

# **Customer value in port operations**

**A supply chain perspective**

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*Customer Value in Port Operations:*

*A Supply Chain Perspective*

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*Abstract*

*The importance of Customer value has been received the academicians and companies attention in recent years. Port and terminal integration is not a new topic, as the concept of supply chain integration has been extended to maritime and port supply chain by scholars over the last decade. Many studies took the supply chain integration concept and its functions in order to analysis the partners' relationships within maritime supply chain. The value that port users perceive and seek is different with that one in many years ago; long term relationship is considered rather than cost reduction. Consolidation ports in global supply chain brought a new role for ports in terms of delivering value to customers. This thesis aims to make a contribution in respect of the significance of customer value in port operations by first, adopting a systematic review of the relevant literature on customer value and supply chain. Second, identify the potential interactions which effect on customer value, by focusing on information technology and internal integration. Finally, conceptualize the possible relationships between information technology, internal integration, and customer into a model.*

**Keywords:** *Maritime Logistics, Port Operations, Information Technology, Customer value, Maritime Supply Chain*

*I dedicate this work to my parents  
who have endlessly supported me with their love and never stopped encouraging me*

*Preface*

*This master thesis is a compulsory requirement for the fulfillment of Master of Science in Maritime Management. The topic of my thesis is customer value and its importance in port operations, a very relevant topic in maritime transportation. To accomplish this thesis, I have performed a systematic literature review, proposed a conceptual model and formulated research propositions.*

*I would like to express my deepest gratitude to my supervisor, Umar Burki, associate professor at the department of business and management, Vestfold University College. He guided me throughout the entire thesis process and provided constructive comments. His guidance helped me to trust my abilities and complete this thesis.*

*I would also like to thank all my teachers who taught and guided me during the master program.*

*In the end, I want to thank my immediate family members who supported me throughout the master program and provided the essential emotional and financial support.*

*Vestfold, May, 2013*

*Afra Koulaei*

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***List of Abbreviations***

***TEU: Twenty-foot Equivalent Units***

***SCM: Supply Chain Management***

***CV: Customer Value***

***II: Internal Integration***

***IT: Information Technology***

***EDI: Electronic Data Interchange***

***RFID: Radio Frequency Identification***



## **Introduction**

### **Background**

*Over the last few decades, worldwide business environments have changed rapidly. Globalization has triggered international trade between countries, quickened the multimodal transportation growth, and has brought a necessity that global supply chain operations need to be managed in the most efficient and effective way by the involved firms within the chain. (Lee, 2010). Therefore, globalization changed the role of ports in the global supply chain, and pushed the ports to fulfill a new role as parts of integrated global supply chain systems (Dong- wook song & Panayides, 2007) .*

*Due to increased demand for containerization, and also rapid increase in world trade in the past decade, the need for technology has raised up in cargo handling, terminal operations, the shipping industry, and other modes of transportation. Almotairi (2012) suggested that substantial changes in maritime transport environment resulted from strong growth in containerized cargo, increased efficiency of inland distribution patterns, advanced technological breakthroughs, and the need for accurate information for planning and operations. Maritime supply chain tends to pursue for efficiency and improved services.*

*Currently, ports operate in an environment marked by a high degree of operational complexity. This creates a need for a fast and efficient exchange process in port operations under which a large amount of data and information should be exchanged between the port users (Bichou, 2009). The importance of information technology and investigation the operational inefficiencies which caused by lack of information technology and communication in terminal operations, has been studied during the last years.*

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*Kia, Shayan, and F.Ghotb (2000) adopted a simulation model in terminal operations. They found that the application of electronic devices in container terminals reduced the manual effort and paper flow, and also facilitated timely information flow and enhanced control and quality of services and decision making processes. The result of their study clarified the significance of information technology in facilitating the exchange of information in the port supply chain.*

*Dramatic changes in cargo transportation modes and port operations, have been increased the demand of value-added logistics services and the integration in the port operations chain. A Port as an integrated component of global maritime logistics needs to provide transport related services and create value for the customers within its supply chain. That is why Bichou (2009) stated that today much of the emphasis of business logistics is placed on effective customer service. He also defines customer service as the measure of how well the logistics system satisfies its customers and their expected levels of service. In ports, it is important to perform efficient operations while still satisfying the port users and customers.*

*The main value of maritime and port logistics is achieving both operational efficiency and service effectiveness (Lee, Nam, & song, 2012). Lee et al. (2012) defined service effectiveness in port operations as flexibility, responsiveness, and reliability in the provided services by port operators. Effective logistics and supply chain management can provide a major source of competitive advantage, in other words a position of enduring superiority over competitors in terms of customer preference may be achieved through better management of logistics and the supply chain (Christopher, 2011) . An ideal of effective supply chain management is to achieve synchronization of all supply chain activities in order*

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to create customer value (Mentzer, DeWitt, Keebler, & Min, 2001) and Customer is the one who defines value (Webster, 1994).

Understanding how customer value is identified, created and delivered is increasingly seen as the next source of competitive advantage (Woodruff, 1997). The means to achieve competitive advantage is by creating value for downstream member clients than that offered by competitors. Customer value is created through cooperation and coordination to improve cost efficiency and/or service effectiveness in ways that are most valuable to key customers (Pienaar & Vogt, 2012).

Defining Supply chain management and logistics chain excluding the customer value concept is impossible. Christopher (2011, p. 3) stated that supply chain management is: “the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole”. Logistics has become a major economic activity comprising the process of planning, implementing, and controlling the efficient and effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose of conforming to customer requirements (Council of logistics management, 1998) and this is advocated by Coronado Mondragon, Lalwani, Coronado Mondragon, Coronado Mondragon, and Pawar (2012).

In today's customer driven market, the focus is mainly placed on the perceived value to the customer of the entire relationship with a company than the product or service. Supply chain management is naturally an important component in fulfilling customer needs and providing value (Simchi-Levi, Kaminsky, & Simchi-Levi, 2008). The importance of customer value as one of the top research agendas (Spiteri & Dion, 2004), and also role of

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*customer in maintaining a longterm relationship between partners chain has been investigated, in some industries; such as pharmaceutical supply chain (Carter, 1997).*

*Simchi-Levi et al (2008) introduced the customer value as an important factor in determining the type of supply chain required to serve the customers and the type of services for retaining them. A firm seeking to competitive advantage must clearly understand its customers' value perceptions and the product attributes demanded by them. Value perceptions differ among customer segments. A firm must, therefore, identify the customer segments that are important for its long-term success and adjust its capability correspondingly to deliver the value to these segments (Pienaar & Vogt, 2012).*

*Supply chain management is an effective method for creation and maximization of customer value (Zhang & Liu, 2010). In maritime logistics operations which consists of shipping lines, port operations and freight forwarders (Lee, 2010), all of the customer value elements, such as quality, cost, time, and service (Christopher, 2011) are important to enhance the competitiveness of the port operations and improving the partners' business relationship or collaboration in the maritime supply chain.*

*Logistics integration, and consolidation the position of ports as premier locations for complex logistics networks (Coronado Mondragon et al., 2012) redefined the functional role of ports in the value chains (Bichou, 2009) . Supply chain management extends the logistics concept of integration to a network of organizations by advocating trust, closer collaboration, and partnership arrangements(Bichou & Gray, 2004). This is also advised by Bichou (2009), where he underlines the importance of the collaboration between partners in international logistics and ports.*

*While supply chain integration is the alignment and interlinking of business processes, collaboration is a relationship between supply chain partners developed over period of time (Mangan, Lalwani, Butcher, & Javadpour, 2012). Supply chain integration consists of internal integration of different functions within a company, and external integration with trading partners (Zhao, Huo, Selen, & Yeung, 2011). For example, applying electronic data interchange (Simchi-Levi et al., 2008) in the firm and information sharing leads to internal integration within the firm's supply chain.*

*Zhao et al. (2011) proposed a model which positively correlates the internal integration on external integration in the supply chain. This study, further, argued that while information sharing and the application of IT systems creates an internal integration, this internal integration has a positive effect on external integration between suppliers and customers.*

### ***Identify the Research Area***

*More than 80% of international trade by volume being carried by sea and ports are vital for seaborne trade and international commerce. Bichou (2009) highlighted that ports are critical nodal interfaces which connect maritime transport with other modes of transport, where trading, distribution, and logistics activities can take place. Efficient port operations significantly lower maritime and trade costs whereas delay in ports impose costs on logistics and supply chains through the costs of warehousing and inventory.*

*Multimodal logistics has become an important component of logistics worldwide. Therefore, access to other modes of transportation including road, rail, pipeline, and air is available in ports (Mondragon et al., 2012). The efficient management of multimodal logistics would be difficult to achieve without the support of sophisticated information and*

*communication technology. The importance of investment in technology on port's success, has advocated by Dong-Wook Song (2002).*

