-completion questionnaire was applied as it is more economical and convenient to administer, especially when the sample size is large or samples are geographically widely dispersed (Bryman 2012). Further, optional modes of questionnaire which include paper and electronic copy were provided. Respondents would be free to choose which mode they completed and returned to the research.

Step 3: Determine the content of individual questions

The content of individual questions was decided by the research questions derived from critical literature review (in Chapter 2) and the results of interview. It should be transferred into a measurable question according to the measurements identified in Chapter 3.

Step 4: Determine the form of response to each question

Most of the questions were designed as closed-end style, and supplemented open elements in order to pursuit the more suitable answers. The category scales were used to collect the information of participants' background. The five-point Likert scale rating were applied to measure the participants' perceptions of the statements about relationship strength and value generated (for example, scale descriptors are 1: Strongly Disagree, 2: Disagree, 3: Neither Agree or Disagree, 4: Agree, 5: Strongly Agree). Five or seven-point Likert scale are the most common formats (Malhotra and Peterson 2006), and both of them produce the same mean score once they are rescaled (Dawes 2008). As the measurements of relationship structure and value generated in the maritime logistics has been complicated in this research, five-point

scale which is simpler for the participants were used in order not to enhance the complexity of reading out the list of scale descriptors (Dawes 2008).

Step 5: Determine the wording of each question

Using a simple expression is the core concept of the wording design. Each question was addressed to express only one idea, avoiding jargon and colloquialisms (Easterby-Smith et al. 2012). Caution was taken to ensure that questions were neither leading, nor making implicit assumptions. As most of the participants are based in Taiwan, a Chinese-language version questionnaire translated from English was prepared at the same time.

Step 6: Determine the sequence of the questions

Careful attention was given to the sequencing of questions in order to ensure they flow logically from one to the next, such as: from the more general to the more specific; from the least sensitive to the most sensitive; from factual and behavioural questions to attitudinal and opinion questions; from unaided to aided questions.

Step 7: Determine the physical characteristics of the questionnaire

The layout of the questionnaire was design in a manner which can enable participants to have a clear understanding of all the questions and assist to complete the questionnaire. In the beginning of the questionnaire, the instruction of the main purpose of the questionnaire was presented. A visualized figure related to the maritime logistics network was demonstrated in order to facilitate the participants to appreciate the research framework. Instead of repeated words, the tables were applied to scale respondents' perception. The other approaches include: establishment of simple and clear formats; creative use of space and typeface; and placing the same type of questions in the same page. In addition, since four types of respondents were included within this single survey (cargo owners, freight forwarder, shipping carriers and port operators), different colour and marked coding are used to help in the administration of questionnaires.

Step 8: Re-examine from steps 1 to 7 and revise if necessary

The initial layout and content of the questionnaire were discussed, expanded and revised in several supervision meetings in line with the procedure from step 1 to step 7.

Step 9: Pre-test the questionnaire and revise if necessary

Before running formal questionnaire survey, the pilot survey was conducted with seven senior professionals in the shipping and port industry. The questionnaire was revised in line with their suggestions, including: more comprehensible language for respondents should be used; more tailored wordings and flow of the questions should be provided in the different versions of questionnaire for the different types of respondents. This pre-test also examined the effect of the situation that interview participants were also respondents at the survey stage.

(2) Questions setting in the questionnaire

According to the above discussion, the finalized questionnaire was divided into five parts:

Part 1: introduces the purpose of the questionnaire, the estimated filling time, the right of participants, and the contact persons.

Part 2: starts with collecting the data relating to the general personal and company information, which aims to form the background of participants' working area and experience, and the business nature and scale of their companies.

Part 3: demonstrates the framework of analysis in the questionnaire, and ask participants to score the level of importance of each business relationship ties between major players in the maritime logistics network.

Part 4: focuses on evaluating the relationship strength and value between major players by complexity of maritime logistics service. This part includes three themes: to identify the structure of types of the maritime logistics service which the participants' companies provide or receive; the relationship strength between participants' companies and their different group of trading partners associated with different types of logistics service; the value generated by different types of logistics service and its origin associated with participants' different trading partners.

Part 5: includes an open-ended question to ask participants to give other comments, and encourage participants to leave their contact information for further communication if needed, or to receive a summary of the survey findings.

The questionnaire was designed based on a standard form, but with a slightly customized arrangement for different players. The major different part is the question about the content of the services the different players provide or receive. Appendix B.2 contains the example of English and Chinese version questionnaire for shipping carriers.

In terms of the number of survey questions, Melnyk et al. (2012) indicate that it is one of the crucial factors affecting response rate. They show a trend that the number of questions is negatively correlated with response rate when there are more than 20 questions, and the response rate starts to significantly drop after about 75 questions. Accordingly, it is necessary not to have too many questions in the survey in order to help the response rate up. Hence, besides the questions about participant's information and open-ended comments, there were total 75 questions in this survey.

In addition, as the main part of this questionnaire were aiming to explore the relationship structures and values from 3 dimensions which include 4 kinds of player, 6 relationship measurements and 3 service types, a certain minimum number of questions were required. Therefore, to keep the balance between number of questions and the content of individual questions, the single construct for each measure identified in the literature (Chapter 2) were used.

3.7.2 Sampling in questionnaire survey

The questionnaire survey was mainly conducted with the professionals from Taiwan-based companies and their major trading partners, which consist of cargo owners, shipping carriers, ocean freight forwarders and port operators. The questionnaires were mainly distributed by e-mail through the relevant major industrial associations in Taiwan and by snowball sampling through the member companies within these associations. A small proportion of participants without e-mail access or prefer the paper questionnaires were provided with the paper copies. These major industrial associations include: Nation Shippers' Council Republic of China; National Association of Chinese Shipowners; Taipei Shipping Agencies Association; International Ocean Freight Forwarders and Logistics Association, Taiwan; and Association of Container Terminal Operator, Republic of China. The participants are expected to be familiar with operational or strategic aspects for the above-mentioned business practice.

An e-mail attachment questionnaire was used (Bradley 1999), because e-mail is regarded as a cost-efficient method with wide geographic coverage and generating fast response (Schillewaert et al. 1998). However, the e-mail survey has been criticised due to a lack of externally valid (representative). This problem can be tackled in this study, as the specific research population (cargo owners, ocean freight forwarders, shipping carriers, and port operators) is available through the aforementioned industrial associations (Schillewaert et al. 1998).

In terms of snowball sampling approach, it is originally introduced by Coleman (1958) and Goodman (1961). Coleman (1958) suggests that it may be a better approach than conventional probability sampling and can be relevant to quantitative research, when the researcher needs to focus upon or to reflect relationships between people, and tracing connections. Goodman (2011) puts forward that it is a means for studying the structure of social network, and a convenience method to access hidden populations. Some researchers (Kaplan et al. 1987; Griffiths et al. 1993) claim that most snowball samples are biased and cannot be generalized because they are dependent on the referrals of the respondents first accessed. However, Cohen and Arieli (2011) argue that despite this limitation, it is possible to increase the representativeness of snowball sampling method by sufficient planning of the sampling process and goals, initiating parallel snowball networks.

Cohen and Arieli (2011) also indicate that snowball sampling method can play a key role in three critical stages of data collection: locating, accessing, and involving hidden and hard to reach populations. Browne (2005) applied the technique of snowball sampling to explore the interpersonal relations, and indicates that this approach can include those often ignored in studies that rely on random or representative sampling, yet the disadvantage may be excluding those not within relationship groups. The latter problem can be reduced by distributing the questionnaire through the major industrial associations which own a complete population of the relevant industry. Therefore, this sampling approach is suitable for this research which focusing on the inter-organizational relationships between main players in the maritime logistics network.

The other concern about the sampling in survey is the potential bias which could be caused if interview participants were also respondents at the survey stage. Some of the issues around bias may include:

- Would the respondents answer the survey in a certain way if they knew about your research from the interviews?
- Are they more likely to respond than those who weren't in the interviews?
- Would the interviews give them more insights and therefore understanding of the questions?
- Would certain issues be given more weight in your discussion if the same respondent highlighted them in the interviews and survey?

These issues were addressed through minimizing the number of participants who both take part interview and survey studies, and examining such effect on pre-testing surveys.

3.7.3 Implementation in questionnaire survey

The pilot questionnaire survey was conducted with seven senior professionals, and the wordings of the questions were revised in line with their suggestions. Questionnaire survey were conducted during November 2014 to February 2015. In order to improve the response rate, a follow-up e-mail or telephone was sent out to the low-respondent-rate associations after a four weeks' period. The return date of each completed questionnaire was recorded. This information enabled non-response bias can be calculated by comparing the data from the first responded and last responded groups of respondent.

The total number of effective respondents is 248 who come from cargo owners (73), shipping carriers (55), ocean freight forwarders (53) and port operators (67) respectively. There are 4 ineffective respondent questionnaires because of the misdistribution or providing nearly blank answers.

3.7.4 Analysis of questionnaire survey data

With regard to the framework of analysis, three levels of analysis are applied, which includes node level, dyadic relationship level, and network level. The aggregation of the information gathered at the level of dyadic relationship gives insight into the network, and meanwhile

reflects the position of dyads (Harland 1996). From a network perspective, the relative position of individual nodes (players in this research) can determine their power and influence in their surrounding network (Burkhardt and Brass 1990; Ibarra 1993; Borgatti and Li 2009).

In terms of the techniques for analysis, data collected from this standardised-questions questionnaire survey can be analysed through quantitative methods. Responses were encoded into numerical data in order to perform statistical tests (May 2001). Appropriate statistical methods of analysis were applied depending on types of data (e.g. variable) and number of responses received in the survey (Kinnear and Gray 1997). The following statistical methods were applied:

- Descriptive statistics (for respondents' information): to examine the profile of respondents and their firms to gain the background information of the data collected.
- Descriptive statistics (for the answers of main research questions): mean values were generated and complemented with rankings, tables and graphs to determine the similarity, difference and specific pattern among different variables.
- Non-parametric tests: to determine whether the difference between mean values is statistically significant. Such tests require very few, if any, assumptions about the population probability distribution and the level of measurement.

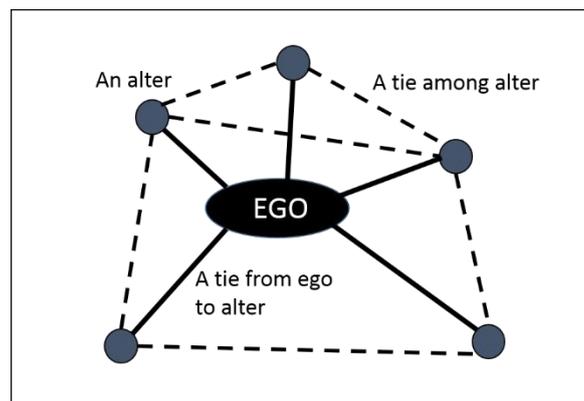
Further, social network analysis (SNA) which is a quantitative modelling approach to analyse the structural characteristics of supply networks (Borgatti and Li 2009) was applied. The tools of SNA including adjacency matrix, sociogram and some key metrics were utilizing to undertake the further analysis. The general introduction of SNA has been shown in Section 2.3, and the details of its application in this research will be presented in Section 3.8.

3.8 Application of SNA in this thesis

The application of SNA in this thesis links to the coming chapters, particularly involve the questionnaire data analysis in section 5.6. The details of application of SNA in this thesis show as follows:

(1) Formation of the framework of analysis

As this research is developed from the framework of logistics triad which only consists of the core players within the logistics network, and we are also mostly interested in the main players and the relationships among them in the maritime logistics network, we do not look into the whole players in the full network. Instead, this research utilizes only what is called the ego network, which consists of: a focal actor (known as ego); the set of actors with any kind of tie to ego (known as alters); all ties among the alters and between the alters and the ego (Borgatti and Li 2009, see Figure 3.3). Works of Lee (2005) and Kim et al. (2011) discussed in the previous section are two examples for this.



(source: Borgatti and Li, 2009)

Figure 3.3 An example of ego network

Borgatti and Li (2009) point out that in practice many studies which apply the network theoretical perspective do not actually take into account the full network, but only focus on the ego network. The main reason to restrict attention to the ego network is the belief that more distant connections are not relevant to the specific mechanisms at hand. In addition, it is much more convenient to collect ego network data than full network data, and there is little reason to collect the whole network, if the ego network could provide a reasonable proxy for position in the larger structure. In addition, methodologically, the ego network approach is fairly easy, although in a complex organization it may be necessary to ask the same information from a number of different organizational members (each with a limited view of the organization's activities) in order to construct a complete ego network.

(2) Data collection

In terms of the data collection, this research adopted a strategy of aggregation. This strategy has been used in several fields, such as ecology food web research and sociology. In ecological

food web research, there are often too many species to work with, and so sets of similar species are grouped together into what are called compartments, and these are taken as the units of analysis instead of individual species (Borgatti and Li 2009). The social capital theorists Lin, Fu and Hsung (2001) have advocated the use of “position generators” which is a survey technique in which the respondent is asked not for their ties to specific others, but to categories of others, such as “priests” or “managers” or “marketing people”. In the supply chain case, this corresponds to aggregating by industry, technology, some other convenient variable or varying levels of sector (Borgatti and Li 2009).

Accordingly, strategy of aggregation can be done with firms as well, so that, in this research, instead of asking for the relationship strength with individual trading partners, the firm was asked for inputs from different categories of trading partners (cargo owners, ocean freight forwarders, shipping carriers, port operators) in line with the research objectives.

(3) Data analysis

The nature of data

This research adopted the SNA related to the directional and weighted network. Since the thesis is developed based on the network perspective, the data of relationship strengths will be collected from each main player’s perception. This will generate a directional network of tangible or in tangible flow, which focus on either the flow initiated (out-degree) or flow received (in-degree) (Kim et al. 2011). On the other word, the maritime logistics network would be the ego network defined by the set of all main players with a direct relationship (in or out) to the other main players (Borgatti and Li 2009).

Further, referring to Chapter 2, this thesis intends to measure the inter-organizational relationship strength by six dimensions (communication, cooperation, relationship duration, commitment, trust and dependency) which are interval measures. According to Hanneman and Riddle (2005), continuous measures of strengths of relationships allow the application of a wider range of mathematical and statistical tools to the exploration and analysis of the data. Many of the algorithms that have been developed by social network analysts, originally for binary data, have been extended to take advantage of the information available in full interval measures. This research thus will use the SNA metrics adopted in the weighted network.

Node-level analysis

In terms of the selection of SNA metrics, the simplest method of measuring network centrality for a node is by the way of **degree centrality**, which takes account the number of direct connections with the nodes (Iyengar et al. 2012). This degree is a measure of the importance of a node in a network, nodes with strong connections should be accorded more importance than nodes with only weak connections. Every link of weight n can be replaced with n parallel links of weight 1 each, connecting the same nodes. Therefore, techniques that can normally be applied to non-weighted graphs can be applied to the weighted graphs as well (Newman, 2001). Degree can be extended to the sum of weights when analysing weighted networks, and this measure has been formalized as follows (Barrat et al. 2004; Newman 2004; Opsahl et al. 2008):

$$s_i = C_D^w(i) = \sum_j^N w_{ij}$$

where w is the weighted adjacency matrix, in which w_{ij} is greater than 0 if the node i is connected to node j , and the value represents the weight of the tie. This is equal to the definition of degree if the network is binary, i.e. each tie has a weight of 1. The degree centrality will be measured by the out-degree centrality, in-degree centrality and the conjunction of these two respectively. On the other hand, the degree in the weighted network need to be normalized in order to sum to one for the purpose of comparison (Liu 2008).

As Kim et al. (2011) used degree centrality to determine the integrator and allocator in the supply chain cited in Section 2.3.2, the questionnaire survey in this research has used such weighted degree and normalized weighted degree to identify the position of each main player in the maritime logistics network. In addition to the figures derived from the degree of a node in the SNA, the strength of the connection can also be depicted by the thickness of the line, the number of lines, or other graphical means (Lee 2005).

Second, the individual **degree of connectedness** was explored in order to identify the most connected node (main player), or the node (main player) gives output and receives input more

than other nodes. This degree of connectedness was derived from the data consisting a main player's output and input to other main players.

Network-level analysis

With regards to the network-level metric, the **network density** which is a measure of the overall connectedness of a network were adopted. Network density refer to the number of total ties in a network relative to the number of potential ties (Scott 2000). The research has applied this to compare the SCI degree of different networks according to three types of service complexity, as Lee (2005) did cited in Section 2.3.2. As applied in the weighted node-level SNA, the network density for weighted network can refer to the number of total weighted ties in a network relative to the number of potential weighted ties.

3.9 Summary

This chapter has outlined the main methods used in this thesis, providing an overview of the alternative as well as more detail on the specific approaches chosen. This thesis is underpinned by a realism epistemology, based on which mixed methods were carried out in order to provider a wider and reliable context to understand the relationship structure in the maritime logistics network. Being applying realism-based mixed methods is corresponding to the latest trends in SCM and logistics research (Voss et al. 2002; Mangan et al. 2005; Woo et al. 2011b).

Given the research questions to be considered, three main methods were selected: semi-structured interview; questionnaire survey and social network analysis (SNA). The first is used to establish the framework of relationship structure in the maritime logistics network which is still absent in the literature. The second is used to measure the quantitative level of the relationship strength and value generated within the network. The third one is a contemporary technique for further understanding the insights of the maritime logistics network. By applying such methods, a more comprehensive and dynamic picture of the maritime logistics network from different perspectives can be revealed.

Chapter 4 Interview Study

As has been discussed in Chapter 2, the main research questions and initial framework of analysis were proposed by reviewing the previous literature. In Chapter 3, mixed research methods including interview study and questionnaire survey, were designed to answer these research questions. Based on these two chapters, this chapter aims to demonstrate the findings from exploratory study by applying the in-depth interview method.

The initial framework of analysis for relationship structure in maritime logistics network in this research is based on the Bask (2001) model discussed in Section 2.2.2 (see Figure 2.2). However, according to the literature review in maritime logistics area, this initial framework should be revised in order to fit in the maritime logistics context. Hence, the shipping carriers and freight forwarders were included as the maritime logistics service providers (MLSPs), and port operators were added as an additional analysis unit within the logistics triad (see Figure 4.1) because of their unique and crucial role in the maritime logistics network suggested by the literature in Section 2.7. The following interview study started from this first revised framework, and aimed to seek opinions from industry in order to verify or craft the framework of analysis to conform to the business practice in maritime logistics.

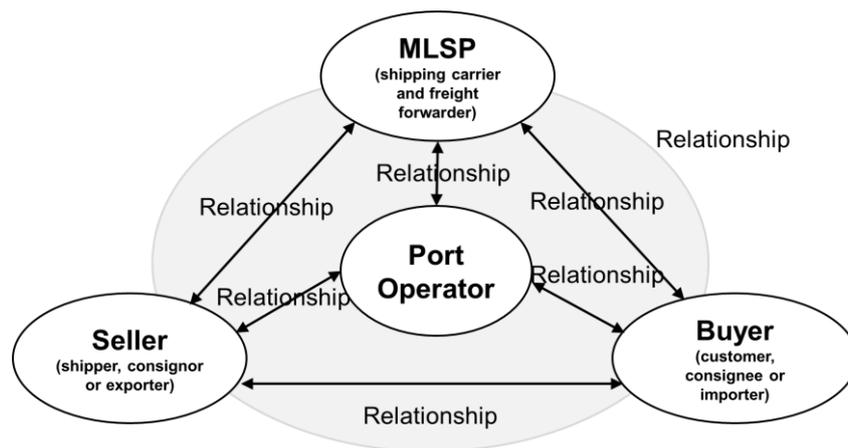


Figure 4.1 First revised research framework

Through the interview study in this chapter, the framework of analysis and the insights of relationship structure reviewing from the dyadic to network perspective in maritime logistics network were explored. The following sections will provide information about the

interviewees, the findings together with an analysis from the interviews which not only focus on general themes but also address the special issue made by respondents, discussion reflecting on the previous literature and a conclusion linking to the coming questionnaire survey study which is the next stage of this research.

4.1 Information about the interviewees

Exploratory in-depth semi-structured interviews with 41 interviewees from 23 different companies/organizations/authorities, three site observations and supplementary document analysis were conducted between the autumn 2013 and the autumn 2014. The participants included 17 professionals from leading shipping carriers, 8 from freight forwarders, 10 from port operators and 6 from cargo owners, from managerial level to technical and operational level in order to provide a wide range of perspectives and verify the initial model in accordance with industry practice (see Table 4.1).

The participants were mainly based in Taiwan, which has well-developed manufacturing and maritime sectors, and the majority of these participants' companies/organizations are involved in global scale business. Seven participants were working in the oversea branches of the Taiwanese companies. One professional from a leading Korean shipping carrier and one professional from a major port operator based in the UK were interviewed for enriching the source of participants.

Most of the participants are senior managers occupying the high position in their companies or organizations including company owners, chairmen, presidents as well as chief operators, and 67% of them have over 20-years work experience. The site observations include the handling of a container ship in a port, a container yard of port operator in port area, and advanced warehouses which provide vendor-managed inventory, multi-temperature storage and value-added services.

Table 4.1 Background of the interviewees

Industry	Firm	Interviewee's Position	Working age	Interviewee Code
Shipping Carrier	Global container shipping company 1 (Top 20 in the world)	President	40	SC1-1
		Vice President (Global management group)	25	SC1-2
		Branch President (EU branch)	25	SC1-3
		Branch Executive Vice President (EU branch)	25	SC1-4
		Branch Senior Vice President (US branch)	21	SC1-5
		Branch President (UK branch)	22	SC1-6
		Assistant Vice President (Reefer Container Business Section)	10	SC1-7
		Chief Engineer (Reefer container operation Section)	15	SC1-8
		Chief Officer (Seafarer on Board)	15	SC1-9
	Global container shipping company 2 (Top 10 in the world)	Vice Group Chairman (Based in the UK)	35	SC2-1
		Chairman (Based in the UK)	25	SC2-2
		Senior Vice President (Project Div.)	23	SC2-3
		Deputy Senior Vice President (Project Div.)	21	SC2-4
		Branch Senior Vice President (US branch)	21	SC2-5
	Global container shipping company 3 (Top 40 in the world)	Vice President	15	SC3
Global container shipping company 4 (Top 10 in the world)	Executive Sales	7	SC4	
Global container shipping company 5 (Korea, top 10 in the world)	Manager	5	SC5	
Ocean Freight Forwarder	Freight Forwarder 1	President	25	FF1
	Freight Forwarder 2	Chairman	19	FF2
	Freight Forwarder 3	President	23	FF3
	Freight Forwarder 4	President	25	FF4-1
	(Subsidiary of global container shipping)	Manager (Planning Dept.)	7	FF4-2
	Junior Vice President	19	FF4-3	

	Freight Forwarder	5	(Subsidiary of global container shipping)	President	25	FF5
	Freight Forwarder	6	(Relevant Association)	Secretary General	25	FF6
Port Operator	Port Operator 1 (Port Authority)			Counsellor	35	PO1
(Port Authority)	Port Operator 2 (Port Authority)			Counsellor	26	PO2
	Port Operator 3			Administration Vice President	22	PO3-1
				Assistant Vice President	20	PO3-2
				Supervisor (Marketing & Planning Dep.)	13	PO3-3
	Port Operator 4			President	28	PO4-1
				Vice President (Operations Dep.)	15	PO4-2
				Manager (Planning Dep.)	10	PO4-3
	Port Operator 5			President	21	PO5
	Port Operator 6 (UK)			Business Development Director	20	PO6
Cargo Owner	Cargo Owner 1 (Relevant Association)			Secretary General	25	CO1
	Cargo Owner 2 (Global retailer in Taiwan)			Executive assistant to general manager	15	CO2
	Cargo Owner 3 (Food manufacturer)			Executive assistant to general manager	15	CO3
	Cargo Owner 4 (Home improvement and garden centre retailer)			Branch President (Taiwan branch)	25	CO4
	Cargo Owner 5 (ICT products manufacturer)	ODM		Manager	12	CO5
	Cargo Owner 6 (Optronics manufacturer)			Specialist	5	CO6

In this interview study, the results will be presented by different themes with outstanding quotes (the comprehensive quotes can be seen in Appendix C), tables and figures correspondent to some of the research questions identified in Chapter 2 (see table 3.3) and the significant unexpected findings. The details of how to present the findings of interviews

has been reported in Section 3.6.4. Four key themes below will be shown in the following sections:

- development of the framework of analysis based on interviewees' comments;
- business relationship between major players from general views, dyadic views to network views;
- different relationship structures in line with different attributes;
- values derived from the business relationships and network.

4.2 Development of the framework of analysis in research

In order to develop the framework of analysis for relationship structure in maritime logistics network, firstly, an initial relationship model should be applied (Bask 2001) and has been proposed as shown in Figure 5.1. Secondly, the main players and key links between them in the network should be identified (Lambert 2001). The presentation of findings in this part will follow this sequence.

4.2.1 Main players in maritime logistics networks

In the first question, the interviewees were asked which major players should be included in the maritime logistics chain in their opinion. It was found that most interviewees only care about the players with whom they have an immediate business relationship, as these players usually are most relevant to the interviewees' own benefits. Therefore, the major players who are mentioned could vary according to the interviewees' individual perspectives. Some outstanding statements are quoted below:

"The major players should include all the service providers who help the cargo move." FF3

"The major players should include cargo owners, freight forwarders, shipping as well as air transport carriers, terminal operators, custom agents, warehouse operators, inland transport carriers, and insurance companies." FF2

"We care about the critical points which influence the export of the cargo. These points include shipping and the shipping related operations – port operations, terminal operation, packing, warehousing and so on." CO1

“Cargo owners, freight forwarders, shipping carriers and port operators are the core players in the maritime logistics chain.” FF4-3

The accumulative frequency of these main players mentioned by the interviewees, which implies their relative importance in maritime logistics network, is depicted in Figure 4.2. According to this figure, there is a gap of the accumulative frequency between the first four players and the rest of the players suggested by interviewees. These most noted four main players are consignors as well as consignees, shipping carriers, port operators and freight forwarders. The other less noted players include the government authorities which deal with customs and port governing, warehousing operators, inland transport operators, customs agents, shipping agents, and insurance and banking companies. In order to develop an achievable analytical framework, only the top four players have been chosen as the major players in this research.

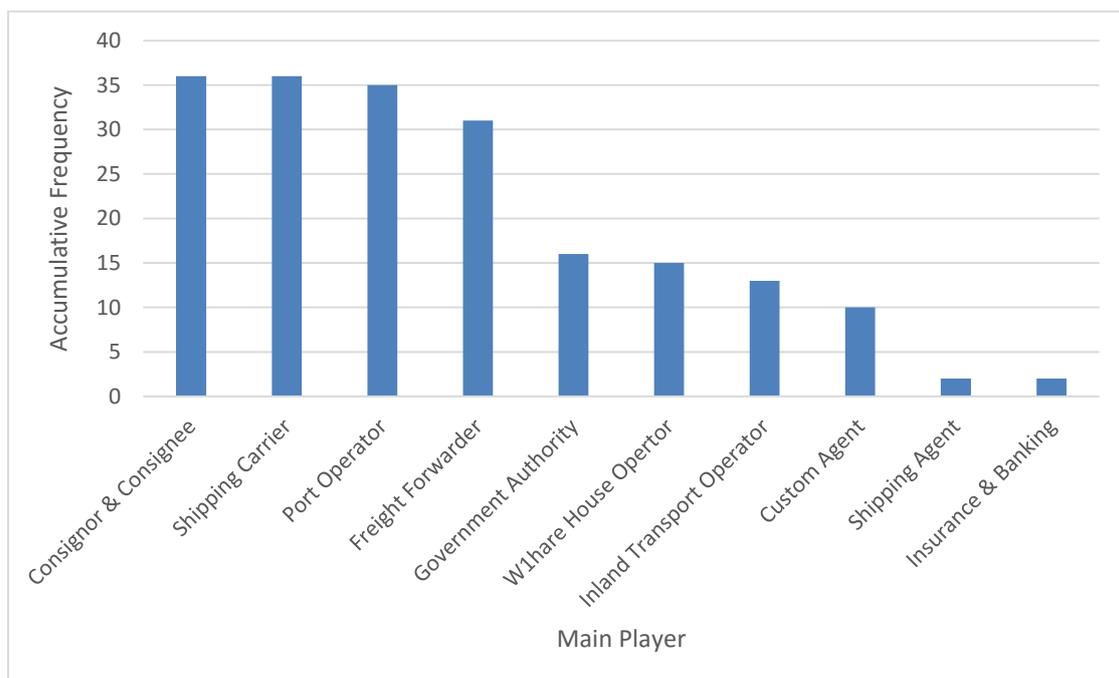


Figure 4.2 The accumulative frequency of main players

4.2.2 Triadic relationship structure in maritime logistics network

In the second set of questions, the interviewees were asked whether they agree the above-mentioned research setting (see Figure 4.1), in which we assume that the consignor, consignee, MLSP (include shipping carrier and freight forwarder) and port operator are the major players in the maritime logistics network with a triadic relationship structure.

Thirty-five interviewees agreed with this research setting because it could produce a more comprehensive picture of the maritime logistics. Five interviewees emphasised that it would be worth looking at some, or all, of the players involved in the process of delivering the cargo. Twelve interviewees suggested that there should be other important players which can also significantly influence the freight flow within this network and should be included. One interviewee mentioned that this framework provides an opportunity to do the role playing from different main players' views in the chain. Some outstanding quotes are shown below:

"It is a right direction to look at the maritime logistics from more than dyadic perspectives. To consider about the triadic relationship at the same time between the seller, buyer and maritime logistics service provider is a brilliant idea." SC1-1

"It is important to study each player along the maritime logistics chain, analyse the interaction between these players, and explore the stuff passing through whole the process." PO1

"It would be interesting in looking at the maritime logistics chain by role playing from different major players in the chain. There should be different views from each of these roles." SC1-6

4.2.3 The integrator in the maritime logistics networks

The integrator is the player who is able to coordinate network factors (resources, actors and activities) within the maritime logistics chain (Cox 2001; Robinson 2002). Integrators in maritime logistics have been noted in Section 2.7.2. When interviewees were asked who is able to be the integrator in the maritime logistics chain, the answers were diverse depending on different perspectives. Eleven of the participants indicated that the shipping carriers are more competent than port operators as they are mobile, while eight claimed freight forwarders could be the integrator as they provide a wider range of services. One port operator mentioned they are more capable of integrating the logistics resources from port side to hinterland. Six interviewees pointed out that the government sector has public authority and more resources to be the integrator. The example quotes are summarized in Table 4.2.

Table 4.2 The example quotes about integrator in maritime logistics network

Integrator	Example Quotes
Shipping carrier	<i>"With mobility, shipping carriers are more suitable than port operators to be the integrators. In contrast, port operators are usually passive to meet customers' needs because they could only offer their services in a fixed destination."</i> SC1-2
	<i>"Only shipping carriers are capable to be integrators as only they know who the cargo owners are. As a port operator, we are not capable of being this role."</i> PO1
	<i>"From the port operator's view, we think only shipping carriers are capable of integrating the cargo flow. As part of the government, Maritime and Port Bureau could only integrate the administrative level affairs."</i> PO2
	<i>"Shipping carriers are more capable of being an integrator because they have cargo owners' information and can make the decision as to which port to call at."</i> PO3-2
Freight forwarder	<i>"In terms of door-to-door service, freight forwarders are more competent at being the integrator"</i> SC2-4
	<i>"By being competent at integrating logistics resources, freight forwarders are the leading roles."</i> FF2
	<i>"If the big cargo owners come to the Far East and only contact with the shipping carriers, they will realize that the shipping carriers are not really helpful, except in offering the shipping service. The American cargo owners prefer to choose the freight forwarders as the single window which is the same as the integrator when they need a maritime logistics service in this area."</i> FF5
	<i>"As a freight forwarder with a specialized warehouse within the port area, we can integrate five windows into one."</i> FF4-3
Port operator	<i>"As a terminal operator, we are more capable of coordinating the relevant resources from quay side to hinterland compared with other hinterland players"</i> PO4-1
	<i>"The capability of port operators to integrate all the things actually are limited."</i> SC1-4
Cargo owner	<i>"In Taiwan, some big owners of bulk cargo have been an integrator. The big owners of general containerised cargo are not so willing to be the integrator for the logistics service"</i> CO1
	<i>"For bulk cargo transport, cargo owners arrange the sea-leg transport, choose the ports called at and sometimes run the terminal operator themselves; cargo owners could be integrators in this case."</i> PO3-2
Government	<i>"The government is more capable of integrating all the resources through the regulations or national schemes."</i> SC2-3
	<i>"Each player in the private sector only cares about their own benefits. The government should act as an integrator to harmonize the benefits between them by establishing a transparent information platform."</i> PO1
Other	<i>"I should say that the players who deal with cargo owners' customs clearance can be the integrator."</i> SC1-4
	<i>"Whether inland transport carriers could play the role as integrators depend on their scale. For example, DB (Deutsche Bahn, German Railway) is very good at running the railway transport and his service coverage is extensive to many other European countries."</i> SC1-4

It is worth noting that ten interviewees suggested that each major player has their own strength to integrate other resources in their own specific area based on their specific natures. For instance, shipping carriers could integrate the container transport and terminal operation, freight forwarders could integrate cargo flows, and port operators could integrate inland resources as well as the government authorities. Furthermore, whether some particular major players could become an integrator depends on their needs and willingness.

“Each major player could be an integrator in their own specific area according to their particular natures. Shipping carriers could integrate the container transport and terminal operation, as they provide standard container shipping services.

Freight forwarders could integrate cargo flows, as they provide a variety of services. Port operators could integrate inland resources such as infrastructures and the government authorities because of their state-owned nature in Asia.”

FF4-1

“The major players have their own industrial clusters, and can act as an integrator in line with their ambitions, resources and needs.” PO3-1

“No one can integrate all the things perfectly. Either shipping carriers or port operators have their own weaknesses and strengths to integrate the resources along the maritime logistics chain.” SC1-2

Besides the specific players, six interviewees indicated that who can be an integrator depends on particular factors: geographic influence; controls of the cash flow; ownership of the rare resources; dealing with customers' confidential information; substantive influence to decide the shipping; the bargaining power and cargo characters. Three sample quotes are shown as following:

*“The one **who controls the cash flow** is more powerful than logistics service providers and could be more capable of being an integrator. The other one who could be an integrator is the player **who owns the scarce resources**. The new established state-owned Taiwan International Ports Corporation could become an integrator by exercising their well-equipped warehouses and the funds raised from the state-owned banks.”* FF3

*“Which main player could be an integrator may **depend on different geographic areas**. In the US, the big cargo owners have in-house logistics departments which are like the big freight forwarders. Some of these big accounts could contribute 8000 TEU cargo volume per year, and have the power to integrate the logistics resources. In Europe, because the cargo flows come from multi-countries and need a lot of cross-border transportation, freight forwarders are traditionally more familiar to these relevant operations including customs clearance, they are more competent to be a logistics integrator.”* SC1-3

*“There are three points which could affect the player to become an integrator. First, the **substantive influence to decide the shipping** is a crucial one. Second, the **bargaining power**. Third, the **specific type of cargo**.” FF6*

To summarize the findings so far in this interview study, even though there are many relevant players within the maritime logistics chain, the interviewees suggested that only some are capable of coordinating the resources, and willing to do so. From the interviews, the cargo owners (consignor and consignee), MLSPs and port operators were confirmed as being able to act as integrators coordinating the other supplementary players in maritime logistics networks. For example, the sellers could include or integrate manufacturers and traders; the maritime logistics service providers are able to coordinate other supportive players such as: in-land carriers, warehousing operators; customs agents; bank services and insurance services. Port operators could integrate the in-land transport system, terminal operators and relevant government sectors which are located within the port area. Therefore, the real maritime logistics network could look like a picture with four linked big bubbles in that, and each of the big bubble connects with many small bubbles around them (see Figure 4.3).

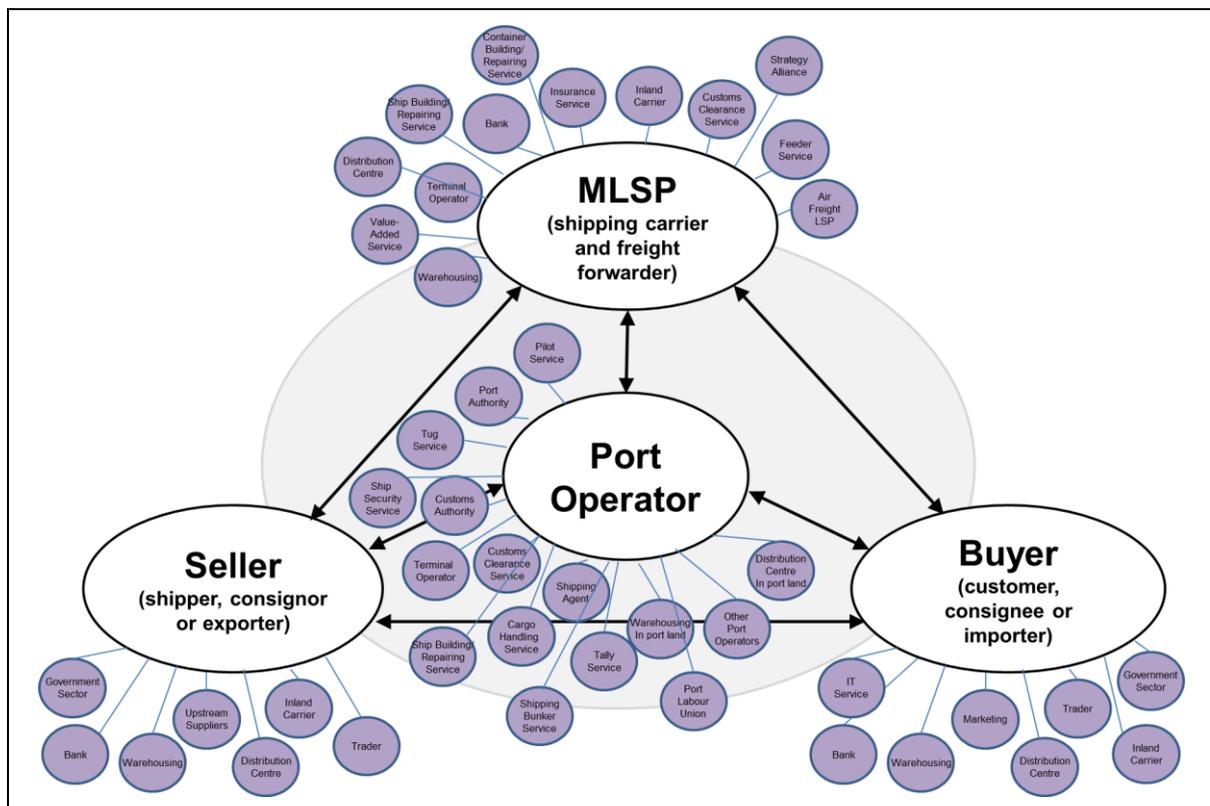


Figure 4.3 Second revised research framework

There is no single one player, or a single pair of players, which could integrate all the things along the maritime networks. Therefore, the study of the maritime logistics network should

be explored from a systems view rather than a single-player dimension or a solo dyadic angle. The government sectors are not considered in this study given their role as a regulator rather than as an operator dealing with cargo transport.

4.2.4 The division of MLSP into shipping carriers and freight forwarders

In the initial research setting, we set up the MLSP (including the shipping carrier and freight forwarder) as a common unit of analysis, but nine of the interviewees deliberately suggested that MLSP should be divided into separate analysing units as MLSP (shipping carrier) and MLSP (freight forwarder). The reasons they provided could be summarized as two categories: the nature of assets owning and different types of service they provide.

From the perspective of owning assets, shipping carriers are asset based providers, while freight forwarders are usually non-asset or light asset-based providers. Therefore, shipping carriers are called VOCC (Vessel Operating Common Carrier), and some freight forwarders are named as NVOCC (Non Vessel Operating Common Carrier). Besides large and direct cargo owners, freight forwarders are also the major customers of shipping carriers. Small and medium cargo owners usually contact the freight forwarders first, and then freight forwarders provide the shipping transport by buying services from shipping carriers.

From the perspective of different types of service provided, eight of interviewees from the shipping carrier sector stated that they mainly focus on the port-to-port service. On the other hand, many interviewees from the freight forwarder sector claimed they can offer a much more comprehensive service than the shipping carriers. Therefore, shipping carriers only sell the slots (the space for a container on a containerized ship) providing the sea-leg transportation based on a port-to-port service, while freight forwarders usually claim they sell the solutions and focus on the door-to-door service.

“The majority of shipping carriers who claim they can provide a total solution, actually only focus on the sea-leg of the transport.” SC1-2

“We still only mainly provide port-to-port service” SC2-2

“We can offer a range of shipping route service, because we our suppliers include many shipping carriers covering comprehensive geographic areas.” FF2

“Warehousing and door-to-door service is our regular service, but they are a kind of customized service for shipping carriers.” FF4-1

Because the nature of shipping carriers and freight forwarders are very different from each other regarding assets ownership, expertise of core business and the range of services offered, nine interviewees strongly suggested they should be divided into two units of analysis instead of one single MLSP unit. Furthermore, they commented that other new business relationship links should be added (see Figure 4.4).

In order to keep the balance between convenience of data collection and practical reality, the focus on the network made by the aforementioned integrators should be limited to include consignor, consignee, shipping carriers, freight forwarders and port operators as the major players.

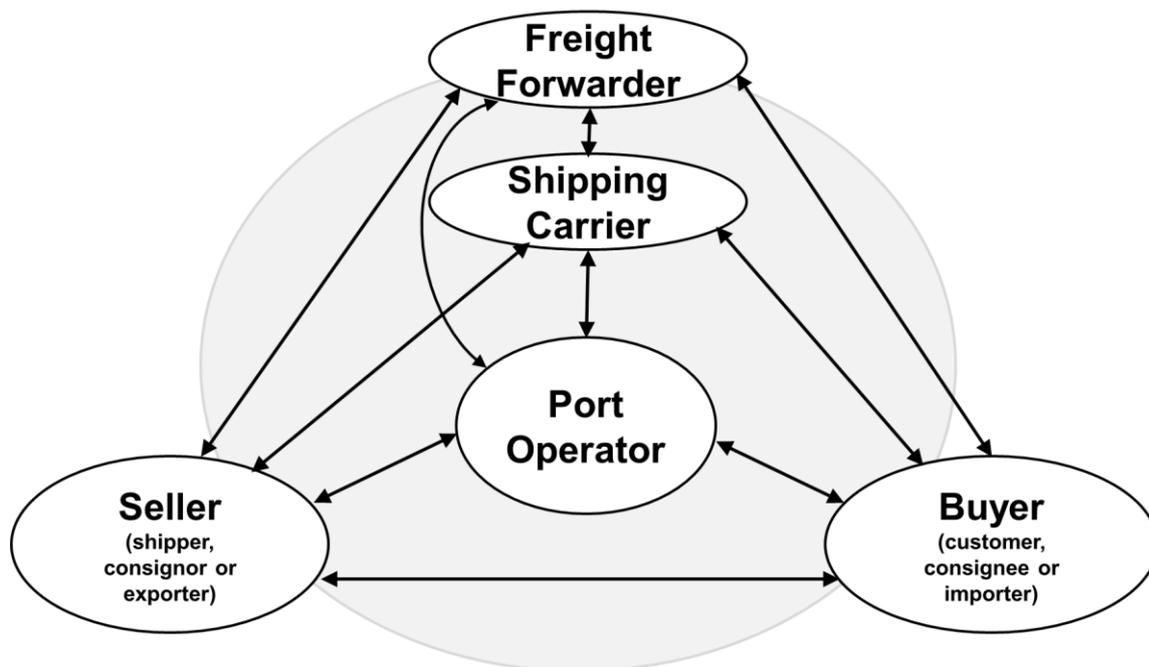


Figure 4.4 The division of MLSP into shipping carriers and freight forwarders

4.2.5 Combination of sellers and buyers as cargo owners

Theoretically, sellers (consignors) and buyers (consignees) are different players sitting at the two ends of the maritime supply chain. It was taken into consideration in the initial research framework as above discussions. However, seven interviewees mentioned that in the business practice logistics service providers only have a direct business relationship with one of them, depending on the trade term that is pre-defined in the Incoterms (International Commercial Terms) rules. The Incoterms rules published by the International Chamber of Commerce (ICC) that are widely used in international commercial transactions or procurement processes, are

intended primarily to clearly communicate the tasks, costs, and risks associated with the transportation and delivery of goods.

For example, if the trade term is CNF (Cost and Freight), by which the sellers must pay the costs and freight to bring the goods to the port of destination, the interactions will occur between the MLSPs and the sellers. In contrast, if the trade term is FOB (Free on Board), by which the buyers arrange for the vessel and pay the cost of marine freight transportation, insurance, unloading and transportation costs from the arrival port to destination, the MLSP will have more interactions with the buyers. The relationship circle which joins sellers, freight forwarders, shipping carriers and port operators will move to join the buyers and these three players (see Figure 4.5).

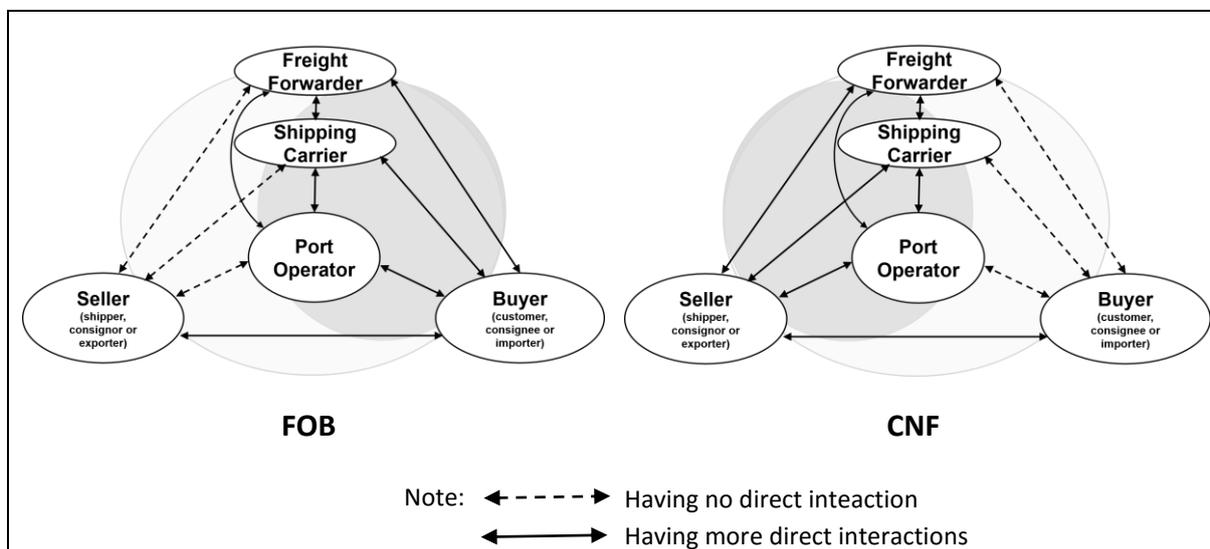


Figure 4.5 Relationships in different trade terms

Some interviewees also mentioned that the maritime logistics service providers more care about who pays the freight rate, no matter who are consignors or consignees.

“As a shipping carrier, we only care about who pays for the freight. The consignor and consignee should be summarized as the cargo owner who is responsible for paying the freight, who can ultimately decide on the shipping, and who can easily to be recognized.” SC1-4

“The player who pays for the freight rate by the trade terms has the power to influence the maritime logistics chain.” FF3

“MLSPs seeking to manage business relationships well with their customers and suppliers need to be clear about the rules of trade term in order to identify who

pay for the freight or really exercise their discretion to control maritime logistics.”

FF2

Therefore, sellers (consignors) and buyers (consignees) could be combined as one unit of analysis, which is the cargo owner. Accordingly, the initial relevant business relationship links derived from sellers and buyers could be simplified by only referring to the cargo owner. Therefore, the focus on the network made by the aforementioned integrators will be limited to include cargo owners, shipping carriers, freight forwarders and port operators as the major players, in order to keep the balance between convenience of data collection and practical reality.

Consequently, the initial triadic conceptual model has been revised as a more complicated network framework in the maritime logistics context. This final-revised framework has evolved beyond a triadic shape and could be taken as a combination of several triads. The final-revised diagram of research framework (see Figure 4.6) with 4 major players and 6 links could also be a useful visual tool to describe and discuss the structure of business relationships within this network. Many interviewees agree with this final framework of analysis, and one of them comments: *“This is a very useful diagram for looking at the big picture of maritime logistics, comparing and discussing the relationships between different players.”* (SC1-6).

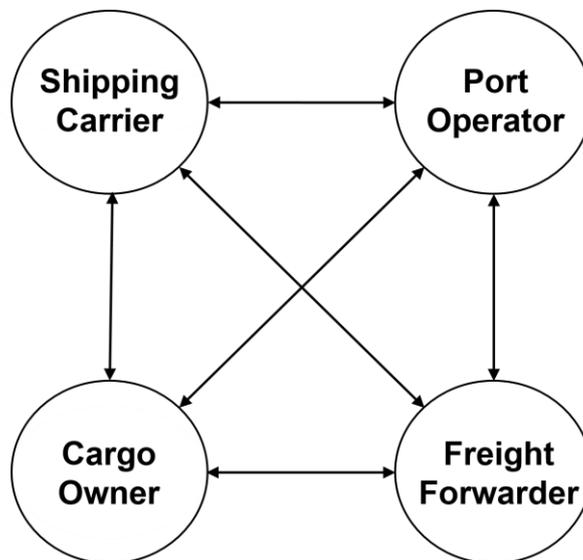


Figure 4.6 The final-revised framework of analysis for maritime logistics network

4.3 Nature of the business relationship between main players

This section will show the findings and analysis from the interviews when the participants were asked to comment the nature of the business relationship between the main players in the maritime logistics network. The order of the demonstration will start from general business relationship, dyadic relationship to relationships beyond dyadic perspective. There will be visual aids to help the reading in the part of dyadic relationships.

4.3.1 General business relationship between major players

When the interviewees were asked about their perception of the general business relationship between the major players in the maritime logistics network, the answers are diverse but could be categorised into three categories. Firstly, four well-experienced CEO interviewees claimed that only business relationships exist, but there is no partnership between these players in this network. The business relationship could depend on price competitiveness, different needs, different degrees of co-operation based on business benefits, and their previous experience of working together. Whether the players could have long-term business relationships or partnerships depends on consistent mutual dependency, organizational compatibility and common goals to develop together in their business. It is not necessarily true that big cargo owners are more willing to make a long-term commitment to the MLSP and keep a close business relationship. They very often go between the different MLSPs to pursue the maximum benefits. The following quotes provide the evidences.