*One of the most important factors of port competitiveness is port efficiency. Customers choose a port for many reasons, such as; port accessibility, closeness to high import and export area, closeness to main navigational routes, and etc. Today, due to the complexity in port operations and high volume of cargoes which transport via ports, well managing the operations is not the only factor to have an efficient and attractive port for the customers. It should be noted that the provision of up-to-date facilities, equipment and information technology such as Electronic Data Interchange, play an important leading role in enhancing the overall port efficiency (Yang, Low, & Tang, 2011).*

*Despite the wide recognition of the importance of information and communication technology in logistics, transportation, and fulfill the customer' needs in supply chain, little studies have been conducted to study the importance of information technology applications (Mondragon et al., 2012; Ngai, Lai, & Cheng, 2008), in enhancing customer value in maritime logistics and port operations. Due to globalization, global logistics becomes to rely more on the maritime transportation than ever before. Ports nowadays play an important role as members of a supply chain. In this role, ports are locations in which different logistics and transport operators are involved in bringing value to the final consumers.*

*Port competitiveness nowadays depends to a large extent on the ability of ports to integrate in global supply chain (Dong- wook song & Panayides, 2007). Despite the well-articulated of issues regarding the customer value and competitive advantage in supply chain and logistics, little has been offered theoretically of the importance of the customer value in maritime and port operations supply chain.*

*Recent studies have conceptualized and tested effectiveness of information technology in reducing congestion in port terminal operations, reducing loading and discharging time cycles (Asbjørnslett, Lindstad, & Pedersen, 2012; Kia et al., 2000), and better relationship with shipping companies (Dong-wook song & Panayides, 2007; Vitsounis & Pallis, 2012). Yet, there is no specific study which is discussed the effectiveness of information technology in enhancing customer value, and also the role of customer value on partners' collaboration in maritime logistics chain and port operations.*

*During the last decades, the concept of supply chain has been studied as value chain and the focus placed upon the search for strategies that will provide superior value in the eyes of the customer (Azaddin Salem, 2004; Christopher, 2011; Mentzer et al., 2001; Woodruff, 1997). Supply chain management is concerned with improving both efficiency (i.e., cost reduction) and effectiveness (i.e., customer service) in a strategic context (i.e., creating customer value and satisfaction through integrated supply chain management) to obtain competitive advantage that ultimately brings profitability.*

*Mangan et al. (2012, p. 227) states that, "today's market-driven global supply chains are information intensive and require adaptive information systems to manage logistics complexities, and access to timely and accurate information is fundamental to effective supply chain". While Christopher (2011) addressed Steven's model for integration of supply chain; he explains the crucial role of internal integration in achieving the external integration ( collaboration or partners' relationship). Similarly, Mangan et al. (2012) explained that while information technology enables supply chain internal integration, in turn, this internal integration enables collaboration.*

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*The existing literature, clarifies the significance of the information and communication technology in supply chain integration and the firms' competitiveness. The current literature in port and maritime supply chain adopted empirical and theoretical analysis to study the concept of the supply chain management integration and technology usage in maritime context. Further, some of these studies investigated the relationships of the involved players in the port and maritime logistics chain, and they suggested perceived value by the customers in the chain. Existing literature has yet to clearly define the effectiveness of information technology as one of the tools in enhancing customer value in port operations, and the effect of the enhanced customer value on the collaboration/ business relationship between the actors in maritime supply chain and port logistics.*

*Maritime transport has experienced considerable changes during the last decade. Globalization, containerization, maritime and ports logistics integration in global logistics system, have forced the maritime supply chain players not only to focus on regular transportation of the cargo, but, also understand the value added attributes, and value of the customer in the maritime industry. For this reason, this thesis aims to bridge a research gap from information technology and customer value to collaboration in port operations.*

*While most of the literature tries to explain that the mission of the supply chain management is providing the means whereby customers' requirements met at lowest price/cost, the consideration of this thesis is not focusing on the cost minimization, instead on the supply chain potential to enhance customer value and collaboration. This can be happened through the integration of customer value, information technology, and internal integration into collaboration within the maritime and port supply chain.*



**Thesis Question**

*In the background and problem area section, it is argued that port is a critical connection node in supply chains and global logistics. Further, ports are the major source of value-added services in maritime logistics chain. Enhancing customer value in ports, leads to improving overall value of the maritime supply chain and logistics system. In recent years, seaports have positioned as vital locations for complex logistics network (Mondragon et al., 2012). Thus, a port should focus on improving those capabilities which create value for its customers. I will emphasize the next capabilities: “information technology” (IT) and “internal integration” (II).*

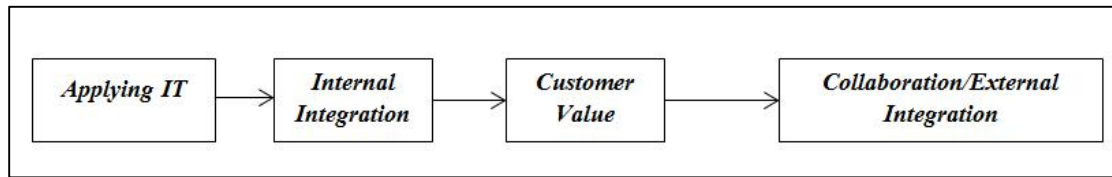
*The main purpose of this thesis is to conceptualize the potential relationships between information technology, internal integration, customer value, and collaboration in port operations. It seeks to highlight the importance of customer value concept in port operations. This study adopts the supply chain management approach aiming at the identification of the customer value attributes that contributes in maritime and port supply chain. The results of reviewing the written literature on the effectiveness of information technology in supply chain management, the concept of the supply chain integration, and perceived value by customers within the maritime supply chain context, will allow me to address the thesis propositions and build up a conceptual model.*

*Supply chain and logistics scholars define the higher the degree of integration across the supply chain brings competitive advantage for a firm in supply chain management, and customer value is considered a source of competitive advantage (Christopher (2011); Simchi-Levi et al. (2008); Mangan et al. (2012); Zhao et al. (2011)). Scholars also address how information technology caused internal integration in the supply chain management,*

*and therefore, increases the responsiveness of the chain and brings competitive advantage for a company.*

*The main Thesis question has been formulated as follows; “How the interaction of information technology and internal integration enhance customer value in port operations?”*

*The thesis question is presented in figure 1.*



*Figure 1: The thesis question*

*In the course of answering the main question of the thesis, and present a conceptual model, it is important to investigate the effectiveness of information and communication technology in port terminal operations. Therefore, the main question of the thesis can be answered by a review of the relevant literature and theoretical findings on role of ports in global and maritime supply chain, the importance of customer value in supply chain and port operations, and role of IT in supply chain and port operations.*

### ***The Structure of the Thesis***

*The thesis consists of total of five chapters. Chapter 2 reviews the theoretical background, and introduces the significance of maritime logistics, customer value, and the role of information technology in port operations. Chapter 3 reviews the thesis methodology. Chapter 4 presents a conceptual model and sets out a number of propositions between information technology, internal integration, and customer value based upon the existing literature in SCM, maritime logistics and Customer value. Finally, chapter 5 is closed with discussion and future research direction.*

**Theoretical Approach**

**Customer Value**

*In order to review the customer value, it is essential to define the concept of value in business relationship. Many of the theoretical foundations on which recent perspectives of “customer value” are based, have their origin in earlier work of the development of the current concepts of value (Payne & Holt, 2001). The concept of value has been considered as a basis constituent of business relationship. Ravald and Grönroos (1996) contended that the ability to provide superior value to customers is a prerequisite when trying to establish and maintain long-term customer relationships.*

*As a first step of conducting a theoretical review on the development of customer value concept, this thesis refers to Payne and Hole’s (2001) comprehensive literature review on customer value. Table 1 illustrates the Key Influences, Perspectives and Development in the Value Concept.*

*Table 1 The Key Influences, Perspectives and Development in the Value Concept.*

<b>1980s</b>	<b>1990s</b>	<b>late 1990s to present</b>
<b>Key Influences</b>	<b>Recent Perspectives</b>	<b>New Development</b>
<i>Consumer values an consumer value</i>	<i>Creating and delivery superior customer value</i>	<i>Customer value and shareholders’ value</i>
<i>Augmented product concept</i>	<i>Customer’s value to the firm</i>	
<i>Customer satisfaction and service quality</i>	<i>Customer-perceived value</i>	<i>Relationship value</i>
<i>The value chain</i>		

*Note: Modified from (Payne & Holt, 2001)*

*According to Payne and Holt’s (2001) literature review, the field of marketing and strategy have produced key-influences on the value literature in the 1980s in developing concepts such as consumer value and consumer values. Holbrook (1994) suggests that term*

value refers to a preferential judgment whilst values term refers to the criteria by which such judgments are made (as cited in Payne & Holt, 2001).