“There is no partnership except for a working relationship which is a seller and buyer relationship between these players in business practice.” FF4-1

“There is no customer loyalty, but only acceptable prices to customers. Only when we offer a competitive price and service, can we build the dependency of our customers.” FF4-3

“I think partnership between the major players actually becomes rare and rare at the moment.” FF2

“Even though we much rely on the large amount of cargo from big accounts. The revenues from big accounts are quite low compared with small and medium cargo owners. They are very often go between different MLSPs to pursue the maximum benefits.” SC2

Secondly, partnerships were mentioned as a trend evolving from arm-length business relationships by several interviewees. Players prefer to keep a close relationship with a few suppliers, instead of buying a service from an open market at arm's length.

"We are selling expensive wine. Recently we started to work closely with a new single truck carrier which operates with the elderly and charges more money, but they are more reliable and trustworthy than previous multiple carriers we used as they have never caused any cargo damage." FF1

"Our customers consist of 60 % long-term partners, and 40% working partners." SC3

"We got 80% repeated orders, and we benefited from these orders with less risks. Such regular cargo does not necessary contribute great financing revenues per unit, but its stability is very essential for shipping carriers." SC2-3

Four firms have found they could have more benefits with a limited number of big long-term contract customers, rather than dealing with many one-off smaller customers but spending more on transaction costs and earning smaller profit margins.

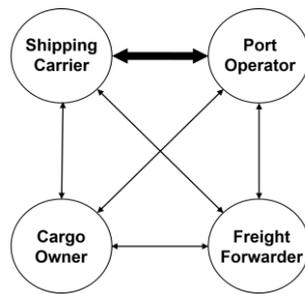
"We have two warehouses, in contrast with the normal one which is serving 150 customers but can only fill 65% of the space, the temperature-controlled one is only serving 24 customers but can be fully filled." FF4-3

The third opinion of business relationships in this area is "coopetition" which is a combination of cooperation and competition. Firms at both horizontal and vertical levels are leveraging cooperation and competition between each other to seek a dynamic balance point.

"In summary, I should say business relationships between players at the horizontal and vertical levels are mixed with co-operation and competition, and looking for achieving a balance point in the dynamic environment. For example, members in the strategic alliances cooperate at the operation level, but become independent at the business level." SC1-3

"As a freight forwarder, even with my mother firm which is a shipping carrier, I still need to keep a neutral position with it because of the regulations and considering the benefits from other players." FF5

4.3.2 Dyadic business relationships between shipping carriers and port operators



The most frequently mentioned business relationships in the maritime logistics network is the ties between shipping carriers and port operators. According to the interviews, shipping carriers are the most important customers of port operators. Therefore, port operators traditionally focus on the needs for these major customers, which usually request for the operational efficiency and effectiveness.

“Shipping carriers are the main customers of port operators. Therefore, port operators need to accompany their operational needs, focusing on the depth of the berth, the length of the berth, cargo handling equipment and enough operation space in the berth” SC1-6

“There are obvious and strong ties between shipping carriers and port operators. Port operators mainly make their efforts to suit shipping carriers’ need. Even though all the maritime logistics service providers have cooperative relationship with ports, shipping carriers have more influence on the ports comparing with other players.” FF3

“The main purpose of the operations in terminal operators within the port area is to facilitate the loading/unloading jobs of shipping carriers. Therefore, they very emphasis on the turnover rate for their space, and avoiding to delay ships’ operations.” FF2

“Shipping carriers ask for low coat, efficient and convenient from port operators” PO1

On the other hand, shipping carriers regard the port operators as their suppliers for offering terminal operations in the port area. They will be interested in renting or investing their own dedicated container terminals from the port operators, if they could gain equivalent benefits. These benefits include the enhancement of the intensive cargo handling operations efficiency, and stable source of cargo through this port’s hinterland. By running the dedicated container terminals, shipping carriers would have more strategic business relationship with port

operators. The interviewees also mentioned several the other types of strategic relationship between these two roles.

“From shipping carriers’ perspective, we have three levels of relationship with the ports: got the cargo before calling at port and starting a new liner service; evaluate and decide the ports to call at in the surrounding area after starting a new liner service; to invest the terminal operator if there are long-term benefits.” SC1-2

“To integrate on the operational level with port operators are significantly important for us.” SC1-2

“Shipping carriers who engage in running the container terminals mainly seek for controlling the terminal operations for not delaying the sailing schedule.” FF3

“From port operators’ perspective, we have several levels of relationships with the shipping carriers from arm-length to closely integrated including: calling at; renting the dedicated container terminals; jointing the BOT project; forming a joint venture to run the feeder services; joint project of oversea investment for port operators.” PO1

“The relationship between shipping carriers and port operators are customers and suppliers relationship. Furthermore, we could also cooperate to do the canvassing.” PO1

“Port operators are not the normal suppliers for shipping carriers, we cannot be too dominant to them as they usually include the public sectors or authorities. If we don’t deal with them well, we may lose the chances to run our business in those ports even the countries they are located.” SC1-2

“Besides offering big amount of transshipment cargo and efficient services, Singapore port also provide the other necessary resources for ships, such as cheap ship bunker and ship repairing service, in order to build a firm relationship with the shipping carriers.” SC2-3

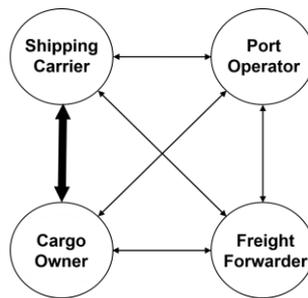
However, shipping carriers have no loyalty with the ports as they follow the cargo instead of the ports.

“The reason that shipping carriers call at the ports is quite simple. As a shipping carrier, we only follow the cargo. In the same area, we pick the port which offers the best deal including the low cost and attractive package.” SC2-1

“Shipping carriers just follow the cargo, comparing the prices and make the choices between ports” PO10

“Shipping carriers will try to establish partnership with different ports in the neighbouring regions in order to diversify risks. For example, shipping carriers will arrange several optional ports in the western coast of America in case for the frequent port strike in this area.” PO3-2

4.3.3 Dyadic business relationships between cargo owners and shipping carriers



All participant shipping carriers indicated that their customers mainly include direct cargo owners and freight forwarders. The reason behind such customer composition is that these shipping carriers focus on port to port transport service and are more interested in dealing with the FCL cargo (full-container-load cargo, also known as container yard cargo – CY cargo) in container yards usually located at shipside. On the other hand, the freight forwarders are more capable of dealing with the LCL cargo (less-than-container-load cargo, also known as container freight station cargo – CFS cargo). The direct cargo owners whom the shipping carriers are dealing with are called big accounts. The proportion of direct cargo owners and freight forwarders varies across participant firms and geographic market. Participant shipping carriers could carry out the business with both exporters and importers. For example, the proportion of direct cargo owner is higher in the US than in Europe.

“Take our company for example, the proportion of direct cargo owner in the US is higher than 50%, on the other hand, the proportion is less than 20% in Europe.” SC1-5

According to the interviewees, the structure of cargo source is like a pyramid which consists of two layers. The bottom is regular cargo which is usually based on a preferential contract and the upper layer is spot cargo, which has a higher margin.

“Regular orders are very important for shipping carriers. We have 80% of repeated orders which benefit from lower risk. You may not know that some big cargo owners are doing trial order purchasing from different shipping carriers to pursuit the lowest cost which means they are actually squeezing the benefits from us.” SC2-4

“It is very important to achieve leverage between fully filling the space and collecting high-priced goods.” SC1-3

“We only earn a small profit from the big accounts, to be honest, they are not good customers, but we need them to offer the base cargoes.” SC1-2

In terms of the interaction between the cargo owners and shipping carriers, the big accounts can exercise their power and tend to negotiate the shipping freight with several (for example five) shipping carriers by different trade routes and then make the booking agents or freight forwarders book the space for them. Within these several shipping carriers, some are major carriers and some are spare carriers.

“Some big accounts from the IT industry, open the bidding for several carriers, use major shipping carriers delivering 80% cargo, and employ the rest as spare carriers for spare function delivering 20% cargo.” SC3

Besides the shipping freight, the big accounts also ask for several benefits including delayed payment, assigning of shipping destinations, extending container use time, setting up dedicated EDI (Electronic Data Interchange) and so on. In contrast, the smaller cargo owners have less power to negotiate the shipping freight, and need to follow the shipping carriers' rules.

Five participants mentioned that besides the shipping freight, cargo owners maintain a long-term contractual relationship with the shipping carriers for pursuing the lower shipping freight, and maintain good relationships for securing the priority space in the peak season. There is one point worth mentioning: most of the participants pointed out that contemporary cargo owners mainly ask for on-time delivery rather than speedy shipping.

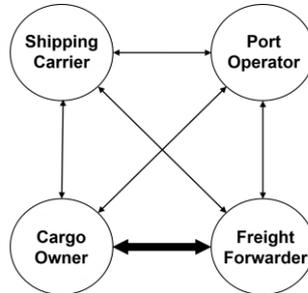
“Cargo owners should maintain special relationships with the shipping carriers in order to obtain the enough space in peak season to complete the shipping tasks.” CO1

The majority of participating shipping carriers build up an EDI system to communicate with their customers, and offer a cargo tracing service. One participating shipping carrier emphasized that they enhance their service by offering a more face-to-face service.

In terms of cultural difference, five participants claimed that business relationships between shipping carriers and cargo owners in Asia (or Taiwan) could be affected by “guanxi” which implies the existence of informal individual relationship between them. They don't care about the little price difference with this individual guanxi. However, when individual guanxi discontinues, this will cease the business relationship between firms. In contrast, the western shipping carriers care more about the price difference and efficiency.

“One European shipping carrier tends to use automated voice system and outsourcing system to deal with a shipping booking.” SC2-4

4.3.4 Dyadic business relationships between cargo owners and freight forwarders



According to the interviews, freight forwarders can deal with both LCL and FCL cargo. The big cargo owners may have LCL and FLC cargo at the same time, and they may send all this cargo to freight forwarders or only send LCL cargo to freight forwarders and send FCL cargo to shipping carriers. It depends on the cargo owners' outsourcing strategies and the consideration of overall costs.

“The direct cargo owners make the freight forwarders deal with their LCL cargo, as they have outsourced their shipping department to freight forwarders.” SC1-3

“We have at least 250 TEUs per year, and we usually make freight forwarders to deal with these cargos for us.” CO6

Twelve of the participants stated that the big accounts usually ask for more than one maritime logistics service provider to quote the price and attend the bids, these service providers include shipping carriers and freight forwarders. Five interviewees claimed that they gain great benefits from the big accounts.

“The big accounts very often try to squeeze the MLSPs, instead of keeping the long-term business relationship with them. For example, one well-known Taiwan-based 3C brander usually invites 5 maritime logistics service providers including shipping carriers and freight forwarders to deal with their international logistics in order to gain lower costs. Such customers also exercise their power to obtain benefits of delaying payment from freight forwarders.” FF2

“We are acting as a cargo shipping manager for a specific big cargo owner who is a fashion clothing brander, and we earn a lot of benefits from this big account.”

FF2

Small and medium cargo owners tend to work with freight forwarders in order to gain a better price and service for their small amount and sporadic cargo. Freight forwarders can gain their

niche by dealing with these LCL cargoes. Even though the price offered by freight forwarders may be higher than the price offered by shipping carriers, they can obtain benefits of delaying payment from freight forwarders. Some cargo owners would buy a freight forwarders' service initially, and then contact the shipping carriers directly to pursue the lower cost when they are more familiar with the maritime logistics system. They also look for more than one logistics service provider to offer the service.

A freight forwarder can play different roles for the cargo owners in line with the different types of service they provide and charge different costs accordingly. The first type of freight forwarder acts as the commission agent for cargo owners, booking the space from shipping carriers, making the documents on behalf of cargo owners and earning a minor service charge. This type of service is the easiest, and many freight forwarders deal with such business. The second type of freight forwarder acts as the shipping carrier, and earns a service charge plus shipping freight. The third type of freight forwarder acts as cargo shipping manager, integrating the resources through the means of buying services from or working with other freight forwarders as well as offering package services to cargo owners. However, they do not tend to be involved in shipping transport. One well-experienced CEO interviewee claimed that most of the freight forwarders in Taiwan conduct this type of business. In addition, freight forwarders are sometimes taken as cargo owners because they act on behalf of cargo owners on legal documents (e.g. B/L, bill of lading).

"Most Taiwan-based freight forwarders are acting as cargo shipping managers offering the package service for cargo owners." FF2

"Freight forwarders act on behalf of cargo holders, when they do business with shipping carriers." FF1

In terms of how service differentiation influences the business relationship between different freight forwarders and cargo owners, the interviewees provided several opinions about business practice as follows. With regard to geographic range between forwarders, foreign-invested freight forwarders mainly deal with global accounts' business in order to follow their mother companies' policy. The Taiwan-based freight forwarders mainly deal with the business from local cargo owners. They have very different markets.

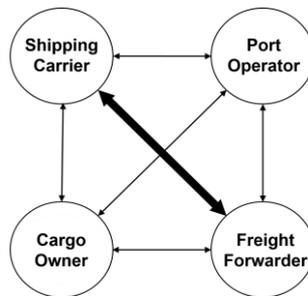
“Services offered by freight forwarders in Taiwan nowadays are very similar; therefore, the cargo owners tend to care most about the shipping freight and the amount of credit they could obtain from the freight forwarders.” FF2

“For keeping a long-term business relationship with cargo owners, MLSP (including freight forwarders) should strengthen themselves to increase the cargo owners’ risk of switching to other service providers.” FF4-1

“If you don’t consider the cost, freight forwarders will offer the best service for cargo owners.” FF5

“We neither set up an information and communication technology (ICT) system to connect maritime logistics service providers’ system, nor deliberately trace our cargo in these logistics providers’ hands. There is almost no need to do these, unless we expect to be shut down by lacking of production materials. We usually communicate with the maritime logistics service providers by telephone.” CO6

4.3.5 Dyadic business relationships between shipping carriers and freight forwarders



According to the interviews, freight forwarders can deal with both FCL cargo and LCL cargo. The second type of cargo is not attractive for the shipping carriers, as mentioned in the previous section, but the freight forwarders are experts in dealing with this type of cargo as they are good at consolidation. The big freight forwarders book the FCL containers from shipping carriers and sell them to small and medium cargo owners by consolidating their small amount of cargo in order to earn the price difference.

“Freight forwarders often pick up the small business that shipping carriers are not willing to do.” SC1-4

“We mainly deal with door-to-door service for FCL cargo. We don’t deal with LCL cargo which is more doing consolidation, and we leave it to freight forwarders.” SC5

“Maritime transport is very different from air freight transport in the respect of the role of middle men (freight forwarders) between cargo owners and carriers. In air freight transport, air lines traditionally do not collect the cargo from the cargo owners and totally rely on air freight forwarders’ contribution of the cargo.

In contrast, the shipping carriers could grab the cargo by themselves and from ocean freight forwarders.” FF1

Although freight forwarders are shipping carriers’ customers, they may have a competitive relationship in some situations. When dealing with LCL cargo, they have a cooperative relationship, while dealing with FCL cargo, they have a competitive business relationship. Shipping carriers’ policies for working with freight forwarders are varied. One participating Taiwan-based shipping carrier conducts 50% of their business with freight forwarders, while the others prefer to enhance their own business-function department to pursue the cargo. One participating Europe-based shipping carrier has a smaller business-function department, but it depends more on the cargo from the outsourcing freight forwarders. In some new markets which the shipping carriers are not familiar with, they need to rely on and cooperate with the freight forwarders who have connections and are capable of gaining cargo there.

“Shipping carriers look for cargo by themselves, and also from freight forwarders. There is special business relationship between them” SC1-6

“Shipping carriers get cargo from freight forwarders, and then try to grab this cargo by directly contacting the cargo owners and skipping the freight forwarders. Shipping carriers should be very careful when dealing with this situation; they should consider whether it is worth losing their freight forwarder partners.” SC 1-4

“There is a co-opetition relationship between the freight forwarder and the shipping carrier.” FF1

According to the interviewees, the shipping carriers are generally more powerful than the freight forwarders in Taiwan. The freight forwarders do not have their own fleets and rely heavily on these shipping carriers’ slots. The shipping carriers are less willing to bear the financial and reputation risks, therefore, freight forwarders are more flexible about accepting delayed payment by cargo owners. Another reason for the dominant position of the shipping carriers in Taiwan is that freight forwarders have no legal right to consolidate the cargo in their own place, and should follow the shipping carriers’ assigned terminal. That is also one of the factors which diminishes the power of freight forwarders.

In order to avoid chaos in the market, some shipping carriers who were interviewed pick up several freight forwarders as A-class customers with close business relationships connecting with dedicated EDI systems and offering preferential shipping freights and fixed S/O numbers. Such A-class freight forwarders are called master co-loaders who can be guaranteed good

deals of spaces from shipping carriers and sell them to the other freight forwarders, these are called co-loaders. The master co-loader deals with the consolidation business from the co-loader. Except being one of shipping carriers' customers, freight forwarders/NVOs could also act as shipping carriers' supplier partners working together to deal with very customized cases, but it is just a rare case.

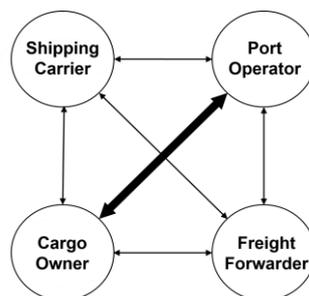
“In special cases, shipping carriers and freight forwarders may have opportunities to work together, for example, they could make a team to attend a bidding of a project cargo transport (e.g. project cargo, turnkey cargo).” SC1-3

“The bids of the big project cargo usually open to the shipping carriers with strong integrated ability or the equivalent international logistics service providers. The small and medium freight forwarders may lack of relevant experiences and not fit the bidding requirements.” SC1-2

“For some VIP or complicated supply chain required customers that will be joint efforts by carrier and freight forwards/NVOs, but it's not commonly seen, only for a handful of customers.” SC2-5

If the freight forwarders belong to the shipping carriers' subsidiaries, they will have different relationships with their mother company, which will play a role in supplementing the inadequacy of these shipping companies.

4.3.6 Dyadic business relationships between cargo owners and port operators



Twenty-five of interviewees indicated that there is no direct business relationship existing between the cargo owner and the port operator. Cargo owners' cargo goes through the port operators by the MLSP. MLSPs deal with the operation affairs with port operators for cargo owners; therefore, port operators usually have a direct business relationship with MLSPs instead of cargo owners.

“MLSP stands in the middle between cargo owners and port operators; generally, there is no business relationship between cargo owners and port operators.” FF5

“Compared to shipping carriers and freight forwarders, cargo owners even feel cannot the existence of the port.” FF3

“Most of the cargo owners contact the calling port they are interested in through shipping carriers. In addition, there are very few port operators taking the initiative to contact the cargo owners.” SC-TS Line

“As a retailer, we do not care about the operation details in the port sector, our strategy is to manage the MLSP well, and make them deal with these minor operational stuffs.” CO2

“The business relationship between port operators and cargo owners is very loose, as freight forwarders deal with the relevant business for the cargo owners.” PO2

According to the interviewees, the immediate business relationships would only exist between cargo owners and port operators in a few particular situations. These situations include the ports' proximity to the cargo owner, serious inefficiency, frequent cargo damage occurring in the same port and unacceptable port charges. Two interviewees mentioned that the customs system may influence a cargo owners' decision to choose the called-at port.

“There is more interaction between Taichung Port and the cargo owners within Taichung Industry District, as they are very geographically close to each other. However, this is not a common situation but a special case.” FF4-1

“The closer the ports are to the market, the more competitive they are. Kaohsiung Port and Hamburg Port are two cases. In contrast, Port Antwerp which is further from its market needs to employ more aggressive methods to attract big cargo owners.” FF4-1

“Usually only we shipping carriers deal with the port operators, but when a strike in a port seriously affects the cargo exported into the US, US importers will try to get involved to sort it out through their domestic political system.” SC2-5

“Some cargo owners tend to stick to their usual customs in Keelung Port, even though the new Taipei Port is more geographically convenient for them.” PO1

Facing intense competition, some port operators are starting to take the initiative to offer more benefits for cargo owners. Such benefits include offering preferential rates to use the warehouses in the port area, and providing value-added functions which are beyond the conventional load/unload functions to deal with extended business. Some big cargo owners are also trying to take advantage of these opportunities. There were several examples mentioned by the interviewees as follows:

“One port in the eastern US built many warehouses beside the port area in order to attract the department stores setting up their distribution centres.” SC1-1

“Abu Dhabi Ports Company in the United Arab Emirates offered two to three weeks’ free warehouse using time, which means the cargo owners can use the Abu Dhabi port as their warehouse, in order to attract cargo owners and shipping carriers to switch their calling port from Dubai to Abu Dhabi.” FF5

“DP World expanded the port business model from the conventional load/unload function to a logistics centre, and turned Dubai into the regional distribution centre in the Middle East area.” PO1

“Port operators have started to serve customers’ customers who are the cargo owners. The new established Taiwan International Port Corporation started to run the warehouse business to meet cargo owners’ needs. Launching the FTZ (free trade zone) scheme is also attractive for cargo owners” FF5

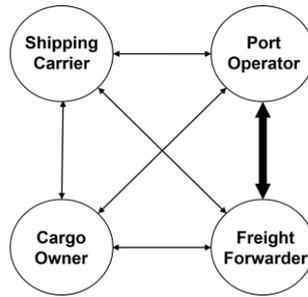
“According to our own experience, port operators are starting to have closer relationships with big cargo owners nowadays. There are two big accounts coming to us to look for more cooperation.” PO3-2

“Ports should not only develop their functions along the quay side, but also need to expand their operations into the hinterland called dry port. By doing this, ports can approach the cargo owners and help them to load/unload their cargo remotely and provide more logistics functions.” CO1

Although this research mainly looks at the liner containerised cargo transport, some participants mentioned that bulk shipping, which carries bulk cargo, is based on very different supply chains and has very different relationship structures within the maritime logistics network. In practice, the buyers of bulk cargoes tend to choose destination ports, allocate proper storage areas at the quayside, and manage the ocean transport and terminal operation at the port on their own, which will cause them to deal directly with port operators, rather than operating through ocean carriers:

“Most of the state-owned and large tramp cargo buyers act as the cargo owner, shipping carrier and terminal operator in the port area at the same time.” CO1

4.3.7 Dyadic business relationships between freight forwarders and port operators



Similar to the business relationship between cargo owners and port operators stated in the past section in this chapter, it seems that the business relationship between freight forwarders and port operators also tend to be less close. The freight forwarders concern more on the choice of shipping lines and the brokers as they may affect their service quality like rates, transit time and efficiency.

“In business practice, freight forwarders seldom get involved in the port choice, but get involved more in the shipping carrier choice. I feel most of the port operators do not take freight forwarders as their customers.” SC1-6

“The role of a freight forwarder is to act as a cargo shipment agent for shippers or consignees who do not need to pay much attention to choosing the port.” FF5

There could be more interactions between the freight forwarders and port operators only in a few situations. Furthermore, if port operators could provide the value-added services or provide spaces for freight forwarders to operate these activities for cargoes (e.g. MCC: multi-national container consolidation, re-export, distribution centre or free trade zone), there will be more opportunities to establish direct relationships between port operators and freight forwarders.

“If the shipper, freight forwarder and actual cargo owner both find a port or customs is tough to deal with, they may move over to another shipping line who calls a port with more friendly approach. In addition, in a few occasions, my company was approached by the port operator/authority and asked us to support them. This is because they wanted to promote the port by helping the shipping carrier to locate more shippers and/or consignees. The port usually tries to persuade the forwarder to join in and use its FTZ facility for MCC. We do this kind of operation in Hong Kong port for years. Other functions in a port FTZ are also the same, which may attract the freight forwarder to take part in. Customs is also critical as the entry, the clearance and tariff duties are in the hands of the authority.” FF5

“If cargo owners ask freight forwarders to deal with the inland transport and custom cleaning, the freight forwarders will be involved in choosing the ports. For example, if an importer asks shipment to Manchester, then the freight forwarder could engage in port choosing.” SC1-6

“Taiwan International Port Corporation is starting to look for partners from freight forwarders to deal with the MCC business.” SC1-1

4.3.8 Relationships beyond dyadic perspectives

The interviewees were asked to give some examples of business relationships beyond the dyadic consideration in this section. From the interviews, it shows that not every participant can instantly and clearly demonstrate the interactions based on the triadic view. Four mentioned how the trade terms influence these triadic links. Fifteen participants pointed out that there is the other crucial tie which significantly affects the dyadic relationships between shipping carriers and port operators. Some interesting points were suggested, such as: port operators offer a more integrated service which will weaken the ties between shipping carriers, freight forwarders and cargo owners; the triadic relationship could start from the link between MLSPs and seller and expand to the link between MLSPs and buyer. One interviewee mentioned the relationship between cargo owners, shipping carriers and port operators should be kept balanced in order to pursue the long-term economic development of maritime logistics network.

“Each player in this network is usually only familiar with and care about the immediate and important trading partner for themselves. Therefore, they usually don’t have direct understanding of the triadic business relationship.” SC1-3

“FOB is becoming more and more popular at the moment, and it will cause the formation of a triadic relationship more with the buyers instead of sellers.” FF2

“We found the power of the cargo buyers is continuously increasing and that they tend to use FOB to control the shipping themselves. Therefore, the triadic relationship circle moves from the sellers’ side to the buyers’ side.” PO6

“Shipping carriers follow the cargo instead of the port, therefore the relationships between shipping carriers and port operators depends on the relationships between shipping carriers and cargo owners.” SC2-1

“Shipping carriers realize the trend that freight forwarders may have more opportunities to contact with cargo owners directly and put shipping carriers in the downstream of the logistics chain. Therefore, they tend to establish their own logistics companies to handle their customers in a more direct way.” FF3

“Cargo owners’ demand is fulfilled by freight forwarders, this is why there is no direct relationship between cargo owners and cargo owners. The port operators traditionally make efforts to meet shipping carriers’ need, but nowadays they start to provide logistics warehousing and simple value-added serviced in order to create closer relationship with the freight forwarders.” FF2

“If port operators offer more integrated service, they will weaken the ties between the agents and cargo owners” PO3-2

“There are some examples that we initially got the business from the sellers, and we tried to build up the connection with the buyers for making the next business. Eventually, we can do the business with both sides.” SC3

“The ports in Taiwan ingratiate themselves with shipping carriers and ignore small and medium cargo owners’ benefits. These cargo owners run away from Taiwan because of the increasing logistics cost caused by such leaning relationship. Eventually, it has caused the revenue loss for the shipping carriers and port operators can receive in Taiwan market. Therefore, the relationships between these four players should be kept balanced to pursue the long-term economic development of the maritime logistics” CO1

In summary, the trade term is a significant factor determining whether sellers or buyers will play a more dominant role in maritime logistics network and be involved in the substantial interaction with the MLSPs. The triadic relationship could start from the link between MLSP and seller and expand to the link between MLSP and buyer. The dyadic relationship between two specific players could be influenced by the other dyadic relationship(s).

4.4 Factors affecting the relationship structure in maritime logistics networks

The interviewees highlighted that a wide range of factors, not only the trade term and service complexity, can influence the existing business relationship structure between the main players within maritime logistics networks. Besides trade term which has been discussed in Section 4.2.5 and adopted in the research framework, these attributes could be classified into six categories including: cargo type, trade route, type of port, type of cargo owner, different shipping market and service complexity. The different existing relationship structures caused by these different factors are summarized in Table 4.3, and detailed as below.

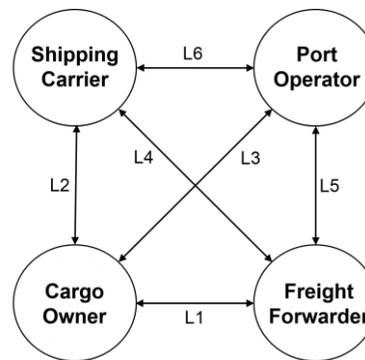
In Table 4.3, the relationship strengths were assessed by the interviewees’ descriptions based on the principle of ‘quasi-quantification’. These relationship strengths are marked and termed as: ‘0=No relationship’; ‘+=Loose relationship’; ‘++= Medium relationship’; ‘+++=Close relationship’. This table shows that different attributes cause different relationship structures

in the maritime logistics network. In general, each link within the maritime logistics network is not necessarily the same integrated. The relationship strength of L1, L2, L4 and L6 have an increasing trend when the complexity of service increase. L3 and L5 which related to port operators' connections with cargo owners and freight forwarders are the weakest links in the maritime logistics network. Only when the port operators offer LCL cargo consolidation and value-added services, they could form connections with cargo owners and freight forwarders. In other categories, relationship strengths between different players varies according to different contingent factors. The details of different categories are presented in the following sections.

Table 4.3 Relationship structures between major players in maritime logistics chain

	Cargo Type		Service Complexity			Trade Route			Port Type				Cargo Owner Type		Market Type	
	FCL	LCL	Routine	Standard	Customized	North America	Europe	Intra-Asia	None Value-added	Value-added	Transhipment	Import/Export	Manufacturer	Brander/Retailer	Liner	Bulk
L1	++	+++	+	++	+++	+	+++	+++	+	++	+	+	++	+++	++	+
L2	++	0	+	++	+++	+++	++	++	+	+	+	+	+	++	++	+++
L3	0	0	0	0	+	+	++	++	0	++	0	++	0	+	0	+++
L4	++	+++	+	++	+++	+	+	+	+	+	+	+	++	+	+	++
L5	0	++	0	0	+	0	+	+	0	+++	+	++	0	0	0	0
L6	++	++	+	++	++	+++	++	++	+	++	+++	++	++	++	++	+++

- L1: Relationship between cargo owners and freight forwarders
- L2: Relationship between cargo owners and shipping carriers
- L3: Relationship between cargo owners and port operators
- L4: Relationship between freight forwarders and shipping carriers
- L5: Relationship between freight forwarders and port operators
- L6: Relationship between shipping carriers and port operators



0 = No relationship
 + = Loose relationship
 ++ = Medium relationship
 +++ = Close relationship

(source: author)

4.4.1 By cargo type: Full container load (FCL), Less-than-container load (LCL)

As mentioned in the previous section, there are two cargo types, FCL and LCL, which are distinguished by whether they can fill a container. Shipping carriers are more interested in and mainly deal with FCL cargoes in container yards located at shipside. These are usually booked by large cargo owners and freight forwarders. LCL cargoes usually come from many small cargo owners, and need to be consolidated in the container freight station by freight forwarders before they are delivered to container yards and then passed to shipping carriers. Freight forwarders can also receive FCL cargoes from cargo owners.

Therefore, in the case of FCL cargo, both shipping carriers and freight forwarders will have business relationships with cargo owners. In the case of LCL cargo, freight forwarders will have more opportunities to build close relationships with the cargo owners, and freight forwarders become the shipping carriers' main customers.

“As a shipping carrier, we focus on port to port transport service and are more interested in dealing with the FCL cargo. On the other hand, the freight forwarders are more capable of dealing with the LCL cargo.” SC2-1

“Freight forwarders often pick up the small business that shipping carriers are not willing to do.” SC1-4

“For the FCL cargo, carriers are freight forwarders competitors. For the LCL cargo, freight forwarders seldom face threats from shipping carriers as shipping carriers are not interested in dealing with this uneconomical business.” FF3

4.4.2 By trade route: North America, Europe, Intra-Asia

According to the literature (Martin 2010), maritime trade is dominated by three economic centres, namely North America, Europe and Asia Pacific. MLSPs in such different regions have seen different trends in service offering, which has significantly influenced the relationships among cargo owners, shipping carriers, freight forwarders and port operators. The reasons for such different trends include historical evolution, the power of freight forwarders, geographical difference and the length of shipping routes. Interviewees highlighted that freight forwarders in Western Europe and Asia Pacific tend to offer more integrated services than those in North America. In North America, shipping carriers usually need to provide shipping and inland rail or truck services to cargo owners' depots, but they only need to provide shipping services in Western Europe, as traditionally, inland transports in this area are

mainly managed by freight forwarders. In terms of intra-Asia routes, which are shorter shipping routes, shipping carriers and freight forwarders need to spend more time in communicating with cargo owners, dealing with relevant documents and making quick responses. In such cases, both need to keep closer relationships with cargo owners. We could also recognize this trend from the proportion of direct cargo owners of a shipping carrier in different areas.

“In the US, the big cargo owners have in-house logistics departments which are like the big freight forwarders. Some of these big accounts could contribute 8000 TEU cargo volume per year, and have the power to integrate the logistics resources. In Europe, because the cargo flows need a lot of cross-border transportation, freight forwarders are traditionally more familiar to the relevant operations including customs clearance, they are more competent to be a logistics integrator.” SC1-3

“Add number from FF and BDE” SC1-5

“Relationship structure within maritime logistics chain is quite different between our business in the US and European market. In the US, we need to manage more multi-transportation from ports to railway depots. In Europe, we mainly deal with port-to-port service, and the freight forwarders dominate the door-to-door or more customized services.” SC2-2

“We need to maintain good relationships with train and track companies in the US, as we need to deal with more door-to-door service in this area.” SC5

“Freight forwarders will play more important roles in the maritime logistics chain in Europe, as the different systems between these multi countries and customs system is more complicated in this area.” FF7

“Take our company for example, the proportion of direct cargo owner in the US is higher than 50%, on the other hand, it is less than 20% in Europe.” SC1-1

“The tempo of the intra-Asia shipping route is quite quick compared with the long-distance shipping route; you should be very flexible and need to response quickly enough. The role of freight forwarders in this region is similar to Europe.” SC3

4.4.3 By port type: Non-value-added, Value-added; Transshipment, Import/Export

According to the above discussions, fifteen participants mentioned that port operators usually have no direct relationships with cargo owners (and freight forwarders), but if port operators could provide the value-added services or spaces to operate these activities for cargoes (for example, multi-national container consolidation, re-export, distribution centre or free trade

zone), they may have more opportunities to establish direct relationships with these two players. This could reflect the point suggested by some interviewees, which is landlord ports will have more possibilities than public ports to establish relationships with other players. In the case of public ports, port authorities own the land and all available assets, and perform all regulatory and port functions. In the case of landlord ports, the port authorities maintain ownership of the ports and the infrastructures are leased to private operating companies. These initiatives should lead to more traffic and value-added services and more interactions with other players.

Five interviewees also pointed out that relationship structures can be influenced by whether the ports mainly operate transshipment or import/export cargoes. The shipping carriers could only decide which transshipment ports they call at, while import/export ports are usually decided by cargo owners. Therefore, transshipment ports have closer relationships with shipping carriers, and import/export ports should keep closer relationships with cargo owners.

“Generally, shipping carriers only can decide the transshipment port.” SC1-3

“There are several “hot” ports in the world: Los Angeles port and Long Beach port in US western coast, New Jersey port in US east coast; Shanghai port; Ningbo port; Yantian port; Mumbai port; Port Said in Egypt; Port of Rotterdam in Netherland and Hamburg port in Germany. The common point of these ports is they are all important import or export ports, and geographically close to the importers, exporters or market. In contrast, transshipment ports are not necessary close to the cargo owners, and can be choose by the shipping carriers at their convenience to manage the shipping operations.” SC1-6

“As an import port, Port of Antwerp encourages local buyers to apply the FOB trade term to indirectly arrange shipping carriers to call at this port. By doing this, he can attract more cargo and compete with the neighbouring Port of Rotterdam.” SC1-3

4.4.4 By cargo owner type: Manufacturer, Brander/retailer

It was found that different types of cargo owners have different logistics outsourcing strategies, which means they have different business relationships with different types of maritime logistics service providers from the interviews. Compared with manufacturers, branders and large retailers usually dominate the logistics process. The branders and retailers, with their strong bargaining power, tend to contract with freight forwarders and shipping carriers separately. In contrast, manufacturers tend to accommodate their customer’s logistics

arrangement or contract with freight forwarders to make them deal with all the logistics processes.

“The business relationship between cargo owners and maritime logistics service providers depends on the industry, region and market needs. As a leading electric manufacturing service provider, we tend to outsource our whole logistics business to professional logistics providers. However, we seldom rely on single logistics provider but usually keep working relationship with several spare providers in order to exercise the bargain power if needed.” CO5

“The volume of our cargo is not so big, therefore, we usually deal with the maritime logistics through the freight forwarders.” CO6

“We import the materials through the common purchasing channel organized by the industry association, and the maritime logistics service is included in the whole package. When we export finished food products, we prefer to break it down to different parts. The logistics services are bought from different service providers, as the all-in-one service provided by a single logistics provider is quite expensive.” CO3

“As a retailer who needs more than 10 thousands TEUs transportation per year, normally the orders are made in FCL basis and for that matter, we speak directly with vessel companies. This is the easy part to understand, because all we need is to submit shipping details and vessel companies will work through it. We are more like a director, we tell them what we want and they deliver. If they don't, we will have to cut in to make thing work. It's a date-to-date work, nobody wants to mess it up, because once it is delayed, it may cause empty shelves. We also have contractual relationship with freight forwarders. We book the shipping places directly with vessel companies, and the freight forwarder concentrate on consolidating our cargo.” CO4

“As a leading retailer, logistics is the core part of our value chain. We have to make sure there are no empty shelves in our stores by pursuing the ‘just-in-time’ and frequent deliveries. Therefore, we tend to be an integrator and control the logistics by ourselves or our subsidiaries. The other reason is the consideration of securing the confidential information.” CO2

4.4.5 By shipping market: Liner shipping, bulk shipping

Although this research mainly looks at the liner containerised cargo transport, four participants mentioned that tramp shipping which carries bulk cargo is based on very different supply chains and has very different relationship structures within the maritime logistics network. In practice, the buyers of bulk cargoes tend to choose destination ports, allocate proper storage areas at the quayside, manage the ocean transport and terminal operation at

the port on their own, which will cause them to be closer to port operators directly, rather than through ocean carriers:

“For container transport, shipping carriers choose ports and ports are ignorant of cargo owners; the shipping carrier is better than the port operator to be an integrator. For bulk cargo transport, cargo owners arrange the sea-leg transport, choose the ports called at and sometimes run the terminal operator themselves; cargo owners could be integrators in this case.” PO3-2

“In Taiwan, some big owners of bulk cargo have been an integrator. They integrate the cargo owner, the shipping carrier, the port operator and the inland transport carrier as a whole. In contrast, the big owners of general containerised cargo are not so willing to be the integrator for the logistics service” CO1

4.4.6 By service complexity: Routine, Standard, Customized

This section of findings can be broken down into two parts. The first part identifies different types service with different level of complexity. Although some interviewees indicated that container shipping service actually is a very “standardized” service because of the nature of container, different complexities of service in ocean container transport and logistics were recognised through interviews according to the different types of container or operation which can deal with different types of cargo.

“Shipping carriers mainly deal with FCL cargo sea-leg transport... From a container shipping carrier’s perspective, I think we provide a quite standardized service. If you deliberately ask me to distinguish our services, I would say that it could depend on the operational differences from different types of container. These services include: general cargo, refer cargo and open top cargo (BB, OFG). IT provision could also cause different level of customized service, which could be from cargo tracing, B/L printing, rate calculation to e-billing. Furthermore, the guarantee of shipping spaces and priority for shipping could be regarded as more customized services for big-account cargo owners especially in the peak season.”

SC1-1

“Container transport is a very “standard” service; port to port could be routine service, and door to door could be more customized service for shipping carriers.”

SC3

“Refer cargo and dangerous cargo need more trace and taking care.” SC1-8

“From a freight forwarder’s perspective, different service could be provided depending on the different level of customization. These services include: standard service, easily-customized service and highly-customized service. Freight forwarders could offer different service to fit different customers’ need.” FF4-1

“As a freight forwarder running our own warehouse, we could offer a range of service from dealing general CFS cargo, door to door or warehousing service, to supply chain management for our customers, which could fit the categories of routine, standard and customized service.” FF4-3

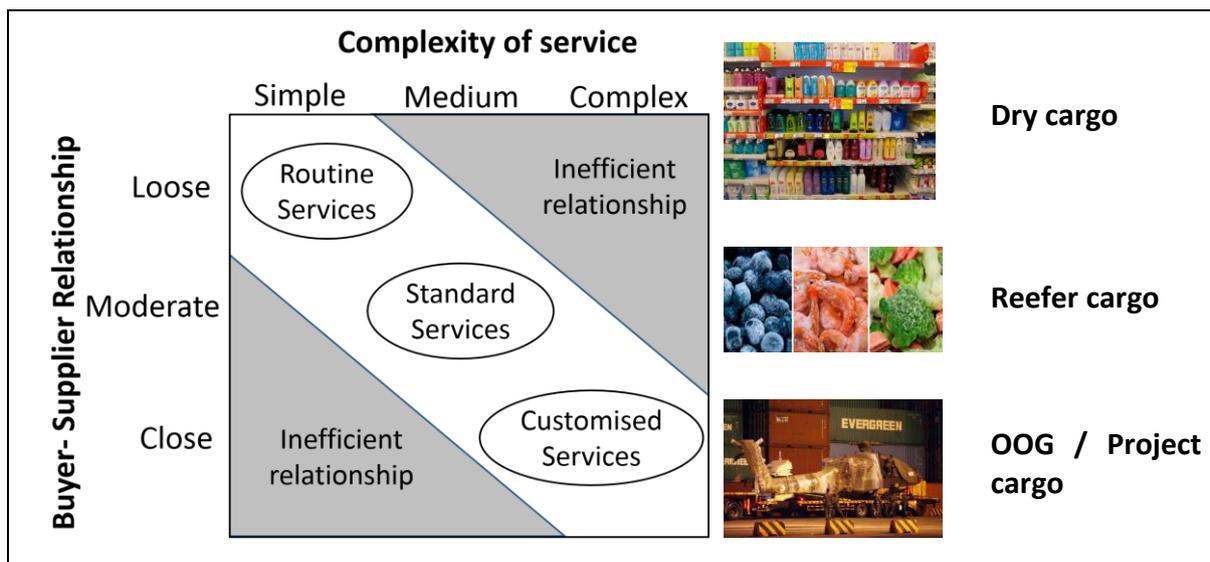
“Different complexity type service for different players should be different. For shipping carriers, their service differentiation depending on different kinds of containers for cargo owners; for port operators, their service differentiation mainly depending on different level of customized service for shipping carriers.” SC1-2

To sum up the statements from the interviewees, three types of cargo, namely: **general purpose cargo (by dry cargo container)**, **reefer cargo (by reefer container)** and **out of gauge (OOG)/project cargo (cannot put in a container)** were identified to correspond to Bask's (2001) description for three types of service (routine, standard and customised service). The dry cargo containers service is a routine service, because it provides the simplest services for general purpose cargo (e.g. commodities, recycling waste) that do not comprise any specific arrangements. This service is volume-based, and the most important factors in decision making are competitive price and ease of service procurement. The reefer container service is a standard service, providing some degree of customised operations for temperature-sensitive cargoes (e.g. fruit, sea food, meat, flowers, high-tech parts and chemicals), which include air ventilation, temperature setting, controlling and monitoring. Not all of the MLSPs have equivalent facilities and specialists to offer such services.

The OOG/project cargo services are the most complicated and highly customised services, and could include the transportation of large, heavy, high value, critical pieces of equipment. The items made of various components need to be disassembled for shipment and reassembled after delivery. Some participants shared their experiences for delivering yachts, helicopters, sensitive equipment, turnkeys, exhibiting antiquities and project cargo management for their customers. These highly specialist shipments require individual transport planning from origin to destination, and all players work as a team to deal with these tasks. The rationale behind such services is economies of scope and usually bases on long-term contracts. These services require special knowledge, facilities and marketing channels. Only a few providers could offer such special services.

The second part of findings shows that the more complexity/customisation of the services, the closer the relationship should be kept between the MLSPs and cargo owners. For instance,

an increasing level of complexity or customization increases the possibilities that customers have to influence services output and service flexibility, and calls for more joint work between the cargo owners and MLSPs, from planning to operations. In addition, more communication, information sharing and application of IT technology are needed. This type of service often results in high transaction costs because of dedicated investment, but can also develop strong loyalty from the customers (Bask 2001). The three types of service complexity in the context of container maritime logistics is shown as Figure 4.7.



(source: adapted from Bask, 2001)

Figure 4.7 Three types of service identified in container maritime logistics

4.5 Value from the business relationships and networks

In this semi-structured interview study, the author was interested in the extent to which the concepts of value from the business relationships and networks were understood and therefore started initially with general questions. If it was unclear for interviewees, then the interviewer explained the concept in more detail before moving on through the rest of the questions. This approach also helped to inform the questionnaire design in terms of the required clarity of such questions.

When the interviewees were asked about what is the association between matching business relationships among these the major players and the triadic (or network) benefits in this section, similar to the question of network interaction, most of them were not instantly clear about this issue.

“What is the triadic benefits? Is it related to the total cost for whole supply chain, the maritime logistics chain, or the total cost for logistics, and how to measure them? If it is the shipper’s satisfaction of operational efficiency, how could we measure it?” SC1-6

“It is impossible to have a win-win situation in the business practice. One player gained; the other player lost.” SC1-3

In contrast, they mainly discussed the values which they and their customers can obtain from the different levels of complexity (or customisation) of the maritime logistics services. The interviewees’ comments show that more differentiation, new fashion and customisation services would create higher value.

“The differentiation of the service will offer cargo owners higher value and also bring freight forwarders higher financial revenues in spite of the more challenging tasks for service providers. General cargo could contribute the certain volume cargo for freight forwarders to keep good relationship with the shipping carriers, and special cargo could bring the freight forwarders more money.” FF3

“We intend to make the business with the cargo owners who may peruse the new supply chain model, as the entrance barriers are higher and may make more values.” FF4-3

“In our company, the cargo volume of project cargo which needs most customized service is 30%, but it contributes over 70% financial revenues.” FF5

“Ports did their best to pursuit the cargo volume in the past. Nowadays, they need provide value-added services to attract more diverse cargo.” PO1

Many interviewees implied that although more customised services could bring about many benefits (for example, higher financial revenues), they could also cause higher risks. The service providers often cannot gain equivalent revenues when they make extra efforts to provide customized service. On the other hand, cargo owners do not really obtain acceptable value when they pay for the highly-customized services. Therefore, the opinions about whether more customized service can contribute more value for them is varied.

“For routine and standard services, our customers follow the procedure of our services and the rate we charge. However, for more customized services, we need make extra efforts to meet customers’ need which has been beyond our regular procedure, and we cannot earn equivalent revenues from this kind of service. Therefore, the routine and standard services will generate more values per input for us.” SC4

“Normal firms (cargo owners) will escape to use the highly-customized services because of the expensive cost, and try the easily-customized services instead. The

end value for using highly-customized services may depend on the revenues and value of the product the cargo owner deal with. Majority of the firms in Taiwan are small or medium size, and make decision for cost reason. Therefore, the value of highly-customized services may not reveal in these cases.” CO6

“When we use more customized service, we actually input more manpower and resources simultaneously compared with using the routine services. However, the maritime logistics service providers never realize this point.” CO5

Furthermore, in line with interviewees’ statements, it also shows that the perception of value gaining from the maritime logistics network is different between players (e.g. cargo owners and service providers). Most maritime logistics service providers expect both cargo owners and themselves could gain more benefits from a value-added customized service, however, the cargo owners are not necessary agree with this point. To sum up, the perception of value creation form different customized level or different players’ view is still arguable.

4.6 Discussion

According to the findings of interviews reported in the previous sections, the discussion could be broken down into four stages: evolution of the logistics triads research framework; the business relationship between major players from dyadic views to network views; different attributes which cause different relationship structures in the maritime logistics network; and values derived from these business relationships and the network (see Figure 4.8). The following discussion will be addressed in this order, and mainly focus on the parts which will provide the foundation for developing the upcoming questionnaire survey study. The rest parts of findings will be discussed with the results from questionnaire survey in Chapter 6 which bring everything together to provide a more comprehensive discussion.

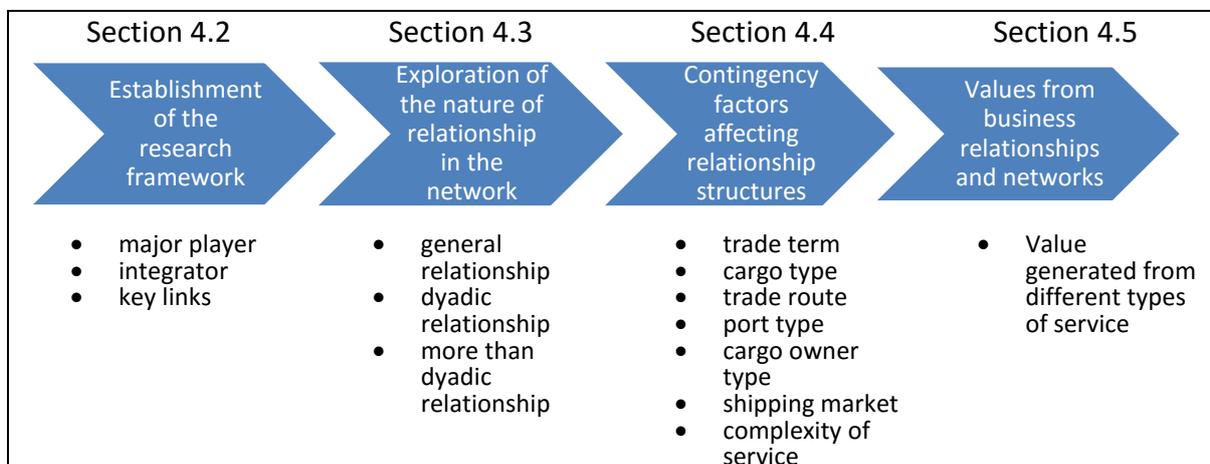


Figure 4.8 Development of the interview study

4.6.1 Development of the research framework

Major players and integrators

Through these interviews, the four major players were identified: cargo owners; shipping carriers; freight forwarders and port operators in the maritime logistics network, which also fit the most-mentioned major members in the maritime logistics SCI research (e.g. Carbone and De Martino 2003; Woo et al. 2011a; Lam 2013; Song and Lee 2012). Each of these major players are also the most-mentioned integrators by the interviewees. Although inland transport carriers are recognized as one of the major players in literature (Notteboom and Merckx 2006), they are seldom suggested to be an integrator by the interviewees except having extensive geographic service scale.

Findings show that each major player has their own strength to integrate other resources in their own specific area based on their specific natures. Whether one particular major player could become an integrator depends on their needs and willingness. Major players only make efforts to integrate the most relevant and easier aspects into their in-house operation. There is no single one player, or a single pair of players, which could integrate all the things along the maritime network. This is because those who own and control critical supply chain assets will be able to dominate the process of value accumulation and appropriation (Cox, 1997).

However, the possibility of managing a relationship crossing a boundary is limited. Therefore, according to this interview study, no single player can connect or integrate with all the other players, and the real maritime logistics network which has been identified (see Figure 4.3) looks like a picture with four linked big bubbles in that, and each of the big bubble connects with many small bubbles around them. This is similar to the power regime framework (see Figure 2.1) proposed by Cox et al. (2001), which points out the limitation of a single player to carry out the supply chain management in business practice. If firms are seeking to manage relationships with their customers and suppliers, it is crucial for them to understand where the boundaries between these sub-regimes lie.

The role of integrator is important in maritime logistics networks. Findings show that the players familiar with cargo owners or deal with cargo owners' confidential customs clearance information can be the integrators. This reflects to an interesting point that the integrator is

not necessary defined by type of firm or by the firm's position in the network, but it is defined, critically, by the firm's 'ownership' of privileged and priority information about the end-user, by its core competency of high level management skills to leverage control throughout the chain effectively, and by control over the end points of the chain (Weston and Robinson 2008).

The other surprising finding derived from interview shows that shipping carriers and freight forwarders are more capable of being an integrator than port operators. This is because these two types of player are more familiar with the cargo owners, can provide more mobile as well as diverse services, and have more opportunities to integrate themselves with both two sides: cargo owners and port operators. This point reflects the demand for port services is a double-derived demand (Marlow and Paixao-Casaca 2003).

Different natures of maritime logistics service providers

Findings from the interviews demonstrate that the unit of analysis from the logistics triad cannot perfectly fit the practice in the maritime logistics network. The single unit of logistics service providers (LSP) which principally include the shipping carrier and freight forwarder, should be broken down into separate units of analysis, because of the significant difference coming from the ownership of logistics assets and service scope. From maritime practice view, there is one major difference between forwarders and shipping lines. The business of the former requires primarily human resources to strengthen a network of agencies that facilitate contact with client shippers while the latter must first make heavy capital investments to be able to ensure maritime and landside links or large-scale handling operations (Frémont 2008).

If we expand the analysing scale, the above-mentioned point can also comply with Stefansson's (2005) proposal, in which third-party service providers should be regarded as three different types: carrier; LSP (logistics service providers) and LSI (logistics service intermediaries) according to the level of their assets ownership, scope of service and degree of customization they offer (see Figure 2.9). This demonstrates that the different natures of the maritime logistics service providers will influence the scope of activities they run. For many shipping lines, logistics remains an activity that is limited and at the very least. Therefore, if shipping lines claim that they provide 'logistics service', it has more to do with publicity slogans than with reality.

Following these views, port operators may also be regarded as another type of MLSP, as they have different nature from shipping carriers and freight forwarders but all provide the core maritime logistics service in the network. Therefore, the analysing unit LSP locating in the middle between seller and buyer should be broken down into three separate analysing units in the maritime logistics context (see Figure 4.4).

Trade terms determine the relationship structure

Findings show that the logistics service provider only has a direct contractual relationship with either the seller or the buyer, depending on the trade terms in the business practice. The maritime logistics service providers more care about who pays the freight rate that is determined by trade terms. MLSPs seeking to manage business relationships well with their customers and suppliers need to be clear about the rules of trade term in order to understand who pays for the freight or really exercise their discretion to control maritime logistics. This point is significant but, as also noted by Tseng (2010), very seldom mentioned by the maritime researchers. The practitioners or researchers are suggested to understand this foundational rules in maritime logistics practice before the relevant tasks or analysis are undertaken. For example, sales persons in the freight forwarders should be clear about the trade terms of the cases in order to reach the right customers (Tseng, 2010).

Revised logistics triads as a research framework in the maritime logistics context

Consequently, the initial triadic conceptual model (Beier 1989) has been revised as a more complicated network framework in the maritime logistics context. It has evolved beyond a triadic shape and could be taken as a combination of several triads. This final evolved diagram (see Figure 5.5) of research framework consists of 4 nodes (players) and 6 links (dyadic relationships). These 4 nodes are the most-mentioned main players and also the most-mentioned integrators within the maritime logistics network by the interviewees. These 6 key links are the interactions between each pair of the main players. It is crucial to map the chain and the key members of the chain in the beginning for making a whole chain efficient (Nassirnia and Robinson, 2013). This can help to analyse the value propositions and core competencies within the chain, and the appropriate evaluation of existing and future supply chain relationships. Then, a successful integrated chain is able to be designed in order to increase the overall benefits for the chain and chain members.

On the other hand, drawing back to the social network analysis (SNA) approach noted in Section 3.7.4, ego network (see Figure 3.3) which consists of focal actors and the key links between them is capable to analyse the nature of the network (Borgatti and Li 2009). Therefore, even though the framework of analysis evolved from the interview study does not actually take into account the full network, it could still provide a reasonable proxy for positioning in the larger maritime logistics structure, and much more convenient to collect data from this refining network than from full network.

4.6.2 Business relationship strength between players

As Harland (1996) points out that aggregation of the information gathered at the level of dyadic relationship gives insight into the network. The analysing of dyads allows positioning relationships at different positions in the supply network, providing insight into network behaviour. Therefore, the information about the interactions from each of the 6 dyadic links between 4 main players in this study can contribute to an in-depth understanding of the whole maritime logistics network. The following sections will build the blocks from dyadic view to the views beyond it, and highlight some novel points.

Relationship between shipping carriers and port operators

A lot of research in the maritime logistics looks at the interactions between ports (or port operators) and shipping carriers. Findings in interviews show that shipping carriers are the main customers of port operators at the moment, and the level of integration between these two players are high as the operational needs. This point verifies Adolf's (2012) statement that for enhancing efficiency and smoothness of transport process, many shipping lines, especially the top 20 had undertaken vertical integration, and are very often involved in the operation of port terminals.

Although there is a strong operational relationship between shipping carriers and port operators, shipping carriers are still footloose with the port operators in long-term relationship. Many interviewees emphasize that shipping carriers' priority is following cargo, and then they choose the port which offers more incentives from the accessible alternatives. This reflects the nature of double-derived demand for port services (Marlow and Paixao-Casaca's 2003), and port's role as a mere 'pawn in the game' of global corporate interests and

intermodal networks (Olivier and Slack 2010). This fact that port management and strategies are both directly and indirectly influenced by prevailing logistics trends has been identified by scholars (Marlow and Paixao-Casaca's 2003; Beresford et al. 2004; Woo et al. 2011b). While shipping carriers' bargaining power has dramatically increased (Lam 2002, Adolf 2012) because of the shipping lines' concentration which caused by the creation of the hub and feeder ports hierarchical system (Midoro, R. et al. 2005; Adolf 2012), the findings in interview still reveal the passive role of ports in their relationships with shipping carriers. This suggests that while port operators and port authorities make efforts to keep the relationships with shipping carriers, they should consider to look for new relationships with other players in the maritime logistics network to survive.

Relationship between port operators, cargo owners and freight forwarders

There is little literature that explicitly discusses the business relationship between port operators, cargo owners and freight forwarders. The majority of these studies look at this issue from the perspectives of port choice or stakeholders management (Ugboma et al. 2006; Tongzon 2009). Likewise, according to the interviews, interactions between port operators and both of these two players are not frequent in business practice. Nowadays, increasing literature emphasizes the importance of integrating port into the hinterland or whole supply chain (Panayides and Song 2009; Woo et al. 2012; Nassirnia and Robinson 2013). However, little of it clearly identifies the loose relationship between port operators with cargo owners and freight forwarders, or explicitly recognizes the needs to look at these links.

Fawcett and Marnan (2002) point out that complete forward and backward integration was also associated with SCM. This notion was expressed as integration from the "suppliers' supplier to the customers' customer". Such extended integration was perceived as very rare – more of a theoretical ideal than a reality. However, this point could help to create possible and potential business models between port operators, with cargo owners and freight forwarders according to the above findings.

Relationship between cargo owners, shipping carriers and freight forwarders

Findings indicate that whether cargo owners go to shipping carriers or freight forwarders depends on the volume of cargo and the cargo to accommodate in one full container load.

Further, shipping carriers are not interested in doing the consolidation of the LCL cargo and the door-to-door service, as they need to concentrate on the port-to-port service for FCL cargo rather than. If one shipping carrier claims they can provide a total logistical solution to their customers, this may not be the truth. The shipping carrier which really offers such service, must outsource this to his logistics subsidiaries or other logistics service providers as Adolf (2012) states.

On the other hand, according to the previous literature (e.g. Stefansson 2005; Fransoo and Lee 2012), the relationships between shipping carriers and freight forwarders are only upstream and downstream cooperative relationships. However, findings indicate that this may not be the truth in the FCL situation. Both shipping carriers and freight forwarders are interested in FCL cargo, they may be the competitors in the market. Therefore, the business relationships between them should be co-opetition with some competitive manner rather than purely cooperative (Frémont 2008). The maritime logistics procedure flow chart in literature perhaps need be reshaped in line with this issue.

Beyond dyadic relationship consideration

Findings show that not every participant can instantly and clearly demonstrate the interactions based on the triadic view. However, several interesting points were suggested: First, relationships between shipping carriers and cargo owners will affect the relationships between shipping carriers and port operators. This point could imply the nature of double-derived demand of port and also verify the following literature: Notteboom (2004) indicates that the competition within container transport industries have been not only relying on the single player, but on the whole chain. Magala and Sammons' (2008) statement which the choice of a port made by the shipping carrier could be interrelated to the choice made by the cargo owner, and both choices are only one part of the supply chain selection process. Likewise, the choice of a maritime transport chain by shipping carriers, ports and cargo owners is considered to be jointly rather than independently determined (Talley and Ng, 2013). Therefore, when we look at the business ties between shipping carriers and port operators, cargo owners should be included in the discussion.

Second, when port operators offer a more integrated service, they will weaken the ties between other MLSPs and cargo owners. This could be explained by Cox et al.'s (2001) power

regime framework, which proposes the dynamics of the boundaries for relationship management in the supply chain. Third, the relationship within the triads should be kept balanced to pursue the long-term economic development. This reflects Notteboom and Rodrigue's (2008) statement that imbalances in trade flows and accessibility and capacity constraints are among some of the developments that are making it increasingly difficult to reap the full benefits of containerisation.

Dimensions of relationship strength

In the interviews, there is no universal description of relationship strength by interviewees. The participants used varied of terms to describe relationship strength, such as partnership, dependency, commitment and trust. In addition, the same situation could result in different strength in such different concepts. Therefore, the notion of relationship strength should include multiple dimensions, rather than a single dimension. There is a need for further exploring relationship strength in the maritime logistics network from more a comprehensive perspective.

4.6.3 Factors affecting relationship structure

The findings of interview show that there are a wide range of factors influencing the relationship structure among the main players within the maritime logistics network (see Table 4.3). Except service complexity (Bask, 2001), six factors from industrial practice were identified through the interview, namely: trade term; cargo type; shipping trade route; port type; cargo owner type; and market type. In order to form the framework of analysis of maritime logistics network, the trade term has been applied and discussed in the previous sections. The following sections will discuss the other factors, and the discussion of service complexity will specifically aim to inform the questionnaire design.

4.6.3.1 Cargo type

As mentioned in Chapter 2, ocean container shipping can be performed in different ways by two cargo types, FCL (full-container-load cargo, also known as container yard cargo – CY cargo) and LCL (less-than-container-load cargo, also known as container freight station cargo – CFS cargo), which are distinguished by whether they can fill a container (Zeng, 2003; Dallari et al., 2006). According to the findings of interview, SCs are more interested in and mainly deal with

FCL cargoes in container yards located at shipside. These are usually booked by large COs and FFs. LCL cargos usually come from many small COs, and need to be consolidated in the container freight station by FFs before they are delivered to container yards and then passed to SCs. FFs can also receive FCL cargoes from COs. Therefore, in the case of FCL cargo, both SCs and FFs will have business relationships with COs. In the case of LCL cargo, FFs will have more opportunities to build close relationships with the COs, and FFs become the SCs' main customers.

From these points, the cargo type can determine the relationships between CO-FF, CO-SC, FF-SC, and the role of FF and SC. As Martin and Thomas (2001) state, FFs no longer act as agents of the cargo owner but are principals in their own right. They offer groupage services and increasingly provide integrated logistic packages to many LCL and FCL cargo owners who still do not have a transport or shipping department of their own. In theory, ocean cargo shipments go to LSPs (e.g. FFs) before SCs (Stefansson 2005; Fransoo and Lee 2012), but except FFs, SCs have developed direct contacts with large COs who provide them with regular and large volumes of FCL cargos in practice (Fremont, 2009; Panymid and Song, 2013). This privileged relationship between a shipping line and one or more large cargo owners can account for up to half of the activity of a shipping agency in a given port (Fremont, 2009). Therefore, these situation has created a special relationship between FFs and SCs. They could be partners with upstream and downstream cooperative relationships (Stefansson 2005; Fremont 2009; Fransoo and Lee 2012; Veenstra et al. 2012), or in a customer-competitor relationship (Martin and Thomas 2001; Notteboom 2004; Mccalla et al. 2004; Fremont 2009; Adolf 2012).

4.6.3.2 Shipping trade route

Shipping economist Martin Stopford (2010) indicates that maritime trade is dominated by three economic centres, namely North America, Europe and Asia Pacific. According to the findings of interview, the different ways maritime logistics service offered in the shipping trade routes which involved in these major regions have significantly influenced the relationships among the main players in the network.

Interviewees highlighted that FFs in western Europe and Asia Pacific tend to offer more integrated services than those in North America. In North America, shipping carriers usually need to provide shipping and inland rail or truck services to cargo owners' depots, but they usually only need to provide port-to-port shipping services in western Europe, as traditionally, inland transports in Europe are mainly managed by FFs. This reflects Heaver's (2001) observation showing the practice that COs have remained free to make their own inland arrangements is more popular in Europe than in North America. The main reasons for such trend include historical evolution, the power of FFs, and geographical character. For example, FFs play more important roles in Europe, because the systems between these multi countries such as customs is more complicated than the single system in the US. This trend also can be recognized from the proportion of direct COs of participant SCs in different regions. The proportion of direct cargo owner in the US is higher than 50%, while it is less than 20% in Europe.

In terms of intra-Asia shipping trade routes, the tempo is quite quick compared with the long-distance western Europe and North America shipping routes. Thus, SCs and FFs need to spend more time in communicating with COs, dealing with relevant documents, keeping more flexibility and making quick responses. Both SCs and FFs need to keep closer relationships with COs in such case. The role of FFs in this region is similar to the FFs in Europe.

4.6.3.3 Port type

In the interview, many participants indicated that POs usually have no direct relationships with COs and FFs, but if POs could provide more value-added services or spaces to operate these services for cargoes, they may have more opportunities to establish direct relationships with these two players. The value-added services, for example, can include multi-national container consolidation (MCC), re-export, running distribution centre or free trade zone. Notteboom and Winkelmanns (2001) underpins this points, indicating that the strategic scope of port authorities should go beyond that of a traditional facilitator. Port authorities can play an important role in the creation of core competencies and economies of scope by an active engagement in the development of port-related Value-Added Logistics (VAL) activities, information systems and intermodality. Going beyond the port boundaries, both in terms of physical investments and managerial capabilities is more and more important for a port to

gain competitive advantage. Weston and Robinson (2008) also argue that in port-oriented landside freight systems, the emerging new value to be captured by chain players is one that is associated with the integration of chain functions.

With regard to port type, some interviewees pointed out that relationship structures can be also influenced by whether the ports mainly operate transshipment or import/export cargoes. SCs could only decide which transshipment ports they call at, while import/export ports usually are decided by COs. Therefore, transshipment ports have closer relationships with SCs, and import/export ports should keep closer relationship with COs. Port of Rotterdam is one example which encourages local buyers (COs) to apply the FOB trade term to indirectly arrange SCs to call at Port of Rotterdam.

Literature often emphasizes the challenge of facing foot-loose SCs for POs (Beresford et al. 2004 and Woo et al. 2011b, Adolf 2012). However, findings of interview show that not every type of port has the problem of losing SCs. The import/export ports with booming market will still have strong business relationships with COs and SCs as the large volume cargo must go through these ports. On the contrast, the transshipment ports with competitors in the neighbouring regions will be more afraid of losing SCs. This point has not been very clearly identified in these literature (Beresford et al. 2004; Woo et al. 2011b; Adolf 2012).

4.6.3.4 Cargo owner type

Literature often emphasizes that many manufacturers have adopted global logistics strategies rather than simply relying on conventionally segregated shipping or forwarding activities, and cause huge influence on SCs and FFs (e.g. Notteboom and Merckx 2006). However, it was found from the interview that different types of CO have different logistics outsourcing strategies which could cause different relationship structure among main players in the network. Compared with manufacturers, branders (e.g. ASUS, Acer) and large retailers (e.g. Wal-mart) usually dominate the logistics process. The branders and retailers, with their strong bargaining power, tend to contract with FFs and SCs separately, while manufacturers tend to accommodate their customer's logistics arrangement or contract with FFs to make them deal with all the logistics processes. Therefore, not all types of CO influence SCs and FFs significantly, and different types of CO will cause different relationship structure in the network. This point

is supported by Beddow's (2001) work, which indicates that large COs with global service requirements appear more interests in entering into integrated supply chain service arrangements than other COs. The result of varied interests among COs is that varied levels and forms of integration should be expected to exist. Heaver (2001) from maritime area suggests that the balance between advantages and disadvantages of vertical (logistics) integration varies among regions and industries and with the condition and characteristics of particular firms.

4.6.3.5 Shipping market type

Although this research mainly looks at the liner containerised cargo transport, some participants mentioned that bulk shipping which carries bulk cargo is based on very different supply chains and has very different relationship structures within the maritime logistics network. In practice, the buyers of bulk cargoes tend to choose destination ports, allocate proper storage areas at the quayside, manage the ocean transport and terminal operation at the port on their own, which will cause them to be closer to port operators directly, rather than through ocean carriers. One example is that most of the state-owned and large bulk cargo buyers in Taiwan act as the CO, SC and PO at the same time. Some scholars also identify that the ocean transport for bulk or other types of cargo may bring about different relationship structure in the (Martin and Thomas, 2001; Lam, 2013), and suggest this is as an agenda for future research.

4.6.3.6 Service complexity

Three types of transport logistics service for ocean containerised cargo which corresponds to Bask's (2001) categorization, have been identified from the findings by their degree of complexity/customisation. However, not all types of main players agree themselves can provide the same level of customized service. There is more agreement about the positive correlation between service complexity and relationship strength. As noted in the interviews, the integrated degree of different dimensions may be different in one case, there is a need for further exploring such possible difference in detail. In addition, different main players may have different views for this issue as they did in the issue of value creation. Therefore, the author was interested in further examining the correlation between service complexity and different dimensions of relationship strength, and from different main player's view.

4.6.4 Value within the maritime logistics network

Findings in the interview study show that the value generated from the maritime logistics network are still blurred for interviewees. This perhaps is sensible, as firms may not always purposefully structure their relationships and rarely measure the value of the relationships. They thus do not always know if they are getting value from their relationships with trading partners (Cannon and Perreault, 1999; Cox, 2001), not to mention the more complicated concept of network value.

On the other hand, the interviewees are more familiar with using the term 'added value' in business context, although their understandings of 'added value' are not always consistent with the definition made by professional institutes (Chartered Institute of Marketing, 2012; Chartered Institute of Purchasing & Supply, 2000). The most-mentioned concept of value (or added value) creation is derived from complex or more customised maritime logistics services. This reflects the literature which claims that value creation arises from a process of complex exchange in business, offering for example, integrated solutions, full service and customer solutions, tailored service (Nordin and Kowalkowski, 2010; Foote et al., 2001), and maximization of customer involvement (Vargo and Lusch, 2004).

However, the interviewees suggest that not all cases can prove the positive correlation between service complexity and value creation, such as some researchers note that close interaction within the supply chain would not always create further added value or benefit (Lambert and Burduroglu 2000; Horvath 2001). Although more customised services could bring about benefits, they could also result in higher risks. If the service providers cannot gain equivalent revenues when they make extra efforts to provide customized service, this complex service or exchange may not create higher value for the service providers. In turn, if the cargo owners should pay extra money but cannot gain enough benefits, there is no higher value for them. Thus, the way they evaluate value was through the perception of the benefits received versus the costs that were paid to obtain the benefits (Monroe, 1990).

Surprisingly, the opinions of interviewees about whether more customized service can contribute more value for them is varied, even though it has been conceptually recognized that there is a positive correlation between these two variables. In addition, the perception of value gaining is different between cargo owners and logistics service providers. As the

significance of identifying the relevance between service complexity and value creation (Aarikka-Stenroos and Jaakkola, 2012; Lindgreen et al., 2009), empirical tests which were seldom-conducted should be carried out, especially through the comparison of value creation by different degree of service complexity, and different players' perspectives.

In summary, whether more customised service will bring about more value is still arguable according to the interview study. This will link back to research question 4 (see Table 1.1 in Section 1.4) which aim to further examine the association between service complexity and value generated, the origin of the value and different players' perspectives in the succeeding quantitative questionnaire survey.

4.7 Conclusion

Through an in-depth interview study presented in this chapter, a conceptual framework of maritime logistics network is established. This framework evolved basing on the well-developed logistics triad (Beire, 1989) in logistics field. However, it is proved that the logistics triad cannot fully analyse the relationship network dynamics in maritime logistics because of the international ocean transport and logistics are more complicated than this domestic concept, such as having more key players and the links among them. Moreover, a rich insight of relationship structure in the network from stakeholders in industry was obtained, and a range of contingency factors affecting the relationship strength were identified. The probable benefits generated from the customized service and the network were spotted, but they are still blurry as well as arguable. This part need to be further examined in the proceeding questionnaire survey study.

On the other hand, as several unexpected and arguable points were proposed by the interview study, which have not been considered in the research questions derived from the literature review, more research questions were developed inductively from the interview. These new-developed questions mainly aim to look for the perception gaps for each issue between different main players, and obtain the suitable dimension(s) to measure relationship strength (see Table 4.4)

Consequently, the results and further research questions raised by the interview study provide a groundwork for developing the research framework and informing the questionnaire design

in the next survey stage. The further evaluation of the association between relationship strength, service complexity and value generated from different relationship strength dimensions and main players' views will be carried out by quantitative questionnaire survey based on this foundation.

Table 4.4 Summary of the research questions derived from interview study

Research question	Sub-question
RQ 1: What is the inter-organizational relationship structure in maritime logistics networks?	Are there any perception gaps between different main players for the relationship strength?
	Are there any perception gaps between different main players for the level of importance?
RQ 3: Will more customized logistics service cause closer business relationship among main players in the maritime logistics network?	What dimension(s) are suitable to measure the relationship strength in maritime logistics networks?
	Does the relationship strength increase with the increase of service complexity? (1) in different dimensions of relationship strength (2) from different main players' views
	Are there any perception gaps between different main players for the inter-organizational relationship strength?
RQ 4: What is the association between logistics service complexity and value perceived by main players?	Will more customized service create more value from different main players' views in maritime logistics networks?

Chapter 5 Questionnaire survey study

In Chapter 4, the research framework has been established through the interview study, which determines the shape of maritime logistics network, main players, general perception of relationship strength, and ideas of value generated within it, through the interview study. However, qualitative interviews are unsatisfactory to examine to what extent the difference of relationship strength among different main players, and to confirm the association between service complexity and relationship strength as well as value generated through mathematics and statistics techniques. Further, the findings from interviews with a small number of expert participants should be generalized by applying a survey with a broader population (Bryman, 2012). Therefore, there is a need for a questionnaire survey study, and the findings and analysis are presented in this chapter.

The measurements and the methods of analysis in the questionnaire survey have already been justified in Chapter 2 and Chapter 3. The following sections start from the overview of data collected and the introduction of the methods of analysis. The subsequent sections then present the research results including: anticipated importance level of each relationship link between main players in the maritime logistics network; perceived existing relationship strength of each relationship link; the association between service complexity and relationship strength; the association between service complexity and value; the identification of the origin of value generated; perception gaps in different situations, and the further analysis from node and network perspectives through SNA. The last part shows a discussion reflecting on the previous literature and the conclusion summarizing this chapter.

5.1 Overview of data collected

The following sections will overview the data collected through the survey, which include the highlight on different players, characteristics of respondents and their firms, and the examination for non-response bias.

5.1.1 Highlight on different players

Table 5.1 highlights the characteristics of each group of main player and the service type they provided/received. The samples from CO cover importers (35), exporters (37), manufacturers (28), brand vendors (6), retailer (1) and so on, dealing with a wide range of products from raw materials, semi-finished and finished goods. On the other hand, for maritime logistics service providers (MLSPs), the samples of FF come from the professionals working in the 53 leading freight forwarders, and samples of PO come from professionals working in the 39 leading port operators which mainly based in Taiwan. The participants of SCs come from the 15 in the top 25 global container shipping companies, which hold a combined 70.6% share of the world container fleet in TEU (Twenty-Foot Equivalent Unit which is used to measure a ship's cargo carrying capacity) terms (Alphaliner, 2015).

In terms of the average percentage for each type of service that the main players provide/receive, SCs provide most percentage of routine service (76%) and least customized service (7%), followed by POs providing 60% routine service, 21 % standard services, and 19% customized service. FFs provide more diverse services compared with the other two MLSPs, in which 44% are the standard and customized services. On the other hand, COs mainly use routine service (73%) in the maritime logistics, followed by standard service (18%) and routine service (9%).

Table 5.1 Highlight of each group of main player

Main Player	Number of samples	Characteristics	Service type provided/received		
			Routine Service (%)	Standard Service (%)	Customized Service (%)
SC	55	Professionals from top 30 global container shipping carriers	76	17	7
FF	53	Professionals from 50 leading freight forwarders which HQ are mainly based in Taiwan	56	24	20
PO	67	Professionals from top 20 port operators in Taiwan	60	21	19
CO	73	Professionals from a range of cargo owners including flour, food, juice, wine, metal ore raw materials, imported pasture, steel, paper, waste paper, textile, feather, plastic, gas, tire, energy material, fibre, wire, umbrella, luggage, kitchen, garden tool, bathing, medical equipment, rehabilitation equipment, home appliances, furniture, construction, component, machine, display & solar, IC, IT OEM, DIY retailer, cosmetic industry and so on, which HQ are mainly based in Taiwan	73	18	9
total	248				

5.1.2 Characteristics of respondents

The details of the characteristics of respondents are presented in appendix D, which include their positions, working experience (years) in the relevant industries and departments they work for in the firms. These details comprise the profiles of four groups of main players and the total average for all respondents.

As reported in appendix D, 65.72% of all respondents occupy the positions above manager/assistant manager, in which, 32.66% of these respondents occupy the positions above vice president, and 20.56% within them are vice managing directors or above. Further, 64.11% of all respondents have more than 10 years' working experience. The respondents come from variety of departments in their firms, which include management (22.58%), finance (19.76%), operating (10.08%), marketing (34.27%) and purchasing (5.24%) and so on. This information shows that the majority of these participants are at management level, well-experienced in industry and come from a range of departments.

5.1.3 Characteristics of respondents' firms

The numbers of valid samples of four groups of main players are 73 for CO, 53 for FF, 55 for SC, and 67 for PO. The details of the characteristics of respondents' firms are showed in appendix D, which include their company age, number of employees, company's capital, company's geographical business area(s), and company's annual revenue. These details also comprise the profiles of four groups of main players and the total average for all respondents.

As stated in appendix D, 53.63% of all respondents' firms have more than 250 employees, 63.71% have capital more than 3 million USD, and 70.16% have annual revenue more than 15 million USD. These have gone beyond the requirements of being a SEM (small and medium-sized enterprises) in Taiwan and the UK. However, CO and FF are identified having more variance in these data than SC and PO because of their different nature. In addition, 62.50% of all respondents' firms have more than 20-years lifespan, and 63.71% of them are dealing with global market business (13.31% dealing with 2 main markets, and 50.4% dealing with 3 and more than 3 main shipping markets in the world. Thus, information of such firms suggest the samples are representative of the population.

5.1.4 Non-response bias

Nonresponse issue in the survey-method has drawn many scholars' attention, as this may lead to a potential source of bias in research (Barclay, et al. 2002). In order to check any potential non-response bias in this study, the non-response bias was estimated using procedures recommended by scholars (Armstrong and Overton, 1977; Lambert and Harrington, 1990). Their suggestive method is based on the assumption that late respondents are similar to non-respondents because their replies took the most effort and the longest time to obtain. Thus, the first quartile of respondents was classed as early respondents, the last quartile as late respondents, and their respective responses were compared (Armstrong and Overton, 1977). A comparison of the means of the response of each question given by each group through an independent-sample t-test (at 5% level, and 1% level), demonstrates there is no significant differences at the 0.05 level in most assessments. Consequently, a non-response bias is not considered as a concern in this study. The summary is shown in Table 5.2 and the details of the test is displayed in Appendix C.

Table 5.2 Comparison of respondent and non-respondent groups by different players

	at 5% level		at 1% level	
	Significant differences	No significant differences	Significant differences	No significant differences
CO	0	72	0	72
FF	1	71	0	72
SC	4	68	1	71
PO	8	64	1	71
Total	13	275	2	286

5.2 Introduction to the method of analysis

The following sections will introduce the framework of analysis, three-level analysis and definition of three types of service applied in the questionnaire survey.

5.2.1 Framework of analysis

As stated in chapter 4, the questionnaire in this thesis was primarily designed to explore: how respondents anticipate the importance level of each link in maritime logistics network; how they perceive the existing network relationship strength according to different service complexity with the other main players; the value recognized and its origins. Answers were

scored on a Likert scale, from least important (1) to most important (5) for the first question, and from strongly disagree (1) to strongly agree (5) for the rest of questions.

The units of analysis in questionnaire survey was stemmed from the conclusion of the interview study in Chapter 5, which identified the four main players and six links among them (see figure 5.1). Three dimensions were considered during the analysis, which includes the links between pair players, relationship strength measurement and service complexity. The abbreviation of these factors are shown in Figure 6.1, and will be used in the following sections.

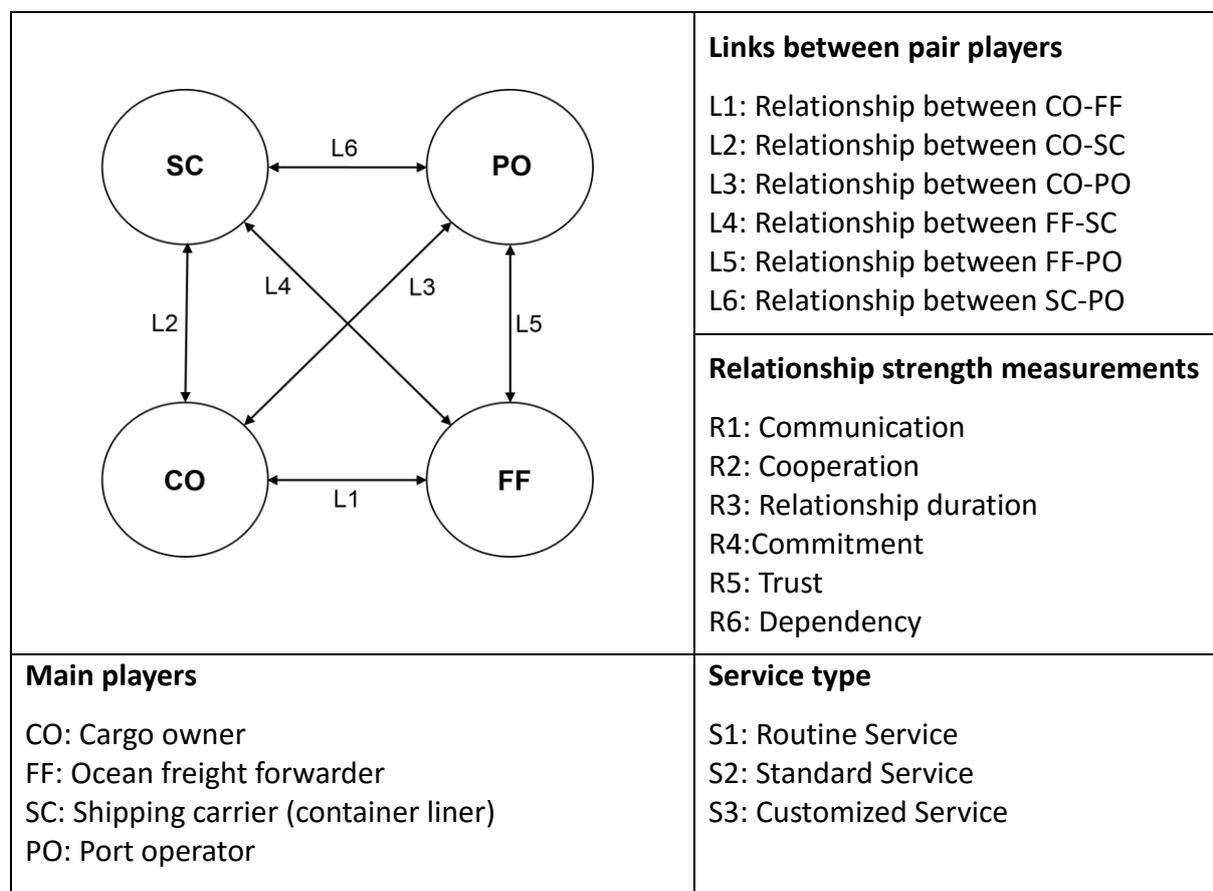


Figure 5.1 Abbreviations in the framework of analysis

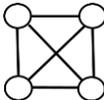
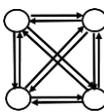
5.2.2 Three-level analysis

Building on the SCM, marketing and social network analysis literature cited earlier, the data collected from questionnaires were analysed by three-level method in this chapter, including macro view, mixed view and micro view (see Table 5.3).

In the macro view, it is assumed that there is no significant difference among each group of main players' perceptions, thus, overall trend can be derived by averaging all of their perceptions. For the mixed view, only the evaluation from the pair players through their own immediate relationships are involved. It is assumed that these pair players have same perceptions and can be averaged together in this case. The mean value of each link, each relationship strength measurement and each type of service were assessed.

With regard to the micro view, each individual group of players are presumed to have different perceptions in all aspects, even in the same immediate link connecting with the pair players. Examined items include each group of players' viewpoints, rankings of each direct links, perception gaps between pair players, each player's position in network and the SCI degree of network for different service types through social network analysis.

Table 5.3 Instruction of three-level analysis

Level of analysis	Concept	Assumption	Items of analysis
Macro View		The value of perceptions can be gained from averaging the score of each individual player	Overall mean value
Mixed View		The players within the same link have same perceptions and their scores can be averaged together; and only the immediate relationships for players are evaluated	Mean values by: (1) Links (2) Relationship strength (3) Service types
Micro View		Players in the same type of role have the same perception, but have different perception from other types of player	(1) Individual players' viewpoint (2) Adjacency matrix (perception gap) (3) ranking by mean value (4) statistics test (5) SNA

5.2.3 Three types of service

According to the suggestions by participants in the pilot study in the questionnaire survey study, the definition of the three types of service has been revised to more fit in the maritime logistics context for different players who provide services. Table 5.4 presents the three

different types of service in maritime logistics which are correspondent to the categories made by Bask (2001), namely: routine service, standard service and customized service.

Table 5.4 Three types of service in maritime logistics

	Definition (Bask 2001)	Maritime Context
Routine Service	Simple services that do not contain any specific arrangements	Basic booking, shipping transport, cargo handling, e.g. general dry container cargo
Standard Service (Easily-customized service)	Services which contain some easily customized types of operations	<ul style="list-style-type: none"> • Special transportation arrangement where products need to be cooled/heated, or moved in a special package or specific equipment (e.g. use special container), e.g. the transportation of reefer cargo, DG cargo, and vulnerable cargo • Or combination with two functions, e.g. shipping transport plus inland transport, or transportation plus terminal service by customer needs • Or priority or guaranteed service offering
Customized Service (Highly-customized service)	Customers highly influence services output and services flexibility	<ul style="list-style-type: none"> • Logistics service providers have to invest extra and dedicated resources to meet customers' specific needs, or make more efforts for co-ordination of work and joint planning with customers, e.g. dedicated EDI, project cargo, turnkey • Or highly integrated service, e.g. single window service for VIP, relabelling, packing, final assembly, inventory management, purchasing management, buyer consolidation, distribution centre, supply chain management, total solution, or port operators providing functions for running multi-country consolidation (MCC) or Free Trade Zone

In following sections, the findings in the questionnaire survey study will be presented in this order: the anticipated importance level of each link; perceived existing network relationship strength; value and the identification of its origin; and social network analysis (SNA). Each analysis will mainly follow the three-level analysis approach.

5.3 Anticipated importance level of each link

This section analyses the anticipated importance level of each link in the network from three levels (macro level, mixed level, micro level).

5.3.1 Macro level

All participants were asked to score the degree of importance for each of the six business relationship links in the maritime logistics network by giving a number from 1 (least important) to 5 (most important). These links include the direct and indirect connections with the participants. Table 5.5 presents the mean values of importance, standard deviation, p-value and ranking of each links by averaging all of these scores. In this macro level, the mean importance values of L1 (4.54) and L6 (4.52) are very close and ranked at the 1st and 2nd place respectively, followed by L4 (4.45) and L2 (4.34). L5 (3.57) and L3 (3.12) are scored below 4.00, significantly lesser important and ranked at the last and second-last place respectively. Through t-test, the p-values show that there is no statistically significant difference between L1 and L6 (0.355), there is difference between L6 and L4 (0.083), L4 and L2 (0.062) at the 10% level of significance, and there is evidence to suggest that L2 and L5 (0.000), L5 and L3 (0.000) are different at the 1% level of significance. Thus, there is a clear trend of varied levels of importance between different main players in the maritime logistics network.

For the low rated averaged of L3, it is likely that there is much lesser direct business relationship between POs and COs, as several respondents suggest that COs deal with POs mainly through their LSPs which are FFs and/or SCs. On the other hand, the low mean value of L5 may be due to the fact that there is no strong necessity to build direct business relationships between FFs and POs.

The first four ranked links have smaller standard deviation than the last two ranked links, which implies that respondents are in more agreement with the rates of the former four links than the latter two links.

Table 5.5 Average importance degree all from 4 type of players

Ranking	Links	Mean	S.D.	p-value
1	L1:CO-FF	4.54	0.78	0.355
2	L6:SC-PO	4.52	0.74	
3	L4:FF-SC	4.45	0.81	0.083
4	L2:CO-SC	4.34	0.89	0.062*
*5	L5:FF-PO	3.57	1.09	0.000**
6	L3:CO-PO	3.12	1.07	0.000**

Note: * stands for been significant different at 1 % level, ** stands for been significant different at 10 % level

5.3.2 Mixed level

In this section, it is assumed that the pair of trading partners have same perceptions of the important degree of their own immediate links, and can be averaged together. Thus, the degree of importance of each links will only be measured based on the pair trading partners' viewpoints, who have immediate links with each other. Table 5.6 displays the level of importance of L6 (4.73) and L4 (4.64) are ranked at the most two important links in the maritime logistics network, followed by L1 (4.52), L2 (4.46), L5 (3.78) and L3 (3.47). Comparing the results of mixed level analysis with macro level analysis presented in the previous Section 5.3.1, it can be seen that all scores increase, with the exception of L1's slight decrease. A similar pattern of the ranking of the importance degree for each link between mixed level and macro level can be seen, expect the ranking of L1 which drops from the first to the third. These show that general the pair of trading partners rate the importance degree of the relationships immediately linking to them higher than the overall averages which include all the other type of players' viewpoints. The only exceptional case is that the score of L1 mixed (averaged) with COs and FFs' score is slightly lower than the overall average from all players.

Table 5.6 Average importance degree from each pair of players

Ranking	Links	Mean	S.D.
1	L6:SC-PO	4.73	0.51
2	L4:FF-SC	4.64	0.59
3	L1:CO-FF	4.52	0.80
4	L2:CO-SC	4.46	0.82
5	L5:FF-PO	3.78	0.96
6	L3:CO-PO	3.47	0.98

When comparing with the standard deviations between the data in Table 5.6 and Table 5.5 noted in Section 5.3.1, they follow a similar pattern (see Figure 5.2). However, all of the standard deviations in Table 5.6 are smaller than the data in the Table 5.5, which indicates that the pair trading partners with immediate links are in more agreement with these links, comparing with those who have no direct connections with these links.

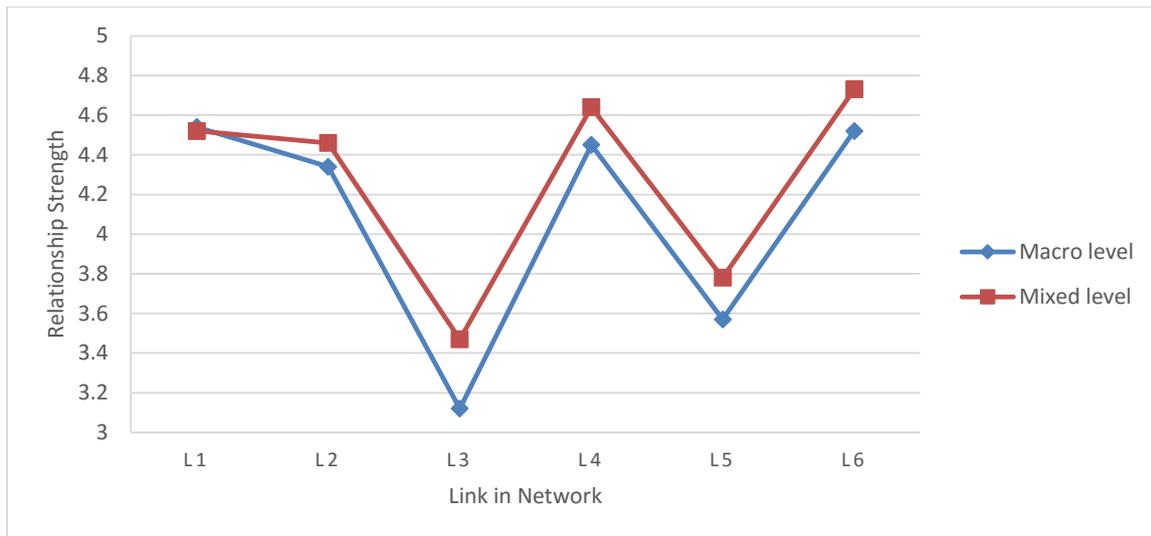


Figure 5.2 Comparison of the important degree of each link from macro and mixed level

5.3.3 Micro level

This section will explore the importance degree of each link from a micro-level perspective, which assume each main player has different viewpoint, therefore, their perceptions should be presented separately and cannot be averaged.

(1) Individual players' viewpoint

Table 5.7 compares the perceptions of importance degree for each links among four individual players (COs, FFs, SCs, POs). According to data in Table 5.7 and Figure 5.3, the most significant points are heightened below:

- For COs, L1 (4.32) and L2 (4.29) are the most important links in the maritime logistics network, which indicates that COs pay more attention to FFs and SCs.
- For FFs, L1 (4.81), L4 (4.77) and L6 (4.64) are the most important links. In addition to the immediate links with COs and SCs (L2), the links between SCs and POs (L6) are also emphasized. This may be because the problem occurring between SCs and POs will correspondingly pose serious problems for FFs' services.
- For SCs, L2 (4.69) and L6 (4.62) are the most important, and L4 (4.51) are also highly important. Hence, in addition to the direct customers (COs) and suppliers (POs) were highlighted, the link between SC and FF were also rated high. This implies the important role of FF for SC, because FF may play multiple roles including the customer, logistics partner and competitor for SC.

- For POs, in addition to the most and significantly important link L6 (4.82), L1 (4.72) are also highlighted which shows POs realize the importance of cargo's source from FFs.

Table 5.7 Comparison of the perceptions of importance degree

		L1	L2	L3	L4	L5	L6
CO	Mean	4.32	4.29	3.21	4.07	3.73	4.08
FF	Mean	4.81	3.87	2.64	4.77	3.55	4.64
SC	Mean	4.36	4.69	2.69	4.51	2.89	4.62
PO	Mean	4.72	4.48	3.76	4.57	3.97	4.82
Ave.	Mean	4.54	4.34	3.12	4.45	3.57	4.52
	(S.D.)	(0.78)	(0.89)	(1.07)	(0.81)	(1.09)	(0.74)

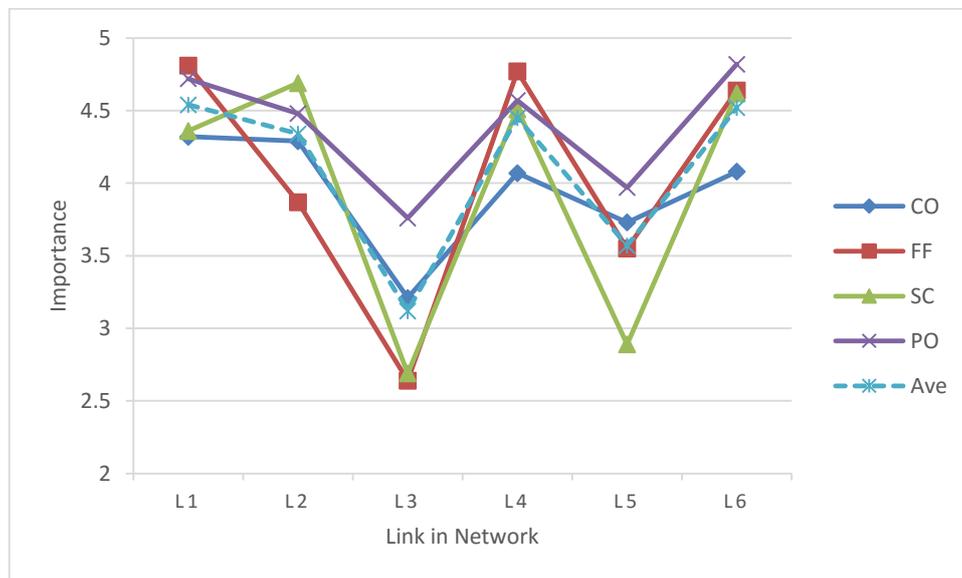


Figure 5.3 Comparison of the perceptions of importance degree

(2) Perception gap

Table 5.8 and Figure 5.4 compare the perceptions of importance degree between pair players within specific immediate links. It can be seen that there are statistically significant differences of perceptions of importance degree between all of the pair players through the t-test. These results reveal several points that:

- COs undervalue all of the links between themselves and the MLSPs (FFs, SCs, POs);
- FFs overestimate the links between themselves and CO and SC, but underestimate the links between themselves and POs;
- SCs only overestimate their connections with COs, but underestimate their connections with FFs and POs;
- POs overrate all of their connections with other main players: COs, FFs and SCs.

Surprisingly, there are perception gaps between all of the pair players, in which the statistically significant differences exist between all of their opinions for importance degree. Overall, customers undervalue their links with suppliers, while the suppliers overvalue their connections with customers in the maritime logistics network.

Table 5.8 Comparison of the perceptions of importance degree by players in the same link

	L1	L2	L3	L4	L5	L6
	CO-FF	CO-SC	CO-PO	FF-SC	FF-PO	SC-PO
	FF-CO	SC-CO	PO-CO	SC-FF	PO-FF	PO-SC
p-value	0.00	0.00	0.00	0.01	0.01	0.02
Significant Different (at 5% level)	Yes	Yes	Yes	Yes	Yes	Yes

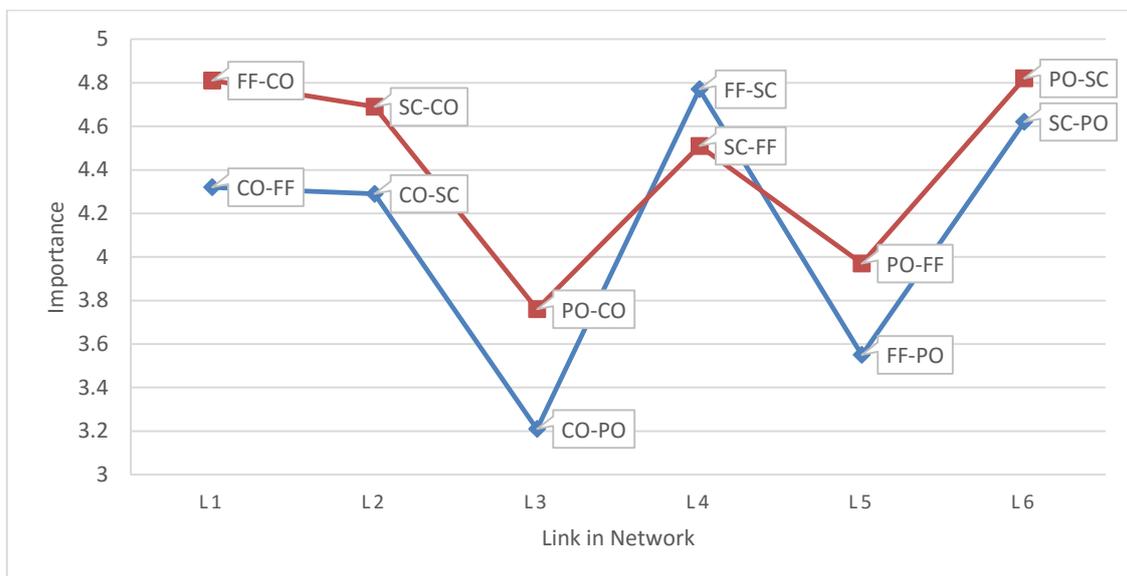


Figure 5.4 Comparison of the perceptions of importance degree by players in the same link

(3) Ranking of the 12 links

Figure 5.5 presents the ranking of the perception of importance degree for 12 direct links from individual main players' viewpoints. It can be seen that PO-SC (4.82) as well as FF-CO (4.81) links were ranked first and second respectively, and FF-PO (3.55) as well as CO-PO (3.21) were ranked the second-last and last. 6 out of 12 links' mean score are above 4.5 (PO-SC, FF-CO, FF-SC, SC-CO, SC-PO, SC-FF), 2 out of 12 links' mean score are between 4.00 and 4.5 (CO-FF, CO-SC), and 4 out of 12 links' mean score are below 4.00 (PO-FF, PP-CO, FF-PO, CO-PO). As has

been revealed in this trend, the links between CO and PO, FF and PO are regarded as less important.