Customer value models and value creation systems, which introduced later in this chapter, are built in the stream of the value concept development. In their review of the value literature, Payne and Holt (2001) presented the concepts of shareholder value, customer value and relationship value. Therefore, I can address that the focus of customer value has become relationship value in late 1990s. A study (Lefaix-Durand, 2008) suggested that customer-supplier relationships are a means of value creation and represent a solution for organizations to increase their competitiveness.

Different definitions of customer value are summarised in table 2.

Table 2 Different definitions of customer value

<b>Study</b>	<b>Definition of customer value</b>
<b>Porter (1985)</b>	The value chain of an enterprise must match that of the customers. The enterprise's competitive advantage comes from its ability to create value for customers.
<b>Holbrook (1994)</b>	Customer value is "a relativistic (comparative, personal, situational) preference characterizing a subject's [consumer's] experience of interacting with some object ... i.e., any good, Service, person, place, thing, event, or idea
<b>Gale (1994)</b>	Customer value is market perceived quality adjusted for the relative price of your product. [It is] your customer's opinion of your products (or services) as compared to that of your competitors
<b>Woodruff (1997)</b>	The customer's perception of the extent to which use of a product allows him/her to accomplish some desired purpose or goal, and the preference and evaluation customers developed resulting from the use of the product
<b>Kotler and Keller (2009)</b>	The total customer value is that the customer expect to get a group of interests from buying certain products and services
<b>Christopher (2011)</b>	Customer value is: $Quality * service / Cost * time$ .
<b>Paananen (2012)</b>	Customer value is a result of dynamic interaction of expectations, experience, and evaluation of product/ service's attributes
<b>Best (2013)</b>	Perceived customer value = Relative performance – Relative cost of purchase Customer value is a combination of product/service's performance, quality, and brand reputation

The early concept of customer value was introduced by Porter (1985) in Competitive advantage; however, the in-depth research of customer value began in the 1990's. Many attempts by marketing scholars (e.g. Christopher, 1996; Woodruff, 1997; Payne & Holt,

2001; Azaddin Salem, 2004; Grönroos, 2008; Paananen, 2012) have been done in order to present a comprehensive concept of customer value and introduce customers as the main source of value creation in a firm.

### **Customer Value Models**

A study (Azaddin Salem, 2004) classified the customer value definitions into three categories: value components models, utilitarian or benefits/costs ratio models and means-ends models. This study further, explained that, each category emphasizes certain dimensions of the concepts and pays little attention to others. However, Azaddin Salem (2004) by adopting a comprehensive literature review, proposed an integrative configuration of customer value. By this configuration, Azaddin Salem (2004) suggests that customer value goes beyond product and service itself.

**Components model.** Customers' perceived value is not a new concept, it can be traced back in consumer behavior literature (Azaddin Salem, 2004), and has been studied by numerous researchers over time (Best, 2013; Christopher, 2011; Kaufman, 1998; Naumann, 1995; Oliver, 2010; Rust & Oliver, 2000; Simchi-Levi et al., 2008; Woodruff, 1997). Delivering the best value from the customers perspective, is one of the successful keys for the suppliers in today's highly competitive business environment. Naumann (1995) suggested that the different components affecting the perceived value can be formed into a model. Figure 3 illustrates the components of the customer value. Naumann (1995) stipulated that, once a customer has made a purchase decision, a new component of value emerges. That component is the relationship between customer and the vendor, over time the relationship component can develop into an extremely important factor. In introduction part, the importance of the collaboration and relationship between customers and suppliers is

explained. A strong relationship between customers and suppliers brings competitive advantage for the company.

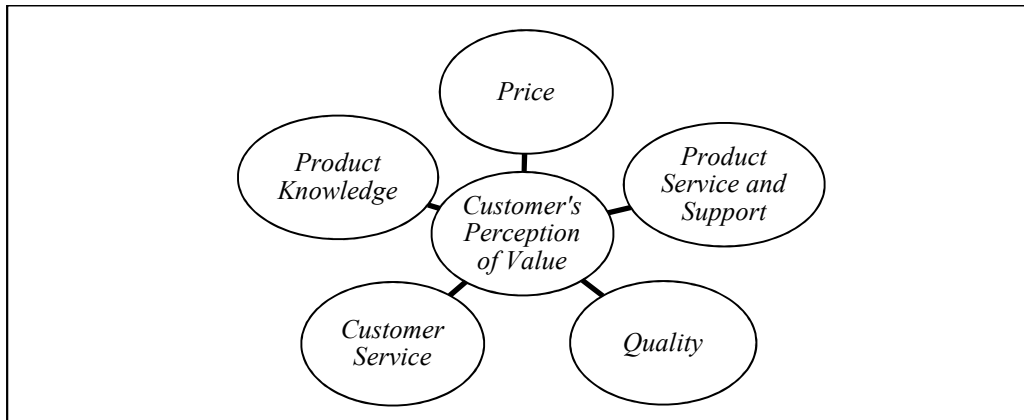


Figure 2: The Components of Customer Value. Adapted from Naumann, (1995)

Simchi-Levi et al. (2008) outlines customer value as the way the customer perceives the entire company's offerings, including products, services, and other intangibles. The customer perception can be broken into several dimensions, as shown in figure 4.

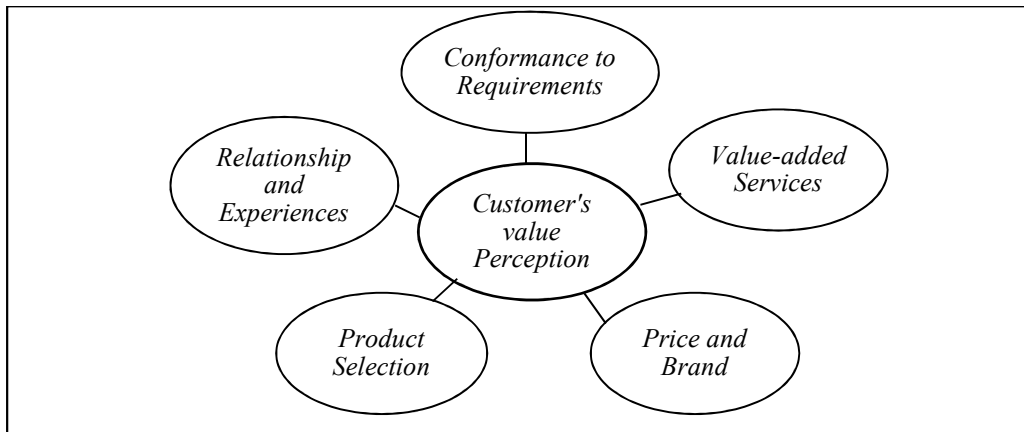


Figure 3: The Dimension of the Customer's Value Perception (drawn by Author)

**Benefits/costs ratio model.** The benefits/costs model are based on the assumption that, customer value is the difference between total customer value and total customer cost. Day (1990) proposes that the perceived customer value represents the difference between Customer's perceived benefits and customer's perceived costs (as cited in Azaddin, 2004).

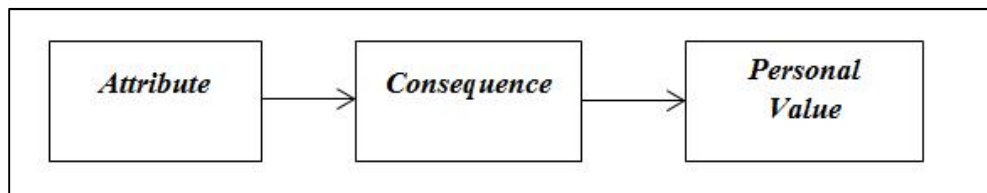
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*Customer value is the sum of benefits received minus the costs incurred by the customer from the product and the service that we provide (Treacy & Wiersima, 1995).*

*According to (Johansson, McHugh, Pendlebury, & Wheeler, 1993), customer value is defined as the result of four parameters; service quality, cost, and cycle time. A study by (Lagoudis, Lalwani, & Naim, 2006), adopted Johansson et al's four key metrics in order to identify the key factors that add value to ocean transportation industry. This study, further, advocated that, there is strong emphasis placed by ocean transportation companies on quality. One of the measured quality metrics in this study was found as development and maintenance of good relationships with customers and suppliers.*

**Means-ends model.** *Means-end models are based on the assumption that customers acquire and use products or services to accomplish favorable ends (Azaddin Salem, 2004). Means end theory, is a theory about the customer behavior. The means end theory was developed by (Gutman, 1982) as a basic theory for marketing scholars to explore consumer choice and to understand the emotional underpinnings that drive customer's decisions.*

*The conceptual model of means-end theory can be figured out in the figure 4 :*



*Figure 4: Means-End conceptual model*

*Means end chain is composed of three parts, that is attribute, consequence, goal (or value). Attribute are visible tangible elements of all products or services (Gao & Pan, 2010). Woodruff (1997) based on means-end chain approach, divided the customer value into desired value and received value, to form the customer value hierarchy model. In an empirical study on the value of relationships in ports, Vitsounis and Pallis (2012) by referring*

to means end theory, explained the ways and conditions which port users perceive value when using a particular port. Figure 5 elaborates the relationship between desired and received value perceived by customers.