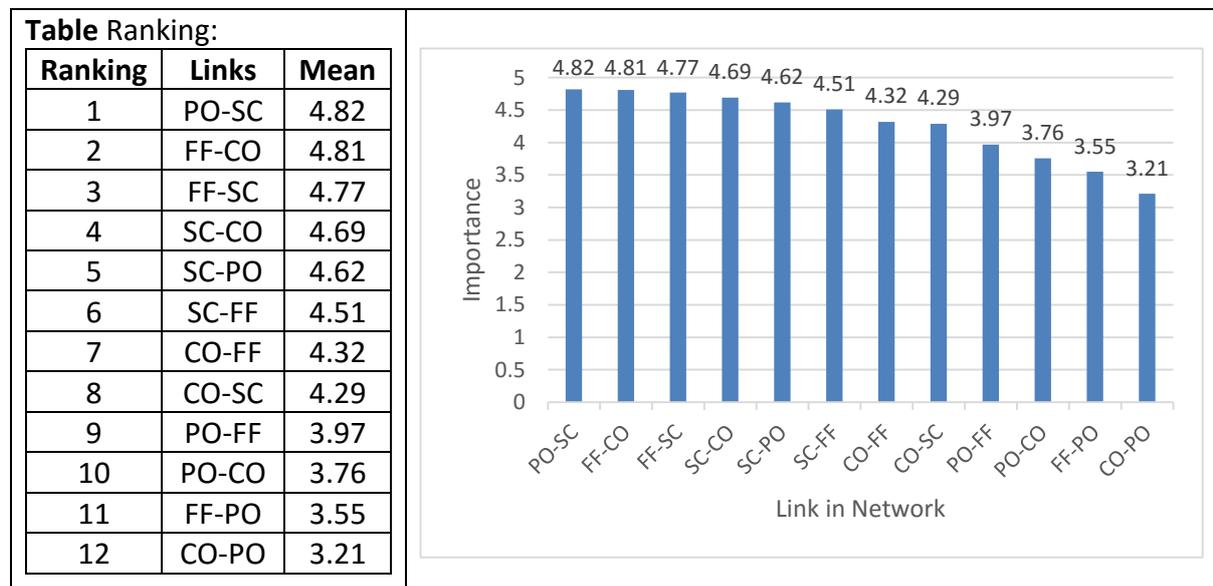


Figure 5.5 Ranking of the perception of importance degree for 12 direct links

The findings presented in the above reveal several interesting points. The practitioners distinguished the different importance degree between the links among main players in the maritime logistics. In other words, the relationships at different points in the maritime logistics network should not always be regarded as keeping the same closeness, and could vary. When practitioners run their business, they actually show different levels of interest in or pay different degrees of attention on different trading partners, instead of putting the same emphasis.

When looking into the importance degree for each link, links related to POs lie in the two extremes. Links between POs and SCs are highly emphasized, but links between POs, COs and FFs are regarded as the least important. It is expected that the relationships between POs and SCs are underlined, as the issue between these two players always draw the most attention in maritime logistics practice. Although there is an increasing trend for POs to expand their business areas, the links between POs, COs and FFs are unexpectedly considered as the least important in participants' opinions. This also highlights the reality that POs are still very much rely on SCs, even though they claim the significance of integrating themselves with other functions or trading partners in the supply chain.

The other surprising findings come from the analysis of perception gaps of importance degree. As there are perception gaps between all of the pair players, it reminds that the practitioners should look at the relationship management issue from both sides rather than their own single side. In addition, customers undervalue their links with suppliers, while the suppliers overvalue their connections with customers in the maritime logistics network. This implies that everyone is looking downstream to the end customer rather than upstream, and perhaps the imbalance of power exists between the pair players.

5.4 Perceived existing network relationship strength

This section analyses the perceived existing network relationship strength in the network from three levels (macro level, mixed level, micro level) and three dimensions (relationship strength dimension, business link dimension, service type dimension).

5.4.1 Macro level

In this level of analysis, all participants' score is averaged along 6 relationship strength dimensions and 3 service types. The results in Table 5.9 and Figure 5.6 reveal the following points:

(1) The comparison of relationship strength among 3 service types

- The rankings of the 3 service types by the average scores of relationship strength dimensions is shown as: customized service (3.81), standard service (3.69), routine service (3.56), which indicates that, generally, the more complex service causes the overall higher relationship strength in the network.
- Each dimension of relationship strength increases when the service become more complex service, which indicates that, generally, the more complex service causes the higher strength in each relationship strength dimension.
- Commitment ranks at the top in S1 and S2, while communication and cooperation rank at the top in S3. Communication in S3 has the highest mean value (4.00) and is the only one achieving 4.00 in this data. Cooperation in S1 has the lowest mean value (3.36).

(2) The comparison among 6 relationship strength dimensions

- The rankings of the average scores of the six relationship dimensions is shown below: commitment (3.86); communication (3.75); cooperation (3.62); dependency (3.58); trust (3.53); and relationship duration (3.52). It displays that the main players in maritime logistics network have stronger enduring desire to maintain a valued long-term business relationship with each other, but only have short-term contract business relationship in practice. In addition, the degree of communication and cooperation are higher than dependency and trust in the maritime logistic services.
- With the increase of service complexity, communication and cooperation increase rapidly, the changing degrees of relationship duration, trust and dependency are relatively lower, and the commitment just increases gradually with the lowest changing degree.
- The changing degrees of relationship duration is more equally between different services, but for trust and dependency, their strengths increase more between S1 and S2. These imply that, with the increase of service complexity (degree of customization), except relationship duration, the increasing degree of hard-factor interactions (communication, cooperation) is more than the other soft-factor interactions (dependency, trust) in the maritime logistics network.
- All average scores of the 6 relationship dimensions are below 4.00, which could imply that the degree of SCI in the maritime logistics network is not high compared with the highest degree of relationship strength (5.00).

Table 5.9 Comparison of average relationship strength in macro level

	S1: Routine service	S2: Standard service	S3: Customized service	Average of specific relationship strength
R1: Communication	3.56	3.75	4.00	3.75
R2: Cooperation	3.36	3.63	3.93	3.62
R3: Relationship duration	3.43	3.53	3.61	3.52
R4: Commitment	3.82	3.85	3.92	3.86
R5: Trust	3.45	3.56	3.61	3.53
R6: Dependency	3.45	3.62	3.69	3.58
Average of specific service type	3.56	3.69	3.81	3.64

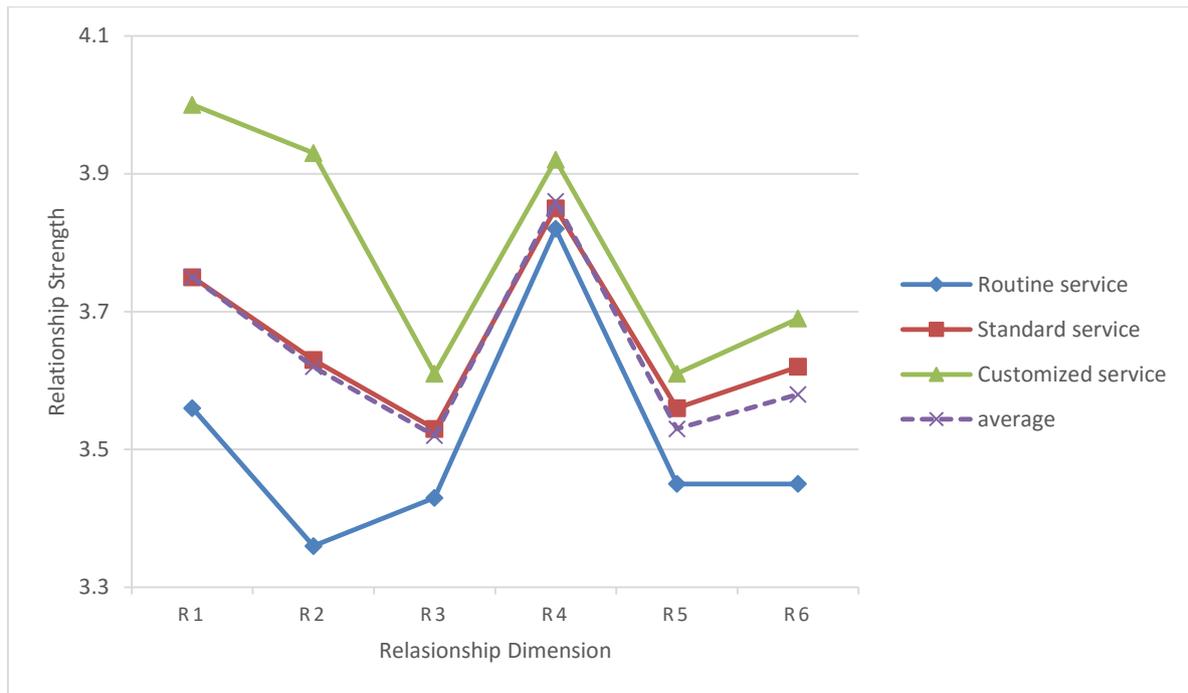


Figure 5.6 Comparison of average relationship strength in macro level

5.4.2 Mixed level

(1) Analysis of each relationship strength dimension from the perspective of links

Table 5.10 shows the mean values of 6 relationship strength dimensions in 3 types of service among 6 different links. Figure 5.7 compares each link's average relationship strength in 6 relationship dimensions. As stated in these table and figure, some trends can be identified as follows:

- Most communication exists in L1 (average: 4.12), followed by L4 (average: 4.02), L6 (average: 4.00) and L2 (average: 3.96), which indicates that there is most frequent interactions and quality information sharing between CO and FF.
- The trend of ranking about cooperation among different links is similar to above-mentioned communication. However, almost all of the cooperation strength between each pair players are lower than communication strength. This implies that, generally, players make more efforts on communication level works than cooperation level works with each other in maritime logistics network.
- With regard to the score of relationship duration, L6 (average: 4.27) is significant higher than other links. L4 (average: 3.74), L2 (average: 3.67) and L1 (average: 3.61) have smaller scores for relationship duration, and L5 (average: 3.03), L3 (average: 2.82)

have the smallest average scores in relationship duration. These reveal that the longer-term contracts primarily exist between SC and PO, and relationships are more foot-loose among CO, FF and SC from contract's perspective. There are few contract relationships between PO as well as FF, and PO as well as CO.

- The scores of commitment for almost links excluding L5 and L3 in all types of service are above 4.00. L6 (average: 4.33) has the highest commitment strength, followed by L4 (average: 4.14), L1 (average: 4.12) and L2 (average: 4.05). These suggest that every business link is expected to be maintained as a valued long-term one, with the exception of the links PO–FF and PO–CO.
- There is most trust in L6 (average: 3.93), followed by L1 (average: 3.82), L4 (average: 3.73) and L2 (3.71). This indicates that SC and PO have strongest confidence with each other in reliability and integrity, and view each other as the strategic partner sharing risks and benefits.
- In terms of dependency, L6 (average: 3.94) and L4 (average: 3.86) are the highest two, followed by L1 and L2. L5 and L3 again have the lowest scores. As revealed in these data, there are more dependency existing in SC–PO and FF–SC.
- As can be seen in Figure 5.7, not all of the relationship dimensions are at the same level for a specific link. R4 (commitment) and R1 (communication) always occupy the leading places. R2 (cooperation), R6 (dependency) and R5 (trust) generally locate in the middle. R3 (relationship duration) always shows the lowest strength, except in the link between SC and PO.
- The average relationship strength of different links varies, and these links can be divided into two groups by the degree of relationship strength. L1, L2, L4 and L6 can be categorised as higher-interactive links; L5 and L3 can be categorised as low-interactive links as these two links have significantly lower scores. This implies that there is no direct or only few business relationships within FF–PO and CO–PO.

Table 5.10 Comparison of relationship strength in mixed level

		L1	L2	L3	L4	L5	L6
R1: Communication	S1:Routine	3.81	3.79	2.95	3.88	3.28	3.75
	S2:Standard	4.21	3.95	3.08	4.00	3.32	3.97
	S3:Customized	4.46	4.22	3.36	4.23	3.56	4.30
	Average	4.12	3.96	3.11	4.02	3.38	4.00
R2: Cooperation	Routine	3.59	3.58	2.83	3.49	3.05	3.69
	Standard	4.09	3.71	3.00	3.80	3.23	3.99
	Customized	4.43	4.06	3.30	4.19	3.47	4.23
	Average	3.99	3.76	3.02	3.81	3.24	3.96
R3: Relationship duration	Routine	3.37	3.69	2.69	3.59	3.05	4.31
	Standard	3.63	3.65	2.80	3.75	3.08	4.29
	Customized	3.95	3.66	3.01	3.89	2.96	4.22
	Average	3.61	3.67	2.82	3.74	3.03	4.27
R4: Commitment	Routine	3.99	4.13	3.13	4.15	3.30	4.32
	Standard	4.095	4.06	3.19	4.09	3.36	4.29
	Customized	4.15	3.94	3.36	4.18	3.43	4.37
	Average	4.12	4.05	3.21	4.14	3.36	4.33
R5: Trust	Routine	3.63	3.68	2.88	3.59	3.15	3.87
	Standard	3.92	3.73	2.92	3.72	3.12	3.98
	Customized	4.00	3.74	3.08	3.91	3.09	3.93
	Average	3.82	3.71	2.95	3.73	3.13	3.93
R6: Dependency	Routine	3.50	3.63	2.94	3.69	3.07	3.95
	Standard	3.82	3.75	3.08	3.95	3.23	3.93
	Customized	4.03	3.72	3.26	3.99	3.28	3.93
	Average	3.75	3.69	3.07	3.86	3.19	3.94

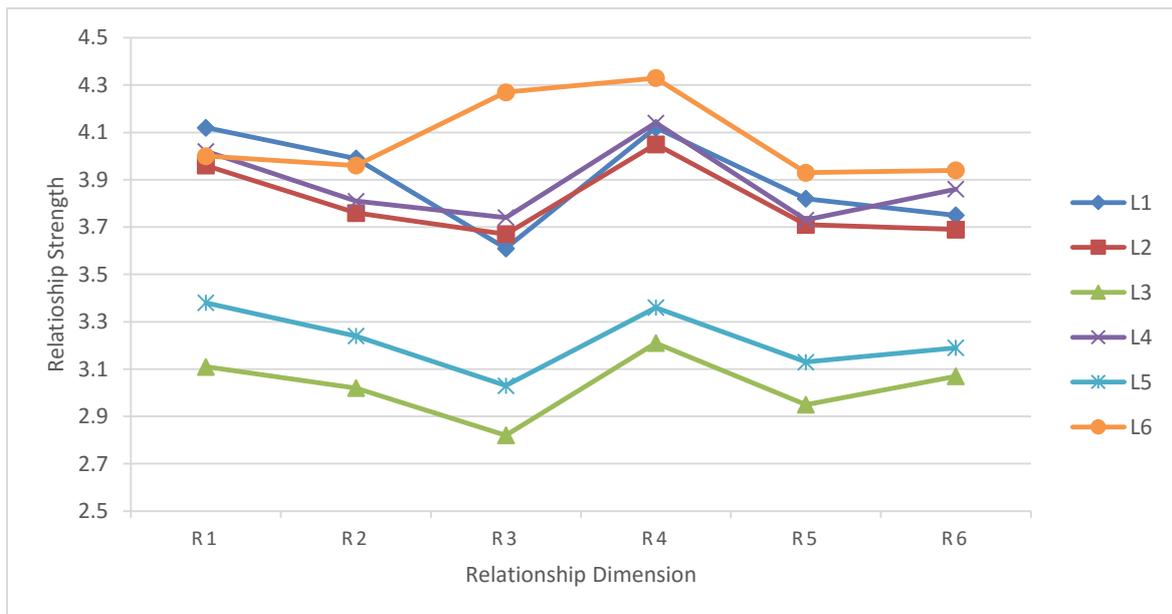


Figure 5.7 Comparison of relationship strength in mixed level

(2) Average strength of each link in different service complexities

Figure 5.8 presents the average relationship strength of each link in 3 service types and in total average. The relationship strength of each link was obtained by averaging the value from six relationship dimensions. As can be seen in Figure 5.8, the average relationship strength increases by the service complexity in every link. With the increase of service complexity, L1, L3 and L4's average relationship strength increase more rapidly than L2, L5 and L6. This implies that service complexity has more influence on the relationship strength between CO and FF, CO and PO, and FF and SC. Moreover, the total average line is very close to the line of standard service.

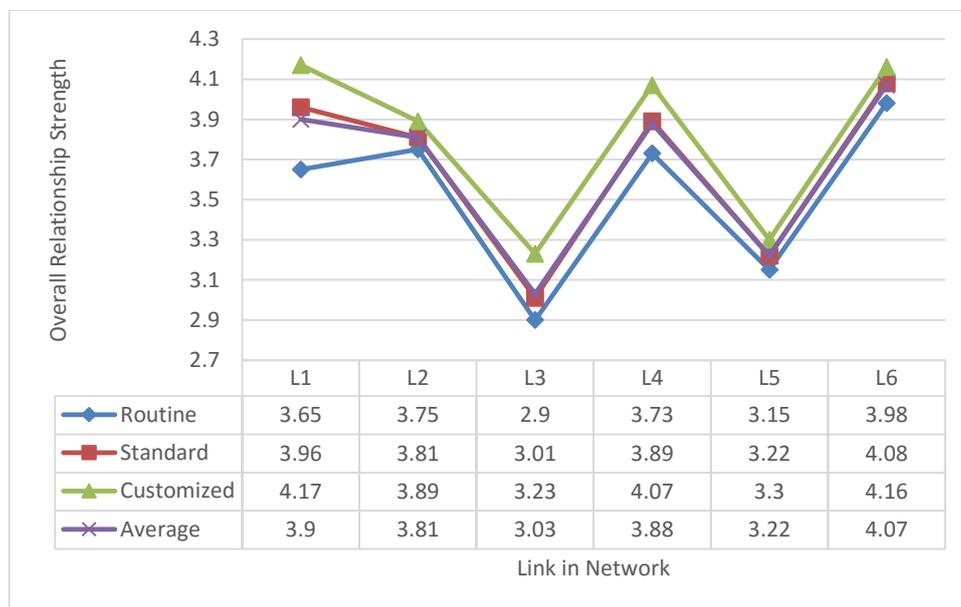


Figure 5.8 Comparison of relationship strength in total average

On the other hand, with the aim of identifying the order of each link's average relationship strength, Figure 5.9 compares the rankings of each link in 3 types of service. According to the values of total average, L6 is in the 1st place, followed by L1, L4, L2, L5 and L3. L1's ranking increases by the service complexity, and replaces L6's consistent top position in customized service. In contrast, L2's ranking decrease from the 2nd to the 4th by the service complexity. L4 always occupies the 3rd place, and L5 along with L3 are always at the second last and last places in every service type. These points highlight FF's crucial role in customized service, and SC's advantage in routine service, and SC's limitation in customized service. Further, as can be seen, these rankings of average relationship strength have a similar pattern with the rankings of importance described in previous section 5.3.2.

On the other hand, no matter how the rankings of each link change, it is obvious to distinguish that L6, L4, L2 and L5 are located in the high strength group, as well as L5 and L3 are located in the low strength group.

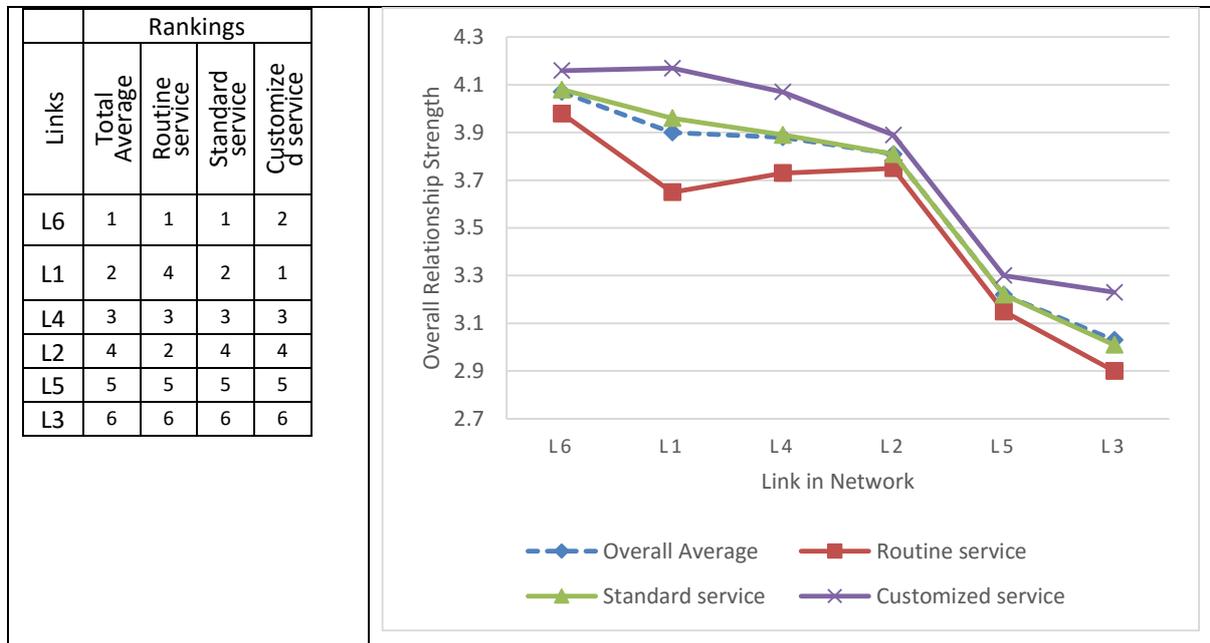


Figure 5.9 Comparison of relationship strength rankings in total average

5.4.3 Micro level

This section explores the existing relationship strength in the maritime logistics network by applying micro level approach. It will start from presenting the results from network perspective which includes the relationship strength of all of directional links, and then look at the issue from each type of player’s viewpoint.

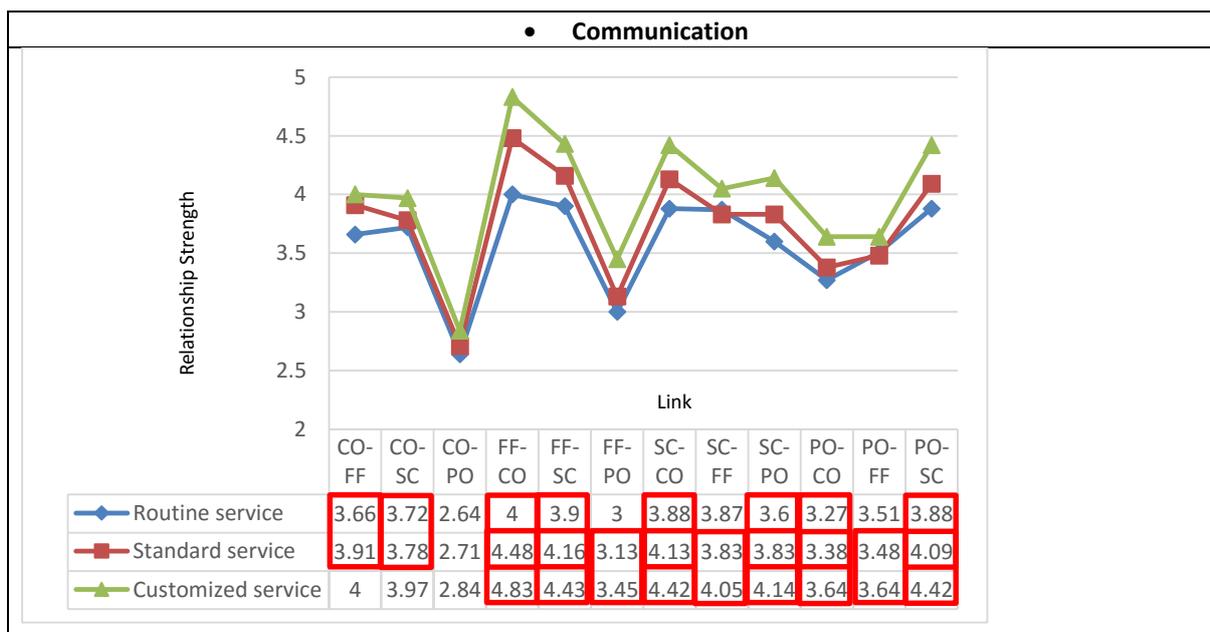
(1) Dynamics of 12 links with different service types and relationship dimensions

Figure 5.10 compares the 12 links’ relationship strength by 3 types of service along with 6 different dimensions of relationship strength. Appendix F presents the adjacency matrix for different players in different situations. According to Figure 5.10:

- PO-FF, PO-CO, FF-PO, CO-PO always display the lowest level of all the 6 relationship strength dimensions in 3 types of service.
- When looking into the changing degree of relationship strength in each link, there are many and the most increasing trend existing in FF-CO and FF-SC. In contrast, there is no or few significantly increasing trend of relationship strength with the increase of service complexity in CO-PO, CO-FF, PO-FF. There are some links showing the

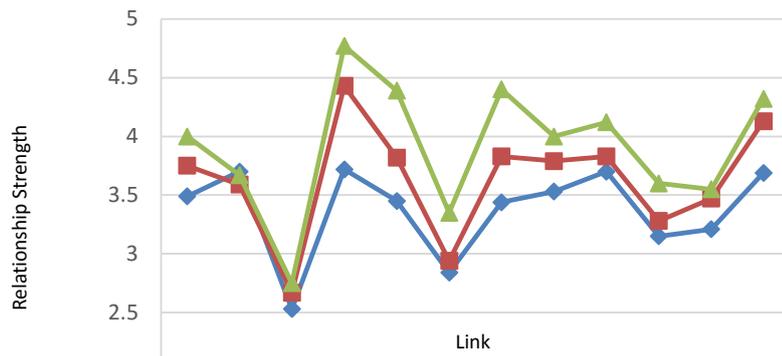
constantly decreasing trend, such as: SC-PO and PO-FF in relationship duration dimension; SC-FF and SC-PO in commitment; CO-SC in trust; CO-SC and PO-SC in dependency.

- Communication: Not all links show the significant increasing relationship strength along with service complexity. The continually significant increasing strength exist within FF-CO, FF-SC, SC-CO, SC-PO, PO-CO and PO-SC.
- Cooperation: There are more significant increasing relationship strength along with service complexity compared with communication. These continually significant increasing strengths exist within FF-CO, FF-SC, SC-CO, SC-FF and PO-CO.
- Relationship duration: Only FF-CO shows the continually significant increasing relationship strength along with service complexity.
- Commitment: Only FF-CO reveals the continually significant increasing relationship strength along with service complexity.
- Trust: Only FF-CO shows the continually significant increasing relationship strength along with service complexity.
- Dependency: Only FF-CO and FF-SC show the continually significant increasing relationship strength along with service complexity.



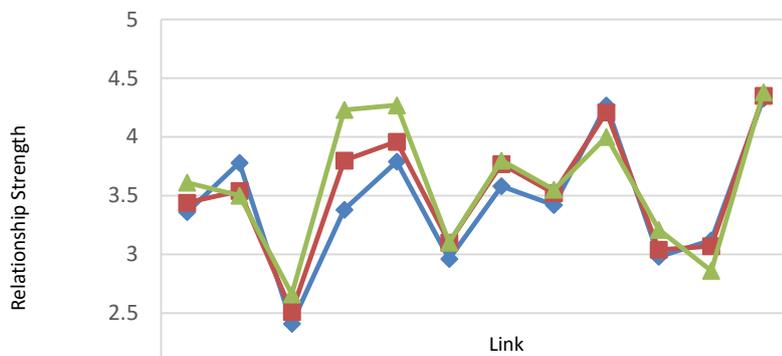
note: there is a statistical difference between these two values

Cooperation



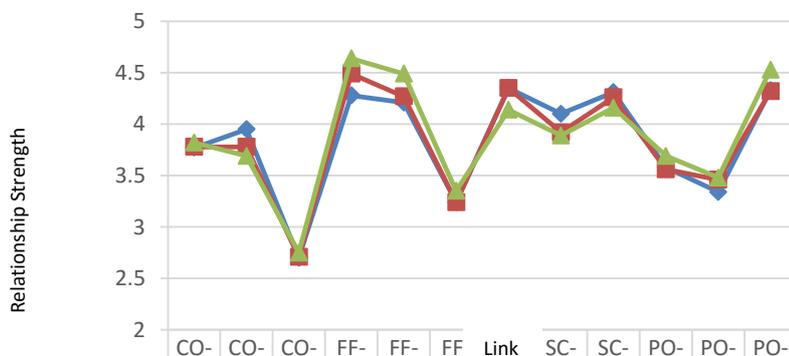
	CO-FF	CO-SC	CO-PO	FF-CO	FF-SC	FF-PO	SC-CO	SC-FF	SC-PO	PO-CO	PO-FF	PO-SC
Routine service	3.49	3.7	2.53	3.72	3.45	2.84	3.44	3.53	3.7	3.15	3.21	3.69
Standard service	3.75	3.59	2.67	4.43	3.82	2.94	3.83	3.79	3.83	3.28	3.47	4.13
Customized service	4	3.67	2.75	4.77	4.39	3.35	4.4	4	4.12	3.6	3.55	4.32

Relationship duration



	CO-FF	CO-SC	CO-PO	FF-CO	FF-SC	FF-PO	SC-CO	SC-FF	SC-PO	PO-CO	PO-FF	PO-SC
Routine service	3.36	3.78	2.41	3.38	3.79	2.96	3.58	3.42	4.27	2.98	3.12	4.33
Standard service	3.44	3.54	2.51	3.8	3.96	3.1	3.77	3.52	4.21	3.04	3.07	4.35
Customized service	3.61	3.5	2.66	4.23	4.27	3.1	3.8	3.55	4	3.21	2.86	4.38

Commitment



	CO-FF	CO-SC	CO-PO	FF-CO	FF-SC	FF-PO	Link CO	SC-FF	SC-PO	PO-CO	PO-FF	PO-SC
Routine service	3.77	3.95	2.7	4.28	4.21	3.24	4.35	4.1	4.31	3.58	3.34	4.33
Standard service	3.78	3.78	2.71	4.49	4.27	3.24	4.35	3.92	4.26	3.56	3.46	4.32
Customized service	3.82	3.69	2.75	4.64	4.49	3.35	4.14	3.89	4.16	3.69	3.48	4.53

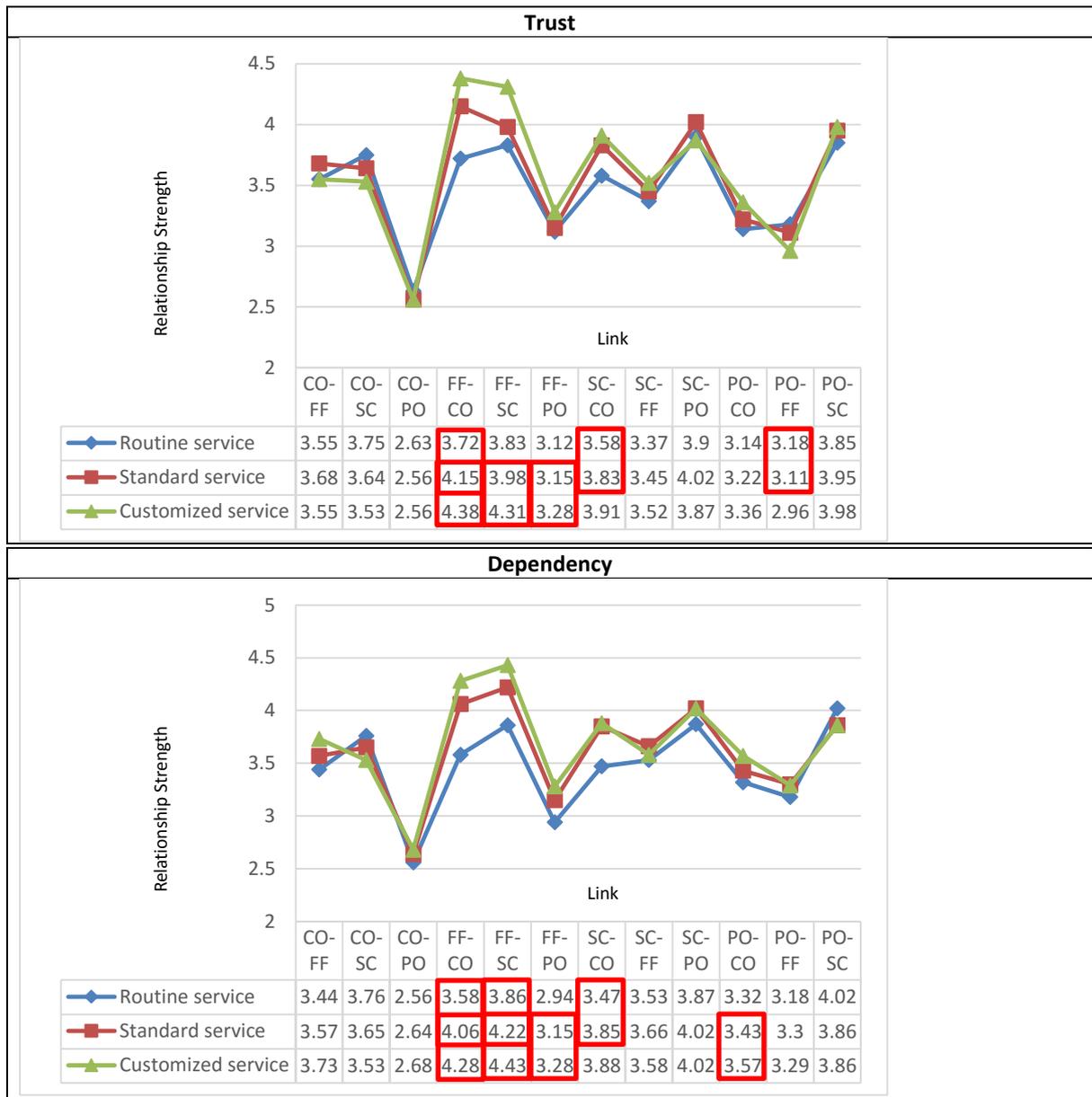


Figure 5.10 The trends of 12 links' relationship strength by service complexity

(3) Explore the existing relationship strength from each player's viewpoint

Cargo owner's viewpoint

The numbers in Table 5.11 are the mean values of relationship strength derived from 6 relationship dimensions in 3 types of service with the other main players from COs' view. According to the mean values derived from 3 types of service for each relationship dimension with each other trading partner in Table 5.11:

- For communication, COs have the most frequent interactions and share quality information with FFs (3.82) and SCs (3.80), and have very few communications with POs (2.71).

- Likewise, COs most often work, plan, operate and control together with SCs (3.70) and FFs (3.66) to offer the best logistics solution. COs have a lesser degree of such cooperation with POs (2.62).
- COs have the longest contract lengths with SCs (3.64), followed by FFs (3.45). COs have very short relationship duration with POs (2.50).
- For commitment, COs have stronger enduring desire to maintain a valued long-term business relationship with the SCs (3.83) and FFs (3.79), rather than PO (2.72).
- Likewise, for trust, COs have stronger confidence in the SCs (3.66) and FFs' (3.59) reliability and integrity, viewing each other as the strategic partner sharing risks and benefits, rather than PO (2.59).
- In terms of dependency, COs have a strongest need of specific resources from the SCs (3.67) to achieve desired goals, followed by FFs (3.55), and POs only contribute a little (2.61).

Overall, COs have closer business relationships with FFs and SCs, but much looser business relationship strength with POs.

Table 5.11 Relationship strength from COs' viewpoint

		with FF	with SC	with PO
R1: Communication	S1:Routine	3.66	3.72	2.64
	S2:Standard	3.91	3.78	2.71
	S3:Customized	4.00	3.97	2.84
	Average	3.82	3.80	2.71
R2: Cooperation	Routine	3.49	3.70	2.53
	Standard	3.75	3.59	2.67
	Customized	4.00	3.67	2.75
	Average	3.70	3.66	2.62
R3: Relationship duration	Routine	3.36	3.78	2.41
	Standard	3.44	3.54	2.51
	Customized	3.61	3.50	2.66
	Average	3.45	3.64	2.50
R4:Commitment	Routine	3.77	3.95	2.70
	Standard	3.78	3.78	2.71
	Customized	3.82	3.69	2.75
	Average	3.79	3.83	2.72
R5: Trust	Routine	3.55	3.75	2.63
	Standard	3.68	3.64	2.56
	Customized	3.55	3.53	2.56
	Average	3.59	3.66	2.59
R6: Dependency	Routine	3.44	3.76	2.56
	Standard	3.57	3.65	2.64
	Customized	3.73	3.53	2.68
	Average	3.55	3.67	2.61

Ocean freight forwarder's viewpoint

The numbers in Table 5.12 are the mean values of relationship strength derived from 6 relationship dimensions in 3 types of service with the other main players from FFs' view. According to Table 5.12:

- FFs have most communication with COs (4.42) and SCs (4.14), and have few communications with POs (3.17).
- Likewise, FFs have almost cooperation with CO (4.30) and SCs (3.86), but only a little cooperation with POs (3.02).
- FFs have longer relationship duration with SCs (3.99) and CO (3.78), and shortest relationship duration with POs (3.05).
- For commitment, FFs have stronger enduring desire to maintain a valued long-term business relationship with the COs (4.46) and SCs (4.31), rather than PO (3.28).

- For trust, FFs have almost the same stronger confidence in the COs (4.06) and FFs (4.03) reliability and integrity, viewing each other as the strategic partner sharing risks and benefits.
- In terms of dependency, FFs have a strongest need of specific resources from the SCs (4.15) to achieve desired goals, followed by COs (3.95), and POs only contribute a little (3.11).

Overall, FFs have closer business relationships with COs and SCs, but loose business relationship strength with POs.

Table 5.12 Relationship strength from FFs' viewpoint

		with CO	with SC	with PO
R1: Communication	S1:Routine	4.00	3.90	3.00
	S2:Standard	4.48	4.16	3.13
	S3:Customized	4.83	4.43	3.45
	Average	4.42	4.14	3.17
R2: Cooperation	Routine	3.72	3.45	2.84
	Standard	4.43	3.82	2.94
	Customized	4.77	4.39	3.35
	Average	4.30	3.86	3.02
R3: Relationship duration	Routine	3.38	3.79	2.96
	Standard	3.80	3.96	3.10
	Customized	4.23	4.27	3.10
	Average	3.78	3.99	3.05
R4:Commitment	Routine	4.28	4.21	3.24
	Standard	4.49	4.27	3.24
	Customized	4.64	4.49	3.35
	Average	4.46	4.31	3.28
R5: Trust	Routine	3.72	3.83	3.12
	Standard	4.15	3.98	3.15
	Customized	4.38	4.31	3.28
	Average	4.06	4.03	3.17
R6: Dependency	Routine	3.58	3.86	2.94
	Standard	4.06	4.22	3.15
	Customized	4.28	4.43	3.28
	Average	3.95	4.15	3.11

Shipping carrier's viewpoint

The figures in Table 5.13 are the mean values of relationship strength derived from 6 relationship dimensions in 3 types of service with the other main players from SCs' view. According to Table 5.13:

- SCs have more communication with COs (4.13) and FFs (3.91) rather than POs (3.84).
- SCs have almost the same highest degree of cooperation with CO (3.86) and POs (3.87).
- SCs have longer relationship duration with POs (4.17) followed by COs (3.71) and FFs (3.49).
- For commitment, SCs have stronger enduring desire to maintain a valued long-term business relationship with the COs (4.29) and POs (4.24), rather than FF (3.97).
- For trust, SCs have stronger confidence in the POs' (3.93) reliability and integrity, viewing each other as the strategic partner sharing risks and benefits.
- In terms of dependency, SCs have a strong need of specific resources from the POs (3.97) to achieve desired goals, followed by COs (3.72) and FFs (3.59).

Overall, except the communication dimension, SCs have closer business relationships with COs and POs, but have comparatively less close business relationship with FFs.

Table 5.13 Relationship strength from SCs' viewpoint

		with CO	with FF	with PO
R1: Communication	S1:Routine	3.88	3.87	3.60
	S2:Standard	4.13	3.83	3.83
	S3:Customized	4.42	4.05	4.14
	Average	4.13	3.91	3.84
R2: Cooperation	Routine	3.44	3.53	3.70
	Standard	3.83	3.79	3.83
	Customized	4.40	4.00	4.12
	Average	3.86	3.76	3.87
R3: Relationship duration	Routine	3.58	3.42	4.27
	Standard	3.77	3.52	4.21
	Customized	3.80	3.55	4.00
	Average	3.71	3.49	4.17
R4:Commitment	Routine	4.35	4.10	4.31
	Standard	4.35	3.92	4.26
	Customized	4.14	3.89	4.16
	Average	4.29	3.97	4.24
R5: Trust	Routine	3.58	3.37	3.90
	Standard	3.83	3.45	4.02
	Customized	3.91	3.52	3.87
	Average	3.76	3.44	3.93
R6: Dependency	Routine	3.47	3.53	3.87
	Standard	3.85	3.66	4.02
	Customized	3.88	3.58	4.02
	Average	3.72	3.59	3.97

Port operator's viewpoint

The figures in Table 5.14 are the mean values of relationship strength derived from 6 relationship dimensions in 3 types of service with the other main players from POs' view. According to Table 5.14:

- POs have much more communication with SCs (4.13) than FFs (3.54) and COs (3.43).
- POs have much more cooperation with SCs (4.03) than FFs (3.41) and COs (3.34).
- POs have much longer relationship duration with SCs (4.36) than with COs (3.07) and FFs (3.02).
- For commitment, POs have much stronger enduring desire to maintain a valued long-term business relationship with the SCs (4.40) than and COs (3.61) and FF (3.43).
- For trust, POs have much stronger confidence in the SCs' (3.93) reliability and integrity, viewing each other as the strategic partner sharing risks and benefits, than in COs' (3.24) and FFs' (3.09).
- In terms of dependency, POs have a strong need of specific resources from the SCs (3.91) to achieve desired goals, followed by COs (3.44) and FFs (3.25).

Overall, POs have much closer business relationships with SCs, but looser business relationship strength with COs and FFs.

In terms of the perception gaps between different main players in this section, there are substantial gaps between COs-FFs and FFs-SCs. While FFs perceive the significant increasing relationship strength with COs with the increase of service complexity, the COs only perceive little change for this. Likewise, while FFs perceive the major increasing relationship strength with SCs with the increase of service complexity, the SCs only perceive relatively little variation for this.

Table 5.14 Relationship strength from POs' view

		with CO	with FF	with SC
R1: Communication	S1:Routine	3.27	3.51	3.88
	S2:Standard	3.38	3.48	4.09
	S3:Customized	3.64	3.64	4.42
	Average	3.43	3.54	4.13
R2: Cooperation	Routine	3.15	3.21	3.69
	Standard	3.28	3.47	4.13
	Customized	3.60	3.55	4.32
	Average	3.34	3.41	4.03
R3: Relationship duration	Routine	2.98	3.12	4.33
	Standard	3.04	3.07	4.35
	Customized	3.21	2.86	4.38
	Average	3.07	3.02	4.36
R4:Commitment	Routine	3.58	3.34	4.33
	Standard	3.56	3.46	4.32
	Customized	3.69	3.48	4.53
	Average	3.61	3.43	4.40
R5: Trust	Routine	3.14	3.18	3.85
	Standard	3.22	3.11	3.95
	Customized	3.36	2.96	3.98
	Average	3.24	3.09	3.93
R6: Dependency	Routine	3.32	3.18	4.02
	Standard	3.43	3.30	3.86
	Customized	3.57	3.29	3.86
	Average	3.44	3.25	3.91

To sum up, the findings in this section proposed several interesting and surprising points. Firstly, when service complexity increases, only communication and cooperation have constantly significantly increasing trend. From micro-level perspective, the strength of some dimensions in some links even slightly decreases by service complexity. This mean the significantly positive association between service complexity and relationship strength may only occur in the communication and cooperation dimensions.

Secondly, although relationship strengths generally grow with the increase of the service complexity, the increasing speeds in each link are varied. With the increase of service complexity, the average relationship strengths between CO-FF, CO-PO and FF-SC increase more rapidly than the strengths between CO-SC, FF-PO and SC-PO. This implies that service complexity has more influence on the relationship strength between CO and FF, CO and PO, and FF and SC. Further, according to the rankings of each link in 3 types of service presented

in Figure 5.9, FFs play crucial roles in the customized services, and SCs have their limitations for providing standard services.

Thirdly, there are substantially perception gaps of the changing relationship strengths between COs-FFs and FFs-SCs. While FFs perceive the significant increasing relationship strength with COs with the increase of service complexity, the COs only perceive little change for this. Likewise, while FFs perceive the major increasing relationship strength with SCs with the increase of service complexity, the SCs only perceive relatively little variation for this. These imply that FFs make more efforts to deal with the more customised services.

Fourthly, while commitment always occupies the leading place, relationship duration always shows the lowest strength, except in the link between SC and PO. This implies that the main players in maritime logistics network have stronger enduring desire to maintain a valued long-term business relationship with each other, but only have short-term contractual business relationship in practice. Further, while POs are worried about the footloose nature of SCs, SCs' customers - COs and FFs are more footloose for SCs as the much shorter relationship duration between them.

Lastly, L6, L4, L1, L2 in upper group, L3 and L5 in the button group. Figure 5.7, Figure 5.8 and Figure 5.9 display a trend that that six links can be divided into two groups by their average degree of relationship strength. L1, L2, L4 and L6 can be categorised as higher-interactive links; L5 and L6 can be categorised as low-interactive links as these later two links have significantly lower scores. This implies that there is no direct or only few business relationship strength existing between FF-PO and CO-PO. And COs do not really care about MLSPs according to their relationship strength with MLSPs.

5.5 Value and the identification of its origin

The succeeding sections will firstly present the value perceived from three different types of service, and then show the origin of the value. The investigation was mainly analysed by three-levels analysis approach (macro level, mixed level, micro level).

5.5.1 Value perceived from different service complexity by different players

(1) Macro level analysis

Through the macro level analysis, the average value perceived from 4 types of main player increase gradually with the increase of service complexity. The average value for routine service is 3.83, standard service is 3.93, and the customized service is 3.96 (see the dot line in Figure 5.11).

(2) Micro level analysis

Figure 5.11 also compares the value perceived by different types of player with different types of service. It shows different results with the macro level analysis, that not every type of player perceived increasing value with the increase of service complexity. As has been demonstrated in Figure 5.11, with the increase of service complexity, the value perceived by FF rises rapidly, while PO's rises gradually. SC's perceived value increases from routine service to standard service, but decreases from standard service to customized service. Surprisingly, the value perceived by CO declines with the increase of service complexity. The difference between each main player's perceptions discussed above is necessary to be further examined whether it is statistically significant. The results of t-test show that only the values perceived by FF in each types of service are statistically significant different at 5% level. The difference of values perceived by other main players in 3 types of service have not achieve the statistically significant level.

There two possible reasons causing the unexpected result that COs perceived the decreasing value with the increase of service complexity. First, according to the comments from several respondent COs, the cost of customized logistics service is very high, therefore COs cannot perceive higher value when applying this type of service. COs tend to buy separate routine services on their own, or use the standard service which is much cheaper than customized service. Second, while the maritime logistics service is the vital part for MLSPs, it is just a small part of the whole supply chain for COs. On the other hand, as such results were derived from considering the CO group as a whole, it is worth drilling down and see if the major sub-groups within CO present different findings. This will be discussed in Section 5.6.

For FFs, they can offer a range of services by their nature, thus they perceive the increasing value along with service complexity. For POs, many of them are considering about expanding their business to provide value-added service, hence they have a gradually raising trend on the value generation. In terms of SCs, many of them emphasize that they mainly focus on

routine and standard port-to-port container transport services, and the extra efforts they make for the customized services cannot help them to gain the equivalent benefits. Therefore, customized service is of less value for SCs, and standard service is more beneficial than routine service for them.

Besides the value growing trend in line with the service complexity, Figure 5.11 can also demonstrate which player could obtain more value from each type of service. In routine service, the value perceived by POs is the highest, followed by COs', SCs' and FFs', but there is only slight difference between them. In standard service, the FFs' perceived value progresses to the first place, and the COs' regresses to the last. The customized service retains the same trend of rankings as they are in the standard service, but the difference degree of value perceived by each player becomes more increasing. These findings actually quite fit the current liner market trend that POs have stable profits no matter in what kind of service, SCs cannot obtain good profits in the competitive environment, and FFs have the best financial gains in the more customized services.

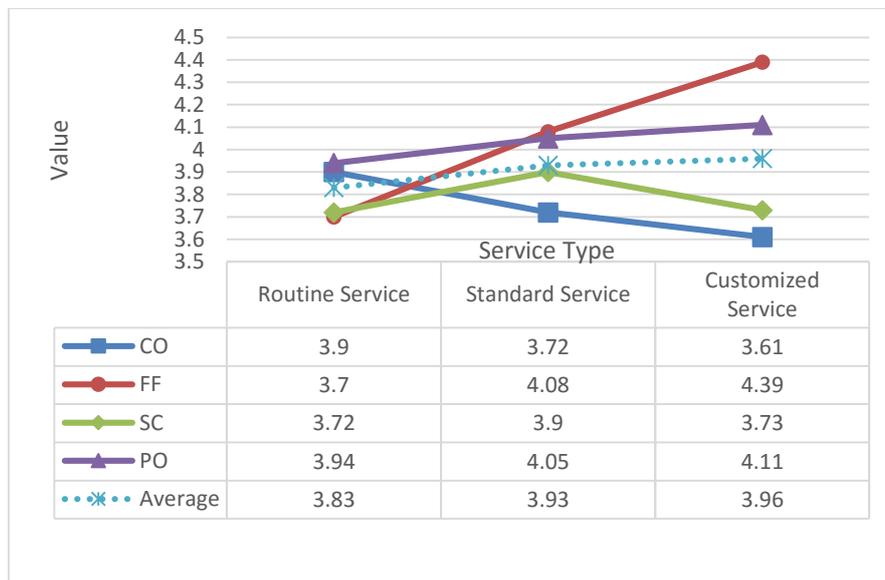


Figure 5.11 Value perceived by different players based on different service complexities

5.5.2 The origin of value

(1) Macro level analysis

Figure 5.12 displays the value perceived from each link, and compares the changes with different service complexities. The average value of L1 (4.07) and L6 (4.04) ranked at the 1st and 2nd place respectively, followed by L4 (3.94) and L2 (3.91). The average values of L5 (3.37)

and L3 (3.09) are much lower than the other 4 links, and rank at the last two places. This can suggest each link's contribution for creating value in the network.

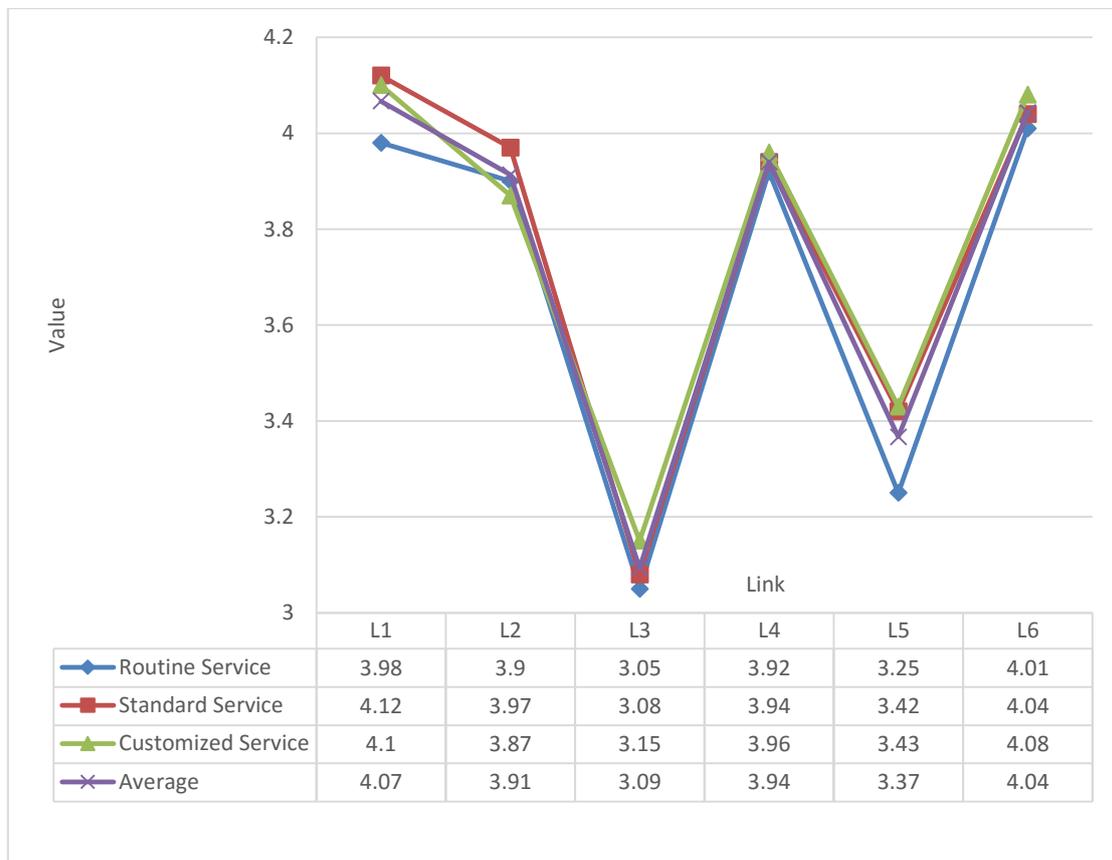


Figure 5.12 Value perceived from each link

(2) Mixed level analysis

Comparison of value perceived from each link

Figure 5.13 compares the perceived value of pair players by different service complexity in each link. As can be seen, from COs' perspective, except the value generated from the routine service with SCs, all of the values scored by COs are lower than the values perceived by FFs, SCs and POs from COs (from L1, L2, L3). This shows that COs underestimate almost of the values they received from different logistics services with these MLSPs. A possible reason for this could be the same as the point discussed in Section 5.5.1 that the maritime logistics is the whole thing for MLSPs, but it is just a small part of the entire supply chain for COs. In addition, the only exceptional case as above mentioned, implies that COs more satisfy the routine service which SCs provide.

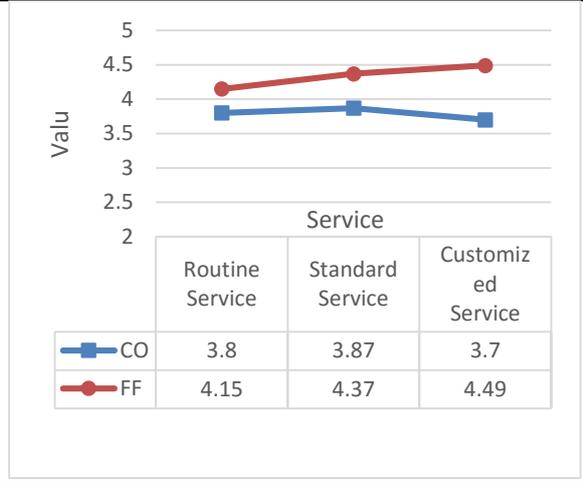
On the other hand, FFs, SCs and POs all perceived increasing values from COs along with the increasing service complexity, but COs often perceived different trends of value derived from these MLPs. While the values perceived increasingly diverge in L1 and L2, the values perceived in L3 reveal similarly increasing patterns. This implies that MLSPs can obtain more values from COs in more customized services, and COs think POs could contribute to more values when using more customized services.

With regard to the values perceived between FFs and SCs (in L4), the score is very close in the routine service, but become diverge in standard and customised service, in that FFs always perceive more value than SCs. According to the findings of interviews in Chapter 4, SCs tend to contact with COs when COs need the standard and customized services. This can explain why the values derived from FFs in standard and customized services become lower than routine service for SCs.

In the contrast, the trends of value perceived in L5 and L6 is converging. These can be explained by some respondents' comments that the benefits received by FFs and SCs from more customized services are increasingly more than the cost they spend on POs. On the other hand, these also can suggest that POs make much efforts to offer the customized services, but cannot receive the equivalent values they expect from FFs and SCs. These results are also in accordance with the perception gaps of importance level and existing relationship strength between pair players, which were identified in section 5.3.3 and 5.4.3.

Further, all of the values scored by POs are higher than the values perceived by FFs, SCs and COs from POs (from L3, L5, L6). It shows that POs overestimate all of the values received from different logistics services with other MLSPs (SCs and FFs) and COs. This reflects that POs very depend on other players in the maritime logistics network, and highlights the POs' double-derived demand role in the networks.

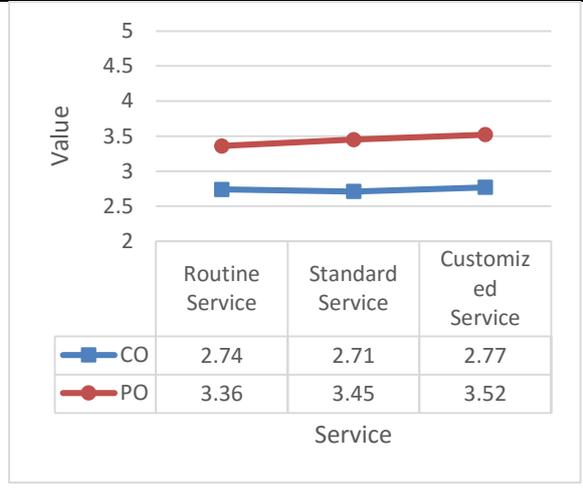
L1- Value from L1 by different service type



L2- Value from L2 by different service type



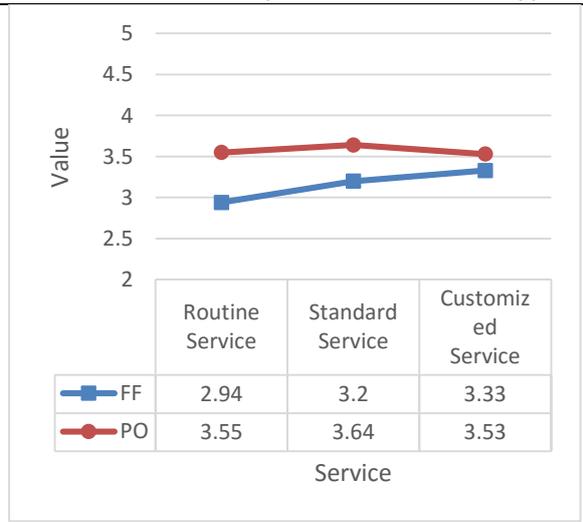
L3- Value from L3 by different service type



L4- Value from L4 by different service type



L5- Value from L5 by different service type



L6- Value from L6 by different service type

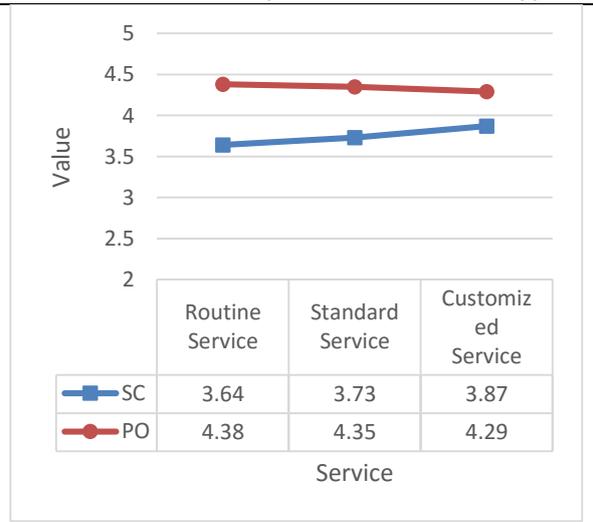


Figure 5.13 Comparison of pair of players' perceptions of value from different service

(3) Micro level analysis

Figure 5.13 presents the origin of value from the view of each type of main player in the maritime logistics network. For COs, the values derived from SCs and FFs in customized service are lower than routine services, while the values derived from POs are higher in customized service. These may be because the cost of customized service charged by SCs and FFs are much higher than routine services, and POs provide not so expensive but equivalent/higher customized service for them.

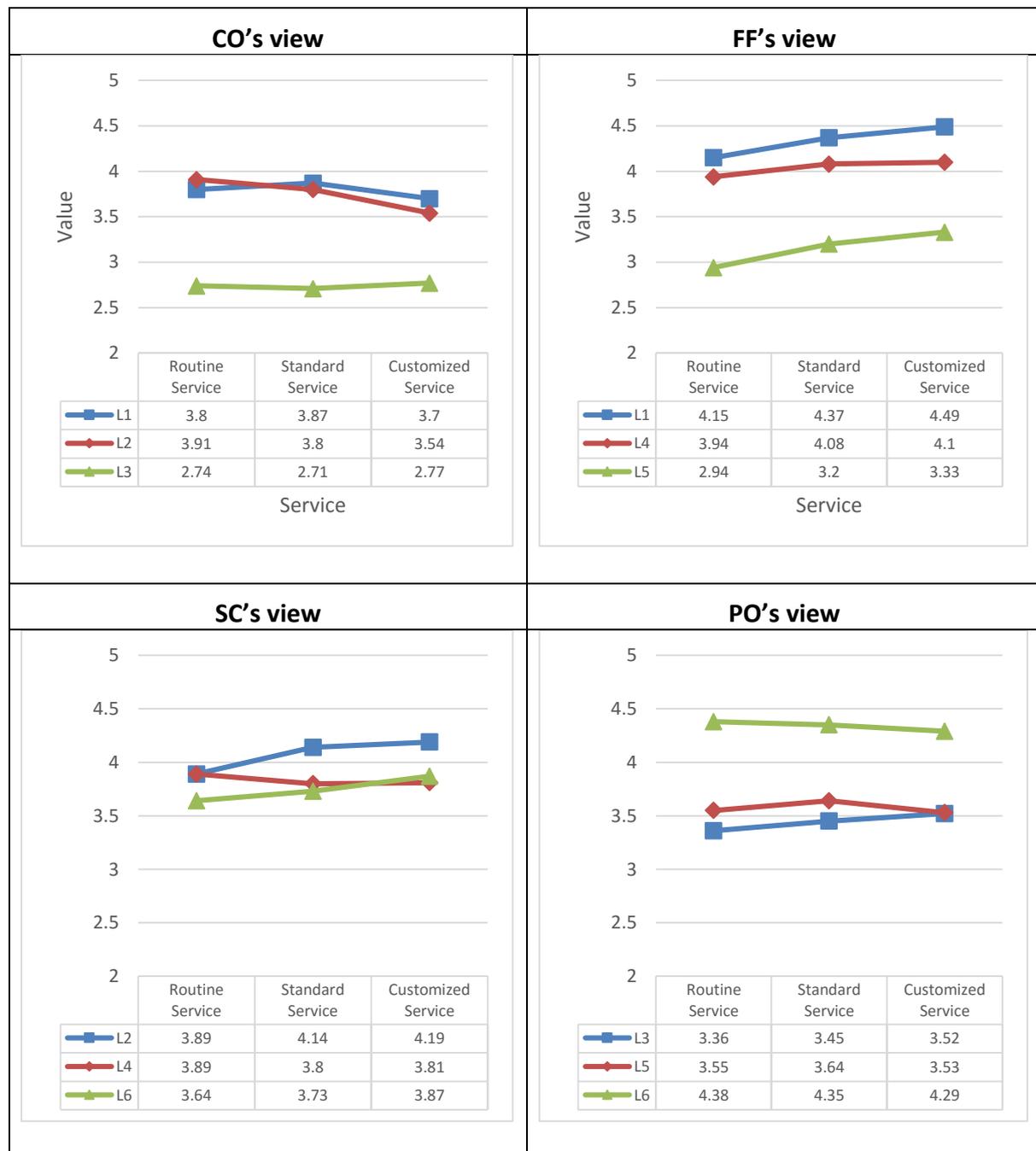


Figure 5.14 Value generated from different links for a player

For FFs, the values derived from all other players reveal a similarly increasing pattern. This

For SCs, the values derived from COs and POs show a similarly increasing pattern, but the values from FFs decrease along with the service complexity. The possible reason is that SCs tend to contact with COs when COs need the standard and customized service which has been stated in previous section. For POs, the value contributing from COs rises along with the service complexity, the value from SCs declines gradually, and the value from FF increase slightly then decrease in the customized service. It means that POs make much efforts to offer the customized services, but cannot receive the equivalent values they expect from FFs and SCs. On the contrary, POs can obtain increasing values from COs when offering more customized services.

From both CO's and FF's views, the values generated from POs in each type of service are significant lower than the other trading partners. From SC's view, values generated from other trading partners are alike. From PO's view, value derived from SC are significant higher than other partners. These suggest that all of these main players perceive receiving the higher values from the other players who may be either major customers or suppliers. Through this analysis, such major stakeholders in the maritime logistics network for each type of main players were identified. For COs, their major suppliers include both FFs and SCs. For FFs, they cherish their end-customers who are COs, and their major suppliers SCs. For POs, they only highly value SCs, as SCs obviously are their only big-account customers. Interestingly, for SCs, it seems that they think highly of all the other players - COs, FFs and POs who are their major customers and suppliers respectively, at the same time.

5.6 Drilling down the different types of cargo owner

In the above sections, the CO group were discussed as a whole, but actually there are mainly 5 sub-groups within the CO, which include importers (35), exporters (37), manufacturers (28), brand vendors (6) and retailer (1). As there is an unexpected finding reported in the Section 5.5.1., that COs perceived the decreasing value with the increase of service complexity, there is a need to drill down and see if the major sub-groups within CO present different findings. Because there is only one sample in the retailer sub-group, and the retailers are banded together with brand vendors as the same factor affecting the relationship structure (see Table

4.3 in Section 4.4), these two sub-groups are combined as one unit of analysis. Thus, the following analysis was conducted through breaking the COs down to 4 major sub-groups: importers, exporters, manufacturers, and brand vendors/retailers. Furthermore, as the using of different types of service, perception of relationship structure (e.g. importance degree) in the network, and value generated from COs' perspectives are the main interests in this research, these three points will be highlighted as below.

5.6.1 The service used by CO sub-groups

As Section 5.5.1 noted, when CO group were discussed as a whole, COs use routine service (73%) in the maritime logistics, followed by standard service (18%) and routine service (9%). Figure 5.15 discloses the proportion of using different types of service by each sub-group CO. The result brings out the different trend of service using by brand vendors/retailers. Brand vendors/retailers use the most customized services than the rest of the sub-groups, and they use more customized services than standard services which are also different from others. This identifies the need of using customized services by brand vendors/retailers, which cannot be displayed in the average trend in the above sections.



Figure 5.15 The percentage of using different types of service by each sub-group CO

5.6.2 The importance degree of each link perceived by CO sub-group

Figure 5.16 shows the importance degree of different links perceived by each sub-groups of COs and the overall average degree. The importance degree of L1, L4 and L6 perceived by brand are much higher than the degree perceived by the other three sub-groups. This means that brand vendors/retailers are more emphasize on the most critical points where could influence the efficient and effective running of the more customized services. These significant links include the connections between COs-FFs, FFs-SCs, and SCs-POs.

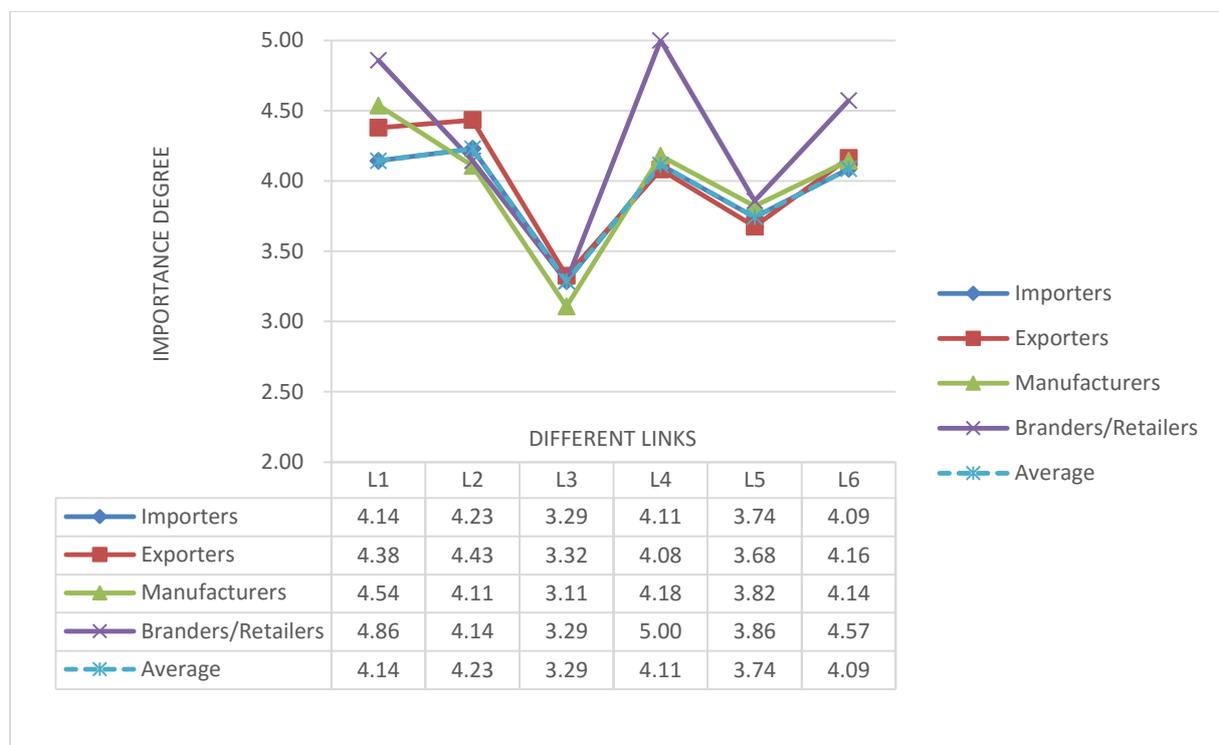


Figure 5.16 The importance degree of each link perceived by CO sub-group

5.6.3 Value perceived by CO sub-group

Figure 5.17 presents value perceived from different types of service by each CO sub-group and the overall average value. Surprisingly, while the other three sub-groups perceive the decreasing values when using more-customized services, brand vendors/retailers perceive the increasing values, especially in the customized service. This also disagrees the findings developed on considering the CO group as a whole. All the samples of these brand vendors/retailers are running global scale business and applying the supply chain

management across countries. These points thus imply that such brand vendors/retailers need and can obtain greater value from customized service, and LSPs which pursuit to gain profits from more customized services should aim at these kind of COs.



Figure 5.17 The value perceived from different types of service by each sub-group CO

5.7 Social network analysis (SNA)

Through the data collected from questionnaire survey, this section will apply SNA to identify the position of a specific player in the network from a node-level analysis, and measure the degree of supply chain integration (SCI) in the networks from a network-level analysis. The details of analysis methods have been discussed in Section 3.8, and the following content will mainly show the results from SNA.

5.7.1 Identify the position of a specific player

In order to identify the position of each type of main player, the anticipated importance data reported in Table 5.5 (Section 5.3.1), Table 5.6 (within Section 5.3.2) and Table 5.7 (within Section 5.3.3) were used to conduct the SNA. These data were turned to the number of **degree centrality** (see Table 5.15 and Table 5.16), which presents the degree centrality of each player

by the importance level of each link from macro, mixed and micro views. As can be seen in Table 5.15, the rankings of the centrality degree are the same from both macro and mixed views. SC ranked at the 1st place, followed by FF, CO and PO. This implies that SCs are most plugged into the maritime logistics network, or they tend to give and receive information more than other players. On the contrary, POs occupy the relative marginalized positions.

Table 5.16 shows the degree centrality of each player by the importance level of each link from micro views. The results from out-degree, in-degree and sum of both are presented. The sum of out-degree and in-degree centrality shows a similar pattern of players' rankings as compared with the findings in the macro and mixed views.

Table 5.15 Degree centrality of each player by the importance level of each link from macro and mixed views

	Macro view		Mixed view	
	Degree	Normalized Degree	Degree	Normalized Degree
CO	12	0.245	12.45	0.243
FF	12.56	0.256	12.94	0.253
SC	13.31	0.271	13.83	0.270
PO	11.21	0.228	11.98	0.234
Total	49.08	1.00	51.2	1.00

Table 5.16 Degree centrality of each player by the importance level of each link from micro view

	Out-degree		In-degree		Sum of both	
	Degree	Normalized Degree	Degree	Normalized Degree	Degree	Normalized Degree
CO	11.82	0.23	13.26	0.26	25.08	0.244
FF	13.13	0.26	12.8	0.25	25.93	0.253
SC	13.82	0.27	13.88	0.27	27.7	0.270
PO	12.55	0.24	11.38	0.22	23.93	0.233
Total	51.32	1.00	51.32	1.00	102.64	1.00

One advantage of SNA is to visualize the network data into a graph called sociogram. This visual aids can help researcher to identify the difference between nodes and links (Lee 2005). As there were a similar pattern of degree centrality existing in all the macro, mixed and micro views, the data from micro view which includes more immediate anticipation was chose to make a sociogram (see Figure 5.18). In Figure 5.18, the thicker link means the stronger connection, and the larger node means the more important player. Therefore, according to

this diagram, the links between CO-PO and FF-PO are relatively very weak, and the links between SC-PO, SC-CO, and SC-FF are stronger. On the other hand, the node of SC is the biggest, followed by FF as well as CO, and PO are significantly small than the rest of players. This implies that SCs are most plugged into the maritime logistics network, or they tend to give and receive information more than other players. This also implies that SC is most competent to be an integrator in the maritime logistics network, and the marginalized role in the maritime logistics network. These reinforce the findings from interview study and strengthen the results which have been discussed in this chapter.

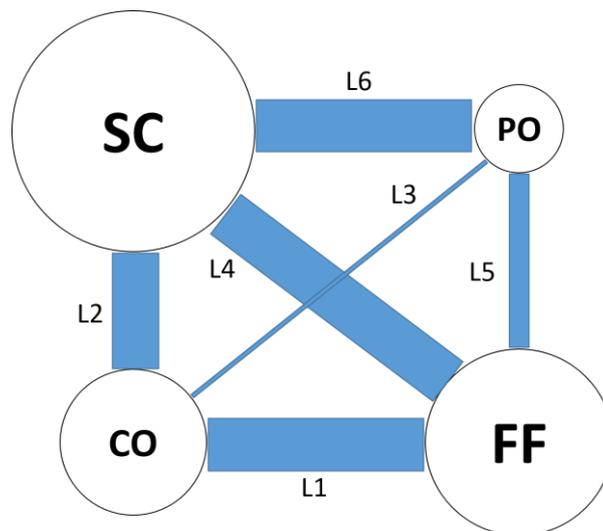


Figure 5.18 Sociogram corresponding to the importance level from micro-level view

5.7.2 SNA by degree of connectedness

In order to identify the most connected node (main player), or the node (main player) gives output and receives input more than other nodes in different relationship strength dimensions and different complexity of service, the individual **degree of connectedness** was explored. This degree of connectedness was derived from the data consisting a main player's output and input to other main players reported in different relationship strength dimensions and different complexity of service (see Table 5.11, Table 5.12, Table 5.13 and Table 5.14 in Section 6.4.3), and turned into the SNA data (see Table 5.17, Table 5.18 and Table 5.19).

Out-degree connectedness

Table 5.17 presents the degree of connectedness from the perspective of output relationship strength by a specific player. As can be seen in Table 5.17, COs always give least output in all

dimensions, and POs are always the second last. FFs occupy the second places in the routine services, approach the first-place SCs in the standard services, and go beyond SCs in almost every dimension in the customized services. This shows the fact that FFs play aggressive roles in the customized services, and SCs have their limitations for providing customised services.

Table 5.17 Out-degree connectedness

Relationship Strength Dimension	Main Player	S1: Routine service		S2: Standard service		S3: Customized service	
		Degree	Normalized Degree	Degree	Normalized Degree	Degree	Normalized Degree
R1: Communication	CO	10.02	0.23	10.4	0.23	10.81	0.23
	FF	10.9	0.25	11.77	0.26	12.71	0.27
	SC	11.35	0.26	11.79	0.26	12.61	0.26
	PO	10.66	0.25	10.95	0.24	11.7	0.24
R2: Cooperation	CO	9.72	0.24	10.01	0.23	10.42	0.22
	FF	10.01	0.25	11.19	0.26	12.51	0.27
	SC	10.67	0.26	11.45	0.26	12.52	0.27
	PO	10.05	0.25	10.88	0.25	11.47	0.24
R3: Relationship duration	CO	9.55	0.23	9.49	0.22	9.77	0.23
	FF	10.13	0.24	10.86	0.26	11.6	0.27
	SC	11.27	0.27	11.5	0.27	11.35	0.26
	PO	10.43	0.25	10.46	0.25	10.45	0.24
R4: Commitment	CO	10.42	0.23	10.27	0.22	10.26	0.22
	FF	11.73	0.25	12	0.26	12.48	0.27
	SC	12.76	0.28	12.53	0.27	12.19	0.26
	PO	11.25	0.24	11.34	0.25	11.7	0.25
R5: Trust	CO	9.93	0.24	9.88	0.23	9.64	0.22
	FF	10.67	0.26	11.28	0.26	11.97	0.28
	SC	10.85	0.26	11.3	0.26	11.3	0.26
	PO	10.17	0.24	10.28	0.24	10.3	0.24
R6: Dependency	CO	9.76	0.24	9.86	0.23	9.94	0.23
	FF	10.38	0.25	11.43	0.26	11.99	0.27
	SC	10.87	0.26	11.53	0.27	11.48	0.26
	PO	10.52	0.25	10.59	0.24	10.72	0.24

In-degree connectedness

Table 5.18 presents the degree of connectedness from the perspective of been input relationship strength by a specific player. As can be seen in Table 5.18, POs always obtain the least input the in all dimensions, and FFs are always the second last. COs occupy the second places in the routine services, approach the first-place SCs in the standard services, and go beyond SCs in some dimensions in the customized services. This implies that when the service become complex, COs receive much more service input than and from the MLSPs.

Table 5.18 In-degree connectedness

		S1: Routine service		S2: Standard service		S3: Customized service	
Relationship Strength Dimension	Main Player	Degree	Normalized Degree	Degree	Normalized Degree	Degree	Normalized Degree
R1: Communication	CO	11.15	0.26	11.99	0.27	12.89	0.27
	FF	11.04	0.26	11.22	0.25	11.69	0.24
	SC	11.5	0.27	12.03	0.27	12.82	0.27
	PO	9.24	0.22	9.67	0.22	10.43	0.22
R2: Cooperation	CO	10.31	0.25	11.54	0.27	12.77	0.27
	FF	10.23	0.25	11.01	0.25	11.55	0.25
	SC	10.84	0.27	11.54	0.27	12.38	0.26
	PO	9.07	0.22	9.44	0.22	10.22	0.22
R3: Relationship duration	CO	9.94	0.24	10.61	0.25	11.24	0.26
	FF	9.9	0.24	10.03	0.24	10.02	0.23
	SC	11.9	0.29	11.85	0.28	12.15	0.28
	PO	9.64	0.23	9.82	0.23	9.76	0.23
R4: Commitment	CO	12.21	0.26	12.4	0.27	12.47	0.27
	FF	11.21	0.24	11.16	0.24	11.19	0.24
	SC	12.49	0.27	12.37	0.27	12.71	0.27
	PO	10.25	0.22	10.21	0.22	10.26	0.22
R5: Trust	CO	10.44	0.25	11.2	0.26	11.65	0.27
	FF	10.1	0.24	10.24	0.24	10.03	0.23
	SC	11.43	0.27	11.57	0.27	11.82	0.27
	PO	9.65	0.23	9.73	0.23	9.71	0.22
R6: Dependency	CO	10.37	0.25	11.34	0.26	11.73	0.27
	FF	10.15	0.24	10.53	0.24	10.6	0.24
	SC	11.64	0.28	11.73	0.27	11.82	0.27
	PO	9.37	0.23	9.81	0.23	9.98	0.23

Out-degree plus in-degree connectedness

Table 5.19 presents the degree of connectedness from the perspective of conjunction of output and input relationship strength into a specific player. The figures in Table 5.19 display a trend which averages the results from both output and input relationship strength. These figures suggest some interesting points as following. The trend of normalized degree of connectedness in communication has not changed by service complexity. This means that no matter how complicated the services are, all major players always have the same level of importance in the communication. For the cooperation dimension, FFs have an increasing degree of connectedness in customized services. It means that FFs play a more important role in the customized service provision. For the relationship duration dimension, while SCs have a decreasing degree of connectedness, FFs have an increasing degree of connectedness with

the increase of service complexity. It means that FFs have more opportunities to provide customized services, and SCs more focus on routine and standard services. For the dependency dimension, while the connectedness degrees of SCs and POs decrease, the connectedness degrees of COs and FFs increase along with the increasing service complexity. This implies that when providing or receiving more customized service, the maritime logistics networks more depend on FFs and COs.

Table 5.19 Out-degree plus in-degree connectedness

Relationship Strength Dimension	Main Player	S1: Routine service		S2: Standard service		S3: Customized service	
		Degree	Normalized Degree	Degree	Normalized Degree	Degree	Normalized Degree
R1: Communication	CO	21.17	0.25	22.39	0.25	23.70	0.25
	FF	21.94	0.26	22.99	0.26	24.40	0.26
	SC	22.85	0.27	23.82	0.27	25.43	0.27
	PO	19.90	0.23	20.62	0.23	22.13	0.23
R2: Cooperation	CO	20.03	0.25	21.55	0.25	23.19	0.25
	FF	20.24	0.25	22.20	0.25	24.06	0.26
	SC	21.51	0.27	22.99	0.26	24.90	0.27
	PO	19.12	0.24	20.32	0.23	21.69	0.23
R3: Relationship duration	CO	19.49	0.24	20.10	0.24	21.01	0.24
	FF	20.03	0.24	20.89	0.25	21.62	0.25
	SC	23.17	0.28	23.35	0.28	23.50	0.27
	PO	20.07	0.24	20.28	0.24	20.21	0.23
R4: Commitment	CO	22.63	0.25	22.67	0.25	22.73	0.24
	FF	22.94	0.25	23.16	0.25	23.67	0.25
	SC	25.25	0.27	24.90	0.27	24.90	0.27
	PO	21.50	0.23	21.55	0.23	21.96	0.24
R5: Trust	CO	20.37	0.24	21.08	0.25	21.29	0.25
	FF	20.77	0.25	21.52	0.25	22.00	0.25
	SC	22.28	0.27	22.87	0.27	23.12	0.27
	PO	19.82	0.24	20.01	0.23	20.01	0.23
R6: Dependency	CO	20.13	0.24	21.20	0.24	21.67	0.25
	FF	20.53	0.25	21.96	0.25	22.59	0.26
	SC	22.51	0.27	23.26	0.27	23.30	0.26
	PO	19.89	0.24	20.40	0.23	20.70	0.23

5.7.3 Measuring the SCI degree in the networks

In order to compare the SCI degree of different networks which are based on different degree of service complexity, the **network density** which is a measure of the overall connectedness of a network were adopted (noted in Section 3.8(3)). The network density for this study can

refer to the amount of total out-degree and in-degree links in a network relative to the amount of potential out-degree and in-degree links.

There are 18 different networks which have been generated by 6 dimensions of relationship strength and 3 types of service complexity. There are 4 main players, each player has 3 out-degree links, so that there are total 12 out-degree links. Likewise, there are total 12 in-degree flows. However, some player's out-degree is the other player's in-degree. Therefore, the overall out-degree flows are the same as overall in-degree flows in a network. Consequently, there is only single value which is constant with total out-degree links, total in-degree links and the half of the total out-degree links plus total in-degree links. This can be referred as the network density for overall degree aggregation. Accordingly, in the Table 5.20, the network density is presented by aggregated degree and normalized degree (from 0 to 1) respectively, and the results are visually by Figure 5.19.

Table 5.20 Network density for different networks

	Routine Service		Standard Service		Customized Service	
	Total degree	Normalized degree	Total degree	Normalized degree	Total degree	Normalized degree
R1: Communication	42.94	0.716	44.91	0.749	47.83	0.797
R2: Cooperation	40.44	0.674	43.52	0.725	46.91	0.782
R3: Relationship duration	41.38	0.690	42.32	0.705	43.14	0.719
R4: Commitment	46.18	0.770	46.14	0.769	46.63	0.777
R5: Trust	41.62	0.694	42.72	0.712	43.20	0.720
R6: Dependency	41.51	0.692	43.41	0.724	44.11	0.735
Average network density (SCI level)	42.34	0.706	43.84	0.731	45.30	0.755
Average value for service type	3.83		3.93		3.96	

The results in Table 5.20 show that:

- Except the density in commitment dimension does not consistently increase, all of the other network density value rise with the increase of service complexity. Within all dimensions, the increasing rates of communication and cooperation are the highest. This implies that generally there is a positive correlation between service complexity and SCI degree, especially for the networks derived by communication and cooperation dimensions.

- When comparing the network density of different dimensions, commitment usually keep in the highest level, except in the customized services. This means that the main players in maritime logistics networks have enduring desire to maintain a valued long-term business relationship with trading partners in all cases.
- In the customized services, the relationship strength dimensions are broken down into two groups by the degree of network density. Communication, cooperation and commitment were in the high-density group, while dependency, trust and relationship duration were in the low-density group. This means that high-density network of communication, cooperation and commitment are needed to provide and support the more customized or more complicated services.
- The increasing rates of the average value between S2 (standard service) and S3 (customized service) are smaller than the increasing rate of SCI. This implies that the value of customized service complexity is still unsure (see Figure 5.19). This may be due to high cost and risk of this type of service.

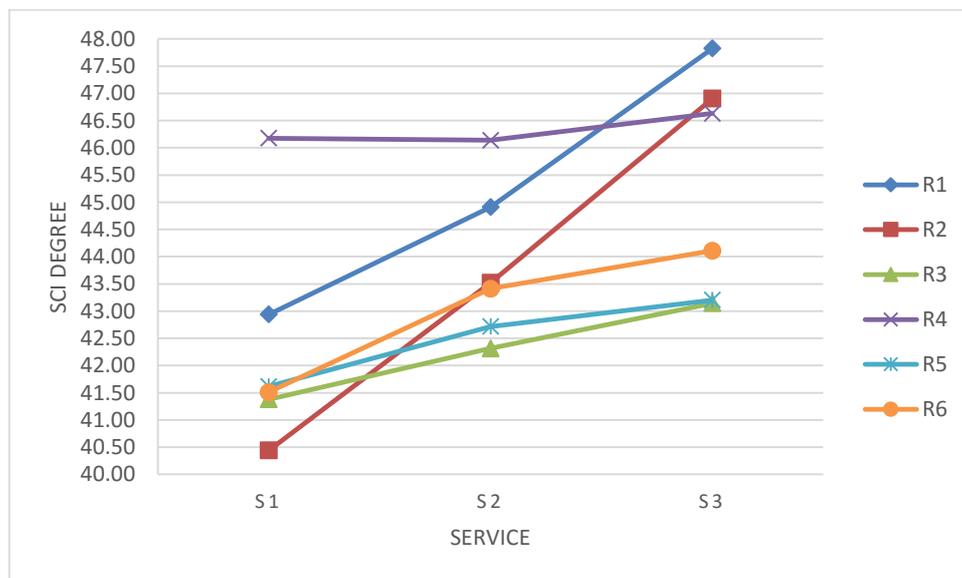


Figure 5.19 Comparison of network density

Figure 5.20. shows the comparison between average SCI degree and the value generated from the equivalent networks. The average value generated from the networks rises with the increase of the average SCI degree of the relevant networks. However, the increasing rates of the average value between S2 (standard service) and S3 (customized service) are smaller than the increasing rate of SCI. This implies that the association between value and service

complexity is not liner positive relation. And the equivalent added value for customized service is unsure. This may be due to the high cost and risk of this type of service.

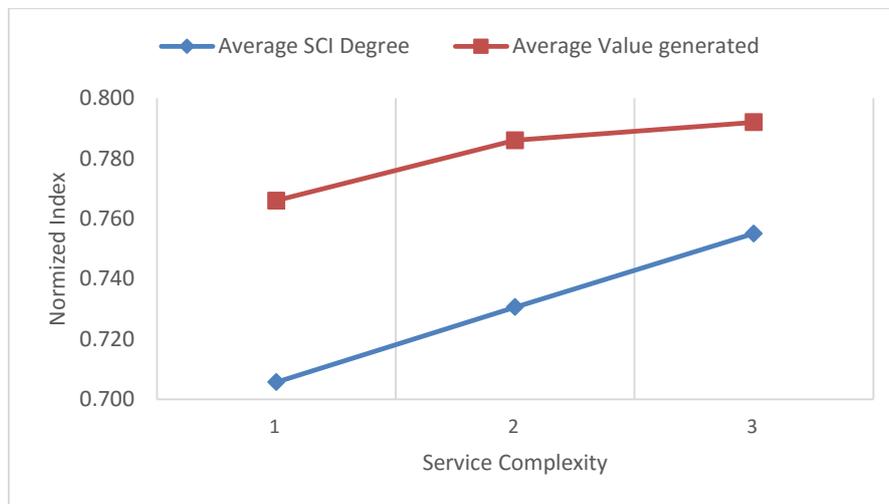


Figure 5.20 Comparison between average SCI degree and value generated

5.8 Discussion and conclusion

This chapter has reported the findings from the questionnaire survey. The trend of different importance level, relationship strength, value generated from different service complexity and originality of each links within the maritime logistics network have been identified. The following section will link the main finding to the research questions and previous literature. More discussions will be presented in Chapter 7, which brings together the findings from both interview and survey.

5.8.1 Dynamics of the links between main players in the maritime logistics network

Both the anticipated importance degree and the perceived existing relationship strength of the links among main players in the maritime logistics are identified as different. These findings reveal the fact that the closeness of the relationship at different points in the supply chain will vary, and empirically support Cooper et al.'s proposition (1997).

On the other hand, data shows that the pattern of perceived existing relationship strength with different links are similar to the anticipated importance degree. This implies that firms understand where are the boundaries to manage relationships with their customers and

suppliers, and deploy the scarce management resources according to the importance degree of the business links, which reflects Cox's (2001) commercial logic.

In terms of the dynamics of a specific link, the findings show that the links between FF-PO and CO-PO are recognized as the last two, and significant weaker than other links. POs are very dependent on SCs as their dominant customers, and are kept away from COs and FFs, which causes POs' marginalized position in the maritime logistics network. However, if we look at this issues from the opposite angle, the development of business relationship with COs and FFs could be a potential opportunity for POs. This echoes the emerging suggestions (Woo et al., 2011b; Adolf, 2012; Nassirnia and Robinson, 2013) which urges port providing more logistics and value-added services in order to increase competitiveness and attract more cargo from shippers in the changing environment.

5.8.2 Correlation between service complexity and relationship strength

From the mixed-level analysis in Section 5.4.2, the average relationship strength increase by the increase of service complexity in every link. However, from the micro-level analysis in section 6.4.3, the results reveal that not all links' relationship strength rises with the service complexity. In addition, different dimensions of relationship strength have different pattern. Not all dimensions of relationship strength have positive correlation in line with statistical test. Further, the data shows that COs do not really care about MLSPs according to their relationship strength with MLSPs. Surprisingly, these results seem to contradict Murphy and Poist (2000: 121) arguments that a relationship between a shipper and third party is characterised by a longer term and mutually beneficial relationship when offering customised service compared with basic services. These results also differ from the Bask's (2001) suggestion which claims a loose customer relationship fits a simple type of service and a close relationship fits a complex type of service characterised as customised services. Therefore, this thesis provides an empirical evidence to expand these propositions.

5.8.3 Correlation between service complexity and value perceived

In line with the data presented in the previous sections, value derived does not always increase by service complexity for different players, and it may depend on the nature of the players. For example, only FFs perceive the significant increasing value along with the

increasing service complexity. This finding reflects the literature (Stefansson, 2005) that FF's nature is to offer more diverse and customized services compared with other MLSPs. On the other hand, SCs focus on providing routine and standard services, selling "transport of box", therefore they cannot benefit from the customized service. This reflects Fuller et al.'s (1993) suggestion that supply chains which try to satisfy all marketing priorities are vulnerable to developing standard or 'average' offerings to their customers that lead to increased costs and poor customer service when specific customisation is required. These also highlight FF's crucial role in customized service, and SC's strength in providing routine and standard container shipping services, and SC's limitation in offering customized services.

The most surprising finding is that COs did not recognize the increasing value along with the increasing service complexity. The possible reasons include:

- The inequivalent costs of the more customized service offset the benefit received.
- The COs who use maritime logistics service mainly need routine and standard services for more functional product, therefore they may not be familiar with the value generated from customized services.
- Maritime logistics is only a small part of COs' whole supply chain. Logistics services are just derived services. MLSPs are not the core part of their business to create values. This is the reason why the data reveal that COs don't really care about MLSPs.
- The cognition of value between COs and MLSPs may be different, as the concept of total customer value is complicated and includes four main categories, namely service, quality, lead time and cost (Wang et al., 2008).

5.8.4 SNA gives a different insight for this research

By using the SNA, a different insight can be obtained for this research. For example, measures of degree centrality in SNA can identify the position of each main player. SC was verified as powerful actors in a central place in the maritime logistics network who receives and gives the most information. This reveals the irreplaceable role of SC in the maritime logistics, who owns the expensive mobile assets moving on the sea. On the contrary, PO was proved as the most marginalized role in this network.

5.8.5 Chapter conclusion

Based on the framework of analysis developed in Chapter 5 (interview study), this chapter has found the answers for the research questions 1, 3 and 4 through the three-level view approach and SNA from a network perspective. The picture of the relationship structure and the value generated from the network become more and more clear. There will be more cross-chapter discussions in Chapter 7, which brings together the findings from both interview and survey, linking back to literature, and providing an overall in-depth discussion.

Chapter 6 Discussion

This research originated in the interests in the relationship structure in the maritime logistics network, the factors which influence this structure and the value perceived in the networks. Through different methods of data collection, different levels of data analysis and the SNA, a number of interesting findings were obtained. In this chapter, the overall discussion of the thesis will be presented, which brings the findings of both interviews and questionnaire survey studies together, reflects to the relevant literature, and highlight the significant points and their contributions to both theory and practice. The arrangement of the discussion mainly follows the order of the appearance of the research questions.

As the research outcomes were mainly derived from the network of Taiwan-based firms, the potential bias that could emerge from this context were noticed and will be discussed in Section 7.5 which more focuses on the limitations of this study.

6.1 What is the relationship structure in the maritime logistics network?

In order to gain the in-depth and comprehensive insight of the relationship structure in the maritime logistics network, firstly a framework of analysis which should include the key nodes, the links among them, and the shape of the combination of these components between in the network have to be set up. As there is no literature precisely depicting the framework of analysis in maritime logistics network, the task should be done through the exploratory interview study and confirmed by questionnaire survey.

6.1.1 Main players and integrators in maritime logistics networks

Main players

From literature, who the main players should be depends on different players' points of view (e.g. Lam 2013; Woo et al. 2011b; Song and Panayides 2012). From interview, the main plyers are decided by accumulation of frequency mentioned, and four most important players were identified: cargo owner (CO); shipping carrier (SC); ocean freight forwarder (FF) and port operator (PO) in the maritime logistics network. These fit the most-mentioned major

members in the maritime logistics SCI research (e.g. Carbone and De Martino 2003, Woo et al. 2011a, Lam 2013, Song and Lee 2012). Although inland transport carriers are recognized as one of the major players in literature (Notteboom and Merckx 2006), the interviewees are seldom suggested to be a key player with integrator function.

Integrators

The answers for which specific player can be an integrator are varied by the interviewees. SCs could integrate the container transport and terminal operation, as they provide standard container shipping services. FFs could integrate cargo flows, as they provide a variety of services. POs could integrate inland resources such as infrastructures and the government authorities because of their state-owned nature in Asia. According to SNA, the SCs are identified as integrator, because SCs are most plugged into the maritime logistics network, or they tend to give and receive information more than other players. On the contrary, POs occupy the relative marginalized positions (see Section 5.7.1).

Heaver (2006) supports such role of shipping carriers who working with cargo owners becomes familiar with their various service requirements and the suppliers of those services in the region. On the other hand, each major player has their own strength to integrate other resources in their own specific area based on their specific natures. Whether one particular major player could become an integrator depends on their needs and willingness. Major players only make efforts to integrate the most relevant and easier aspects into their in-house operation. There is no single one player, or a single pair of players, which could integrate all the things along the supply chain including the maritime networks (Cox 2001). Weston and Robinson (2008) identify the role of 'integrator' and emphasize its importance in the maritime supply chain. They argue that the 'integrator' is not defined by type of firm or necessarily by the firm's position in the chain, but it is defined, critically, by the firm's 'ownership' of privileged and priority information about the end-user, by its core competency of high level management skills to leverage control throughout the chain effectively, and by control over the end points of the chain. These point can help this thesis to choose the right key players among a range of players in the network in line with whether they are integrators in the research framework.

This research is one of the leading works that identifies the role of integrator in maritime logistics networks through quantitative (SNA) approach, and SNA provides a more objective tool for researchers and managers to make out the strategic position of a specific player in the network.

6.1.2 The shape of the maritime logistics network

Can we apply logistics triad on analysing the relationship dyadic in maritime logistics networks?

The logistics triad which is regarded as the basic unit of analysis is widely employed in the logistics research (e.g. Bier 1997; Bask 2001; Naim et al. 2010) was considered as the initial model. However, according to the interviewees from the industry, the typical logistics triad is not enough to be the analysis of unit for analysing the relationship structure in the maritime logistics network. The reason could be due to the significant difference between land domestic (or inland) logistics and international logistics, in which the latter are more complex and has more key players. Consequently, a revised framework is established, which is consist of four main players: CO; FF; SC and PO, and the six links between them (see Figure 4.6).

This thesis establishes the framework of analysis for relationship strength in maritime logistics network, and contribute to refine the concept of logistics triad (Beier, 1989) in maritime context. In addition, this is the first work looking at the relationship structure in maritime logistics from a comprehensive network perspective in conjunction with social network analysis (SNA) theoretically and empirically. This part of research approach also can be applied to the other context in wilder field. Through this framework and knowledge about the dynamics of relationship strength, firms and policy makers can realize the whole structure of maritime logistics network and identify their own functions, positions and boundaries in the network. Manage can find the potential markets, work out new business models, develop effective and efficient collaborative and integration strategies with other trading players in the network.

6.1.3 Links with different relationship strengths

Both the anticipated importance degree and the perceived existing relationship strength of the links among main players in the maritime logistics are identified as different. In terms of

the dynamics of a specific link, the findings show that the links between FF-PO and CO-PO are recognized as the last two, and significant weaker than other links. POs are very dependent on SCs as their dominant customers, and are kept away from COs and FFs, which causes POs' marginalized position in the maritime logistics network. However, if we look at this issues from the opposite angle, the development of business relationship with COs and FFs could be a potential opportunity for POs. This echoes the emerging suggestions (Woo et al. 2011a; Adolf 2012; Nassirnia and Robinson 2013) which urges port providing more logistics and value-added services in order to increase competitiveness and attract more cargo from shippers in the changing environment.

The findings reveal the fact that the closeness of the relationship at different points in the supply chain will vary, and empirically support Cooper et al.'s proposition (1997). On the other hand, data shows that the pattern of perceived existing relationship strength with different links are similar to the anticipated importance degree. This implies that firms understand where are the boundaries to manage relationships with their customers and suppliers, and deploy the scarce management resources according to the importance degree of the business links, which reflects Cox's (2001) commercial logic. On the other hand, through SNA, the relationship structure of the maritime logistics network was evaluated and visualized in a diagram, in which the thicker link means the stronger connection, and the larger node means the more important player. Results of SNA show that the links between CO-PO and FF-PO are relatively very weak, and the links between SC-PO, SC-CO, and SC-FF are stronger. Together with considering the size of each node, SCs are most plugged into the maritime logistics network, or they tend to give and receive information more than other players. SC is most competent to be an integrator in the maritime logistics network, and the marginalized role in the maritime logistics network were identified through the analysis of relationship structure by SNA. The outcomes of SNA help researchers and practitioners to realize the relationship structure of maritime logistics network from a big picture view, and identify each player's positioning in the network.

In addition, a surprising finding comes from the analysis of perception gaps of importance degree. As there are perception gaps between all of the pair players, it reminds that the practitioners should look at the relationship management issue from both sides rather than their own single side. In addition, customers undervalue their links with suppliers, while the

suppliers overvalue their connections with customers in the maritime logistics network. This implies that everyone is looking downstream to the end customer rather than upstream, and perhaps the imbalance of power exists between the pair players. This finding contributes to make researchers and practitioners to look at the relationship management issue from both sides rather than their own single side, and recognize their own position in the supply networks.

In addition, it is novel to break down the concept of relationship strength into multi-dimensional measurements and comparing the difference between the strength of these measurements in the maritime logistics research. Managers can use these measurements to evaluate the relationship strength between their own firms and the trading partners to develop appropriate relationship management strategies.

6.2 Contingency factors influencing relationship structure in the maritime logistics network

Following the SCI-fashion study, some researchers from the maritime logistics field (e.g. Panayides 2006; Song and Lee 2012; Nassirnia and Robinson 2013) tend to assume that the players within the container transport chain should work together closely to gain joint benefits, and the performance or competitiveness will increase by adopting integration strategies. In other words, maritime logistics performance is maximised when all of the logistics activities are performed in a highly integrated manner.

However, seven contingency factors affecting relationship structures in maritime logistics networks were identified in this interview study (see Figure 4.5 and Table 4.3), which have been rarely done in the literature. Most literature only suggests few of such factors. For example, regarding the shipping route, Heaver (2001) suggests a more popular practice in Europe than North America, which shippers have remained free to make their own inland arrangements. For port type, findings show that not every port faces the footloose shipping carriers. The import/export ports and the transshipment ports will have different relationship structure, which have not very clearly been identified in the literature (Beresford et al. 2004; Woo et al. 2011a; Adolf 2012). In terms of the finding that port operators with more value-added function will have more relationships with cargo owners and freight forwarders, some

papers have similar arguments. Notteboom and Winkelmanns (2001) suggest that the strategic scope of port authorities should go beyond that of a traditional facilitator, and actively engage in the development of port-related value-added logistics (VAL) activities, information systems and intermodality. Weston and Robinson (2008) also argue that in port-oriented landside freight systems, the emerging new value to be captured by chain players is one that is associated with the integration of chain functions.

With regard to the cargo owner type, the literature noted in Chapter 2 often emphasizes that many manufacturers have adopted global logistics strategies rather than simply relying on conventionally segregated shipping or forwarding activities (e.g. Notteboom and Merckx 2006). However, findings in interviews show that different types of cargo owners have different logistics outsourcing strategies which could cause different business relationships in the network. Compared with manufacturers, branders and large retailers usually dominate the logistics process. Therefore, not all types of cargo owner influence shipping carriers significantly, this point should be identified more clearly in the maritime logistics research and the wider field.