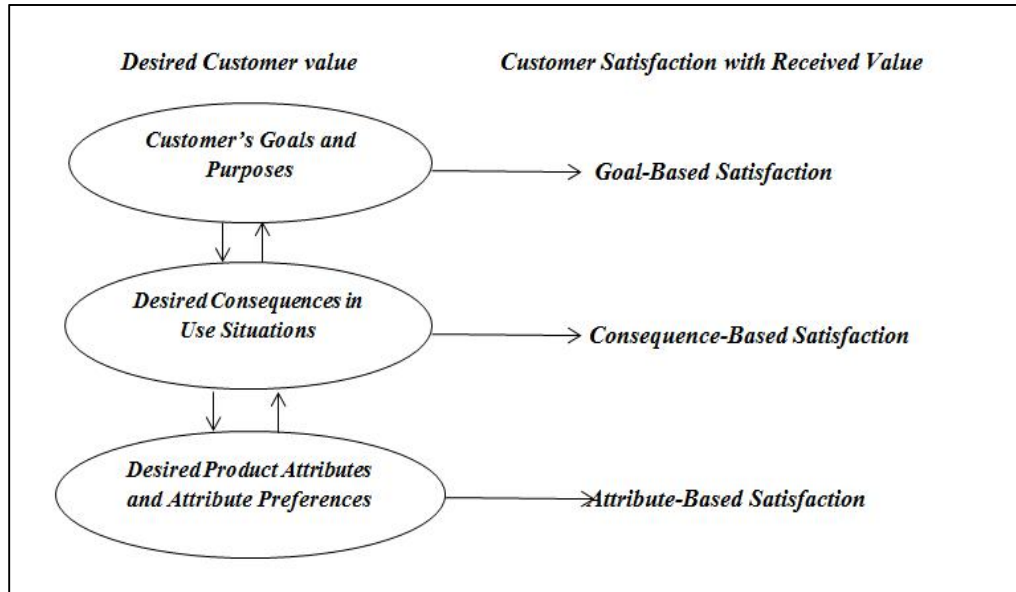


Figure 5: Customer Value Hierarchy. Adapted from (Woodruff 1997)

### **Value Creation**

The future competition regarding companies can be found in a new approach to value creation, which is based on the co-creation of value between customers and companies. In order to explain the new approach to value creation, the old traditional system of value creation will be explained followed by introducing the new system (Prahalad & Ramaswamy, 2004).

Prahalad & Ramaswamy(2004) explain that, in the traditional system of value creation, the interaction is the focus of economic value extraction by the firm. The traditional system of value creation does not show a collaboration or strong relationship between customer and supplier/company.



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Based on the traditional value creation system in figure 6, supplier/company is considered the customer only as a demand target, and supplier is a key player in the market who creates value. Figure 6 illustrates the traditional system of value creation.

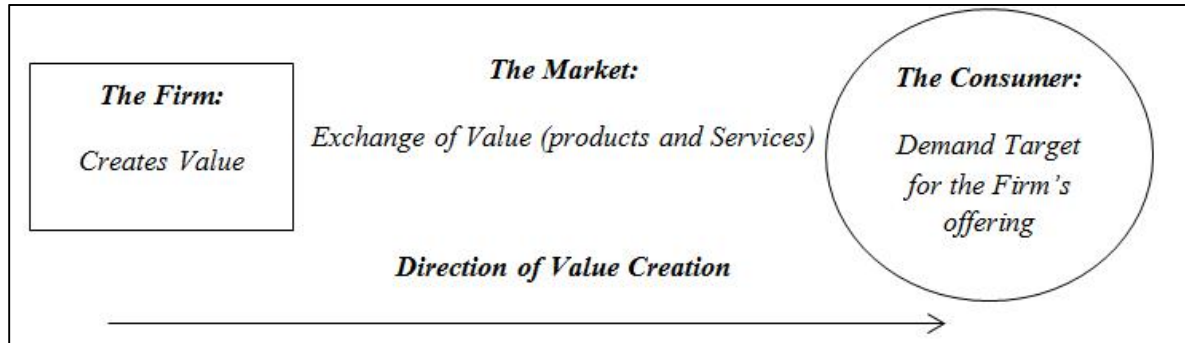


Figure 6: The traditional system of value creation. Modified from (Prahalad and Ramaswamy (2004)

This thesis aims to find out the potential interaction between the customer value and collaboration. Therefore, for this purpose, considering customer as a source of value creation is very important. Value is not created only by the supplier or company, customer also creates value. In further support of this statement, the new value creation system is presented in figure 7.

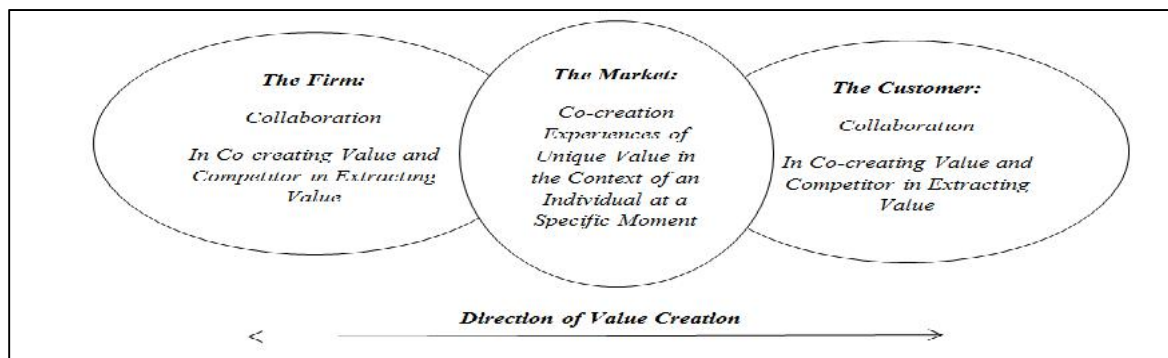


Figure 7: The new system of value creation. Modified from (Prahalad & Ramaswamy, 2004)

Figure 7 illustrates the relationship between the company and the customer within the new system of value creation. Prahalad and Ramaswamy (2004) advocated that high-quality interactions between the company and the customer, enabling the co-creation of unique

*values that might lead to alternative sources of competitive advantage. According to the new value creation system, I can suggest that, not only does the supplier/company create value to the customer, the customer likewise creates value to the supplier/company. For this purpose, a two way value creation line is added to Prahalad & Ramaswamy's model in order to illustrate this correlation.*

*The importance of superior customer value is acknowledged in most business strategy models and has been the focus of much research interest in the 1990s (e.g. (Band, 1991; Brown, 1995; Cravens, 1997; Day, 1990; Gale, 1994; Naumann, 1995; Scott, 1998). The concept of "customer value" is of major and increasing concern, not only to researchers, but also to consumers and marketers (Patterson & Spreng, 1997).*

*Although studies made a comprehensive basis for the existing researches in marketing and supply chain management, I find these studies mostly within the industrial or commercial enterprises in general than more globalized logistics companies with highly complex supply chain. So a comprehensive study of the new concept of customer value, specifically within the maritime supply chain, is an essential way in order to show the importance role of customer and the created value by customers in maritime and port operations supply chain.*

### **Customer Value in SCM**

*Christopher (2009, 2011) underlines the importance of delivering superior customer value at low costs to upstream and downstream relationships between suppliers and customers in a supply chain. That is why he later advocated that supply chains compete and not companies. Therefore, the concept of customer value as an important element in fulfilling customer needs and providing value (Simchi-Levi et al., 2008), led to successful management*

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of supply chains. It is further stated that the ability to access information is of a vital importance in creating customer value in a supply chain. Companies have found out that higher customer value creates additional value for the company. Companies are not working in an isolated environment. There is an extremely high competition out in the business environment, which forces companies to compete with competitors for customers.

Today, customers evaluate suppliers by the amount of value that they receive. Perceived value by customers can be different from industry to industry. But, always there is one intention for both customers and suppliers, and that is reaching for strong and long term collaboration. Collaboration between downstream and upstream partners in supply chain is considered as an important source of value creation.

Spekman, Kamauff, and Myhr (1998) stipulates that firms create competitive advantage by establishing collaboration between upstream and downstream partners. Spekman et al. (1998) explained that Collaboration requires high levels of trust, commitment, and information sharing among supply chain partners. This study also supported the importance of collaboration between supply chain partners by elaborating the transition from open market negotiation to collaboration, and this is illustrated in figure 8.