In terms of service complexity, three types of transport logistics service for ocean containerised cargo which corresponds to Bask's (2001) categorization, have been identified from the findings by their degree of complexity/customisation. However, not all types of main players agree themselves can provide the same level of customized service. Therefore, the author was interested in further examining the correlation between service complexity and different dimensions of relationship strength, and from different main player's view in the questionnaire survey. There will be a further discussion about this in Section 6.3.

Such contingent perspective in this thesis can also explain why some unsuccessful and disintegrated instances within container transport industries are also mentioned, other than the successful examples of supply chain integrated activities (Evangelista and Morvillo 2000; Heaver 2001; Fremont 2009). In addition, it explicates the comment given by Notteboom (2002), that vertical integration is an answer to the trend towards integrated logistics, but this does not necessarily imply that terminal operators have to set up every kind of logistics and transport companies.

To summary, all relationships need not necessary be and are not closely integrated and coordinated throughout the network, and depend on contingency factors which include some surprising points. All of these factors are fundamentally influence the relationship structures in the maritime logistics network, for example, trade terms determine whether the relationships should be formed with sellers or buyers for logistics service providers, but have seldom drawn much attention and been systematically and clearly demonstrated in literature.

The findings in this thesis also reflect the fact that it is important to recognize that relationships at different interfaces in the supply chain will vary (Cooper et al. 1997). Before rushing into collaboration, there are also many other factors to be understood, such as: where can we collaborate in the supply chain; with whom should we collaborate and the elements of collaboration. And he says “no” to the question about whether we can collaborate with everybody in the supply chain. The reason is that organisations need to realise that the resource intensive nature of collaboration means that firms in the networks need to focus their attention on a small number of close relationships rather than trying to collaborate with everyone. Some relationships may well be “optimal” in the sense that they are most suited to an arm’s-length, purely cost based type of relationship (Barratt 2004).

In terms of contribution, this is the first time to identify a range of factors in practice which could influence the business relationship structure in the network, and present how are these factors’ influences on the relationship strength of each link in the maritime literature. Bearing in mind that there is a contingent fashion influencing the relationship structures in the networks, the managers can correctly recognize their firms’ position in the networks, reaching the right customers and suppliers, and policy makers can design policies fitting the purpose.

6.3 Association between logistics service complexity and relationship strength

According to the findings of interview, the logistics service complexity is also identified as one of the factors which can influence the relationship structure in the network. Comparing with all the other factors which are well studied in supply relationships, Benedettini and Neely (2012) report that very limited attempts have been made at either conceptually or empirically substantiating the classifications between simple and complex services, not to mention the influences it could have on relationship strength. Furthermore, Aarikka-Stenroos and Jaakkola

(2012) indicate that complex exchange and collaboration is of critical importance in value co-creation, but the mutual processes of value co-creation have seldom been empirically studied.

Therefore, 'complexity of service' is particularly chosen as the focus to be further explored how it can affect the relationship strength and create value in this thesis. We are interested in the literature's proposition (Bask, 2001), and examining whether more customized logistics service cause closer business relationship among main players in the maritime logistics network.

6.3.1 Three types of service by complexity degree

In terms of the measurement of service complexity, previous studies mainly provide conceptual ideas or descriptive classifications (e.g. Bask, 2001; Delfmann et al., 2002), and very few of them applied these measurements to examine the empirical issues. This thesis built a clear measurement of service complexity in the maritime logistics, and it was successfully applied in the questionnaire survey in order to test the correlation between service complexity and relationship strength. These three types of ocean container shipping service identified in the thesis are namely: the dry cargo containers provide the simplest services for general purpose cargo (e.g. commodities, recycling waste); the reefer container services provide some degree of customised operations for temperature-sensitive cargoes (e.g. fruit, sea food, meat, flowers, high-tech parts and chemicals); and the OOG (Out Of Gauge) /project cargo services which include the transportation of large, heavy, high value, critical pieces of equipment (e.g. yachts, helicopters, sensitive equipment, turnkeys, exhibiting antiquities).

Surprisingly, although three different kinds of service with different level of complexity in maritime logistics were identified (see Table 5.3) through the interview study, not all types of main players agree themselves can provide the same level of customized service. It is unexpected that the majority of participants from SCs and POs indicated that they only provide quite 'standard' services or 'easily-customized' services, rather than 'highly-customized' service. This fact in the shipping and port industries is inconsistent with our common understanding that service providers should make efforts to provide more customised service in the competitive business environment. But it is reasonable if the different natures of their service provision are considered. For example, carrier; LSP (logistics

service providers) and LSI (logistics service intermediaries) should be regarded as three different types of third-party service providers according to the level of their assets ownership, scope of service and degree of customization they offer (Stefansson, 2006). Therefore, when aiming to identify the different service complexity that a specific logistics service provider could provide, the nature and the limitation of this service provider should be considered.

6.3.2 Service complexity and relationship strength

It was found **in the interviews** that, generally, the more complexity/customisation of the services, the closer the relationship should be kept between the MLSPs and COs. For instance, when dealing with a project cargo, which is highly complex or customized, increases the possibilities that customers influence services output and service flexibility, and calls for more joint work between the COs and MLSPs, from planning to operations. In addition, more communication, information sharing and application of IT technology are needed. The highly complex and customised services could bring about higher financial revenues for MLSPs and develop stronger loyalty with COs, however, such services could also result in higher transaction costs and risk for MLSPs. In addition, according to the participants in the interview study, the big COs seldom rely on single logistics provider, but usually keep working relationship with several spare providers in order to exercise the bargain power if needed, even time goes by. This implies that most MLSPs in this research were still regarded as cost saving, instead of strategic roles for COs, and this will influence their relationship strength in different service complexity (Bolumole, 2001).

From the survey study, the three types of service were expanded to fit each player's perspective through the pilot study (see Table 5.4). The survey presents the correlation between service complexity and relationship strength with quantifiable data, in order to supplement and confirm the descriptive results in interview study. There are four main findings summarized from the survey as following:

- According to the findings in Figure 5.6 in Section 5.4.1, the average scores of all relationship strength dimensions rise with the increase of service complexity. This implies that, generally, the more complex service causes the overall higher relationship strength in the network. On the other hand, each dimension of relationship strength increases when the service become more complex service, but with different

increasing speed. This indicates that, generally, the more complex service causes the higher strength in each relationship strength dimension.

- According to the findings of survey presented in Figure 5.8 in Section 5.4.2, the average relationship strength increases by the service complexity in every link, but with different increasing speed. With the increase of service complexity, L1, L3 and L4's average relationship strength increase more rapidly than L2, L5 and L6. This implies that service complexity has more influence on the relationship strength between CO and FF, CO and PO, and FF and SC.
- However, the results of the micro-level analysis are different from the above points. According to the findings in Figure 5.10 in Section 5.4.3, not each directional link's each relationship strength dimension rises with the increase of service complexity. Only in the dimensions of communication and cooperation, there are many directional links showing significantly increasing strength. However, the other four dimensions do not present so much significantly increasing strength in each directional link, except the one of FF-CO. Further, there are many and the most increasing trend existing in FF-CO and FF-SC. In contrast, there is no or few significantly increasing trend of relationship strength with the increase of service complexity in CO-PO, CO-FF, PO-FF. There are some links even showing the constantly decreasing trend, such as: SC-PO and PO-FF in relationship duration dimension; SC-FF and SC-PO in commitment; CO-SC in trust; CO-SC and PO-SC in dependency.
- In terms of the perception gaps between different main players in this section, there are substantial gaps between COs-FFs and FFs-SCs. While FFs perceive the significant increasing relationship strength with COs with the increase of service complexity, the COs only perceive little change for this. Likewise, while FFs perceive the major increasing relationship strength with SCs with the increase of service complexity, the SCs only perceive relatively little variation for this.

As mentioned in the beginning of this section, Bask's (2001) statement suggests that a loose customer relationship fits a simple type of service and a close relationship fits a complex type of service characterised as customised services. Murphy and Poist (2000) also point out that a relationship between a CO and third party is characterised by a longer term and mutually beneficial relationship when offering customised service compared with basic services.

However, it seems that these propositions cannot fully explain the above findings which imply that relationship strength does not always increase with service complexity or customized degree, but depends on the relationship dimension and different relationship link. The possible reasons for these could be that integration at an operational and tactical level can deliver more benefits (Barratt 2004). In addition, the nature of the relationship also depends on the client's rationale for outsourcing. The role of LSPs is limited to operational issues when the CO sees the outsourcing option as the means to achieve cost savings. But when the outsourcing decision is made due to resource considerations, the third party logistics provider is seen as a strategic partner who has a critical role in the customer's supply chain strategy (Bolumole 2001). However, many logistics partnerships which are operational in nature, are often designated as "strategic" without real understanding of the term, and the influence of a logistics partnership on a shipper's strategic moves and competitive positioning (Bhatnagar and Viswanathan 2000).

In terms of the perception gaps between different main players, which were reported in the thesis, Makukha and Gray (2004) have a sensible explanation. Although large companies form logistics partnerships, the perceptions of partnership formation motives, inhibitors and orientations by shippers and LSPs are likely to differ. In particular, COs tend to avoid close integration with LSPs, whereas LSPs claim to be true strategic partners but remain unable to provide the service required. Thus, that most existing logistics partnerships are still operational rather than strategic in nature. The failure to integrate on a strategic level suggests a lack of strategic management knowledge by relevant managers (Makukha and Gray 2004). This can also reflect the point addressing from the survey study, which demonstrate that the main players in maritime logistics network have stronger enduring desire to maintain a valued long-term business relationship with each other, but only have short-term contractual business relationship in practice.

In addition, this issue can be discussed from the longitudinal perspective, which have been noted in the interview study. Partnerships develop gradually, as the number of outsourced activities increases over time. COs often adopt an "increasing scope" strategy in respect of their relationships with LSPs (van Laarhoven et al. 2000). According to this practice, buyers are looking for specific solutions at the initial stages of the relationship in order to test the provider's capabilities (van Damme and Ploos van Amstel, 1996). Over time, the scope of the

relationship increases and the offering expands to include more value-added and customised solutions (Sink et al., 1996).

Therefore, the propositions suggested by some previous literature (e.g. Bask 2001) is too simplified and need to be amend or expanded through the thesis. A comprehensive and in-depth analysing approach which includes network perspective and multi-dimensional measurements of relationship strength is applied by the thesis to empirically test the association between service types and the nature of relationship in them. This combination of analysing approach is the first time to be used in literature, which also successfully produce comprehensive and fruitful outcomes for theory and practice. This research successfully demonstrates the subtle but crucial differences from the different levels of analysis, which is seldom conducted and reported in literature. This also contribute to suggest that researchers and practitioners cannot only look at the issue of the association between service complexity and relationship strength from a single perspective. Further, the findings which display that only specific dimensions of relationship strength and particular relationship links have the significantly increasing trend with the increase of service complexity, can contribute to refine the concept of matching relationship strategy (Bask, 2001).

6.4 Logistics service complexity and value perceived

After clarifying the relationship structure in the maritime logistics network and the influence from logistics service complexity, we are interested in learning about what is the association between such service complexity and the value perceived by main players. Will more customized maritime logistics service create more value? What is the origin of this value? This section will address a discussion for answering these questions.

6.4.1 Association between logistics service complexity and value perceived

Value is added whenever an activity in essential, and logistics value is created through time and place utility, which implies that if goods or services do not arrive at the right time or at the right place, no value will be created. When applied correctly, logistics service can also add additional value to the manufacturing process (Vermeulen, 1993; Shen and Chou, 2010). Logistics service value is an important component of customer service, which provides competitive advantage of customer in the market place (Mentzer et al., 1997). Kent and Flint

(1997) suggest that logistics has been a key source of strategic advantage for firms. While it is critical to measure value from the customer's perspective (Lambert and Burduroglu, 2000), it is also important to investigate the value that service suppliers can experience (Smals and Smits, 2012). Service providers are encouraged to understand the importance of material flow integration and how it is linked to value creation, as a part of the firm's objective. In order to create value, it is crucial for service providers to match the requirements of customers with their capability to provide service (Kent and Flint, 1997). Recent studies have showed the trend that behavioural oriented supply chain relationship and collaboration have compelled logistics service providers to venture new intrusion into their offerings to create value-added benefits (Li, 2011). Kinard and Capella (2006) conclude that greater benefits are perceived by customers when they are engaged in a relationship with a high contact, customized service versus a more standardized, moderate contact service.

According to the interviewees, the perception of value gained from the maritime logistics network is different between cargo owners and service providers. Most MSLPs expect that both cargo owners and themselves could gain more benefits from a value-added customized service, however, the cargo owners are not necessarily in agreement. One of the cargo owner participants in the interview suggests that normal cargo owners in Taiwan would prefer to use standard services which contain a small portion of customized arrangement, instead of the expensive customized service. A majority of the cargo owners in Taiwan are small or medium size firms, and make decision for cost reasons. The end value for using customized services may depend on the revenues and value of product. Therefore, the equivalent value of customized services may not stand out in their cases. In addition, some of the MLSPs comment that a value-added customized service could not only bring higher financial revenues, but also higher risks for themselves. The subsequent survey provides more precise, quantifiable and details for extending these points. **In line with the survey**, with the increase of service complexity, the value perceived by freight forwarders (FFs) rises rapidly, while port operators' (POs') rises gradually. Shipping carriers' (SCs') perceived value increases from routine service to standard service, but decreases from standard service to customized service. However, only the values perceived by FFs in each types of service are statistically significant different. The value perceived by cargo owners (COs) declines with the increase of service complexity when considering CO group as a whole. However, when the CO group was broken down to 4 sub-

groups, the result shows that the value perceived by brand vendors/retailers sub-group rises with the increase of the service complexity. These findings raise several points about each main player's role, function and need in the maritime logistics networks.

Although literature emphasises on the importance for logistics service providers to provide value-added or customized services to cargo owners (e.g. Li, 2011), and the benefits for cargo owners to receive such service (e.g. Kinard and Capella, 2006), the nature of these service providers and the trade-off between benefit and cost by using customized services for cargo owners should be considered. According to Stefansson (2005), the more advanced services are carried out by the logistics service providers (LSPs) and the logistics service intermediaries (LSIs), while the basic services are more concentrated to the carriers. Accordingly, the nature of freight forwarders (FF) is to offer more diverse and customized services compared with other MLSPs, therefore it can perceive the increasing value from providing more customized services. Port operators perceive consistently increasing value as well, but with much less degree. According to interviews, many of them are considering about expanding their business to provide value-added service. This also implies the potential of a port operator to become a LSP and LSI to provide more customized services, and will be further discussed later. On the other hand, shipping carriers focus on providing routine and standard service, selling "transport of box", therefore they cannot benefit from the customized service. Many of them emphasize that they mainly focus on routine and standard port-to-port container transport services, therefore customized service is of less value for them, and standard service is more beneficial than routine service for them. If they try to satisfy all their customers' needs, it will lead to increased costs and poor customer service when specific customisation is required (Fuller et al., 1993).

Cargo owners who do not recognize the increasing value along with the increasing service complexity, tend to buy separate routine services on their own, or use the standard services instead of the customized services. This may be due to the following reasons:

- The inequivalent costs of the more customized service offset the benefit received.
- The cargo owners who use maritime logistics service mainly need routine and standard services for more functional product, therefore they may not familiar with the value generated from customized services.

- Maritime logistics is only small part of cargo owners' whole supply chain. Logistics service are just derived service. MLSPs are not the core part of their business to create values. This is reason why the data reveal that cargo owners don't really care about MLSPs.
- Firms do not always purposefully structure their relationships and rarely measure the value of their relationships, therefore, they do not always know if they are getting value from their relationships (Cannon and Perreault 1999; Cox 2001).

On the hand, while the other three CO sub-groups (including importers, exporters, manufacturers) perceive the decreasing values when using more-customized services, the sub-group of brand vendors/retailers perceives rising value with the increase of the service complexity. These implies that brand vendors/retailers need and can obtain greater value from customized service, and LSPs which pursuit to gain profits from more customized services should aim at these kind of COs.

Overall, when main players evaluate the value through receiving or providing maritime logistics service with different degree of customization, it may depend on whether additional savings could cover the extra costs triggered, and possible reduction in flexibility due to higher switching cost Adolf (2012). In addition, the relationship integration at an operational and tactical level can deliver significant benefits, although it is not clear as to the impact of gaps in the strategic levels of integration (Barratt 2004).

6.4.2 The origin of the value

After learning the overall value which perceived by different players from different service complexities, we are interesting in what is the origin and dynamics of the value generated from different links in the maritime logistics network. This part of data could only be obtained through questionnaire survey which can provide a quantitative tool to measure and analyse such dynamics. The findings of survey in Section 5.5.2 present the origin of value for each group of main player in the maritime logistics network, and lead the following discussion.

From both CO's and FF's views (see Figure 5.14), the values generated from POs in each type of service are significant lower than other trading partners. From SC's view, values generated from other trading partners are alike. From PO's view, value derived from SC are significant

higher than other partners. For FF and SC, CO contributes to the most value. These reflect Lam's (2013) finding that customer service is the most significant area in contributing to the total supply chain value. Further, these are consistent with the weakest relationship strength between CO-PO and FF-PO, and the strongest links between CO-FF, CO-SC, PO-SC and SC-FF which were identified and discussed in Section 7.1. These also verify that SCs have to deal with COs, FFs as well as POs with little differentiation. In addition, the major logistics service suppliers for COs are FFs and SCs, the major customer for FFs are COs, the major customers for SCs are COs and FFs, the major customer for POs are SCs, and the major service suppliers for FFs are SCs. Although literature has ever addressed similar points, few can make such distinction between players at the same time. For example, Woo et al. (2011a) only determines the SCs, FFs and COs are ports' important clients, but have not distinguish that actually SCs are much more important than the other two players for ports. While quite a few scholars (e.g. Slack, 1996; Heaver, 2001; Nortobbon, 2004; Tongzon, 2009) emphasize the relationship between SC-PO, actually the relationship management between SC-FF and SC-CO also crucial for SCs.

If linking above points to the findings of relationship structure in the maritime logistics network (see Section 7.1), the outcome will show that the links having higher importance and strength also being perceived with higher value (see Figure 7.1). Therefore, it seems that there is a similar pattern and a positive correlation between importance level, relationship strength and value perceived for the links in the maritime logistics network. One way to explain this could be referring to Doz and Hamel's (1998) comment indicating that inter-organizational relationships help firms create value by sharing resources, sharing knowledge, and gaining access to markets. Further, Golicic and Mentzer's (2006) state that higher levels of relationship type result in the perception of higher value and lower levels of relationship type result in lower value.

On the contrast, Cannon and Perreault (1999) and Cox's (2001) comment suggests that firms do not always purposefully structure their relationships and rarely measure the value of their relationships, therefore, they do not always know if they are getting value from their relationships. Novack et al. (1995), argue that the interviewees in their research did not get the most value from their closest alliance but from what he considered to be a lower level of relationship, as a cost along with the commitment of additional resources, the decrease in

leverage over the other party, information security, and other risks. Therefore, the participants in this thesis seem to have consider the trade-off between benefits (value) and costs when evaluating different relationships.

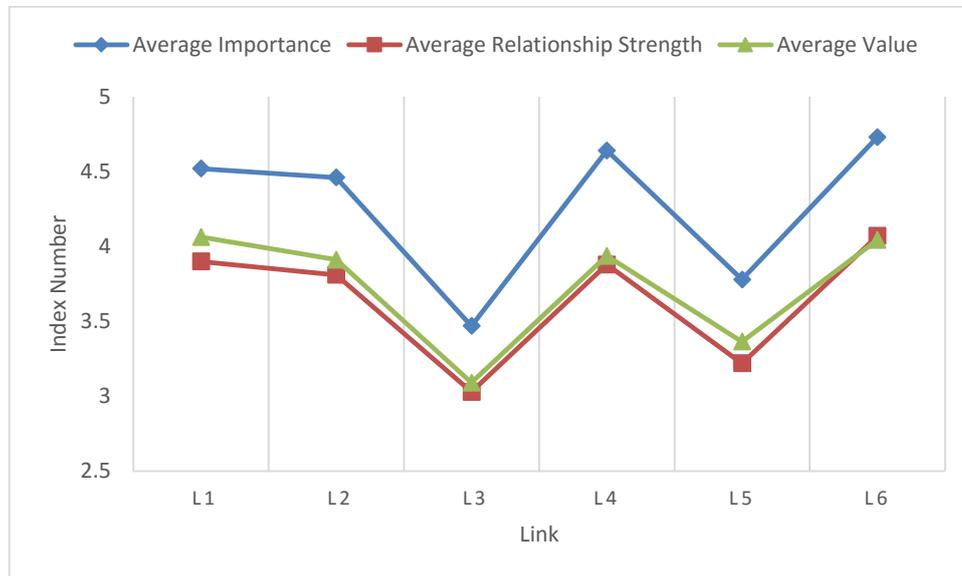


Figure 6.1 Comparison of average importance, strength and value

6.4.3 Position of value creating of each player

According to Figure 5.12 in Section 5.5.2, which compares the perceived value from the players in the same link, there are some gaps of value perceived existing. From COs' perspective, except the value generated from the routine service with SCs, all of the values scored by COs are lower than the values perceived by FFs, SCs and POs from COs (from L1, L2, L3). This is consistent with the resulting from identifying the perception gaps of importance level for each link, and reconfirm the fact that COs underestimate almost of the values they received from different logistics services with the MLSPs. We can conclude that COs do not really care about MLSPs.

In terms of the relationships between SCs and FFs (in L4), the score is very close in the routine service, but diverges in standard and customised service, in that FFs always perceive more value than SCs. This is consistent with the findings of interviews in chapter 5, which point out the special customer-competitor relationship between SCs and FFs (Martin and Thomas, 2001; Mccalla et al., 2004; Fremont, 2009). SCs tend to directly contact with COs when COs need the standard and customized services. This can explain why the values derived from FFs in standard and customized services become lower than routine service for SCs.

In the contrast, the trends of value perceived in L5 and L6 is converging. These can be explained by some respondents' comments that the benefits received by FFs and SCs from more customized services are increasingly more than the cost they spend on POs. All of the values scored by POs are higher than the values perceived by FFs, SCs and COs from POs (from L3, L5, L6). On the contrary, POs need to make much efforts to offer the customized services, but cannot receive the equivalent values they expect from FFs and SCs. These results are also in accordance with the perception gaps of importance level and existing relationship strength between players in the same link, which were identified in section 6.3.3 and 6.4.3. Therefore, we can conclude that POs are in a passive and double-derived position in the maritime logistics network (Paixao and Marlow 2003).

6.4.4 The dynamics of the value from each link

In terms of the change of the value origin with the increase of service complexity, the dynamics can help to identify the position of each player and the potential opportunities and drawbacks for them. The discussion will be based on each the player's view and the comparison of value perceived from each link in the network.

According to Figure 5.13, for COs, the values derived from SCs and FFs in customized service are lower than routine services, while the values derived from POs are higher in customized service. These may be because the cost of customized service charged by SCs and FFs are much higher than routine services, and POs provide not so expensive but equivalent/higher customized service for them. For FFs, the values derived from all other players reveal a similarly increasing pattern. For SCs, the values derived from COs and POs show a similarly increasing pattern, but the values from FFs decrease along with the service complexity. The possible reason is that SCs tend to contact with COs when COs need the standard and customized which has been stated in previous section. For POs, the value contributing from COs rises along with the service complexity, the value from SCs declines gradually, and the value from FF increase slightly then decrease in the customized service. The possible reason is that the interaction model between PO-SC have been fixed in routine service, the interaction model between PO-FF and PO-CO could have more potential to develop to standard and customized services.

As Robinson (2005) suggest, the value generation from different players should go through a specific function or procedure, for example, the value in ports migrates towards functional integration with landside logistics markets. From the other three main players' view, the value perceived from POs all slightly rise with the increase of service complexity. These points can be an application on PO's development, and there are two specific suggestions are given as follows:

- (1) Beyond the traditional landlord functions of port authorities, many studies (Estache and Trujillo 2009; Van der Lugt and De Langen 2007; Verhoeven 2010) suggest they should acquire a coordinator, facilitator and integrator role in port clusters, international transport, logistics and supply chains.
- (2) COs play a critical role in the integration of ports in supply chains by establishing various value-adding activities within the port area (Dias et al. 2010). Through providing value-added service may increase ports' value. Therefore, new business models for port, for example: establishment of free trade zone (FTZ), involvement of (MMC): provide legal framework and physical platform to develop such activities (Notteboom 2006) could create close inter-organizational relationship with other players and should be encouraged. However, ports have to understand how the make proper profits from the value-added services as well.

With regards to the contributions, this is the first work which has identified the origin of the value generated from different links, and the change of the value generation from different links between main players in line with different service complexity in the maritime logistics network. This part of research approach also can be applied to the other context in wilder field. For practice, through identifying the value generated from different service complexity and different links in the networks, manages can get better values from the right types of service and the right relevant links in the networks. Furthermore, through this, the policy makers can pinpoint the player who creates more value in the maritime logistics networks to initiate proper industrial development projects or policies.

6.5 Association between degree of SCI and value generated

Supply chain integration (SCI) is an emerging fashion where manufacturers strategically collaborate with their supply chain partners to manage intra- and inter-organizational processes, in order to achieve effective as well as efficient flows of products and services, and to provide maximum value to the customer (Flynn et al., 2009). The previous research is keen to seek the relationship between SCI and performance but the findings is inconsistent. (e.g. Stank et al. 2001 ; Germain and Iyer 2006; Das et al. 2006; Devaraj et al. 2007 ; Flynn et al. 2009). Gentry (1996) states that closer relationships between suppliers, buyers and carriers in the supply chain lead to operating improvements, increase the likelihood of maximizing supply chain efficiency, and improve their competitive position of the entire supply chain. As shipping is a vital component in global supply chains, it is important for maritime logistics service providers to be embedded well in this system. Thus, it drives more and more researchers to apply SCI concept in maritime studies (e.g. Song and Panayides 2008; Lam and Van de Voorde 2011).

Therefore, the final research purpose is to examine the correlation between SCI degree and value generation, which are caused by the three networks with increasing service complexity. Firstly, the SCI degrees of the three networks was measured by network density through SNA (as Lee (2005) did cited in Section 2.3.2). The results show that except the network density in commitment dimension does not consistently increase, the network densities in the other five dimensions all consistently rise with the increase of service complexity. This implies that the more customized services cause or need higher SCI degree, and there is a positive correlation between service complexity and SCI degree in this research (see Section 5.7.3).

Secondly, the SCI degree of the three networks and the average value generated from them were compared. The results display that both the average network density and average value perceived in these three networks rise consistently with the increase of service complexity. However, the increasing rate of the value between standard and customized service, are less than the increasing rate of the SCI degree between these two networks (see Figure 5.20). This implies that the association between value and service complexity is not liner positive relation. And the equivalent added value for customized service is unsure. This may be due to the high cost and risk of this type of service. As one interviewee commented that majority of the COs

would prefer to use standard services which contain a small portion of customized arrangement, instead of the expensive customized service. This point may be against literature which suggests that the level of SCI is positively related to supply chain value (Lam 2013), or the logistics performance is maximised when all of the logistics activities are performed in a highly integrated manner (e.g. O’Leary-Kelly and Flores 2002), but can be underpinned by the following literature.

Therefore, through the empirical finding, this study contributes a different point of view to the SCI research, which provides an opportunity to consider about the effective integration in the supply chain (or network). To apply strategies with different SCI degree is dependent on: whether additional savings could cover the extra costs triggered; possible reduction in flexibility due to higher switching cost; the possibility of a longer and more complicated decision-making process; and the possible organizational complexity and different management cultures between different firms (Adolf 2012). Integration at an operational and tactical level can deliver significant benefits, although it is not clear as to the impact of gaps in the strategic levels of integration (Barratt 2004). Collaboration within the supply chain would not create any further added value or benefit in some cases (Lambert and Burduroglu 2000; Horvath 2001). The balance between advantages and disadvantages of integration strategies varies among regions and industries and with the condition and characteristics of particular firms (Heaver 2001).

6.6 Conclusion

This chapter has presented the overall discussion which mainly brings together the findings from both interview and survey, and links back to literature. Through such overall discussion, the robust results are provided by triangulating the findings from both interview and survey.

Chapter 7 Conclusion

Maritime logistics plays a critical but often unnoticed role in global supply chains. It has been regarded as the primary means of transport and outbound logistics for parts and finished goods on a global scale (Panayides and Song 2012). Over 90% intercontinental transport of goods takes place by sea, and an increasing share of this transport is containerized, which thus has become the lifeline of almost global supply chains (UN-ESCAP 2005).

The centre of maritime logistics is the concept of integration in physical or organisational (relational, people and process integration across organisations) aspects (Panayides 2006). Management of buyer-supplier relationships is central to the success of SCM in firms (Harland 1996). Therefore, as the essential part within the global supply chain relationships, it is important to study the inter-organizational relationships in maritime logistics network.

The dominant consideration of relationship management research in maritime logistics has been focused on a dyadic level (e.g. Heaver 2001; Panayides and So 2006; Tongzon 2009). There has been little research that has looked at this issue from a network view, and identified the values generated among the main players. Some studies start to consider managing maritime logistics as a whole with supply chain (e.g. Talley and Ng 2013; Lam 2013), however, very few of them distinguish the different relationship structures in different situations, and the value generated from these relationships. In line with the contingency perspective, relationships between relevant firms do not need to be integrated closely through the supply network (Cooper et al. 1997). The most appropriate supply network relationships should depend on different products or services (Fisher 1997; Bask 2001). Further, Shen and Chou (2010) indicate that when applied correctly, logistics service can also add additional value to manufacturing (Chapter 2).

Accordingly, this thesis aims to explore the relationship structure and the value generated within the maritime logistics from a network perspective, mainly considering the service complexity within a varied of influential factors. In order to achieve triangulation of the research findings, a mixed method combined qualitative and quantitative methodology has been adopted, using interview, questionnaire studies and social network analysis (SNA)

(Chapter 3). The research framework based on logistics triad (Beier 1989) was established and exploratory data was collected through the in-depth Interview with 41 experts in industry (Chapter 4). The structure of maritime logistics network, main players, the relationships and valued generated among them were identified in this first-stage study, leading to the next stage of data collection and research development. In the second-stage study which is questionnaire survey, the six-dimensional relationship strengths among each main player with different levels of service complexity were measured, and the value generated was recognised through 248 valid respondents (Chapter 5). Discussion chapter (Chapter 6) opens a discussion about the research findings relating to the research questions, especially brings the results from interviews and questionnaire survey together. In addition to comparing and complementing the findings from different research methods, the discussion reflects to the relevant literature in order to bridge the gaps.

This final chapter will relate the findings back to the research questions addressing from the literature review in Chapter 2, in that way of bringing the research together in an integrated manner. In addition, the contribution of the research is summarized. Finally, the industrial relevance of the thesis is discussed, along with limitations and potential directions for future research.

7.1 Summary of chapters

This section summarises the main body of the thesis by chapter. The order of their presentation is determined by the development of the maritime logistics network exploration through the thesis. There now follows an overview of the key points of each major chapter.

With regard to desk-based works, through **Chapter 2**, it is identified that the dominant consideration of relationship management research in maritime logistics has been focused on a dyadic level, limited mainly either to shipping carrier–cargo owner, shipping carrier–port operator, freight forwarder–cargo owner, and port operator–cargo owner. There has been little research that has looked at this issue from a network view, and identified the values generated among the main players both theoretically and empirically. This leads to the motivation of the research to bridge the gaps in literature, and the following development of the thesis. In addition, the second part of literature review in this chapter provides a set of

measurements to evaluate the relationship strength, value generated and service complexity in maritime logistics network properly. **Chapter 3** developed a mixed method to fit the purpose of this research. Given the research questions to be considered, three main methods were selected: semi-structured interview; questionnaire survey and social network analysis (SNA).

In terms of empirical studies, a research framework of maritime logistics network is established in line with the findings of interview through **Chapter 4**. This framework includes 4 main players and 6 key links among them, which evolved basing on the logistics triad (Beier, 1989), and was proved as workable through the succeeding questionnaire survey. Further, the rich insights of the relationship structure in the maritime logistics network was obtained from these four types of stakeholder. **Chapter 5** applied the network perspective, three-level analysis and social network analysis (SNA) approach to analyse the relationship dynamics in maritime logistics network through the data collecting from the questionnaire survey. The results are presented in a multi-level way, which includes macro, mixed and micro level viewpoints. By deploying such analysing approach, the dynamics of overall structure of the network, each link in the network, and each node's (player's) position can be identified.

Chapter 6 presents the overall discussion which mainly brings together the findings from both interview and survey, and links back to literature. Through such overall discussion, the robust results are provided by triangulating the findings from both interview and survey.

7.2 Answers to the research questions

There are four major questions in this research, which include the issue of relationship structure in the maritime logistics network, factors influence such relationship structure, service complexity and relationship strength, and service complexity and value. The detailed answers have been presented in Chapter 6, thus, research questions will be briefly answered in this chapter as follows:

(1) What is the inter-organizational relationship structure in maritime logistics networks?

The framework of analysis for relationship structure in the maritime logistics network evolved based on the well-developed logistics triad (Beier, 1989). However, it shows that the logistics triad cannot fully analyse the relationship network dynamics in maritime

logistics because of the international ocean transport and logistics are more complicated than this domestic concept, such as have more key players and the links among them. The framework developed in this research consists of four main players namely cargo owner (CO), ocean freight forwarder (FF), shipping carrier (SC) and port operator (PO), and the six links between them (see Figure 5.1). It was proved as workable through the succeeding questionnaire survey.

In terms of the relationship structure in the maritime logistics network, the findings reveal that the relationship strength of each link varies, and the links between FF-PO and CO-PO are recognized as the last two, and significant weaker than other links.

(2) What factors influence the inter-organizational relationship structure in maritime logistics networks?

The findings show that there are a wide range of factors influencing the relationship structure among the main players within the maritime logistics network in practice (see Table 5.2). Besides service complexity (Bask, 2001), six factors from industrial practice were identified through the interview, namely: trade term; cargo type; shipping trade route; port type; cargo owner type; and market type. These factors result in changing relationship strengths among different main players when the condition varies, which reveals that the relation strength in maritime logistics network is contingent.

(3) What is the connection between the service complexity and inter-organizational relationship strength in maritime logistics networks?

Generally, the more complex service causes the overall higher relationship strength in the network, but with different increasing speed in each link. The more complex service causes the higher strength in each relationship strength dimension, but with different increasing speed as well.

However, the results of the micro-level analysis are different from the above points. Only in the dimensions of communication and cooperation, there are many directional links showing significantly increasing strength. Further, there are many and the most increasing trend existing in freight forwarder–cargo owner and freight forwarder–shipping carrier. In contrast, there is no or few significantly increasing trend of relationship strength with the increase of service complexity in cargo owner–port operator, cargo owner–freight

forwarder, port operator–freight forwarder. There are some links even showing the constantly decreasing trend.

In terms of the perception gaps between different main players in this section, there are substantial gaps between COs-FFs and FFs-SCs. In such relationships, FFs always perceive the higher strength than the other trading partner.

(4) What is the connection between the service complexity and value perceived in maritime logistics networks?

Value derived does not always increase by service complexity for different players, and it may depend on the nature of the players. For example, the value perceived by FF rises rapidly, while PO's rises gradually. SC's perceived value increases from routine service to standard service, but decreases from standard service to customized service. However, only the values perceived by FF in each types of service are statistically significant different. The value perceived by COs declines with the increase of service complexity if COs were discussed as a whole. When the CO group were drilled down to 4 sub-groups, the result shows that the sub-group of brand vendors/retailers perceives rising value with the increase of the service complexity, while the other three CO sub-groups (including importers, exporters, manufacturers) still perceive the decreasing values when using more-customized services. These implies that brand vendors/retailers within COs need and can obtain greater value from customized service, and LSPs which pursuit to gain profits from more customized services should aim at these kind of COs.

In terms of the origin of value, it shows that it is varied upon different type of main players. From both CO's and FF's views, the values generated from POs in each type of service are significant lower than other trading partners. From SC's view, values generated from other trading partners are alike. From PO's view, value derived from SC are significant higher than other partners.

7.3 Contributions of the thesis

Throughout the thesis, a number of contributions has been made to theory and practice. **For the overall contribution, the thesis is the first work looking at the relationship structure and value generated in the maritime logistics form a network perspective. Furthermore, the**

contingent fashion was found and considered to analyse the subjects in the research which can bridge the gaps in literature. By means of this research, the comprehensive and fruitful findings which the author aims to pursue have been obtained successfully. Researchers and practitioners can use the framework, analysing approach and measurements developed by this thesis as a tool to study and evaluate the relationship structures and values generated in the networks in other context.

In terms of the wider management field, this is also a leading work which empirically and comprehensively test the connections between the relationship strength, service complexity and value generation in the real network. This part of research approach also can be applied to the other context in the wider field as well. Further, though the unexpected findings of these empirical tests, contributions also can be made to theory.

The contributions that the thesis makes to practice will be presented in Section 7.4 that more focuses on industrial relevance. Each of the specific contribution to academia is discussed as follows, principally by the order of their appearance in the thesis:

(1) Comprehensively exploring the relationship strength in maritime logistics networks

This research explores the relationship structure among main players in maritime logistics networks with a comprehensive approach, from in-depth literature reviewing, building the research framework through rich opinions of industrial stakeholders, and empirically test on both overall general trend and different links through a network perspective. This is a new approach to look at the relationship structure in the maritime logistics network, and even though in the SCM and logistics, the relationship management research is dominated by conventional dyadic view rather than network view (Selviaridis and Spring 2007). The specific contributions related to this point can be underlined below:

- This research is the first work looking at maritime logistics from a comprehensive network perspective theoretically and empirically. A new analysing approach which combines three-level (micro, mixed and macro views) approach and social network analysis (SNA) from a network perspective rather than conventional dyadic view in the maritime logistics literature (Selviaridis and Spring 2007) has been developed and used to explore the relationship structure and value generated by the network. Through such research approach and the research outcomes, this research add rich insights to

the literature, which includes not only considering the network as a whole but also identifying the perception gap between dyadic trading partners, the different results from different levels of analysis, different links, different relationship dimensions and different service complexities.

- This thesis establishes a conceptual analysis framework for relationship strength of maritime logistics network, which verifies the 4 main players and identifies the 6 key links based on the concept of logistics triad and the interviews. This framework then was verified as workable through the application in the questionnaire study in the thesis. This is a novel framework and has never been presented in maritime research. On the other hand, as the initial logistics triad (Beier, 1989) cannot fully analyse the dynamics of the subject in this research, the analysis framework has been evolved by considering the nature maritime logistics which involved international ocean transport and logistics and is more complicated than the domestic concept. According to Arlbjørn and Halldorsson's (2002) argument, this unexpected finding can refine or expand the existing knowledge base of Beier's (1989) idea, or even generate a new concept.
- There is very few maritime research using multi-dimensional measurements to evaluate the relationship strength. These Multi-dimensional measurements allow for investigation of the individual components of relationship strength rather than one single latent relationship strength construct which prevents the risks of simplifying the complex relationship dynamic (Palmatier et al. 2006). Breaking down the concept of relationship strength to multi-dimensions' measurement and comparing the difference between the strength of these measurement is very novel in the maritime logistics research.
- Empirically prove or clarify some concepts in the maritime logistics, for example: cargo owners do not really care about maritime logistics service providers though they are important; the derived-demand nature of transport (logistics), maritime transport (logistics); the double-derived demand of ports; port operators are concern about footloose shipping carriers, but shipping carriers face more challenges of more footloose cargo owners.

(2) Identifying contingent factors that affect relationship strength

Contingency of relationship management and collaboration approaches has been widespread in SCM and logistics studies. However, majority of these studies focus on the context and practice of land/domestic transport and logistics. There is little research looking at the topic of contingency factors in the context and practice of international maritime logistics.

This research identifies a range of factors which fundamentally influence the relationship strength of main players in maritime logistics networks through interview. These factors are predominantly caused by the international trading and shipping practice. Besides identifying the seven factors which could influence the business relationship structure in the network, this thesis also presents how are these factors' influences on the relationship strength of each link (see Table 4.3) which is the first time systematically showing in the maritime literature.

For researchers who are looking at port logistics, identifying the types of port in the start is helpful for them to establish a correct research framework through this research. For example, whether the port is transshipment or import/export type will decide either SCs or COs choose the port. In addition, we cannot use the same measurement to evaluate the transshipment and import/export ports. For scholars who are interested in shipping research, it is useful to learn that the trade term, cargo type, shipping route and shipping market can cause different relationship structures in the network, and to set up the right research agenda. For wild academics in logistics and SCM, cargo owners cannot be discussed as a whole, as different types of cargo owners have different needs for logistics services in terms of the customized degree.

(3) In-depth analysis of the association between service types and the relationship in them

Service complexity is considered as one factor which can influence the relationship strength between logistics partners (Bask, 2001), and is verified as one of the contingent factors in this research. However, the previous works are mostly conceptual studies, and the association between service types and the nature of relationship in them has yet been broadly and empirically tested in the literature. In addition, the maritime literature still treats container shipping as a homogenous sector without the awareness that service

complexity (e.g. dry cargo, refer cargo and project cargo) can lead to different relationship strengths between logistics partners (Lam et al. 2012; Panayides and Song 2013).

In order to conduct an in-depth analysis, this research used comprehensive analysing approach which includes network perspective and multi-dimensional measurements of relationship strength to empirically test the above association. This combination of analysing approach is the first time to be successfully applied in literature. Two specific contributions which add the literature are highlighted as follows:

- This research found that the average relationship strengths of every link increase with the increase of service complexity from the macro view. However, the relationship strengths for every link do not necessarily increase with the increase of service complexity from the micro view. Further, in both of these analysis, the increasing degree between different links are different. This research successfully demonstrates these subtle but crucial differences through empirical test, which is seldom conducted and reported in literature.
- Through using multi-dimensional measurements to evaluate the relationship strength in different service types, this research found that not every dimension of relationship strength increase or has same increasing level with the rise of service complexity. For example, relationship duration decreases when the service become complex in some links; the increasing degree of communication and co-operation are much more than other dimensions. In line with Arlbjørn and Halldorsson's (2002) arguments, these new findings can refine or expand the existing knowledge base of Bask's (2001) concept, or even generate a new concept.

(4) Identifying the origin of value generated

Value creation is important for the competitive advantage of a firm (Porter 1985). When applied correctly, logistics service can add additional value to the manufacturing process (Shen and Chou, 2010). Further, Doz and Hamel (1998) indicate that inter-organizational relationships help firms create value by sharing resources, sharing knowledge, and gaining access to markets. Therefore, it is very important to explore the value generating in the maritime logistics network.

This research successfully identifies the origin of the value generated from different links, and the change of the value generation from different links between main players in line with different service complexity in the maritime logistics network. This is the first time these subjects are studied through the network perspective and contingent consideration in the literature. This part of research approach also can be applied to the other context in wider field.

In addition, this research identifies that more customized maritime logistics services create more value from macro level analysis. However, it is not necessary that more customized maritime logistics services create more value from individual main player's view which is from micro level analysis. This is seldom distinguished in the literature, and is another specific contribution related to value generation in this research.

(5) Applying social network analysis (SNA)

Although methodological potential and benefits of SNA have started to draw the attention of operations and supply management scholars (Ellram et al. 2006; Ketchen and Hult 2007; Borgatti and Li 2009), it is still an under-researched area in the context of maritime logistics, in which only Lee (2005) applies SNA to measure the supply chain integration (SCI) degree in a port supply chain to date. In broader SCM and logistics areas, the empirical studies using this analysing method are also very limited (Choi et al. 2001; Carter et al. 2007).

Through SNA, the relationship structure of the maritime logistics network was evaluated and visualized in a diagram, in which the thicker link means the stronger connection, and the larger node means the more important player. By applying SNA, this research identifies the orders of been integrator in the maritime logistics network and the relationship structure in maritime logistics network. Further, the degree of SCI in maritime logistics network was measured, and thus the correlation between degree of SCI, service complexity and value generation can be and was tested. These items are very important in the research of supply chain relationship management and maritime logistics network, but they never been simultaneously analysed through SNA which is regarded as a formal and quantitative modelling approach to analyse the structural characteristics of supply networks (Borgatti and Li 2009; Grover and Malhotra 2003; Harland et al. 1999). The outcomes of SNA also supplement and complement the qualitative interpretation

methods in this research (Kim et al., 2011). In brief, this research has overcome the difficulties of collecting network-level data in maritime logistics networks which impede the application of SNA (Ketchen and Hult 2007; Borgatti and Li 2009), providing a novel method to evaluate the dynamics in maritime logistics network, and contributes to significantly expand the knowledge base of applying SNA in SCM and logistics literature.

A summary of the major contributions in terms of academia and practice along with the relevant research questions and major conclusions is shown in Table 7.1.

Table 7.1 Summary of the major research questions, conclusion and contributions of the thesis

Research Questions	Major Conclusions	Major Contributions
<p>RQ 1: What is the inter-organizational relationship structure in maritime logistics networks?</p>	<ul style="list-style-type: none"> • The logistics triad (Beier, 1989) cannot fully analyse the relationship network dynamics in maritime logistics. • The framework of analysis developed in this research consists of four main players who also can play as integrators in their relevant areas: cargo owner; ocean freight forwarder; shipping carrier and port operator; and the six key links between them. • The relationship strength of each link varies, links between SC-PO are identified as the closest, and the links between FF-PO and CO-PO are recognized as the last two, and significant weaker than other links. • There are perception gaps of importance degree between all of the pair players in the maritime logistics networks. 	<ul style="list-style-type: none"> • This research is the first work looking at the relationship structure in maritime logistics from a comprehensive network perspective in conjunction with social network analysis (SNA) theoretically and empirically. This part of research approach also can be applied to the other context in wider field. • This thesis establishes the framework of analysis for relationship strength in maritime logistics network, and contribute to refine the concept of logistics triad (Beier, 1989) in maritime context. Through this framework and knowledge about the dynamics of relationship strength, firms and policy makers can realize the whole structure of maritime logistics network and identify their own functions, positions and boundaries in the network. Managers can find the potential markets, work out new business models, develop effective and efficient collaborative and integration strategies with other trading players in the network. • It is novel to break down the concept of relationship strength into multi-dimensional measurements and comparing the difference between the strength of these measurements in the maritime logistics research. Managers can use these measurements to evaluate the relationship strength between their own firms and the trading partners to develop appropriate relationship management strategies. • The perception gaps of importance degree which were identified contribute to make researchers and practitioners to look at the relationship management issue from both sides rather than their own single side, and recognize their own position in the supply networks. • Through SNA, the relationship structure of the maritime logistics network was evaluated and visualized in a diagram. This helps researchers and practitioners to realize the relationship structure of maritime logistics network from a big picture view, and identify each player's positioning in the network.
<p>RQ 2: What factors influence the inter-organizational relationship structure in maritime logistics networks?</p>	<p>Except service complexity (Bask, 2001), six factors from industrial practice were identified through the interview: trade term; cargo type; shipping trade route; port type; cargo owner type; and market type. This reveals that the relationship strength in maritime logistics network is contingent.</p>	<ul style="list-style-type: none"> • This is the first time to identify a range of factors in practice which could influence the business relationship structure in the network, and present how are these factors' influences on the relationship strength of each link in the maritime literature. • Bearing in mind that there is a contingent fashion influencing the relationship structures in the networks, the managers can correctly recognize their firms' position in the networks, reaching the right customers and suppliers, and policy makers can design policies fitting the purpose.

Research Questions	Major Conclusions	Major Contributions
<p>RQ 3: What is the connection between the service complexity and inter-organizational relationship strength in maritime logistics networks?</p>	<ul style="list-style-type: none"> • From macro level analysis, the more complex service causes the higher relationship strength in the network, but with different increasing speed in each link in the network. • However, the results of the micro-level analysis show that only in the dimensions of communication and cooperation show significantly increasing strength. Further, there are many and the most increasing trend existing in FF-CO and FF-SC. • There are substantial gaps of the perceptions of relationship strength between COs-FFs and FFs-SCs. In such relationships, FFs always perceive the higher strength than the other trading partner. 	<ul style="list-style-type: none"> • A comprehensive and in-depth analysing approach which includes network perspective and multi-dimensional measurements of relationship strength is applied to empirically test the association between service types and the nature of relationship in them. This combination of analysing approach is the first time to be used in literature, which also successfully produce comprehensive and fruitful outcomes for theory and practice. • This research successfully demonstrates the subtle but crucial differences from the different levels of analysis, which is seldom conducted and reported in literature. This also contribute to suggest that researchers and practitioners cannot only look at the issue of the association between service complexity and relationship strength from a single perspective. • The findings which display that only specific dimensions of relationship strength and particular relationship links have the significantly increasing trend with the increase of service complexity, can contribute to refine the concept of matching relationship strategy (Bask, 2001).
<p>RQ 4: What is the connection between the service complexity and value perceived in maritime logistics networks?</p>	<ul style="list-style-type: none"> • Value derived does not always increase by service complexity for different players, and it may depend on the nature of the players. Only the values perceived by FFs and brand vendors/retailers within COs rise with the increase of the service complexity. • The origin of value is varied upon different type of main players. From both CO's and FF's views, the values generated from POs are significant lower. From SC's view, values generated from other trading partners are alike. From PO's view, value derived from SC are significant higher. • There are perception gaps of value received between pair players by different service complexity. Except the value generated from the routine service with SCs, COs underestimate almost of the values they received from different logistics services with the MLSPs. 	<ul style="list-style-type: none"> • In literature, this is the first work which has identified the origin of the value generated from different links, and the change of the value generation from different links between main players in line with different service complexity in the maritime logistics network. This part of research approach also can be applied to the other context in wilder field. • For practice, through identifying the value generated from different service complexity and different links in the networks, managers can get better values from the right types of service and the right relevant links in the networks. Furthermore, through this, the policy makers can pinpoint the player who creates more value in the maritime logistics networks to initiate proper industrial development projects or policies.

7.4 Industrial relevance of the thesis

This section will present the contributions that the thesis makes to practice, together with the practical impact, managerial implication, implications and applications for policy maker or government policy.

7.4.1 Managerial implications

Management of buyer-supplier relationships is crucial to the success of SCM in firms (Harland 1996). In order to maximize the value creation in the supply chain, strategic relationships with critical suppliers especially should be acknowledged (Chen et al. 2004). Literature has shown that successful management of buyer-supplier relationships contributes to firm performance (e.g. Tan et al. 1999). Easterby-Smith et al. (2012) report that interest in understanding the nature of networks in or between organizations has grown outside of academia as well. Similarly, it is essential to manage Inter-organisational or stakeholder relationships in maritime container transport chain (Wolff 2014).