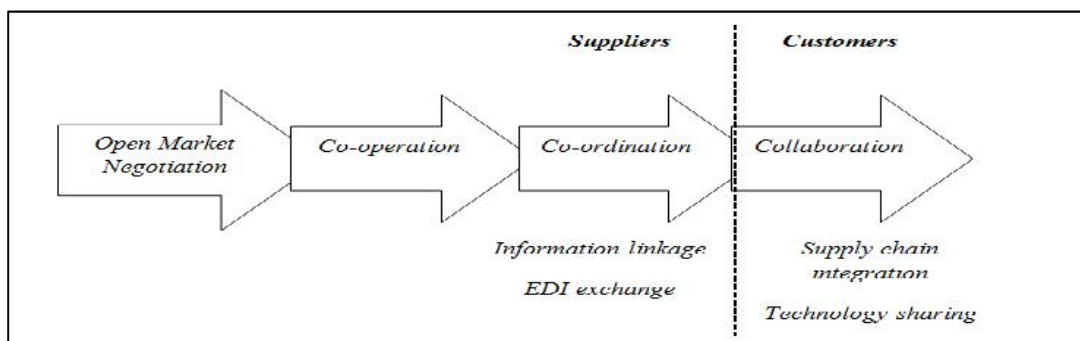


Figure 8: The key transition from open-market negotiations to collaboration. Modified from (Spekman et al., 1998)

*Supply chain management is an effective strategically approach towards the creation of customer value. As pointed by Zhang and Liu (2010), the competitiveness of enterprises is formed during the process of producing value for customers. Because, in addition to a system approach and a strategic orientation, supply chain management also has a customer focus (Mentzer et al., 2001). This focus is about creating unique and individualized source of customer value which leads to customer satisfaction. Zhang and Liu (2010) in a study on customer value oriented supply chain, investigated that supply chain management plays a vital role in achieving core value of customers.*

### ***Supply Chain and Maritime Logistics Integration***

*Lambert, Stock, and Ellram (1998) defined supply chain management as the integration of key business processes such as providing services, and products from supplier to customer, and add value for customers. A study which examined supply chain integration and performance, supports that there is a significant correlation between information technology, and information sharing with logistics integration (Prajogo & Olhager, 2012) . Also, this study contended that both information and material flow integration are important for supply chain integration.*

*Vickery, Jayaram, Droge, and Calantone (2003) conceptualized an integrative supply chain strategy of customer service, and they proposed a model of supply chain integration. This study supported positive relationship between integrated information technology and supply chain management, and also, between supply chain integration and customer service. Figure 9 shows how integrated supply chain positively correlates to customer service.*

*The results of Vickery et al. (2003) 's study, can reinforce the main purpose of this thesis, and making up the interactions of port supply chain integration and information*

technology. Literature review (Mangan et al, 2012; Simchi-Levi et al, 2008) highlighted that the application of technology in the supply chain management and logistics (e.g. EDI, RFID, etc.) has led to the integration of information and material flow in the chain.

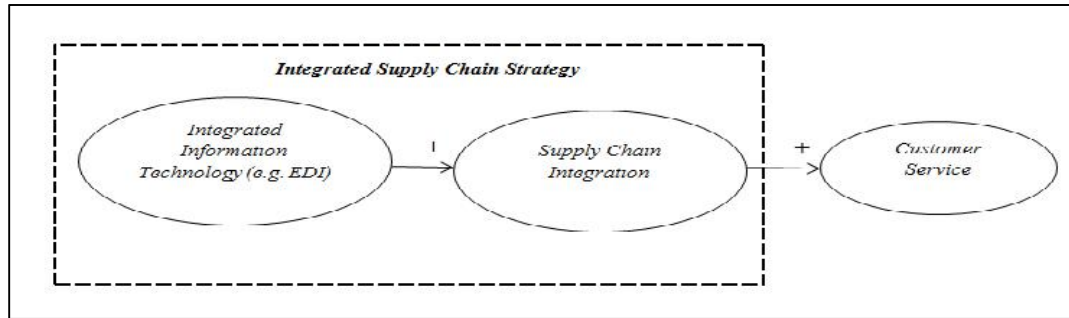


Figure 9: A model of supply chain integration and performance. Modified from Vickery et al. (2003)

Panayides, Wiedmer, and Louca (2012) in an empirical study to investigate the supply chain integration and firm's value, suggested that value is not only related to operating or technical efficiency, but more is related to the degree of integration of business process. In this study, Panayides et al. (2012) listed main key drivers (as cited by Robinson 2002) that influence the value addition in an integrated supply chain. One of these key drivers identified as real-time information and the integration of business processes.

Panayides et al. (2012) explain that information flow between different logistics services is improved through vertical integration. In further support of this finding, Mangan et al. (2012) by considering two dimensions of collaboration; vertical and horizontal integration, advocate that adoption of technology make vertical integration happen easier. Vertical integration is explained as collaboration between supplier and customers (Mangan et al., 2012).

Creation value in supply chain management can be classified into two levels; primary activities and support activities. Primary activities are directly involved in creating and bringing value to the customer, whereas support activities improve the performance of the

primary activities. Support activities can only affect the value delivered to customers insofar as they affect the performance of primary activities. Primary value chain activities deal with physical functions regarding cargoes. All chain activities work together to produce the value delivered at the end of chain (Christopher, 2011). The primary key and supportive activities of maritime logistics can be seen in the table 3.

Table 3: Key and supportive activities of maritime logistics

	<b>Shipping</b>	<b>Port Operations</b>	<b>Freight Forwarding</b>
<b>Main Function</b>	Moving Cargoes between ports	Shipping reception; Loading/discharging cargoes; Stevedoring; And Connecting to inland transportation	Booking vessels; and Preparing for requisite documents for ocean carriage and trade, on behalf of shippers
<b>Supportive Logistics Activities</b>	Documentation relating sea trades; Container tracing and information service.	Warehousing, Offering distribution centers, Repairing and Inland connection	Inventory management; Packing; and Warehousing

Source: Modified from (Lee, 2010)

Lee et al. (2012) in a study proposed a value creation model in maritime logistics on Porter's (1985) value chain model. This study explains that, the primary activities consist of the maritime operators (shipping lines, port/terminal operators and freight forwarders). The secondary activities are the activities that support the primary activities by helping them to run more effectively. Lee et al. (2012) pointed out that higher value logistics services leads to the high performance of individual operators and entire logistics system. According to Lee et al. (2012) shipping lines are the main customers of port/terminal operators; freight forwarders are the customers of shipping lines. The maritime logistics system would be improved when the maritime logistics system satisfies customers more with a higher quality of services.

The identification of the factors that add value to maritime transportation assists the shipping companies and port terminals in the creation of more effective and efficient supply

chain. This thesis aims to figure out the interactions of the factors (IT and internal integration) in port supply chain operations. Further, this thesis seeks to conceptualize enhancing customer value of shipping lines, and freight forwarders, and inland transportation companies by terminal operators. Therefore, the focus of this thesis will be placed on identifying the parameters which lead to supply chain integration and value creation. By this, I consider the adoption of technology in port operations as one of the key drivers in this context.

Figure 10 provides a general configuration of maritime logistics systems, including primary and secondary activities; further the interactions of maritime logistics' actors are elaborated.

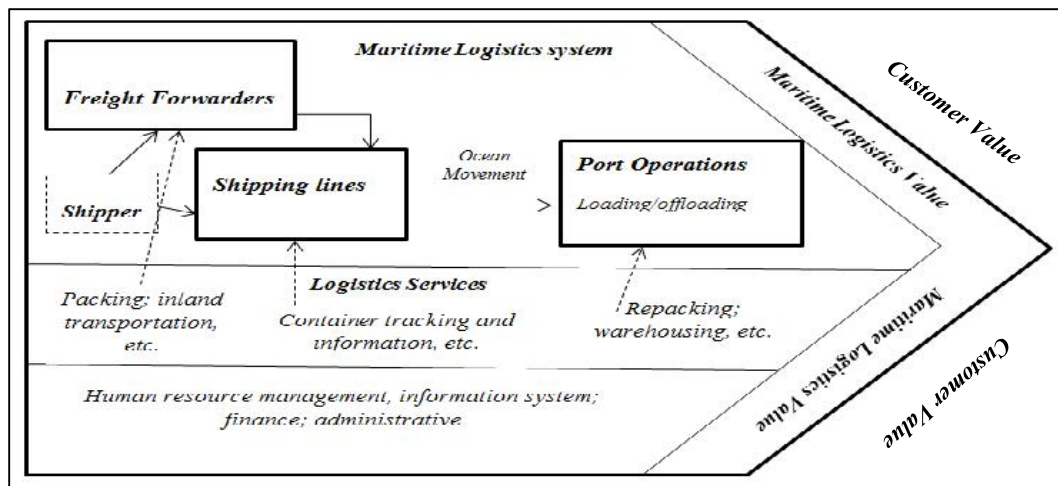


Figure 10: The maritime logistics value configuration (modified from (Lee et al., 2012))

Zhang and Liu (2010) argued that customer value oriented supply chain management enhances customer perceived benefits, optimizes the relationship of its members, speed up the response time, hence generating a competitive advantage. Therefore, production and enhancement of customer value is the driving force behind supply chain

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*management. Supply chain management is an effective method for the creation and maximization of customer value.*

### **Customer Value in Port Operations**

*Developments of sea transport and port operations due to globalization have increased the importance of having a better management the flow of the cargoes from supplier to customers, and also delivering more value added services such as; packaging, product labeling, inspection, etc. to the customers. Extensive competition in maritime business environment, and increasing containerization changed the role of the port to one the most important parts of the global supply chain which creates value for customer.*

*Baluch (2005) states that, today, the products we consume travel long distances along global supply chain to reach us. Production, inventory control, transport, and distribution, and specialized handling and management are all part of these supply chains. In supply chain management, it assumes that the network of organizations in a port supply chain should work collaboratively in order to ensure superior customer service and competitive advantage.*

*Ports are not only competing against other ports on the basis of operational efficiency, price, and location, but also, and more importantly, on the basis that they are embedded in quality supply chains that offer shippers, third party service providers, shipping lines and other customers a greater value than alternative ports, routes and supply chains (Bichou, 2009; Robinson, 2002).*

*There is a close relationship between the term value added service and customer value in logistics. Ports are a good location for value added logistics services. Therefore, ports play key role in creating value for the customers; inside and outside the port*



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(Almotairi, 2012; Bichou, 2009; Dong-wook song & Panayides, 2007; Vitsounis & Pallis, 2012).

*The users of a port develop perceptions regarding the value that is generated and extracted by the use of the port and this value mainly drives from the operational, commercial interactions, and the structural characteristics of the port. Operational interactions include the actual delivery of a service, i.e. the loading of a container into a truck. Commercial interactions refer to all other interactions that are developed between the parties involved, such as communications rather than physical transactions (Vitsounis & Pallis, 2012). The current portfolio of port users extends to a wide range of customers along the supply chain, including shippers, third party logistics providers, and inland transport operators (Bichou, 2009).*

*Vitsounis and Pallis (2012) conducted a comprehensive study on relationships between port users and port service providers and they focused on the value which is extracted by the users of a port. Their findings support that value lies on relations. To explain this, they took a container's movement process from point A to point B via port. Starting from the inland terminal, freight forwarders, shipping lines and terminal operators, a number of actors are involved, and several relationships developed throughout this process. Finally, they advocated that the efficiency and effectiveness of the container's movement are subject to coordination and collaboration of the involved actors.*

*A study (Vickery et al., 2003) suggested that value in maritime and port supply chain places emphasizes on relations developed between service providers and users, and stronger relationships with partners lead to increased satisfaction.*

***The role and significance of technology in port and maritime supply chain***

*The application of technology in supply chain and maritime logistics has examined by many studies; such as: investigating intelligent transport systems in multimodal transport, the study of Single Window Model for maritime logistics, the usage of intelligent multi-agents for supply chain management (Coronado Mondragon et al., 2012; Kyeongrim, 2010; Yung & Yang, 1999).*

*In maritime supply chain and logistics context, Almotairi (2012) took the initiative to propose the port integrated logistics platform, building upon the previous studies (Bichou & Gray, 2004; Dong-Wook Song & Panayides, 2007) . In this study he considered the changing role of ports in global supply chain from landside and seaside perspective, and also he discussed the importance role of information and communication technology as one of the integration tool in supply chain. He argued that information technology plays a significant role in integrating port logistics. Kia et al. (2000) stipulated that technology facilitates the connection between suppliers and customers in maritime and global supply chain.*

*Baluch (2005) stipulates that information technology is the most powerful enablers in maritime logistics and port operations. Competitive supply chain needs to use IT to process information that can improve different aspects of supply chain activities. IT should not be considered only as a support service, but an integral part of port operations that allows greater flexibility, speed and efficiency. That is why Lefaix-Durand (2008) advocated that flexibility and responsiveness are viewed as the major IT contributions to SCM, resulting in overall improved effectiveness, efficiency, competitiveness and performance.*

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*The foundation of the technology used in trade and transport networks is Electronic Data Interchange (Simchi-Levi et al., 2008) which refers to the systems that allow computers to conduct business transactions over telecommunications networks. The result of applying EDI was faster communications, allowing for better control of information flow, a decrease in the volume of paper, and reduced costs (Bichou, 2009).*

*The benefits of EDI as one of the essential software and communication platforms in port operation, summarized by Bichou (2009) in table 4.*

Table 4: The benefits of EDI in port operations

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<b>Benefits of electronic data interchange</b>
<i>Quicker information processing and access</i>
<i>Reduced errors in data entry and transmission</i>
<i>Better customer service</i>
<i>Reduced clerical and paperwork costs</i>
<i>Increased productivity improved tracking, and tracing</i>
<i>Improved billing</i>

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*Source: Adapted from (Bichou, 2009)*

*Radio Frequency Identification or RFID, which introduced for tracking cargoes, was another technology which optimized the maritime logistics chain. RFID significantly reduced the congestion in port terminal (Kia et al., 2000) and eased the cargo handling and delivering process from the supplier to the customer. Applying technologies such as EDI and RFID in port terminal operations changed the way of offering services in port area and maritime logistics. Increasing the volume of the cargoes in ports and accommodating bigger vessel, has increased the traffic in the ports. Therefore, a need for efficient and effective management of the flow of cargoes and information has become the main concern of port operators.*

*All the players in multimodal transport from the supplier to the customer are subject to real time and accurate information regarding their cargoes. Meanwhile, IT played an important role to meet the port and maritime logistics player's needs, and integrating the chain. Shipping companies and freight forwarders as the key players in maritime and port supply chain need several information since the cargo moves from the origin point to the destination point.*

*A study on the effectiveness of information technology in the Port of Singapore Authority (Lee-Partridge, Teo, & Lim, 2000) advocated that applying IT in the port area not only sustained its competitive advantage, it also allowed port users to enjoy faster handling speed, shorter ship turnaround times, easier tracking, and gives access to information without the time-gap. Kia et al. (2000) developed a simulation model to compare a container terminal equipped with electronic devices versus a terminal without such devices. The result of this study is illustrated in table 5.*

*Table 5: A container terminal equipped with electronic devices versus a terminal without electronic devices.*

*Adapted from Kia et al. (2000)*

<b>Description</b>	<b>Terminal without electronic devices</b>	<b>Terminal with electronic devices</b>
<i>Crane service time</i>	<i>182.50 hours</i>	<i>144.74 hours</i>
<i>Ship time at berth</i>	<i>93.20 hours</i>	<i>74.37 hours</i>
<i>Ship cost at port</i>	<i>US\$174,000</i>	<i>US\$139,000</i>
<i>Straddle service time</i>	<i>1,518 hours</i>	<i>1,214hours</i>
<i>Savings time in human resources</i>	<i>1,972hours</i>	<i>1,580 hours</i>
<i>Occupancy of stacking area</i>	<i>63 percent</i>	<i>44 percent</i>

*According to Kia et al. (2000)'s study, adoption of technology has a positive effect in port terminal operations. For example, applying electronic devices such as Radio Frequency Microcircuit system (RF) which is used for tracking containers, reduced the congestion and stay-time in terminal, and consequently reduced the occupancy of stacking area.*

Reviewing the literature gave me a holistic insight into customer value concept, value creation, and supply chain management. Meanwhile, identified studies' findings regarding the supply chain integration, use of technology within supply chain and port terminal, and the importance of port users' relationships allowed me to be able in proposing and making up the conceptual model of this thesis.

As stated in the previous parts, this thesis is not intended to consider all the involved factors and players in port operations. The main intention is to find out the potential interactions of technology and internal integration within port operations, and finally conceptualize the possible effect of these interactions on customer value. To summarize this chapter the configuration of port supply chain integration is presented in figure 11.

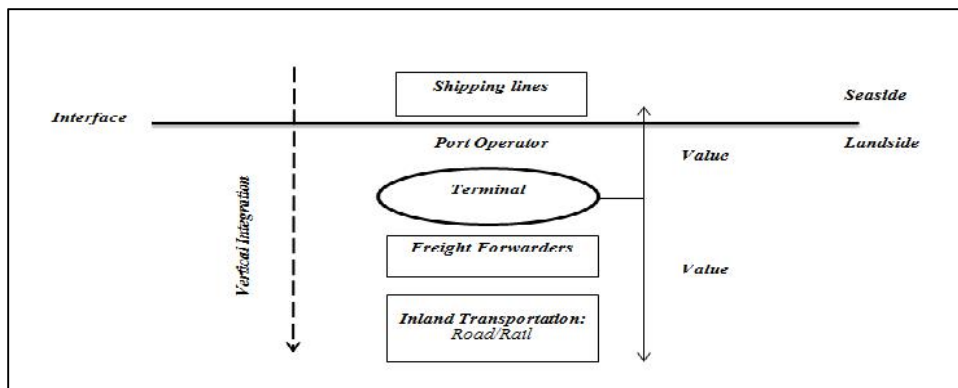


Figure 11: Port supply chain integration and seaside- landside interface Inspired by (Panayides et al., 2012) and (Almotairi, 2012)

Figure 11 shows maritime supply chain integration within seaside- landside interface context. The basis of this figure is inspired mainly upon the concept of maritime logistics platform (Almotairi, 2012) and vertical integration of shipping companies (Panayides et al., 2012). Figure 11 shows the possibility of value creation for shipping companies, freight forwarders, and inland transportation by terminal operator in an integrated port terminal.