Through this thesis, several critical contributions have been made for practice as follows: managers can use multi-dimensional measurements of relationship strength to evaluate the relationship strength between their own firms and the trading partners to develop appropriate relationship management strategies. The perception gaps of importance degree which were identified contribute to make practitioners to look at the relationship management issue from both sides rather than their own single side, and recognize their own position in the supply networks. Likewise, this research demonstrates the subtle but crucial differences from the different levels of analysis, this contribute to suggest that practitioners cannot only look at the issue of association between service complexity and relationship strength from a single perspective.

Bearing in mind that there is a contingent fashion influencing the relationship structures in the networks, the managers can correctly recognize their firms' position in the networks, reaching the right customers and suppliers, and keep proper relationships. In addition, through identifying the value generated from different service complexity and different links in the networks, manages can get better values from the right types of service and the right links in the networks.

Overall, through the knowledge about the dynamics of relationship strength and the value generated in the network, this study provides a foundation for industry to realize the whole structure of maritime logistics network and identify their own functions, positions and boundaries in the network. Further, based on the existing relationship structure found in this research, firms can find the potential markets, work out new business models, and develop effective and efficient collaborative and integration strategies with other trading players in the network.

7.4.2 Government policy implications

Maritime industry in some countries has an economy-wide effects on the nation. This demands researchers to provide policy-makers with accessible and reliable information regarding the role of the maritime industry (Kwak et al. 2005). The issue of maritime logistics systems is often involved in the policy of national development project. For example, governments play a part of offering incentives for promoting the shipping industries (Chiu and Lin,2012), deal with the port governance system and port reform (Cullinane and Wang 2006). Port authorities are always interested in their stakeholder relations management in order to cope with the changing environment (Notteboom 2002). Therefore, it is crucial for policy makers to learn the structure of the maritime logistics industry in order to design policies fitting for purpose. In contrast, if policy makers lack of clear insights into market dynamics, it could lead to wishful thinking by governments and an overoptimistic perspective on the logistics development potential of the regions concerned (Notteboom 2005).

This thesis provides a framework to look at the maritime logistics networks and rich insights within them, thus it helps policy makers who usually lack a clearly whole picture of the industry, to gain a deeper understanding of the relationship structure within the network. Such research can be beneficial for policy makers to correctly arrange the resources, implement appropriate industry strategies, and diagnose problems in the network.

For example, WTO and APEC (Asia-Pacific Economic Cooperation) always pursuit the solutions to facilitate the trade activities across countries, and international maritime service is the core part they focus on. However, they usually follow the traditional classification (Central Product Classification, CPC) which only divide maritime service as primary and ancillary activities, and lack a more dynamic picture of the whole maritime services and industry. This

research can provide a novel framework of analysis and a more comprehensive perspective to catch the dynamics of the maritime industry and the services it offers. In addition, as the double-derived nature of port operators and their potential opportunities to provide value-added service are identified in the thesis, policy makers should take proper actions if they are facing the challenges of running the declining ports.

Policy makers also can design policies much fitting the purpose by realizing that there is a contingent fashion influencing the relationship structures in the networks through this thesis. As quite a few perception gaps were identified through the comparison of different players' views and the outcomes from different levels of analysing approaches, governments or international organizations should take more comprehensive perspectives into account rather than just consider from a single view when making the policy related to maritime logistics industry. Furthermore, through identifying the value generated from different service complexity and different links in the networks, the policy makers can pinpoint the player who creates more value in the maritime logistics networks to initiate proper industrial development projects or policies.

7.5 Limitations to the thesis

Although a rigorous research process (detailed in Chapter 3) has been followed throughout this thesis, it is important to be aware of limitations of the research, and to make sure that the reader recognizes them. Three limitations of the thesis are presented below:

- (1) Because of the complexity of the whole network and the constraints of research resources, this research applied simplified network based on the concept of “ego network” from SNA (Borgatti and Li 2009), instead of the complete network. More comprehensive network would enable to provide more fully insight of the network dynamics.
- (2) This thesis looks at the maritime logistics network, specifically focus on the context of containerized ocean transport and logistics. The other types of ocean transport and logistics would develop very different relationship structure in the network (see Section 5.2.2).

- (3) In the interviews, it was found that different market of maritime trade can result in different relationship structure. The findings from this research were mainly based on the shipping routes that Taiwan-based firms are more familiar with, which are the trading routes between Asia–North America, Asia–Europe and Asia Pacific. Some other major markets have not been investigated, for example the Trans-Atlantic shipping trade route. Besides the geographic limitations, the research outcomes mainly emerged from the network of Taiwan-based firms, in which the characteristic of state ownership in some port operators and the guan-xi aspects in culture etc. may cause potential bias. Therefore, the networks developed based on different cultures may have varied relationship structures.
- (4) As the measurements of maritime logistics value have not been well developed, this thesis applied the measurement from logistics field (see Section 2.4.3), which is regarded as the difference between perceived benefits and perceived cost (Golicic and Mentzer 2006). The other measurements of value could be considered.

7.6 Suggestion for future research

As with any doctoral thesis, there are several constraints on the research, including time, finance and access to data. The limitations addressed above can be a good to suggest the directions for future research. Some other points will add to these suggestions and display as following:

- (1) A more comprehensive network could be included in the research model through the case study method with matched players (Kim et al. 2011). A specific type of cargo, for example cold chain cargo (Lam 2013), could be choose to explore the relationship structure along the maritime logistics network. The results of these individual level research can further confirm the findings of this thesis.
- (2) Applying the same framework of this research, the relationship structure of other types of ocean transport and logistics such as bulk shipping or other modes of international transport and logistics in the network, is worth for being explored. A very different relationship structure could be identified based on the framework of the thesis.

- (3) Besides the measurements in the thesis, the other measurements of value could be used, such as the financial data showing difference between the revenue generated and the cost spend (Lam 2013), in order to obtain more objective results.
- (4) Network benefit is an attractive topic which draw scholars' attention. It refers to the concept of the benefit from the network as a whole will more than the benefit coming from individual players in the network. Future research is suggested to identify such network benefit through the framework of this thesis and the broader application of SNA.

7.7 Summary

This chapter has highlighted the overall conclusions as well as the contributions that these make to the literature and industrial practice. The limitations brought about as a result of the methods and research scope adopted are also recognised, along with potential directions of further research.

Overall, from network perspective, this thesis has identified the dynamics of the relationship structure in the maritime logistics network, mainly considering the service complexity within a varied of influential factors. Not each link has the same level of integration in the network.

Generally, there is a positive correlation between service complexity and relationship strength. However, while looking into the micro level, not each directional link's each relationship strength dimension rises with the increase of service complexity. Likewise, there is a positive correlation between service complexity and value perceived. Nevertheless, while looking into the micro level, only the values perceived by FF in each types of service are statistically significant increasing.

Until now, there has been very little consideration of using network perspective to analyse the relationship dynamics and value generated in the maritime logistics, and therefore this thesis represents a clear contribution to the literature.

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Appendices

Appendix A.1

ETHICS 2

**FULL ETHICAL APPROVAL FORM
(STAFF/PHD STUDENTS) or students referring
their form for a full ethical review**



(For guidance on how to complete this form, please see Learning Central – CARBS RESEARCH ETHICS)

If your research will involve patients or patient data in the NHS then you should secure approval from the NHS National Research Ethics Service. Online applications are available on <http://www.nres.npsa.nhs.uk/applicants/>

NB: Safety Guidelines for researchers working alone on projects – please go to this University's web link to learn about safety policies - <http://www.cf.ac.uk/osheu/index.html>

Name of Lead Researcher : Shang-Min, Lin (known as Moses)

School: Cardiff Business School

Email: LinS3@cardiff.ac.uk

Names of other Researchers:

Email addresses of other Researchers :

Title of Project:

Research of maritime logistics supply chain integration

Start and Estimated End Date of Project: Jan. 2012- Apr.2015

Aims and Objectives of the Research Project:

This research will explore the correlation between the complexity of the maritime logistics services provision and the type of business relationship required to support it. This study will investigate the matching relationships between shipper, maritime logistics service provider (MLSP, including shipping carrier and freight forwarder) and port operator based on the complexity of the maritime logistics service provision for shipper. Furthermore, the correlation between such matching relationships and triadic benefits (e.g. shipper's satisfaction as well as MLSP's business performance) will be examined.

Please indicate any sources of funding for this project:

APPLICATION APPROVED
RESEARCH ETHICS COMMITTEE
CARDIFF BUSINESS SCHOOL
CARDIFF UNIVERSITY

1. Describe the methodology to be applied in the project

Formulation of the research approach takes reference from the social and business research design literature (e.g. Bryman and Bell 2011). This research is composed of three main phases: literature review for knowledge development, semi-structured interviews for exploratory study and questionnaire survey for confirmatory study. This ethical approval form is for the second phase task which mainly includes semi-structured interviews with practitioners.

Semi-structured interviewing is more flexible than standardised methods such as the structured interview or survey. Although the interviewer in this technique will have some established general topics for investigation, this method allows for the exploration of emergent themes and ideas rather than relying only on concepts and questions defined in advance of the interview (ESDS 2013).

An interview topic guide with set questions (shown in appendix 1) will be asked of all respondents. The questions will tend to be asked in a similar order and format to make a form of comparison between answers possible. However, there is also scope for pursuing and probing for novel, relevant information, through additional questions often noted as prompts on the guide. The interviewer frequently has to formulate impromptu questions in order to follow up leads that emerge during the interview. The interviewer will encourage the interviewees to talk about their views and experiences in depth but with limited reciprocal engagement or disclosure.

ETHICS 2

Reference:

Bryman, A. Bell, E. 2011, Business Research Methods, Oxford University Press.
 ESDS. 2013. Economic and Social Data Service: Qualidata teaching resource: exploring diverse interview types. [Online]. Available at: <http://www.esds.ac.uk/qualidata/support/interviews/semi.asp> [Accessed: 25 June 2013].

2. Describe the participant sample who will be contacted for this Research Project. You need to consider the number of participants, their age, gender, recruitment methods and exclusion/inclusion criteria

Three sets of face to face semi-structured interviews with professionals from Taiwan-based companies and authorities (including shippers, shipping carriers, freight forwarders and port operators) will be conducted. They are respectively involved in three different types of maritime logistics chain for three different types of cargo (general cargo, refrigerated cargo, automotive cargo). The total number of participants who come from such companies and authorities will be about 15, aged from 30 to 65, and the majority of the participants are male. These participants are expected to be familiar with operational or strategic aspects for the above-mentioned services. They are mainly recruited through the interviewer's professional connections and considering their current job. Therefore, there are no gender and age discrimination issues.

3. Describe the method by which you intend to gain consent from participants.

Consent from participants will be sought by telephone and e-mail prior to the start of interviews. As part of the interview process, a brief introduction to the research purpose and plan will be given. This will also ensure the clarity of ethical considerations between interviewer and interviewee. Participation in this research is entirely voluntary and each interviewee can withdraw from the research at any time without giving a reason. Permission will also be sought to record the information from interviews. The summary of the research findings will be available to the participants at the end of the entire research work. The invitation letter and the consent form which will be given to prospective participants are shown as appendix 2, appendix 3-1 and appendix 3-2.

4. Please make a clear and concise statement of the ethical considerations raised by the project and how you intend to deal with them throughout the duration of the project (please use additional sheets where necessary)

Relevant steps to be taken in this research will rigorously follow the Association Business Schools (ABS) ethics guide. Appropriate anonymity and confidentiality will be guaranteed for the participants. Respondents will be informed that their details will be kept anonymous in the final version of the thesis. Respondents will have the right not to answer any questions during the session. If required, the respondent is able to answer "no comment" at anytime if they feel uncomfortable about the question. In addition, permission will be granted for the interview to be recorded. Notes will be taken during interviewing and the respondent has the right to review the notes made during the session. If specified by the respondent, the name of the respondent will not be recorded on the tape and will be substituted by letters (i.e. Mr. A). These recorded materials will be kept locked in a suitable case or encrypted digitally when not being used.

Please complete the following in relation to your research project:

5		Yes	No	n/a
(a)	Will you describe the main details of the research process to participants in advance, so that they are informed about what to expect?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b)	Will you tell participants that their participation is voluntary?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c)	Will you obtain written consent for participation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d)	Will you tell participants that they may withdraw from the research at any time and for any reason?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e)	If you are using a questionnaire, will you give participants the option of omitting questions they do not want to answer?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(f)	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(g)	Will you offer to send participants findings from the research (e.g. copies of publications arising from the research)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(h)	If working with children and young people please confirm that you have visited this website : Working with children and young people and vulnerable adults please go to web link - http://www.cardiff.ac.uk/racdv/ethics/guidelines/index.html	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(i)	DATA PROTECTION: (A) Will any non-anonymised and/or personalised data be generated? (B) If "YES" will it be stored beyond the end of the project/archived? http://www.cardiff.ac.uk/socsi/research/researchethics/destructionofdata/index.html	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

PLEASE NOTE:

If you have ticked **No** to any of 5(a) to 5(g), please give an explanation on a separate sheet.
(Note: N/A = not applicable)

If there are any other potential ethical issues that you think SREC should consider please explain them on a separate sheet. It is your obligation to bring to the attention of the Committee any ethical issues not covered on this form and checklist.

X Signed: Shang-Min, Lin
(Principal Researcher/Student)
Print Name: Shang-Min, Lin
Date: 4. July. 2013

SUPERVISOR'S DECLARATION (Student researchers only): As the supervisor for this student project I confirm that I believe that all research ethical issues have been dealt with in accordance with University policy and the research ethics guidelines of the relevant professional organisation.

X Signed: A. Potter
Print Name: ANDREW POTTER
Date: 4/7/13

TWO copies of this form (and attachments) MUST BE OFFICIALLY STAMPED by Ms Lainey Clayton, Room F43, Cardiff Business School BEFORE any research project work is undertaken

STATEMENT OF ETHICAL APPROVAL

This project has been considered using agreed School procedures and is now approved.

Official stamp of approval of the School
Research Ethics Committee:

Date: 27.7/2013

APPLICATION APPROVED
RESEARCH ETHICS COMMITTEE
CARDIFF BUSINESS SCHOOL
CARDIFF UNIVERSITY

Appendix 2: Invitation letter



Logistics and Operations Management Section
Cardiff Business School
Aberconway Building
Cardiff University
Cardiff, UK
CF10 3EU
E-mail: LinS3@cardiff.ac.uk

Company address

APPLICATION APPROVED
RESEARCH ETHICS COMMITTEE
CARDIFF BUSINESS SCHOOL
CARDIFF UNIVERSITY

Dear (name),

I am a second-year PhD student at Cardiff Business School conducting the academic research on the topic of supply chain integration in maritime logistics. The main purpose of this research is to explore the correlation between the complexity of the maritime logistics services provision and the type of business relationship required to support it. This study will investigate the matching relationships between shipper, maritime logistics service provider (MLSP, including shipping carrier and freight forwarder) and port operator based on the complexity of the maritime logistics service provision for shipper. Furthermore, the correlation between such matching relationships and triadic benefits (e.g. shipper's satisfaction as well as MLSP's business performance) will be examined.

As your company/authority is involved in the specific type of maritime logistics chain for general/refrigerated/automotive cargo, conducting an in-depth semi-structured interview with you or the person whom you suggest will help to give valuable insight for this research. Therefore, I am making a request to gain access to the relevant interviewee, and look forward to working with you to complete this research.

To protect the participant's privacy, this research will comply with the highest ethical standards and will not disclose any interviewee's personal identifiers to any third party. I also promise all data collected from participants will be used only for research purposes.

Thank you very much in advance for your support.

Yours sincerely,
(Legible signature)

Shang-Min, Lin

PhD student
Logistics and Operations Management Section
Cardiff Business School
Cardiff University

Appendix 3-2: Informed consent declaration

Informed Consent Declaration – For Research Participants

This study is being conducted by Shang-Min, Lin who is a PhD student in Cardiff Business School under the supervision of Dr Andrew Potter (PotterAT@cf.ac.uk), Dr Stephen Pettit (Pettit@cf.ac.uk) and Dr Rawindaran Nair (Nairr1@cf.ac.uk).

Participation in the research project will involve being interviewed on the topic of supply chain integration in maritime logistics.

Participation in the study is entirely voluntary and participants can withdraw from the study at any time without giving a reason. Participants may also ask questions at any time and discuss any concerns with either the researcher Shang-Min, Lin (LinS3@cardiff.ac.uk) or Dr Andrew Potter (PotterAT@cf.ac.uk).

The findings of the study will form part of the thesis for my PhD.

All information provided during the interview will be held anonymously so that it will not be possible to trace information or comments back to individual contributors. Information will be stored in accordance with the current Data Protection Act.

Participants can request information and feedback about the purpose and results of the study by applying directly to the researcher Shang-Min, Lin (LinS3@cardiff.ac.uk).

*Shang-Min, Lin (no.1125940)
4 July 2013*

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CARDIFF BUSINESS SCHOOL
CARDIFF UNIVERSITY

Appendix 3-2: Informed consent declaration

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Participants can request information and feedback about the purpose and results of the study by applying directly to the researcher Shang-Min, Lin (LinS3@cardiff.ac.uk).

4 July 2013
Researcher — Shang-Min, Lin
Cardiff Business School
Cardiff University
CF10 3EU

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CARDIFF UNIVERSITY

Appendix A.2

Interview Questions

Part 1 Interviewee information

- (1) Which role are your company/organization playing (e.g. shipper, shipping carrier, freight forwarder and port operator)?
- (2) What kind(s) of cargo (or product) are you dealing with (containerised general cargo, refrigerated cargo, automotive cargo (include car parts or car) or other -kind of cargo_____) ?
- (3) What are your company's main service or trade areas or lines?
- (4) What is your position within your company or organization? (Which department are you working for?)
- (5) How long have you been working in this company/organization and industry?
- (6) How many employees/members in your company/organization?

Part 2-1 Major players in maritime logistics chain

- (1) Which players do you think are the major players who should be included in the maritime logistics chain?
- (2) Do you agree that we can summarize the most major three players as shipper, maritime logistics service provider (MLSP, includes shipping carrier and freight forwarder) and port operator in the maritime logistics chain integration research? If you don't agree, why not and do you have any other comments?
- (3) In most maritime studies, consignor (shipper) and consignee (customer) are taken as the same analysing unit which is the shipper. Do you agree with this assumption in this maritime logistics chain integration research? If you don't agree, why not and do you have any other comments?
- (4) Which above-mentioned player do you think is the integrator (who is able to coordinate network factors (resources, actors and activities)) within the maritime logistics chain? Or does it depend on different situations (e.g. terms of trade and terms of sale (e.g. CIF, FOB), types of cargo involved, cargo generating power of the shipper, or the characteristics related to specific trade routes) and so on?
- (5) Which player evaluates your company's (or organization's) performance?

Part 2-2 Relationships between major players in maritime logistics chain

- (1) Do you think shipper-MLSP relationship (relationship 1 in **figure 1**) is buyer-supplier relationship, and MLSP-port operator relationship (relationship 2 in **figure 1**) is buyer-supplier relationship as well? How about the relationship between shipper and port operator (relationship 3 in **figure 1**)?
- (2) Do you agree with the research framework of these relationships which are shown as **figure 1**? If you don't agree, what are your comments?
- (3) Do you agree that such framework of triadic business relationships between shipper, MSLP and port operator can capture more realistic interaction between these three players and more essence of the maritime logistics chain than respectively dyadic relationships (e.g. relationships between shipper-MLSP, MLSP-port operator and shipper-port operator respectively)? If not, why not and do you have any other comments?
- (4) Generally, at this moment, what relationships do you think exist between these major players (e.g. integrated level from loose to close; from independent, an arms' length short-term operational relationship, partnerships, long-term collaborative, cooperative relationship, sharing ownership, establishing subsidiary; from operational, tactic to strategic integration; what kind of ICT is using, what information is sharing; what kind of bid and contract, how many suppliers and buyers)?
- (5) Ideally, what extent or level of these relationships do you think should be kept?
- (6) What reasons do you think will influence such relationships (e.g. customer's needs, different cargos (products), different types (e.g. complexity) of service, different trade terms (e., market structure, market **power**, organization's self-interest (e.g. keeping flexibility, cost consideration)))? What barriers do you think will influence such relationships?

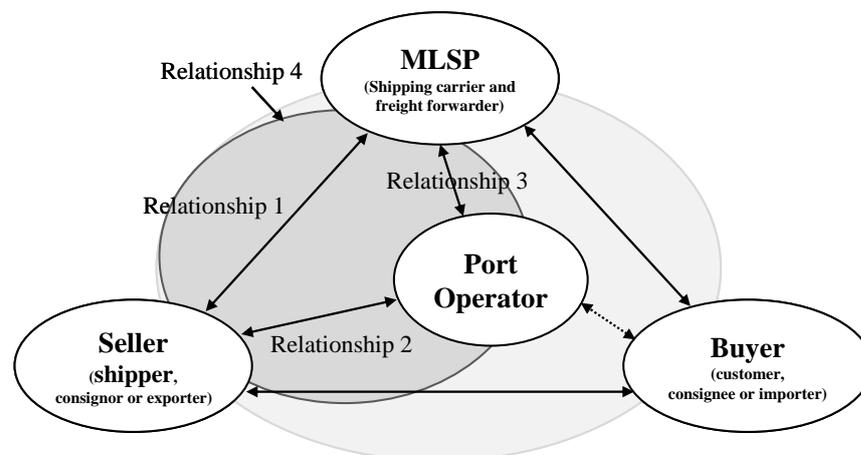


Figure 1. Relationships among shipper, MLSP and port/terminal operator

Part 2-3 Service provided by MLSP and port operator

- (1) In your opinion, what are the needs of shippers for the MLSP as well as the port operator, and the needs of MLSP for port operator from the perspective of SCM (Supply Chain Management)?
- (2) Do you think the MLSP offers different service provision according to different complexity of service needs (simple, medium, or complex according to the level of customized) for different kinds of cargos (or product, different types of supply chain, different level of customization, different trade term, different distance of trade route, regional or global trade route, different trade market, CY or CFS, and so on)?

Part 2-4 Matching relationship and triadic benefit

- (1) In your opinion, what are the matching (more effective and efficient) relationship 1 to relationship 4 respectively in **figure 1** for different complexity of service provisions? Do you agree that all relationships need not be closely integrated and coordinated throughout the maritime logistics chain?
- (2) Could you identify different kinds of service strategies, namely: routine service, standard service and customised service which your company/organization provides or receive by different needs according to above concept?
- (3) Do you agree that the maritime logistics service for containerised general cargo, refrigerated cargo and automotive cargo can properly reflect the above-mentioned three different kinds of service strategies respectively?
- (4) In your opinion, what is the correlation between matching relationships among these three members and the triadic benefit (or value from the network, e.g. shipper's satisfaction, MLSP's business performance, performance of the whole maritime logistics chain)?

Part 3 Further comments

Are there some other comments you would like to make for this research?

Appendix B.1

ETHICS 2

FULL ETHICAL APPROVAL FORM
(STAFF/PHD STUDENTS) or students referring
their form for a full ethical review



(For guidance on how to complete this form, please see Learning Central – CARBS RESEARCH ETHICS)

If your research will involve patients or patient data in the NHS then you should secure approval from the NHS National Research Ethics Service. Online applications are available on <http://www.nres.npsa.nhs.uk/applicants/>

NB: Safety Guidelines for researchers working alone on projects – please go to this University’s web link to learn about safety policies - <http://www.cf.ac.uk/osheu/index.html>

Name of Lead Researcher : Shang-Min, Lin (known as Moses)

School: Cardiff Business School

Email: LinS3@cardiff.ac.uk

Names of other Researchers:

Email addresses of other Researchers :

Title of Project:

Research on maritime logistics supply chain integration

Start and Estimated End Date of Project: Jan. 2012- Sep.2015

Aims and Objectives of the Research Project:

This research will measure the business relationship strength between cargo owners, freight forwarders, shipping carriers and port operators in the maritime logistics network, by the service complexity. Meanwhile, the value generated from the business relationships between these major players and the overall network will be evaluated.

Please indicate any sources of funding for this project:

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Cardiff University

1. Describe the methodology to be applied in the project

This research is composed of three main phases: literature review for knowledge development, semi-structured interviews for exploratory study and questionnaire survey for confirmatory study. The first two phases has been completed. This ethical approval form is for the third phase task which is questionnaire survey with practitioners.

In line with the social and business research design literature (e.g. Bryman and Bell 2011), survey research is a cross-sectional design in relation to which data are collected mainly by self-completion questionnaire or by structured interview on more than one case and at a single point in time in order to collect a body of quantitative or quantifiable data in connection with two or more variables. A questionnaire for this task has been designed (shown in appendix 1), and will be conducted with all the participants accordingly.

Reference: Bryman, A. Bell, E. 2011, Business Research Methods, Oxford University Press.

2. Describe the participant sample who will be contacted for this Research Project. You need to consider the number of participants, their age, gender, recruitment methods and exclusion/inclusion criteria

The questionnaire survey will be conducted with the professionals from Taiwan-based companies and authorities (including cargo owners, shipping carriers, freight forwarders and port operators). These participants are expected to be familiar with operational or strategic aspects for the above-mentioned business practice. The total number of respondents who come from such companies and authorities will be about 100, aged from 30 to 65, and the majority of the participants are likely to be male (reflecting the demographics of this industrial sector). They are mainly recruited through the researcher’s professional connections and considering their current job. Therefore, there are no gender and

ETHICS 2

age discrimination issues.

3. Describe the method by which you intend to gain consent from participants.

Consent from participants will be sought by telephone and e-mail prior to the start of survey. As part of the survey process, a brief introduction to the research purpose and plan will be given. This will also ensure the clarity of ethical considerations for the participants. Participation in this research is entirely voluntary and each participant can withdraw from the research at any time without giving a reason. The summary of the research findings will be available to the participants at the end of the entire research work. The invitation letter and the consent form which will be given to prospective participants are shown as appendix 2 and appendix 3.

4. Please make a clear and concise statement of the ethical considerations raised by the project and how you intend to deal with them throughout the duration of the project (please use additional sheets where necessary)

Relevant steps to be taken in this research will rigorously follow the Association Business Schools (ABS) ethics guide. Appropriate anonymity and confidentiality will be guaranteed for the participants. Respondents will be informed that their details will be kept anonymous in the final version of the thesis. Respondents will have the right not to answer any questions in the questionnaire. If required, the respondent is able to answer "no comment" at anytime if they feel uncomfortable about the question.

Please complete the following in relation to your research project:

5		Yes	No	n/a
(a)	Will you describe the main details of the research process to participants in advance, so that they are informed about what to expect?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b)	Will you tell participants that their participation is voluntary?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c)	Will you obtain written consent for participation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d)	Will you tell participants that they may withdraw from the research at any time and for any reason?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e)	If you are using a questionnaire, will you give participants the option of omitting questions they do not want to answer?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(f)	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(g)	Will you offer to send participants findings from the research (e.g. copies of publications arising from the research)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(h)	If working with children and young people please confirm that you have visited this website : Working with children and young people and vulnerable adults please go to web link - http://www.cardiff.ac.uk/racdv/ethics/guidelines/index.htm	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(i)	DATA PROTECTION: (A) Will any non-anonymised and/or personalised data be generated? (B) If "YES" will it be stored beyond the end of the project/archived? http://www.cardiff.ac.uk/socsi/research/researchethics/destructionofdata/index.html	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

PLEASE NOTE:

If you have ticked No to any of 5(a) to 5(g), please give an explanation on a separate sheet.
(Note: N/A = not applicable)

If there are any other potential ethical issues that you think SREC should consider please explain them on a separate sheet. It is your obligation to bring to the attention of the Committee any ethical issues not covered on this form and checklist.

Signed:
(Principal Researcher/Student)
Print Name: Shang-Min Lin

Shang-Min Lin

Date: 6 /10/14

SUPERVISOR'S DECLARATION (Student researchers only): As the supervisor for this student project I confirm that I believe that all research ethical issues have been dealt with in accordance with University policy and the research ethics guidelines of the relevant professional organisation.

Signed: 

Print Name: Dr. Andrew Potter

Date: 10/10/14

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Research Ethics Committee
Cardiff Business School
Cardiff University

TWO copies of this form (and attachments) MUST BE OFFICIALLY STAMPED by Ms Lainey Clayton, Room F43, Cardiff Business School BEFORE any research project work is undertaken

STATEMENT OF ETHICAL APPROVAL

This project has been considered using agreed School procedures and is now approved.

Official stamp of approval of the School
Research Ethics Committee

Date: 

APPLICATION APPROVED
Research Ethics Committee
Cardiff Business School
Cardiff University

Appendix B.2

Questionnaire for Evaluating Business Relationship and Values in the Maritime Logistics Network

Dear Sir/Madam,

The main purpose of this questionnaire is to examine the business relationship structure and values in the maritime logistics network, which is part of my PhD research. As an experienced professional working in the maritime logistics network, you are invited to provide your professional perceptions for following questions.

Your participation in this questionnaire survey is entirely voluntary. The information gathered in this survey will be treated in the strictest confidence and be used only for academic research purposes. This survey will take you about 10 to 15 minutes to complete. If you consent to participate in this survey, please fill out the questionnaire and send it back to us by e-mail. If you have any queries or concerns regarding the survey, please contact either myself or my supervisor, Dr. Andrew Potter (PotterAT@cardiff.ac.uk).

Thank you very much for your anticipated co-operation in advance.

Yours Sincerely,

Shang-Min (Moses) Lin

PhD Student
Logistics and Operations Management Section,
Cardiff Business School, Cardiff University, UK
Room D46 Aberconway Building, Cardiff, CF10 3EU, UK
Tel: +44-(0)2920 875480
Email: Lcompassion@gmail.com or LinS3@cardiff.ac.uk



Part 1: Participant's information

1. What is the nature of your company (multiple selections applicable)?

- | | |
|---|---|
| 1. <input type="checkbox"/> Shipping carrier (<input type="checkbox"/> Shipping agent) | 4. <input type="checkbox"/> Port operator |
| 2. <input type="checkbox"/> Ocean freight forwarder | 5. <input type="checkbox"/> Other _____ |
| 3. <input type="checkbox"/> Cargo owner | |

2. What is your position in your company?

- | | |
|---|--|
| 1. <input type="checkbox"/> Vice managing director or above | 4. <input type="checkbox"/> Clerk |
| 2. <input type="checkbox"/> Vice president or above | 5. <input type="checkbox"/> Sales representative |
| 3. <input type="checkbox"/> Manager/assistant manager | 6. <input type="checkbox"/> Other _____ |

3. Which department are you working for?

- | | |
|---|---|
| 1. <input type="checkbox"/> Management department | 4. <input type="checkbox"/> Marketing department |
| 2. <input type="checkbox"/> Finance department | 5. <input type="checkbox"/> Purchasing department |
| 3. <input type="checkbox"/> Operating department | 6. <input type="checkbox"/> Other _____ |

4. How long have you been working in the trading, manufacturing, brand vendor, logistics and shipping industry)?

- | | |
|---|--|
| 1. <input type="checkbox"/> 1-5 years | 4. <input type="checkbox"/> 16-20 years |
| 2. <input type="checkbox"/> 6-10 years | 5. <input type="checkbox"/> Above 20 years |
| 3. <input type="checkbox"/> 11-15 years | |

5. What is your company's number of years in the business?

- | | |
|---|--|
| 1. <input type="checkbox"/> 1-5 years | 4. <input type="checkbox"/> 16-20 years |
| 2. <input type="checkbox"/> 6-10 years | 5. <input type="checkbox"/> Above 20 years |
| 3. <input type="checkbox"/> 11-15 years | |

6. Please indicate the number of employees in your company: _____employees

7. Please indicate your company's capital.

- | | |
|---|--|
| 1. <input type="checkbox"/> Less than 300,000 USD | 3. <input type="checkbox"/> 3,000,001-60,000,000 USD |
| 2. <input type="checkbox"/> 300,000-3,000,000 USD | 4. <input type="checkbox"/> More than 60,000,000 USD |

8. Please indicate your company's main business area (multiple selections applicable).

- | | |
|---|---|
| 1. <input type="checkbox"/> North America | 5. <input type="checkbox"/> South America |
| 2. <input type="checkbox"/> Europe | 6. <input type="checkbox"/> Africa |
| 3. <input type="checkbox"/> Asia | 7. <input type="checkbox"/> Other _____ |
| 4. <input type="checkbox"/> Oceania | |

9. Please indicate your company's annual revenue.

- | | |
|--|---|
| 1. <input type="checkbox"/> Less than 1,500,000USD | 3. <input type="checkbox"/> 15,000,000-60,000,000 USD |
| 2. <input type="checkbox"/> 1,500,000-15,000,000 USD | 4. <input type="checkbox"/> More than 60,000,000 USD |

Part 2: Measuring the level of importance for business relationship ties between major players in the maritime logistics network

1. In this research, there are 4 major players and 6 business relationship ties between them in the maritime logistics network (see Note¹ and Fig.1). **Please indicate the level of importance for each of these business relationship ties by giving a number from 1 to 5 (1 = least important, 5 = most important):**

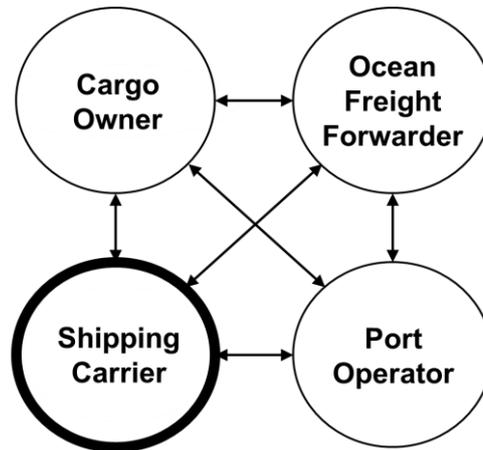


Fig.1

Business relationship ties	Level of importance (1 = least important, 2 = not important, 3 = Neutral, 4 = important, 5 = most important)
Shipping Carrier – Cargo Owner	
Shipping Carrier – Ocean Freight Forwarder	
Shipping Carrier – Port Operator	
Ocean Freight Forwarder – Cargo Owner	
Ocean Freight Forwarder – Port Operator	
Cargo Owner – Port Operator	

Note¹ : The further information of these 4 major players are as follows:

- (1) **Shipping carrier** : Container shipping carrier
- (2) **Ocean freight forwarder**
- (3) **Port operator**: includes port company/authority, and terminal operator
- (4) **Cargo owner/shipper**: which have ever used the container shipping and related logistics service

Part 3: Evaluating the relationship strength and value between major players by complexity of maritime logistics service

1. In this research, there are 3 types of maritime logistics service according to the degree of customized as follows. Please approximately indicate **how much percentage for each type of service you have ever provided by cargo volume.**

	Percentage by cargo volume (%)
<p>(1) Routine service</p> <ul style="list-style-type: none"> – Simple services that do not contain any specific arrangements, such as: <ul style="list-style-type: none"> • Basic shipping transport, cargo handling, e.g. general dry container cargo 	
<p>(2) Easily-customized service</p> <ul style="list-style-type: none"> – Services which contain some easily customized types of operations, such as: <ul style="list-style-type: none"> • Special transportation arrangement where products need to be cooled/heated, or moved in a special package or specific equipment (e.g. use special container) , e.g. the transportation of reefer cargo, DG cargo, vulnerable cargo, out of gauge and heavy lift cargo • Or combination with two functions, e.g. shipping transport plus inland transport, or transportation plus terminal service by customer needs • Or priority or guaranteed service offering 	
<p>(3) Highly-customized service</p> <ul style="list-style-type: none"> – Customers highly influence services output and services flexibility, such as: <ul style="list-style-type: none"> • Logistics service providers have to invest extra and dedicated resources to meet customers’ specific needs, or make more efforts for co-ordination of work and joint planning with customers, e.g. dedicated EDI, project cargo, turnkey • Or highly integrated service, e.g. single window service for VIP, total solution 	

2. According to these different types of maritime logistics service, please indicate the level of agreement with each of the following statement describing the **business relationship strength between your firm and the major cargo owners you are dealing with** (1: Strongly Disagree , 2: Disagree , 3: Neither Agree or Disagree , 4: Agree , 5: Strongly Agree) :

When my firm provides each of the following service,	Routine service	Easily-customized service	Highly-customized service
my firm has very frequent interactions with the cargo owners , sharing quality information (Communications).			
my firm often works, plans, operates and controls together with the cargo owners to offer the best logistics solution (Cooperation).			
the contract lengths between my firm and the cargo owners are usually long-term (Relationship Duration).			
my firm has a strongly enduring desire to maintain a valued long-term business relationship with the cargo owners (Commitment).			
my firm has strong confidence in the cargo owners' reliability and integrity, viewing each other as the strategic partner sharing risks and benefits (Trust).			
my firm has a strong need of specific resources from the cargo owners to achieve desired goals (Dependency).			

3. According to these different types of maritime logistics service, please indicate the level of agreement with each of the following statement describing the **business relationship strength between your firm and the major ocean freight forwarders you are dealing with**

(1: Strongly Disagree, 2: Disagree, 3: Neither Agree or Disagree, 4: Agree, 5: Strongly Agree) :

When my firm provides each of the following service,	Routine service	Easily-customized service	Highly-customized service
my firm has very frequent interactions with the freight forwarders , sharing quality information (Communications).			
my firm often works, plans, operates and controls together with the freight forwarders to offer the best logistics solution (Cooperation).			
the contract lengths between my firm and the freight forwarders are usually long-term (Relationship Duration).			
my firm has a strongly enduring desire to maintain a valued long-term business relationship with the freight forwarders (Commitment).			
my firm has strong confidence in the freight forwarders' reliability and integrity, viewing each other as the strategic partner sharing risks and benefits (Trust).			
my firm has a strong need of specific resources from the freight forwarders to achieve desired goals (Dependency).			

4. According to these different types of maritime logistics service, please indicate the level of agreement with each of the following statement describing the **business relationship strength between your firm and the major port operators you are dealing with** (1: Strongly Disagree, 2: Disagree, 3: Neither Agree or Disagree, 4: Agree, 5: Strongly Agree) :

When my firm provides each of the following service,	Routine service	Easily-customized service	Highly-customized service
my firm has very frequent interactions with the port operators , sharing quality information (Communications).			
my firm often works, plans, operates and controls together with the port operators to offer the best logistics solution (Cooperation).			
the contract lengths between my firm and the port operators are usually long-term (Relationship Duration).			
my firm has a strongly enduring desire to maintain a valued long-term business relationship with the port operators (Commitment).			
my firm has strong confidence in the port operators' reliability and integrity, viewing each other as the strategic partner sharing risks and benefits (Trust).			
my firm has a strong need of specific resources from the port operators to achieve desired goals (Dependency).			

5. Please indicate the level of agreement with each of the following statement describing the **value (the difference between benefits received and costs sacrificed) your firm gains from different types of maritime logistics service** (1: Strongly Disagree, 2: Disagree, 3: Neither Agree or Disagree, 4: Agree, 5: Strongly Agree, the higher value the more agreement) :

	Level of agreement
When my firm provides each of the following service, my firm gains more value/per input from this service comparing with other two services	
Routine service	
Easily-customized service	
Highly-customized service	

6. Please indicate the level of agreement with each of the following statement describing the **value (the difference between benefits received and costs sacrificed) generated from different business relationship ties** (1: Strongly Disagree, 2: Disagree, 3: Neither Agree or Disagree, 4: Agree, 5: Strongly Agree, the higher value the more agreement) :

	Tie between my firm and cargo owner	Tie between my firm and ocean freight forwarder	Tie between my firm and port operator
By providing the routine service , my firm receives more value from each of the following business relationship tie			
easily-customized service , my firm receives more value from each of the following business relationship tie			
highly-customized service , my firm receives more value from each of the following business relationship tie			

7. Other comments:

Please leave your contact information for further contact if needed, or to receive a summary of the survey findings.

Tel. no.: _____

海運物流鏈中商業關係結構及價值之評估問卷

貨櫃航商觀點

海運及業界先進,您好:

後學服務於交通部航政司，主辦航運產業發展業務，承蒙工作時向業界先進們學習所累積基礎，目前獲行政院選送赴英國卡地夫大學攻讀海運政策及國際物流博士學位，研究產業發展政策，很高興我的研究有您的參與。

您在業界的經驗及專業意見對於本研究非常重要，完成填答時間預計 10 至 20 分鐘，您填答的內容將依英國商學院學術倫理規範保密處理。若有任何疑問可連絡我本人及我的指導教授 Dr. Andrew Potter (PotterAT@cardiff.ac.uk)，感謝您的寶貴意見及時間。

林上閔 敬上

交通部航政司技正 &

英國卡地夫大學物流及運籌系博士研究生



Logistics and Operations Management Section,
Cardiff Business School, Cardiff University, UK
Email: LinS3@cardiff.ac.uk, 或 Lcompassion@gmail.com



本問卷研究目標：

以不同客製化程度的海運物流服務作為考量因素，評估海運物流鏈中主要業者間的商業關係強度，及所產生的價值。

第一部分: 個人資料 (請勾選)

1. 請問您公司經營屬性為何? (可複選)

- | | |
|---|--|
| 1. <input type="checkbox"/> 貨櫃航商 (<input type="checkbox"/> 船務代理) | 4. <input type="checkbox"/> 港口經營者 (<input type="checkbox"/> 港務單位,
<input type="checkbox"/> 港公司, <input type="checkbox"/> 貨櫃裝卸業,
<input type="checkbox"/> 港區倉儲業) |
| 2. <input type="checkbox"/> 海運承攬運送業者
(<input type="checkbox"/> 國際物流業者) | 5. <input type="checkbox"/> 其他 _____ |
| 3. <input type="checkbox"/> 貨主 (<input type="checkbox"/> 賣家, <input type="checkbox"/> 買家), 產品: _____ | |

2. 請問您的職稱為何?

- | | |
|---|--------------------------------------|
| 1. <input type="checkbox"/> 總經理及以上 / 副總經理 | 4. <input type="checkbox"/> 職員 |
| 2. <input type="checkbox"/> 協理 / 副協理 | 5. <input type="checkbox"/> 業務代表 |
| 3. <input type="checkbox"/> 經理 / 課長 | 6. <input type="checkbox"/> 其他 _____ |

3. 請問您所屬的部門為何?

- | | |
|-------------------------------------|--------------------------------------|
| 1. <input type="checkbox"/> 管理部門 | 4. <input type="checkbox"/> 業務行銷部門 |
| 2. <input type="checkbox"/> 營運部門 | 5. <input type="checkbox"/> 採購部門 |
| 3. <input type="checkbox"/> 作業及技術部門 | 6. <input type="checkbox"/> 其他 _____ |

4. 請問您在海運、港口、物流、製造及進出口等相關產業的工作年資為何?

- | | |
|-------------------------------------|-------------------------------------|
| 1. <input type="checkbox"/> 1-5 年 | 4. <input type="checkbox"/> 16-20 年 |
| 2. <input type="checkbox"/> 6-10 年 | 5. <input type="checkbox"/> 超過 20 年 |
| 3. <input type="checkbox"/> 11-15 年 | |

5. 請問您公司成立約幾年?

- | | |
|-------------------------------------|-------------------------------------|
| 1. <input type="checkbox"/> 1-5 年 | 4. <input type="checkbox"/> 16-20 年 |
| 2. <input type="checkbox"/> 6-10 年 | 5. <input type="checkbox"/> 超過 20 年 |
| 3. <input type="checkbox"/> 11-15 年 | |

6. 請問您公司員工人數? 約 _____ 人

7. 請問您公司資本額(新台幣)約多少?

- | | |
|---|---|
| 1. <input type="checkbox"/> 少於 1000 萬元 | 3. <input type="checkbox"/> 1 億元至 20 億元以下 |
| 2. <input type="checkbox"/> 1000 萬元至 1 億元以下 | 4. <input type="checkbox"/> 20 億元及以上 |

8. 請問您公司主要的經營市場為何(可複選)?

- | | |
|--|--------------------------------------|
| 1. <input type="checkbox"/> 北美 | 5. <input type="checkbox"/> 南美 |
| 2. <input type="checkbox"/> 歐洲 | 6. <input type="checkbox"/> 非洲 |
| 3. <input type="checkbox"/> 亞洲 | 7. <input type="checkbox"/> 其他 _____ |
| 4. <input type="checkbox"/> 大洋洲(包括澳洲等) | |

9. 請問您公司年營業額(新台幣)約多少?

- | | |
|---|--|
| 1. <input type="checkbox"/> 少於 5000 萬元 | 3. <input type="checkbox"/> 5 億元至元 20 億元以下 |
| 2. <input type="checkbox"/> 5000 萬元至 5 億元以下 | 4. <input type="checkbox"/> 20 億元及以上 |

第二部分: 評估海運物流鏈中主要環節的重要程度

8. 在執行海運物流業務時，海運物流鏈中有一些主要角色及環節(如註²及圖 1)，您認為這些環節的重要性分別為何？請於下表右欄填入主要角色間各商業關係連結的重要程度：

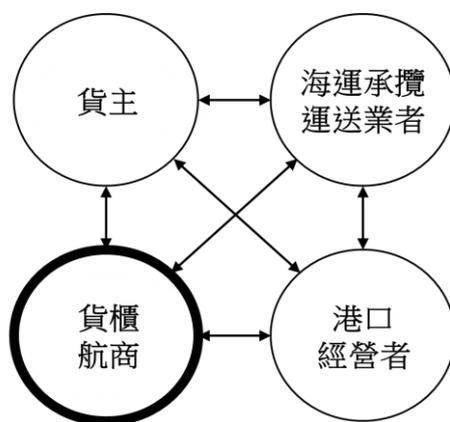


圖 1

商業關係連結	請填入 重要程度 (1:非常不重要, 2:不重要, 3:普通, 4:重要, 5:非常重要)
貨櫃航商—貨主	
貨櫃航商—海運承攬運送業者	
貨櫃航商—港口經營者	
海運承攬運送業者—貨主	
海運承攬運送業者—港口經營者	
貨主—港口經營者	

註²:本研究中海運物流鏈有 4 個主要角色如以下(1)至(4)，及 6 條商業關係連結如圖 1：

(1)貨櫃航商 (shipping carrier, 含船務代理)；

(2)海運承攬運送業者 (ocean freight forwarder)；

(3)港口經營者 (port operator, 指較廣義的港口, 含港務單位、港公司、碼頭裝卸業者、港區櫃場、港區倉儲業者)；

(4)貨主 (cargo owner / shipper, 包括有使用海運貨櫃運輸服務的進出口業者、貿易商、製造商、品牌商)。

第三部分: 以不同客製化程度服務衡量主要角色間的商業關係及價值

1. 本研究將貨櫃航商所提供的服務依客製化程度由低而高分為下表所述標準化服務、輕度客製化服務、高度客製化服務 3 類，請於下表右欄填入貴公司提供這些服務的貨量比例大約為何？

	貨量比例 (%)
<p>(1) 標準化服務 — 基本而無特殊安排</p> <ul style="list-style-type: none"> 基本的海運運輸、貨物裝卸，例如：一般貨物乾櫃運輸 	
<p>(2) 輕度客製化服務 — 輕度客製化的作業安排</p> <ul style="list-style-type: none"> 特殊櫃、或超重櫃的使用，或貨物需特殊包裝、擺設、排艙、儲存，及拍照，例如：冷櫃、精密零件及材料、高級成衣、DG Cargo 的運輸 或輕度複合服務，例如：海運加陸運、運輸加倉儲 或優先,保證提供服務 	
<p>(3) 高度客製化服務 — 客戶對服務產出及彈性有高度影響力</p> <ul style="list-style-type: none"> 為滿足客戶特定需求，需投入額外或專屬的設備及資源，需更常與客戶進行溝通協調，例如：Project Cargo、整廠輸出 (Turnkey) 或高度整合多項功能的服務，例如：一條龍服務、單一服務窗口 	

9. 依據上述貨櫃航商所提供的不同服務，請就下表中有關貨櫃航商與貨主間商業關係強度的敘述事項填入**同意程度** (1:非常不同意，2:不同意，3:普通，4:同意，5:非常同意)：

我們公司提供右列服務時	標準化服務	輕度客製化服務	高度客製化服務
每一次服務和貨主間都有很頻繁且深入的溝通、互動、資訊分享或傳遞 (Communications)			
每一次服務和貨主間需要經常共同規劃、協調及控制，以提供最佳的物流解決方案 (Cooperation)			
和貨主通常有長期合約 (Relationship duration)			
和交易的貨主有高度維持長期生意往來的意願 (Commitment)			
相信貨主很可靠，可以共同分攤風險及利益，並視其為策略合作夥伴 (Trust)			
很倚賴貨主所提供的特定資源或能力，或從其所取得的收益來達成目標 (Dependency)			

10. 依據貨櫃航商所提供的不同服務，請就下表中有關**貨櫃航商與海運承攬運送業者**間商業關係強度的敘述事項填入**同意程度** (1:非常不同意，2:不同意，3:普通，4:同意，5:非常同意)：

我們公司提供右列服務時	標準化服務	輕度客製化服務	高度客製化服務
每一次服務和 海運承攬運送業者 間都有很頻繁且深入的溝通、互動、資訊分享或傳遞 (Communications)			
每一次服務和 海運承攬運送業者 間需要經常共同規劃、協調及控制，以提供最佳的物流解決方案 (Cooperation)			
和 海運承攬運送業者 通常有長期合約 (Relationship duration)			
和交易的 海運承攬運送業者 有高度維持長期生意往來的意願(Commitment)			
相信 海運承攬運送業者 很可靠，可以共同分攤風險及利益，並視其為策略合作夥伴 (Trust)			
很倚賴 海運承攬運送業者 所提供的特定資源或能力，或從其所取得的收益來達成目標 (Dependency)			

11. 依據貨櫃航商所提供的不同服務，請就下表中有關**貨櫃航商與港口經營者**間商業關係強度的敘述事項填入**同意程度** (1:非常不同意，2:不同意，3:普通，4:同意，5:非常同意)：

我們公司提供右列服務時	標準化服務	輕度客製化服務	高度客製化服務
每一次服務和 港口經營者 間都有很頻繁且深入的溝通、互動、資訊分享或傳遞 (Communications)			
每一次服務和 港口經營者 間需要經常共同規劃、協調及控制，以提供最佳的物流解決方案 (Cooperation)			
和 港口經營者 通常有長期合約 (Relationship duration)			
和交易的 港口經營者 有高度維持長期生意往來的意願 (Commitment)			
相信 港口經營者 很可靠，可以共同分攤風險及利益，並視其為策略合作夥伴 (Trust)			
很倚賴 港口經營者 所提供的特定資源或能力，或從其所取得的收益來達成目標 (Dependency)			

12. 依據貨櫃航商所提供的不同服務，請就下表中有關不同客製化程度服務所產生價值(所獲得的利益減去所投入的成本)的敘述事項填入同意程度 (1:非常不同意，2:不同意，3:普通，4:同意，5:非常同意，同意程度越高代表價值越高)：

我們公司提供下列服務時 的每單位投入獲得比其它兩類的服務更多價值	同意程度
標準化服務	
輕度客製化服務	
高度客製化服務	

13. 上題所獲得的價值中，來自貨櫃航商與其他不同交易夥伴間商業關係連結所創造的價值分別為何？請就下表中敘述事項填入同意程度 (1:非常不同意，2:不同意，3:普通，4:同意，5:非常同意，同意程度越高代表價值越高)：

我們公司提供	我們公司與 貨主間 的商業關係連結	我們公司與 海運承攬運送業者 間的商業關係連結	我們公司與 港口經營者間 的商業關係連結
標準化服務 所獲得的價值 中由右列連結創造的較多			
輕度客製化服務 所獲得的 價值中由右列連結創造的 較多			
高度客製化服務 所獲得的 價值中由右列連結創造的 較多			

14. 您若有其他說明或意見請寫於以下空白處:

再次感謝您的參與，若您方便，請留下以下聯絡方式，以供我們若有研究需要再向您請益，或未來將研究成果寄送給您，非常感謝。

Tel. no.: _____

Appendix C.