### Methodology

Glaser (1992, p.7) states that, “Methodology is the theory of methods”. The publication, *the A-Z of social research* (Robinson and Reed, 1958, p. 58), defines a literature review as a “systematic research of published work to find out what is already known about the intended research topic”. A literature review serves many important purposes, including establishing the need for the research; broadening horizons of the researcher; and preventing the researcher from conducting research that already exists. Aitchson (1958, p. 58) supports the view that a literature review allows the researcher to find out what has been done in terms of the problem being investigated- to ensure that duplication does not occur.

A blueprint of the thesis design is presented in figure 12.

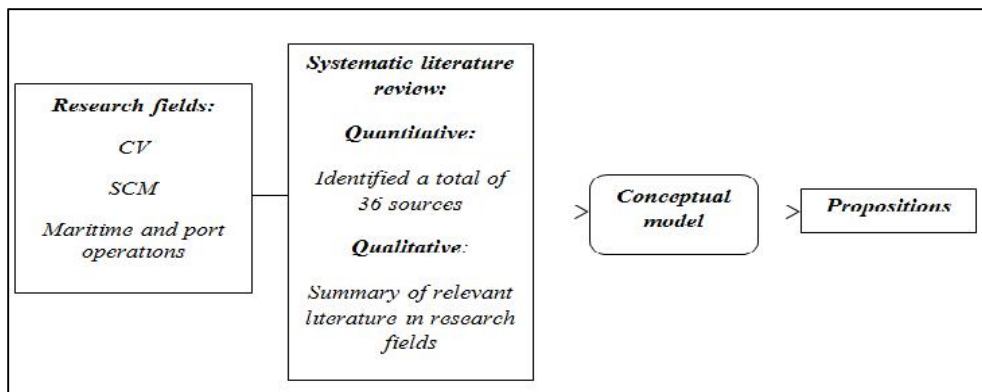


Figure 12: The thesis design

I decided to conduct a literature review to find the information from various research sources in order to support answering the thesis question, and to justify the conceptual model of the thesis. Therefore, I conducted a systematic literature review, which is adapted from (Hüttinger, Schiele, & Veldman, 2012) .

As a first step, I limited the review to journal articles. I performed a systematic search of available literature using the following online database: Science Direct, Emerald, Taylor & Francis Online, ProQuest. To consider the early work, the review focuses on the

period of 1995-2012. As a second step, books, books chapters, and other sources (e.g. conference proceedings) were included in the literature review. Journals, conference papers, and books which used for the purpose of literature review are divided into three main fields: Customer value in B2B and marketing field, supply chain management, maritime and port operations supply chain.

In contrast to the marketing literature, where higher customer value perceives as quality, service, time, relationship, price, and a source of competitive advantage, I consider customer value as relationship value and a positive driver of partners' collaboration in supply chain. Regarding the supply chain term, while in most of the existing literature the focus is on reducing cost in the chain, I consider the value chain supply chain. Lankford (2004) stated that the value chain supply chain focuses more on creating customer value than reducing cost and improving productivity. Therefore, these considerations about the customer value and supply chain value reflected in my literature review.

### **Quantitative analysis**

In order to justify the conceptual model of the study, a total of 36 sources as shown in figure 13, were identified as being relevant in description of the model. These sources were chosen based on more relevance corresponding to the main research fields mentioned above.

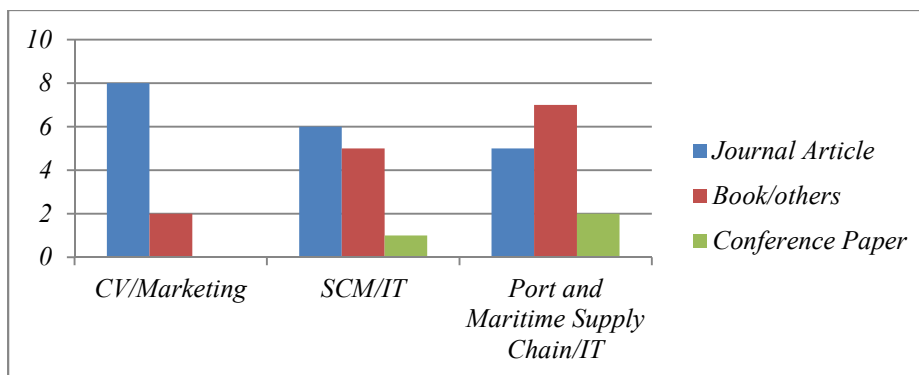


Figure 13: Relevant literature

A detailed overview of the literature which analyzed in each research fields is given in table 6.

Table 6 : Overview of the literature review

<b>Research field</b>	<b>Author, year</b>	<b>Publication</b>
<b>Customer value</b>	Azaddin Salem (2004)	Journal of management decision
	Christopher (1996)	Journal of marketing practice
	Hüttinger, Schiele, and Veldman (2012)	Journal of industrial marketing management
	Lefaix-Durand (2008)	Laval university
	Naumann (1995)	International Thompson/ book
	Payne and Holt (2001)	British journal of management
	Prahalad & Ramaswamy (2004)	Journal of interactive marketing
	Ravald & Gronroos (1996)	European journal of marketing
	Spiteri & Dion (2004)	Journal of industrial marketing management
	Woodruff (1997)	Journal of academy of marketing science
<b>Supply chain management</b>	Christopher (2011)	Pearson /book
	Lambert, Stock, and Ellram (1998)	McGraw-Hill/ book
	Lankford (2004)	Online Information Review
	Mangan, Lalwani, Butcher, and Javadpour (2012)	John Wiley & Sons/book
	Mentzer, DeWitt, Keebler, and Min (2001)	Journal of Business Logistics
	Ngai, Lai, and Cheng (2008)	International journal of Production Economics
	Prajogo and Olhager (2012)	International journal of Production Economics
	Simchi-Levi et al. (2008)	McGraw-Hill/book
	Spekman, Kamauff, and Myhr (1998)	International journal of physical distribution and logistics management
	Vickery, Jayaram, Droge, and Calantone (2003)	Journal of operations management
<b>Port and maritime supply chain</b>	Zhao, Huo, Selen, and Yeung (2011)	Journal of operations management
	Zhang and Liu (2010)	International conference of the logistics systems and intelligent management
	Almotairi (2012)	Chalmers university of technology
	Baluch (2005)	Winning books/ book
	Bichou (2009)	Informa/ book
	Coronado et al (2012)	International journal of production economics
	Kia et al (2000)	International journal of physical distribution and logistics
	Kyeongrim (2010)	Advanced information management and service conference
	Lagoudis et al (2006)	Journal of maritime policy and management
	Lee et al (2012)	Kogan page limited/ book chapters
<b>Port and maritime supply chain</b>	Mondragon et al (2012)	Journal of production economics
	Panayides et al (2012)	Kogan page limited/book chapter
	Song and Panayides (2007)	International conference on logistics, shipping and port management
	Visounis and Pallis (2012)	Emerald group publishing limited/ book chapter
	Yang et al (2011)	World scientific/ book
	Lee-Partridge et al (2000)	Journal of strategic information system

### Qualitative analysis

In this part, I provided the summary of the existing literature discussed in chapter two. The theoretical review clarified the role of supply chain management and technology on customer value, and conceptually outlines how information technology integrates the maritime logistics system in the port and consequently effects on customer value. Summary of



the literature introduced in three research fields: Customer value concept, supply chain management, maritime and port operations supply chain. Qualitative analysis allowed me to build the propositions of the study in chapter four. I summarized the relevant literature that I identified through quantitative analysis in tables 7, 8, and 9 respectively.

As early as 1985, Michael Porter underlined the importance of value creation for the customers. He argued that, creating the value for the customers is the enterprise's competitive advantage. Sometime later, value creation for customers became the main focus of many business studies and companies.

Scholars, defined customer value with different perspectives, and they also expanded the consequences of improved customer value in some business contexts such as; supply chain management, logistics, and marketing business. Table 7 is a blueprint of some of the definitions and consequences of the customer value concept which contented by scholars.