Quotes in interview study

Theme 1: Which major players should be included in the maritime logistics network?

“The major players should include cargo owners, freight forwarders, shipping as well as air transport carriers, terminal operators, custom agents, warehouse operators, inland transport carriers, and insurance companies.” FF2

“We are the bridge connecting the upstream and downstream, taking care of cargo owners’ needs and dealing with delivering the cargo to the end user. The whole process of a maritime logistics chain includes shipping, port and terminal operations, custom cleaning, trucking, warehouse-central activities which consisting of value-added as well as central distribution, to- door service and reverse logistics.” FF5

“The major players related to the port operators are shipping carriers, shipping agents, freight forwarders and terminal operators.” PO2

“We care about the critical points which influence the export of the cargo. These points include shipping and the shipping related operations – port operations, terminal operation, packing, warehousing and so on. ” CO1

Theme 2: Do you agree with the initial framework of analysis (see Figure 5.1) in this research?

“It is a right direction to look at the maritime logistics from more than dyadic perspectives. To consider about the triadic relationship at the same time between the seller, buyer and maritime logistics service provider is a brilliant idea.” SC1-1

“It really needs a range of knowledge to deliver the cargo to the end user. It is important to look at all the links along the procedure.” SC2-2

“It is important to study each player along the maritime logistics chain, analyze the interaction between these players, and explore the stuff passing through whole the process.” PO1

“From a port operator’s view, you should consider not only the players in the vertical level, but also the players in the horizontal level.” PO3-2

“The major players should include all the service providers who help the cargo move.”

FF3

“Cargo owners, freight forwarders, shipping carriers and port operators are the core players in the maritime logistics chain.” FF4-3

“It would be interesting in looking at the maritime logistics chain by role playing from different major players in the chain. There should be different views from each of these roles.” SC1-6

Theme 3: Which player do you think is the integrator (who is able to coordinate network factors (resources, actors and activities)) within the maritime logistics network?

“With mobility, shipping carriers are more suitable than port operators to be the integrators. Shipping carriers could be more aggressive to accompany cargo owners’ need including service destinations and more customized services. In contrast, port operators are usually passive to meet customers’ needs because they could only offer their services in a fixed destination.” SC1-2

“Only shipping carriers are capable to be integrators as only they know who the cargo owners are. I am afraid, as a port operator, we are not capable of being an integrator. We cannot even take initiative for dealing with the customs issue for our customers.”

PO1

“From the port operator’s view, we think only shipping carriers are capable of integrating the cargo flow. As part of the government, Maritime and Port Bureau could only integrate the administrative level affairs, like CIQS (customs, immigration, quarantine and security). The state-owned Taiwan International Ports Corporation could integrate the related private sectors.” PO2

“Shipping carriers are more capable of being an integrator because they have cargo owners’ information and can make the decision as to which port to call at. Shipping carriers could also integrate the inland resources to carry out the door-to-door service.” PO3-2

“In terms of door-to-door service, freight forwarders are more competent at being the integrator” SC2-4

“Freight forwarders could be the integrators. By being competent at integrating logistics resources, freight forwarders are the leading roles instead of supporting roles in the contemporary logistics field.” FF2

“If the big cargo owners come to the Far East and only contact with the shipping carriers, they will realize that the shipping carriers are not really helpful, except in offering the shipping service. Therefore, the American cargo owners prefer to choose the freight forwarders as the single window which is the same as the integrator when they need a maritime logistics service in this area.” FF5

“As a freight forwarder with a specialized warehouse within the port area, we can integrate five windows into one, which includes: shipping carrier service; freight forwarder service; customs clearance; warehousing and trucking. Our price is quite competitive for this all-in-one integrated service.” FF4-3

“As a terminal operator, we are more capable of coordinating the relevant resources from quay side to hinterland compared with other hinterland players” PO4-1

“The capability of port operators to integrate all the things actually are limited. They could build up their own network by doing cross-border investment, but that needs a lot of money. Even though, the development of their network can be quite limited and slow.” SC1-4

“The government is more capable of integrating all the resources (for example, integrating the cargo volume from the public sectors, establishing the EDI system for the ports, improving the efficiency of the ports) through the regulations or national schemes. SC2-3

“Whether inland transport carriers could play the role as integrators depend on their scale. For example, DB (Deutsche Bahn, German Railway) is very good at running the railway transport and his service coverage is extensive to many other European countries.” SC1-4

“Each player in the private sector only cares about their own benefits. The government should act as an integrator to harmonize the benefits between them by establishing a transparent information platform.” PO1

“The one who controls the cash flow is more powerful than logistics service providers and could be more capable of being an integrator. The other one who could be an integrator is the player who owns the scarce resources. The new established state-owned Taiwan International Ports Corporation could become an integrator by exercising their well-equipped warehouses and the funds raised from the state-owned banks.” FF3

“Which main player could be an integrator may depend on different geographic areas. In the US, the big cargo owners have in-house logistics departments which are like the big freight forwarders. Some of these big accounts could contribute 8000 TEU cargo volume per year, and have the power to integrate the logistics resources. In Europe, because the cargo flows come from multi-countries and need a lot of cross-border transportation, freight forwarders are traditionally more familiar to these relevant operations including customs clearance, they are more competent to be a logistics integrator.” SC1-3

“Following my colleague’s above comments, I should say that the players who deal with cargo owners’ customs clearance can be the integrator. The customs clearance documents include confidential information which the cargo owners are not willing to be revealed. Therefore, if you could deal with a cargo owner’s customs clearance well, you could keep going to get the service contract and play as an integrator for the logistics resources. There are more and more freight forwarders doing their business in this way.” SC1-4

“There are three points which could affect the player to become an integrator. First, the substantive influence to decide the shipping is a crucial one. Second, the bargaining power. Third, the specific type of cargo.” FF6

“In Taiwan, some big owners of bulk cargo have been an integrator. They integrate the cargo owner, the shipping carrier, the port operator and the inland transport carrier as a whole. In contrast, the big owners of general containerized cargo are not so willing to be the integrator for the logistics service” CO1

“For container transport, shipping carriers choose ports and ports are ignorant of cargo owners; the shipping carrier is better than the port operator to be an integrator. For bulk cargo transport, cargo owners arrange the sea-leg transport, choose the

ports called at and sometimes run the terminal operator themselves; cargo owners could be integrators in this case.” PO3-2

“Each major player could be an integrator in their own specific area according to their particular natures. Shipping carriers could integrate the container transport and terminal operation, as they provide standard container shipping services. Freight forwarders could integrate cargo flows, as they provide a variety of services. Port operators could integrate inland resources such as infrastructures and the government authorities because of their state-owned nature in Asia.” FF4-1

“The major players have their own industrial clusters, and can act as an integrator in line with their ambitions, resources and needs.” PO3-1

“No one can integrate all the things perfectly. Either shipping carriers or port operators have their own weaknesses and strengths to integrate the resources along the maritime logistics chain.” SC1-2

Theme 4: What about the vertical integration strategies are in your company?

“Shipping carriers tend to integrate with terminal operators by using dedicated terminals in the port area for pursuing the efficiency of load/unload operations. We can meet the punctuality target for our sailing schedule by doing this.” SC1-1

“For shipping carriers, logistics is the other kind of business. I think it is a special case: NYK expanded his area to cover logistics services and places his shipping section under the logistics section.” SC2-2

“As a freight forwarder, we are more interested in owning and managing our own warehouses if needed, but tend not to own land transport fleets as they are quite harder to manage.” FF2

“Each player along the maritime logistics chain would like to offer value-added services which make them provide more and more integrated services. For example, terminal operators may be interested in running the trolley service; freight forwarders may be interested in running the terminal operators and shipping carriers would like to participate in joint ventures or run this service by themselves.” PO3-2

“As a leading retailer, logistics is the core part of our value chain. We have to make sure there are no empty shelves in our stores by pursuing the ‘just-in-time’ and

frequent deliveries. Therefore, we tend to be an integrator and control the logistics by ourselves or our subsidiaries. The other reason is the consideration of securing the confidential information.” CO2

“As a leading food manufacturer, we are more interested in making food and not very interested in integrating the maritime logistics service. The only thing we care about for the maritime logistics service is whether the logistics cost is acceptable.” CO3

“The American cargo owners prefer to choose the freight forwarders as the single window which is the same as an integrator when they need a maritime logistics service in the Far East, while the Taiwanese cargo owners prefer to deal with all the logistics service providers by themselves to minimize the total logistics cost.” FF5

Theme 5: The division of MLSP into shipping carriers and freight forwarders

“The majority of shipping carriers who claim they can provide a total solution, actually only focus on the sea-leg of the transport.” SC1-2

“We still only mainly provide port-to-port service” SC2-2

“We can offer a range of shipping route service, because we our suppliers include many shipping carriers covering comprehensive geographic areas.” FF2

“Warehousing and door-to-door service is our regular service, but they are a kind of customized service for shipping carriers.” FF4-1

Theme 6: Combination of sellers and buyers as cargo owners

“As a shipping carrier, we only care about who pays for the freight. The consignor and consignee should be summarized as the cargo owner who is responsible for paying the freight, who can ultimately decide on the shipping, and who can easily to be recognized.” SC1-4

“The player who pays for the freight rate by the trade terms has the power to influence the maritime logistics chain.” FF3

“MLSPs seeking to manage business relationships well with their customers and suppliers need to be clear about the rules of trade term in order to identify who pay for the freight or really exercise their discretion to control maritime logistics.” FF2

“This is a very useful diagram for looking at the big picture of maritime logistics, comparing and discussing the relationships between different players.” SC1-6

Theme 7: General business relationship between major players

“There is no partnership except for a business relationship which is a seller and buyer relationship between these players in business practice.” FF4-1

“There is no customer loyalty, but only acceptable prices to customers. Only when we offer a competitive price and service, can we build the dependency of our customers. ”

FF4-3

“I think partnership between the major players actually becomes rare and rare at the moment.” FF2

“Even though we much rely on the large amount of cargo from big accounts. The revenues from big accounts are quite low compared with small and medium cargo owners. They are very often go between different MLSPs to pursue the maximum benefits.” SC2

“We are selling expensive wine. Recently we started to work closely with a new single truck carrier which operates with the elderly and charges more money, but they are more reliable and trustworthy than previous multiple carriers we used as they have never caused any cargo damage.” FF1

“Our customers consist of 60 % long-term partners, and 40% working partners.” SC3

“We got 80% repeated orders, and we benefited from these orders with less risks. Such regular cargo does not necessary contribute great financing revenues per unit, but its stability is very essential for shipping carriers.” SC2-3

“We have two warehouses, in contrast with the normal one which is serving 150 customers but can only fill 65% of the space, the temperature-controlled one is only serving 24 customers but can be fully filled.” FF4-3

“In summary, I should say business relationships between players at the horizontal and vertical levels are mixed with co-operation and competition, and looking for achieving a balance point in the dynamic environment. For example, members in the

strategic alliances cooperate at the operation level, but become independent at the business level.” SC1-3

“As a freight forwarder, even with my mother firm which is a shipping carrier, I still need to keep a neutral position with it because of the regulations and considering the benefits from other players.” FF5

Theme 8: Dyadic business relationships between shipping carriers and port operators

“Shipping carriers are the main customers of port operators. Therefore, port operators need to accompany their operational needs, focusing on the depth of the berth, the length of the berth, cargo handling equipment and enough operation space in the berth” SC1-6

*“There are obvious and strong ties between shipping carriers and port operators. Port operators mainly make their efforts to suit shipping carriers’ need. Even though all the maritime logistics service providers have cooperative relationship with ports, shipping carriers have more influence on the ports comparing with other players.”
FF3*

“The main purpose of the operations in terminal operators within the port area is to facilitate the loading/unloading jobs of shipping carriers. Therefore, they very emphasis on the turnover rate for their space, and avoiding to delay ships’ operations.” FF2

*“Shipping carriers ask for low coat, efficient and convenient from port operators”
PO1*

“From shipping carriers’ perspective, we have three levels of relationship with the ports: got the cargo before calling at port and starting a new liner service; evaluate and decide the ports to call at in the surrounding area after starting a new liner service; to invest the terminal operator if there is long-term benefits.” SC1-2

“To integrate on the operational level with port operators are significantly important for us.” SC1-2

“Shipping carriers who engage in running the container terminals mainly seek for controlling the terminal operations for not delaying the sailing schedule.” FF3

“From port operators’ perspective, we have several levels of relationships with the shipping carriers from arm-length to closely integrated including: calling at; renting the dedicated container terminals; jointing the BOT project; forming a joint venture to run the feeder services; joint project of oversea investment for port operators.”

PO1

“The relationship between shipping carriers and port operators are customers and suppliers relationship. Furthermore, we could also cooperate to do the canvassing.”

PO1

“Port operators are not the normal suppliers for shipping carriers, we cannot be too dominant to them as they usually include the public sectors or authorities. If we don’t deal with them well, we may lose the chances to run our business in those ports even the countries they are located.” SC1-2

“Besides offering big amount of transshipment cargo and efficient services, Singapore port also provide the other necessary resources for ships, such as cheap ship bunker and ship repairing service, in order to build a firm relationship with the shipping carriers.” SC2-3

“The reason that shipping carriers call at the ports is quite simple. As a shipping carrier, we only follow the cargo. In the same area, we pick the port which offers the best deal including the low cost and attractive package.” SC2-1

“Shipping carriers just follow the cargo, comparing the prices and make the choices between ports” PO10

“Shipping carriers will try to establish partnership with different ports in the neighboring regions in order to diversify risks. For example, shipping carriers will arrange several optional ports in the western coast of America in case for the frequent port strike in this area.” PO3-2

Theme 9: Dyadic business relationships between cargo owners and shipping carriers

“Take our company for example, the proportion of direct cargo owner in the US is higher than 50%, on the other hand, the proportion is less than 20% in Europe.” SC1-5

"It is very important to achieve leverage between fully filling the space and collecting high-priced goods." SC1-3

"Regular orders are very important for shipping carriers. We have 80% of repeated orders which benefit from lower risk. You may not know that some big cargo owners are doing trial order purchasing from different shipping carriers to pursuit the lowest cost which means they are actually squeezing the benefits from us." SC2-4

"We only earn a small profit from the big accounts, to be honest, they are not good customers, but we need them to offer the base cargoes." SC1-2

"Some big accounts from the IT industry, open the bidding for several carriers, use major shipping carriers delivering 80% cargo, and employ the rest as spare carriers for spare function delivering 20% cargo." SC3

"Cargo owners should maintain special relationships with the shipping carriers in order to obtain the enough space in peak season to complete the shipping tasks." CO1

"One European shipping carrier tends to use automated voice system and outsourcing system to deal with a shipping booking." SC2-4

Theme 10: Dyadic business relationships between cargo owners and freight forwarders

"The direct cargo owners make the freight forwarders deal with their LCL cargo, as they have outsourced their shipping department to freight forwarders." SC1-3

"We have at least 250 TEUs per year, and we usually make freight forwarders to deal with these cargo for us." CO6

"The big accounts very often try to squeeze the MLSPs, instead of keeping the long-term business relationship with them. For example, one well-known Taiwan-based 3C brander usually invites 5 maritime logistics service providers including shipping carriers and freight forwarders to deal with their international logistics in order to gain lower costs. Such customers also exercise their power to obtain benefits of delaying payment from freight forwarders." FF2

"We are acting as a cargo shipping manager for a specific big cargo owner who is a fashion clothing brander, and we earn a lot of benefits from this big account." FF2

“Most Taiwan-based freight forwarders are acting as cargo shipping managers offering the package service for cargo owners.” FF2

“Freight forwarders act on behalf of cargo holders, when they do business with shipping carriers.” FF1

“Services offered by freight forwarders in Taiwan nowadays are very similar; therefore, the cargo owners tend to care most about the shipping freight and the amount of credit they could obtain from the freight forwarders.” FF2

“For keeping a long-term business relationship with cargo owners, MLSP (including freight forwarders) should strengthen themselves to increase the cargo owners’ risk of switching to other service providers.” FF4-1

“If you don’t consider the cost, freight forwarders will offer the best service for cargo owners.” FF5

“We neither set up an information and technology (ICT) system to connect with the maritime logistics service providers’ system, nor deliberately trace our cargo in these logistics providers’ hands. There is almost no need to do these, unless we expect to be shut down by lacking of production materials. We usually communicate with the maritime logistics service providers by telephone.” CO6

Theme 11: Dyadic business relationships between shipping carriers and freight forwarders

“Freight forwarders often pick up the small business that shipping carriers are not willing to do.” SC1-4

“We mainly deal with door-to-door service for FCL cargo. We don’t deal with LCL cargo which is more doing consolidation, and we leave it to freight forwarders.” SC5

“Maritime transport is very different from air freight transport in the respect of the role of middle men (freight forwarders) between cargo owners and carriers. In air freight transport, air lines traditionally do not collect the cargo from the cargo owners and totally rely on air freight forwarders’ contribution of the cargo. In contrast, the shipping carriers could grab the cargo by themselves and from ocean freight forwarders.” FF1

“Shipping carriers look for cargo by themselves, and also from freight forwarders.

There is special business relationship between them” SC1-6

“Shipping carriers get cargo from freight forwarders, and then try to grab this cargo by directly contacting the cargo owners and skipping the freight forwarders. Shipping carriers should be very careful when dealing with this situation; they should consider whether it is worth losing their freight forwarder partners.” SC 1-4

“There is a co-opetition relationship between the freight forwarder and the shipping carrier.” FF1

“In special cases, shipping carriers and freight forwarders may have opportunities to work together, for example, they could make a team to attend a bidding of a project cargo transport (e.g. project cargo, turnkey cargo). ” SC1-3

“The bids of the big project cargo usually open to the shipping carriers with strong integrated ability or the equivalent international logistics service providers. The small and medium freight forwarders may lack of relevant experiences and not fit the bidding requirements.” SC1-2

“For some VIP or complicated supply chain required customers that will be joint efforts by carrier and freight forwards/NVOs, but it's not commonly seen, only for a handful of customers.” SC2-5

Theme 12: Dyadic business relationships between cargo owners and port operators

“MLSP stands in the middle between cargo owners and port operators; generally, there is no business relationship between cargo owners and port operators.” FF5

“Compared to shipping carriers and freight forwarders, cargo owners even feel cannot the existence of the port.” FF3

“Most of the cargo owners contact the calling port they are interested in through shipping carriers. In addition, there are very few port operators taking the initiative to contact the cargo owners.” SC-TS Line

“As a retailer, we do not care about the operation details in the port sector, our strategy is to manage the MLSP well, and make them deal with these minor operational stuffs.” CO2

“The business relationship between port operators and cargo owners is very loose, as freight forwarders deal with the relevant business for the cargo owners.” PO2

“There is more interaction between Taichung Port and the cargo owners within Taichung Industry District, as they are very geographically close to each other.

However, this is not a common situation but a special case.” FF4-1

“The closer the ports are to the market, the more competitive they are. Kaohsiung Port and Hamburg Port are two cases. In contrast, Port Antwerp which is further from its market needs to employ more aggressive methods to attract big cargo owners.” FF4-1

“Usually only we shipping carriers deal with the port operators, but when a strike in a port seriously affects the cargo exported into the US, US importers will try to get involved to sort it out through their domestic political system.” SC2-5

“Some cargo owners tend to stick to their usual customs in Keelung Port, even though the new Taipei Port is more geographically convenient for them.” PO1

“One port in the eastern US built many warehouses beside the port area in order to attract the department stores setting up their distribution centers.” SC1-1

“Abu Dhabi Ports Company in the United Arab Emirates offered two to three weeks free warehouse using time, which means the cargo owners can use the Abu Dhabi port as their warehouse, in order to attract cargo owners and shipping carriers to switch their calling port from Dubai to Abu Dhabi.” FF5

“DP World expanded the port business model from the conventional load/unload function to a logistics center, and turned Dubai into the regional distribution center in the Middle East area.” PO1

“Port operators have started to serve customers’ customers who are the cargo owners. The new established Taiwan International Port Corporation started to run the warehouse business to meet cargo owners’ needs. Launching the FTZ (free trade zone) scheme is also attractive for cargo owners” FF5

“According to our own experience, port operators are starting to have closer relationships with big cargo owners nowadays. There are two big accounts coming to us to look for more cooperation.” PO3-2

“Ports should not only develop their functions along the quay side, but also need to expand their operations into the hinterland called dry port. By doing this, ports can approach the cargo owners and help them to load/unload their cargo remotely and provide more logistics functions.” CO1

“Most of the state-owned and large tramp cargo buyers act as the cargo owner, shipping carrier and terminal operator in the port area at the same time.” CO1

Theme 13: Dyadic business relationships between freight forwarders and port operators

“In business practice, freight forwarders seldom get involved in the port choice, but get involved more in the shipping carrier choice. I feel that most of the port operators do not take freight forwarders as their customers.” SC1-6

“The role of a freight forwarder is to act as a cargo shipment agent for shippers or consignees who do not need to pay much attention to choosing the port.” FF5

“If the shipper, freight forwarder and actual cargo owner both find a port or customs is tough to deal with, they may move over to another shipping line who calls a port with more friendly approach. In addition, in a few occasions, my company was approached by the port operator/authority and asked us to support them. This is because they wanted to promote the port by helping the shipping carrier to locate more shippers and/or consignees. The port usually tries to persuade the forwarder to join in and use its FTZ facility for MCC. We do this kind of operation in Hong Kong port for years. Other functions in a port FTZ are also the same, which may attract the freight forwarder to take part in. Customs is also critical as the entry, the clearance and tariff duties are in the hands of the authority.” FF5

“If cargo owners ask freight forwarders to deal with the inland transport and custom cleaning, the freight forwarders will be involved in choosing the ports. For example, if an importer asks shipment to Manchester, then the freight forwarder could engage in port choosing.” SC1-6

“Taiwan International Port Corporation is starting to look for partners from freight forwarders to deal with the MCC business.” SC1-1

Theme 14: Relationships beyond dyadic perspectives

“Each player in this network is usually only familiar with and care about the immediate and important trading partner for themselves. For example, shipping carriers care about the players who give the cargo; port operator care about shipping carriers’ needs to call at the ports; freight forwarders pay more attention to cargo owners, shipping carriers and customs clearance; and small and medium cargo owners care about the freight rate charged by the shipping carriers. Therefore, they usually don’t have direct understanding of the triadic business relationship.” SC1-3

“FOB is becoming more and more popular at the moment, and it will cause the formation of a triadic relationship more with the buyers instead of sellers.” FF2

“We found the power of the cargo buyers is continuously increasing and that they tend to use FOB to control the shipping themselves. Therefore, the triadic relationship circle moves from the sellers’ side to the buyers’ side.” PO6

“Shipping carriers follow the cargo instead of the port, therefore the relationships between shipping carriers and port operators depends on the relationships between shipping carriers and cargo owners.” SC2-1

“Shipping carriers realize the trend that freight forwarders may have more opportunities to contact with cargo owners directly and put shipping carriers in the downstream of the logistics chain. Therefore, they tend to establish their own logistics companies to handle their customers in a more direct way.” FF3

“Cargo owners’ demand is fulfilled by freight forwarders, this is why there is no direct relationship between cargo owners and cargo owners. The port operators traditionally make efforts to meet shipping carriers’ need, but nowadays they start to provide logistics warehousing and simple value-added serviced in order to create closer relationship with the freight forwarders.” FF2

“If port operators offer more integrated service, they will weaken the ties between the agents and cargo owners” PO3-2

“There are some examples that we initially got the business from the sellers, and we tried to build up the connection with the buyers for making the next business. Eventually, we can do the business with both sides.” SC3

“The ports in Taiwan ingratiate themselves with shipping carriers and ignore small and medium cargo owners’ benefits. These cargo owners run away from Taiwan because of the increasing logistics cost caused by such leaning relationship. Eventually, it have caused the revenue loss for the shipping carriers and port operators can receive in Taiwan market. Therefore, the relationships between the cargo owners, MLSP and port operators within the triads should be kept balanced to pursue the long-term economic development of the maritime logistics” CO1

Theme 15: By cargo type: Full container load (FCL), Less-than-container load (LCL)

“As a shipping carrier, we focus on port to port transport service and are more interested in dealing with the FCL cargo. On the other hand, the freight forwarders are more capable of dealing with the LCL cargo.” SC2-1

“Freight forwarders often pick up the small business that shipping carriers are not willing to do.” SC1-4

“For the FCL cargo, carriers are freight forwarders competitors. For the LCL cargo, freight forwarders seldom face threats from shipping carriers as shipping carriers are not interested in dealing with this uneconomical business.” FF3

Theme 16: By trade route: North America, Europe, Intra-Asia

“In the US, the big cargo owners have in-house logistics departments which are like the big freight forwarders. Some of these big accounts could contribute 8000 TEU cargo volume per year, and have the power to integrate the logistics resources. In Europe, because the cargo flows need a lot of cross-border transportation, freight forwarders are traditionally more familiar to the relevant operations including customs clearance, they are more competent to be a logistics integrator.” SC1-3

“Add number from FF and BDE” SC1-5

“Relationship structure within maritime logistics chain is quite different between our business in the US and European market. In the US, we need to manage more multi-transportation from ports to railway depots. In Europe, we mainly deal with port-to-port service, and the freight forwarders dominate the door-to-door or more customized services.” SC2-2

“We need to maintain good relationships with train and track companies in the US, as we need to deal with more door-to-door service in this area.” SC5

“Freight forwarders will play more important roles in the maritime logistics chain in Europe, as the different systems between these multi countries and customs system is more complicated in this area.” FF7

“Take our company for example, the proportion of direct cargo owner in the US is higher than 50%, on the other hand, it is less than 20% in Europe.” SC1-1

“The tempo of the intra-Asia shipping route is quite quick compared with the long-distance shipping route; you should be very flexible and need to response quickly enough. The role of freight forwarders in this region is similar to Europe.” SC3

Theme 17: By port type: Non-value-added, Value-added; Transshipment, Import/Export

“Generally, shipping carriers only can decide the transshipment port.” SC1-3

“There are several “hot” ports in the world: Los Angeles port and Long Beach port in US western coast, New Jersey port in US east coast; Shanghai port; Ningbo port; Yantian port; Mumbai port; Port Said in Egypt; Port of Rotterdam in Netherland and Hamburg port in Germany. The common point of these ports is they are all important import or export ports, and geographically close to the importers, exporters or market. In contrast, transshipment ports are not necessary close to the cargo owners, and can be choose by the shipping carriers at their convenience to manage the shipping operations.” SC1-6

“As an import port, Port of Antwerp encourages local buyers to apply the FOB trade term to indirectly arrange shipping carriers to call at this port. By doing this, he can attract more cargo and compete with the neighboring Port of Rotterdam.” SC1-3

Theme 18: By cargo owner type: Manufacturer, Brander/retailer

“The business relationship between cargo owners and maritime logistics service providers depends on the industry, region and market needs. As a leading electric manufacturing service provider, we tend to outsource our whole logistics business to professional logistics providers. However, we seldom rely on single logistics provider

but usually keep working relationship with several spare providers in order to exercise the bargain power if needed.” CO5

“The volume of our cargo is not so big, therefore, we usually deal with the maritime logistics through the freight forwarders.” CO6

“We import the materials through the common purchasing channel organized by the industry association, and the maritime logistics service is included in the whole package. When we export finished food products, we prefer to break it down to different parts. The logistics services is bought from different service providers, as the all-in-one service provided by a single logistics provider is quiet expensive.” CO3

“As a retailer who needs more than 10 thousands TEUs transportation per year, normally the orders are made in FCL basis and for that matter, we speak directly with vessel companies. This is the easy part to understand, because all we need is to submit shipping details and vessel companies will work through it. We are more like a director, we tell them what we want and they deliver. If they don't, we will have to cut in to make thing work. It's a date-to-date work, nobody wants to mess it up, because once it is delayed, it may cause empty shelves. We also have contractual relationship with freight forwarders. We book the shipping places directly with vessel companies, and the freight forwarder concentrate on consolidating our cargo.” CO4

“As a leading retailer, logistics is the core part of our value chain. We have to make sure there are no empty shelves in our stores by pursuing the ‘just-in-time’ and frequent deliveries. Therefore, we tend to be an integrator and control the logistics by ourselves or our subsidiaries. The other reason is the consideration of securing the confidential information.” CO2

Theme 19: By shipping market: Liner shipping, bulk shipping

“For container transport, shipping carriers choose ports and ports are ignorant of cargo owners; the shipping carrier is better than the port operator to be an integrator. For bulk cargo transport, cargo owners arrange the sea-leg transport, choose the ports called at and sometimes run the terminal operator themselves; cargo owners could be integrators in this case.” PO3-2

“In Taiwan, some big owners of bulk cargo have been an integrator. They integrate the cargo owner, the shipping carrier, the port operator and the inland transport

carrier as a whole. In contrast, the big owners of general containerized cargo are not so willing to be the integrator for the logistics service” CO1

Theme 20: By service complexity: Routine, Standard, Customized

“Shipping carriers mainly deal with FCL cargo sea-leg transport... From a container shipping carrier’s perspective, I think we provide a quite standardized service. If you deliberately ask me to distinguish our services, I would say that it could depend on the operational differences from different types of container. These services include: general cargo, refer cargo and open top cargo (BB, OFG). IT provision could also cause different level of customized service, which could be from cargo tracing, B/L printing, rate calculation to e-billing. Furthermore, the guarantee of shipping spaces and priority for shipping could be regarded as more customized services for big-account cargo owners especially in the peak season.” SC1-1

“Container transport is a very “standard” service; port to port could be routine service, and door to door could be more customized service for shipping carriers.” SC3

“Refer cargo and dangerous cargo need more trace and taking care.” SC1-8

“From a freight forwarder’s perspective, different service could be provided depending on the different level of customization. These services include: standard service, easily-customized service and highly-customized service. Freight forwarders could offer different service to fit different customers’ need.” FF4-1

“As a freight forwarder running our own warehouse, we could offer a range of service from dealing general CFS cargo, door to door or warehousing service, to supply chain management for our customers, which could fit the categories of routine, standard and customized service.” FF4-3

“Different complexity type service for different players should be different. For shipping carriers, their service differentiation depending on different kinds of containers for cargo owners; for port operators, their service differentiation mainly depending on different level of customized service for shipping carriers.” SC1-2

Theme 21: Values from the business relationships and network

“What is the triadic benefits? Is it related to the total cost for whole supply chain, the maritime logistics chain, or the total cost for logistics, and how to measure them? If it is the shipper’s satisfaction of operational efficiency, how could we measure it?” SC1-6

“It is impossible to have a win-win situation in the business practice. One player gained; the other player lost.” SC1-3

“If freight forwarders want to survive in the severe competition nowadays, we need to make a differentiation and create the added value for our customers. The differentiation of the service could include special geographic service areas, special cargos, and integrated SCM services. These special service will offer cargo owners higher value and also bring freight forwarders higher financial revenues in spite of the more challenging tasks for service providers. These value could not be appeared within a short period, but it is a direction worth making efforts. General cargo could contribute the certain volume cargo for freight forwarders to keep good relationship with the shipping carriers, and special cargo could bring the freight forwarders more money. Some freight forwarders who are good at dealing with the special cargo earn a lot of money from it.” FF3

“We intend to make the business with the cargo owners who may peruse the new supply chain model, as the entrance barriers are higher and may make more values.”

FF4-3

“In our company, the cargo volume of project cargo which needs most customized service is 30%, but it contributes over 70% financial revenues.” FF5

“Ports did their best to pursuit the cargo volume in the past. Nowadays, they need provide value-added services to attract more diverse cargo.” PO1

“Although the higher complex, or the more customized services could bring us higher financial revenues, it could also bring us a higher risk.” SC1-4

“For routine and standard services, our customers follow the procedure of our services and the rate we charge. However, for more customized services, we need make extra efforts to meet customers’ need which has been beyond our regular procedure, and we cannot earn an equivalent revenues from this kind of service. Therefore, the routine and standard services will generate more values per input for us.” SC4

“We import the materials through the common purchasing channel organized by the industry association, and the maritime logistics service is included in the whole package. When we export finished food products, we prefer to break it down to different parts. The logistics services is bought from different service providers, as the all-in-one service provided by a single logistics provider is quite expensive.” CO3

“In my opinion, normal firms (cargo owners) will escape the highly-customized services because of the expensive cost, and try the easily-customized services instead. The end value for using highly-customized services may depend on the revenues and value of product. Majority of the firms in Taiwan are small or medium size, and make decision for cost reason. Therefore, the value of highly-customized services may not reveal in these cases.” CO6

“When we use more customized service, we actually input more manpower and resources simultaneously compared with using the routine services. However, the maritime logistics service providers never realize this point.” CO5

Appendix D.

Non-response bias test

Question Items					P-value	
CO	Level of Importance	L1			0.7572	
		L2			1.0000	
		L3			0.3504	
		L4			0.4377	
		L5			0.7980	
		L6			0.6702	
	Relationship Strength	L1	R1	S1	0.8998	
				S2	0.4391	
				S3	0.5482	
			R2	S1	0.7374	
				S2	0.3341	
				S3	0.8537	
			R3	S1	0.4609	
				S2	0.6773	
				S3	0.8755	
			R4	S1	0.1371	
				S2	0.9283	
				S3	0.8361	
			R5	S1	0.3231	
				S2	0.7569	
				S3	0.9447	
			R6	S1	0.6955	
				S2	0.6033	
				S3	0.5903	
		L2		R1	S1	0.1963
					S2	0.8437
					S3	0.8068
				R2	S1	0.0855
					S2	0.2480
					S3	0.8742
R3		R3	S1	0.7213		
			S2	0.7834		
			S3	0.5652		
		R4	S1	0.9678		
			S2	0.6935		
			S3	0.4966		
R5		R5	S1	0.5084		
			S2	0.9482		
			S3	0.6706		
		R6	S1	0.5419		
			S2	0.8705		
			S3	0.6175		
L3		R1	S1	0.1780		
			S2	0.8414		
			S3	0.8130		
			R2	S1	0.5489	

				S2	0.7269
				S3	0.5279
			R3	S1	0.4623
				S2	0.7553
				S3	0.7236
			R4	S1	0.5307
				S2	0.5214
				S3	0.7236
			R5	S1	0.2761
				S2	0.3931
				S3	0.6860
			R6	S1	0.8121
				S2	0.1668
				S3	0.8639
	Value	S1			0.6840
		S2			0.9640
		S3			0.9796
	Value origine	S1	L1		0.2909
			L2		0.8378
			L3		0.5727
		S2	L1		0.7352
			L2		0.8286
			L3		0.3788
		S3	L1		0.4618
			L2		0.9425
			L3		0.7063
FF	Level of Importance	L1			0.0434
		L2			0.1321
		L3			1.0000
		L4			0.3720
		L5			0.8476
		L6			0.5491
	Relationship Strength	L1	R1	S1	0.2587
				S2	0.8523
				S3	0.7506
			R2	S1	0.2926
				S2	0.2903
				S3	0.2786
			R3	S1	0.0578
				S2	0.8578
				S3	0.0655
			R4	S1	0.5983
				S2	0.9191
				S3	0.5308
			R5	S1	0.3474
				S2	0.2930
				S3	0.0646
			R6	S1	0.8391
				S2	0.2490
				S3	0.1089
		L4	R1	S1	0.6841
				S2	0.3844
				S3	0.6301
			R2	S1	0.8453

				S2	0.2155
				S3	0.4727
			R3	S1	0.0755
				S2	0.5392
				S3	0.7485
			R4	S1	0.4066
				S2	0.5156
				S3	0.3179
			R5	S1	0.8441
				S2	0.8897
				S3	0.9216
			R6	S1	0.9758
				S2	0.4036
				S3	0.9377
		L5	R1	S1	0.7090
				S2	0.7428
				S3	0.5618
			R2	S1	0.8858
				S2	0.8557
				S3	0.5489
			R3	S1	0.3875
				S2	0.1580
				S3	0.7125
			R4	S1	0.7299
				S2	0.6730
				S3	0.8541
			R5	S1	0.9373
				S2	0.7034
				S3	0.8584
			R6	S1	0.6531
				S2	0.8442
				S3	0.5617
	Value	S1			0.6703
		S2			0.7985
		S3			0.3727
	Value origine	S1	L1		0.3436
			L4		0.5226
			L5		0.9007
		S2	L1		0.0106*
			L4		0.5105
			L5		0.8711
		S3	L1		0.0924
			L4		0.8860
			L5		0.3234
SC	Level of Importance	L1			0.7062
		L2			0.4734
		L3			0.1259
		L4			0.5935
		L5			0.7618
		L6			0.7372
	Relationship Strength	L2	R1	S1	0.5881
				S2	0.0963
				S3	0.2590
			R2	S1	0.8314

				S2	0.2132
				S3	0.1795
			R3	S1	0.6742
				S2	0.5142
				S3	0.7435
			R4	S1	0.1960
				S2	0.9800
				S3	0.8614
			R5	S1	0.0330
				S2	0.0090*
				S3	0.4417
			R6	S1	1.0000
				S2	0.3659
				S3	0.6142
		L4	R1	S1	0.1897
				S2	0.4943
				S3	0.4100
			R2	S1	0.1549
				S2	0.2881
				S3	0.8833
			R3	S1	0.0715
				S2	0.8712
				S3	0.4400
			R4	S1	0.5268
				S2	0.9311
				S3	0.3234
			R5	S1	0.0048**
				S2	0.2150
				S3	0.4157
			R6	S1	0.3351
				S2	0.6431
				S3	0.6768
		L6	R1	S1	0.3877
				S2	0.3077
				S3	0.8210
			R2	S1	0.5045
				S2	0.5320
				S3	0.6926
			R3	S1	0.0854
				S2	0.2898
				S3	0.3456
			R4	S1	0.4239
				S2	0.9776
				S3	0.1229
			R5	S1	0.6839
				S2	0.7078
				S3	0.1316
			R6	S1	0.0057*
				S2	0.8931
				S3	0.5865
	Value	S1			0.0758
		S2			0.0174*
		S3			0.7584
	Value origine	S1	L2		0.2921

			L4		0.3333
			L6		0.2711
		S2	L2		0.8421
			L4		0.6976
			L6		0.9384
		S3	L2		0.8849
			L4		0.1832
			L6		0.3879
PO	Level of Importance	L1			1.0000
		L2			0.1251
		L3			0.1204
		L4			0.7650
		L5			1.0000
		L6			0.4341
	Relationship Strength	L3	R1	S1	0.0231*
				S2	0.0055*
				S3	0.0502
			R2	S1	0.0256
				S2	0.0087*
				S3	0.0124*
			R3	S1	0.1477
				S2	0.1913
				S3	0.3801
			R4	S1	0.1087
				S2	0.3704
				S3	0.9581
			R5	S1	0.0300
				S2	0.1161
				S3	0.3157
			R6	S1	0.4091
				S2	0.8230
				S3	0.8296
		L5	R1	S1	0.7139
				S2	0.0076*
				S3	0.0486
			R2	S1	0.6064
				S2	0.6029
				S3	0.7883
			R3	S1	0.6322
				S2	0.1084
				S3	0.0649
			R4	S1	0.0657
				S2	0.0492
				S3	0.1854
			R5	S1	0.3323
				S2	0.0603
				S3	0.0255
			R6	S1	0.3517
				S2	0.6511
				S3	0.3517
		L6	R1	S1	0.0320
				S2	0.2646
				S3	0.4444
			R2	S1	0.0539

				S2	0.6689
				S3	0.0038**
			R3	S1	0.1355
				S2	0.8230
				S3	0.8578
			R4	S1	0.0215*
				S2	0.0671
				S3	0.9064
			R5	S1	0.0139*
				S2	0.1621
				S3	0.1999
			R6	S1	0.3494
				S2	0.8119
				S3	0.2489
	Value	S1			0.3820
		S2			0.2347
		S3			0.7069
	Value origine	S1	L3		0.0499
			L5		0.8266
			L6		0.4638
		S2	L3		0.1060
			L5		0.1784
			L6		0.9097
		S3	L3		0.2212
			L5		0.4018
			L6		0.1166

** significant at 1%,

* significant at 10%

Appendix E.

(1) Profile of respondents

Position

	CO		FF		SC		PO		Total	
	Fre.	Per. (%)	Fre.	Per. (%)						
Vice managing director or above	7	9.59	23	43.40	11	20.00	10	14.93	51	20.56
Vice president or above	4	5.48	4	7.55	10	18.18	12	17.91	30	12.10
Manager/assistant manager	13	17.81	19	35.85	22	40.00	28	41.79	82	33.06
Clerk	35	47.95	7	13.21	7	12.73	14	20.90	63	25.40
Sales representative	10	13.70	0	0.00	3	5.45	0	0.00	13	5.24
Other	4	5.48	0	0.00	2	3.64	3	4.48	9	3.63
Missing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	73	100	53	100	55	100	67	100	248	100

Working experience (years)

	CO		FF		SC		PO		Total	
	Fre.	Per. (%)	Fre.	Per. (%)						
1-5 years	23	31.51	7	13.21	2	3.64	6	8.96	38	15.32
6-10 years	17	23.29	13	24.53	13	23.64	7	10.45	50	20.16
11-15 years	8	10.96	14	26.42	4	7.27	3	4.48	29	11.69
16-20 years	16	21.92	6	11.32	14	25.45	4	5.97	40	16.13
More than 20 years	9	12.33	13	24.53	22	40.00	46	68.66	90	36.29
Missing	0	0.00	0	0.00	0	0.00	1	1.49	1	0.40
Total	73	100.0	53	100	55	100	67	100	248	100

Working department

	CO		FF		SC		PO		Total	
	Fre.	Per. (%)	Fre.	Per. (%)						
Management department	12	16.44	19	35.85	10	18.18	15	22.39	56	22.58
Finance department	10	13.70	15	28.30	9	16.36	15	22.39	49	19.76
Operating department	4	5.48	4	7.55	4	7.27	13	19.40	25	10.08
Marketing department	27	36.99	15	28.30	24	43.64	19	28.36	85	34.27
Purchasing department	12	16.44	0	0.00	1	1.82	0	0.00	13	5.24
Other	8	10.96	0	0.00	7	12.73	5	7.46	20	8.06
Missing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	73	100	53	100	55	100	67	100	248	100

(2) Profile of respondents' firms

Company age

	CO		FF		SC		PO		Total	
	Fre.	Per. (%)	Fre.	Per. (%)						
1-5 years	6	8.22	2	3.77	2	3.64	26	38.81	36	14.52
6-10 years	6	8.22	4	7.55	2	3.64	5	7.46	17	6.85
11-15 years	6	8.22	6	11.32	5	9.09	3	4.48	20	8.06
16-20 years	5	6.85	9	16.98	1	1.82	5	7.46	20	8.06
More than 20 years	50	68.49	32	60.38	45	81.82	28	41.79	155	62.50
Missing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	73	100	53	100	55	100	67	100	248	100

Company employee (persons)

	CO		FF		SC		PO		Total	
	Fre.	Per. (%)	Fre.	Per. (%)						
0-99	29	39.73	20	37.74	16	29.09	16	23.88	81	32.66
100-249	11	15.07	7	13.21	2	3.64	10	14.93	30	12.10
250-499	9	12.33	11	20.75	3	5.45	8	11.94	31	12.50
500-1499	11	15.07	14	26.42	19	34.55	18	26.87	62	25.00
1500 and above	11	15.07	1	1.89	14	25.45	14	20.90	40	16.13
Missing	2	2.74	0	0.00	1	1.82	1	1.49	4	1.61
Total	73	100	53	100	55	100	67	100	248	100

Company capital

	CO		FF		SC		PO		Total	
	Fre.	Per. (%)	Fre.	Per. (%)						
Less than 300,000 USD	14	19.18	8	15.09	3	5.45	2	2.99	27	10.89
300,000-3,000,000 USD	15	20.55	30	56.60	10	18.18	3	4.48	58	23.39
3,000,001-60,000,000 USD	23	31.51	10	18.87	3	5.45	11	16.42	47	18.95
More than 60,000,000 USD	19	26.03	3	5.66	39	70.91	50	74.63	111	44.76
Missing	2	2.74	2	3.77	0	0.00	1	1.49	5	2.02
Total	73	100	53	100	55	100	67	100	248	100

Company's main business area (multiple selections applicable).

	CO		FF		SC		PO		Total	
	Fre.	Per. (%)	Fre.	Per. (%)						
1-market (non-US,EU,Asia)	0	0.00	0	0.00	1	1.82	0	0.00	1	0.40
1-market (non-US,EU,Asia)	34	46.58	6	11.32	8	14.55	12	17.91	60	24.19
2-markets (non-US,EU,Asia)	0	0.00	0	0.00	1	1.82	0	0.00	1	0.40
2-markets (at least one of US,EU,Asia)	10	13.70	13	24.53	6	10.91	4	5.97	33	13.31
3 and above - markets (non-US,EU,Asia)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3 and above - markets	26	35.62	34	64.15	39	70.91	26	38.81	125	50.40

(at least one of US,EU,Asia)										
Other	3	4.11	0	0.00	0	0.00	24	35.82	27	10.89
Missing	0	0.00	0	0.00	0	0.00	1	1.49	1	0.40
Total	73	100	53	100	55	100	67	100	248	100

Company's annual revenue.

	CO		FF		SC		PO		Total	
	Fre.	Per. (%)	Fre.	Per. (%)						
Less than 1,500,000USD	11	15.07	5	9.43	3	5.45	0	0.00	19	7.66
1,500,000-15,000,000 USD	20	27.40	18	33.96	5	9.09	6	8.96	49	19.76
15,000,000-60,000,000 USD	15	20.55	14	26.42	3	5.45	18	26.87	50	20.16
More than 60,000,000 USD	26	35.62	14	26.42	41	74.55	43	64.18	124	50.00
Missing	1	1.37	2	3.77	3	5.45	0	0.00	6	2.42
Total	73	100	53	100	55	100	67	100	248	100

Appendix F.

Table Adjacency matrix

Communication					Cooperation				
– in Routine service (R1S1)					– in Routine service (R2S1)				
Participants ↘	CO	FF	SC	PO	Participants ↘	CO	FF	SC	PO
CO	0	3.66	3.72	2.64	CO	0	3.66	3.72	2.64
FF	4.00	0	3.90	3.00	FF	3.72	0	3.45	2.84
SC	3.88	3.87	0	3.60	SC	3.44	3.53	0	3.70
PO	3.27	3.51	3.88	0	PO	3.15	3.21	3.69	0
– in Standard service (R1S2)					– in Standard service (R2S2)				
Participants ↘	CO	FF	SC	PO	Participants ↘	CO	FF	SC	PO
CO	0	3.91	3.78	2.71	CO	0	3.91	3.78	2.71
FF	4.48	0	4.16	3.13	FF	4.43	0	3.82	2.94
SC	4.13	3.83	0	3.83	SC	3.83	3.79	0	3.83
PO	3.38	3.48	4.09	0	PO	3.28	3.47	4.13	0
– in Customized service (R1S3)					– in Customized service (R2S3)				
Participants ↘	CO	FF	SC	PO	Participants ↘	CO	FF	SC	PO
CO	0	4.00	3.97	2.84	CO	0	4.00	3.97	2.84
FF	4.83	0	4.43	3.45	FF	4.77	0	4.39	3.35
SC	4.42	4.05	0	4.14	SC	4.40	4.00	0	4.12
PO	3.64	3.64	4.42	0	PO	3.60	3.55	4.32	0
Relationship Duration					Commitment				
– in Routine service (R3S1)					– in Routine service (R4S1)				
Participants ↘	CO	FF	SC	PO	Participants ↘	CO	FF	SC	PO
CO	0	3.36	3.78	2.41	CO	0	3.77	3.95	2.70
FF	3.38	0	3.79	2.96	FF	4.28	0	4.21	3.24
SC	3.58	3.42	0	4.27	SC	4.35	4.10	0	4.31
PO	2.98	3.12	4.33	0	PO	3.58	3.34	4.33	0
– in Standard service (R3S2)					– in Standard service (R4S2)				
Participants ↘	CO	FF	SC	PO	Participants ↘	CO	FF	SC	PO
CO	0	3.44	3.54	2.51	CO	0	3.78	3.78	2.71
FF	3.80	0	3.96	3.10	FF	4.49	0	4.27	3.24
SC	3.77	3.52	0	4.21	SC	4.35	3.92	0	4.26
PO	3.04	3.07	4.35	0	PO	3.56	3.46	4.32	0
– in Customized service (R3S3)					– in Customized service (R4S3)				
Participants ↘	CO	FF	SC	PO	Participants ↘	CO	FF	SC	PO
CO	0	3.61	3.50	2.66	CO	0	3.82	3.69	2.75
FF	4.23	0	4.27	3.10	FF	4.64	0	4.49	3.35
SC	3.80	3.55	0	4.00	SC	4.14	3.89	0	4.16
PO	3.21	2.86	4.38	0	PO	3.69	3.48	4.53	0

Trust					Commitment				
– in Routine service (R5S1)					– in Routine service (R6S1)				
Participants \	CO	FF	SC	PO	Participants \	CO	FF	SC	PO
CO	0	3.55	3.75	2.63	CO	0	3.44	3.76	2.56
FF	3.72	0	3.83	3.12	FF	3.58	0	3.86	2.94
SC	3.58	3.37	0	3.90	SC	3.47	3.53	0	3.87
PO	3.14	3.18	3.85	0	PO	3.32	3.18	4.02	0
– in Standard service (R5S2)					– in Standard service (R6S2)				
Participants \	CO	FF	SC	PO	Participants \	CO	FF	SC	PO
CO	0	3.68	3.64	2.56	CO	0	3.57	3.65	2.64
FF	4.15	0	3.98	3.15	FF	4.06	0	4.22	3.15
SC	3.83	3.45	0	4.02	SC	3.85	3.66	0	4.02
PO	3.22	3.11	3.95	0	PO	3.43	3.30	3.86	0
– in Customized service (R5S3)					– in Customized service (R6S3)				
Participants \	CO	FF	SC	PO	Participants \	CO	FF	SC	PO
CO	0	3.55	3.53	2.56	CO	0	3.73	3.53	2.68
FF	4.38	0	4.31	3.28	FF	4.28	0	4.43	3.28
SC	3.91	3.52	0	3.87	SC	3.88	3.58	0	4.02
PO	3.36	2.96	3.98	0	PO	3.57	3.29	3.86	0