Table 7: Antecedents of customer value concept

Focus	Key notes	Reference
<b>Competitive advantage</b>	CV is a source of competitive advantage and value- based strategies Customer is main source of value creation in the company	Woodruff (1997), Prahalad & Ramaswamy (2004), Azaddin Salem (2004) Christopher (1996)
<b>Coordination</b>	CV is created through the cooperation and coordinating High-quality interactions between company and customer enables the co-creation of value	Pienaar & Vogt (2012) Prahalad & Ramaswamy (2004)
<b>Relationship</b>	Maintaining long-term relationship between partners CV is prerequisite to establish and maintain long-term relationship CV has become relationship value in 1990s Customer and vendor relationship is one of the components of value Customer- supplier relationships are means of value creation	Spiteri and Dion (2004) Ravald & Gronroos (1996) Payne and Holt (2001) Naumann (1995), Simchi-Levi et al (2008) Lefaix-Durand (2008)

The concept of the supply chain management (SCM) is recognized as relevant to business success for the last 20 years. Martin Christopher (2009) took an initiative to examine this concept in a broader perspective by stating that “supply chains compete, not companies”. During the last decade, many researchers have studied the concept of the supply chain while they investigated the efficiency and effectiveness of this concept. Table 8 is presenting how scholars examined SCM concept with different considerations.

Table 8: The investigation of the SCM concept

Consideration	Key notes	Reference
<b>IT/Integration</b>	Significant correlation between IT and logistics integration Internal integration correlates external integration Real time information adds value to integrated supply chain	Prajogo & Olhager (2012), Vickery et al (2003) Zhao et al (2011) Panayides et al (2012)
<b>CV</b>	SCM is an important component to fulfilling customer needs Logistics is a major economic activity where customers meet their requirements Effective SCM creates customer value Supply chains compete Supply chain management adds value for customers Positive relationship between customer service and SC integration	Simchi-Levi et al(2008) Coronado Mondragon et al (2012) Mentzer et al (2001), Zhang & Liu (2010) Christopher (2011) Lambert et al (1998) Vickery et al (2003)
<b>Competitive advantage / collaboration</b>	Supply chain provides a major source of competitive advantage  Internal integration effects on collaboration Internal integration is an enabler of collaboration Creating competitive advantage through collaboration between upstream and downstream partners Customer value oriented SCM optimizes the relationship of its members	Christopher (2011), Simchi-Levi et al(2008), Zhao et al (2011)  Zhao et al (2011) Mangan et al (2012), Christopher (2011) Spekman et al (1998) Zhang & Liu (2010)

Supply chain management can be defined as: moving cargo from point of supply to point of demand. It should be noted that, when the cargo is moving through the chain, many elements are involved in this process such as; people, data, electronic systems, relationships, and vehicles. More than 90% of the cargoes are traveling through the sea and ports are

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*tightly tied up in global supply chain. This explains why maritime supply chain and port operations are given high priority among the supply chain management and logistics scholars.*

*Table 9: Some findings of the studies in maritime and port supply chain/ logistics area*

<i>Perspective</i>	<i>Key notes</i>	<i>Reference</i>
<b><i>IT effectiveness / Integration</i></b>	<i>IT (e.g. EDI) reduced paper flow and manual efforts in port terminal</i>	<i>Kia et al (2000), Yan et al (2011), Bichou (2009)</i>
	<i>IT, including internet facilitated exchange of information in port supply chain</i>	<i>Kia et al (2000)</i>
	<i>Information and communication tool is one the integration tool in maritime supply chain</i>	<i>Almotairi (2012)</i>
	<i>Technology facilities the connection between suppliers and customers</i>	<i>Kia et al (2000)</i>
	<i>RFID significantly reduced the congestion in port terminal</i>	<i>Kia et al (2000)</i>
	<i>Successful application of single window, intelligent systems, IT in port area</i>	<i>Kyeongrim (2010), Lee-Partridge et al (2000), Coronado et al (2012)</i>
	<i>Integrated maritime logistics platform, integration of ports in global supply chain</i>	<i>Almotairi (2012) Song &amp; Panayides (2007)</i>
<b><i>Customer Value /relationship</i></b>	<i>The importance of collaboration between partners in international logistics and ports</i>	<i>Bichou (2009)</i>
	<i>good relationship with customers adds value to ocean transportation</i>	<i>Lagoudis et al (2006)</i>
	<i>Higher value services leads to increase the total value of maritime logistics system</i>	<i>Lee et al (2012)</i>
	<i>Port supply chain members collaboratively create superior customer service</i>	<i>Baluch (2005)</i>
	<i>Ports are value added chain , ports create value for customers</i>	<i>Bichou (2009) , Almotairi (2012), Vitsounis &amp; Pallis (2012)</i>
	<i>Value in port lies on relationship</i>	<i>Vitsounis &amp; Pallis (2012)</i>
	<i>Stronger relationship with partners in maritime and port supply chain, increases satisfaction</i>	

*Given the complexity of the supply chain, with multiple participants, table 9 presents some of the valuable findings in terms of usage of IT and creating value in maritime and port supply chain.*

### ***The Conceptual Model and Research Propositions***

*Many of studies define customer value as relationship value, which in turn co-creates value for both customer and supplier. Supply chain management explains the importance of customer value and collaboration through internal and external integration. Many factors have considered as a tool to integrate and enhance CV in the supply chain (e.g. adoption of IT). Integration of ports in the global supply chain, complexity of port operations, and introducing ports as a value chain, highlight the necessity of the CV and collaboration concepts within the port supply chain. Ports are recognized as a member of the supply chain, and play an important role in the management and coordination of materials and information flows.*

### ***The Conceptual Model***

*The conceptual model presents the interactions between information technology and internal integration on customer value. Further, this conceptual model, elaborate the internal integration and customer value interactions on collaboration. This collaboration can be considered as a source of competitive advantage for a port.*

*The principal driving force behind the proposed relationship is the adoption of technology and information sharing. And the core connection node in all the interactions is customer value. Enhanced customer value and internal integration are due to applying technologies in port operations. Applying technologies, such as EDI has facilitated the flow information and material between port and its users, by giving on time data access to the customers. The adoption of RFID and intelligent systems would reduce the congestion in port terminal and increase the transparency within the port and maritime supply chain. Therefore, managing the cargo handling and sending cargos to the final customers became*

easier for port users. Finally, the created relationship and collaboration through the exchange process in port area, lead to extra value for port and its users.

It should also be noticed that to achieve a higher customer value and collaboration, the adoption of technology or integration the processes is not itself enough, but rather the interaction and existing dynamics between them. Figure 14 shows the graphical representation of research propositions.

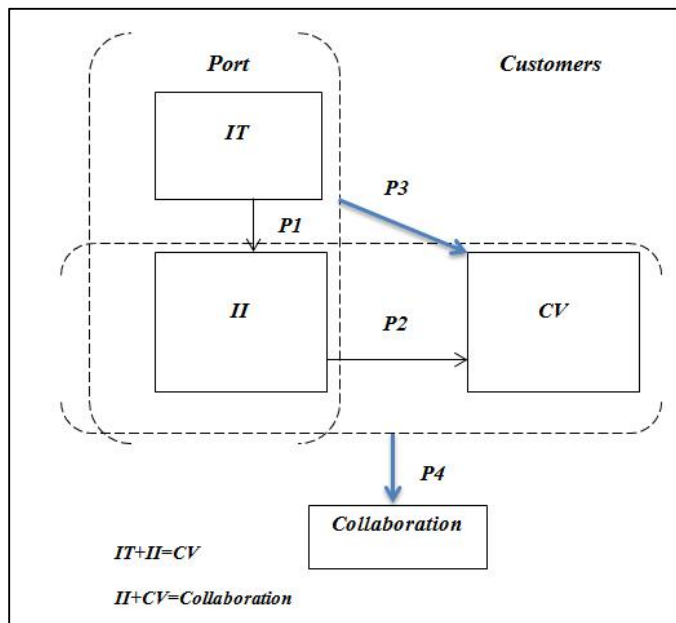


Figure 14: The conceptual model and research propositions

### **Research Propositions**

The four research propositions are formulated and presented as follows:

#### **Research proposition 1: Information technology and internal integration**

Supply chain integration consists of the alignment of the business processes and functions within a firm (internal integration), as well as the integration between customers and suppliers (external integration) (Mangan et al., 2012; Zhao et al., 2011). Internal integration similarly is defined as information sharing between internal functions within a

*firm (Zhao et al., 2011). These functions can be defined as the flow of the products, information, services, money, and decisions (Christopher, 2011; Simchi-Levi et al., 2008).*

*Vickery et al (2003) in a study which used 150 first tier suppliers in automotive industry conceptualized and tested a positive relationship between integrated information technology and supply chain integration. Information technology (such as EDI) has been identified as a vital tool for the integration of the business processes within and between firms (Prajogo & Oldhager 2012; Zhao et al., 2011; Panayides et al., 2012; Simchi-Levi et al., 2008; Coronado et al., 2012; Christopher 2011).*

*Ports are considered as members of the global supply chain .There have been a number of studies (Song & Panayides 2007; Bichou 2009; Baluch 2005; Lee et al .2012) investigating the performance of ports within the context of the global supply chain and logistics chains. Containerization and growth of world trade led to congestion in port terminal and processing bulk of information within port supply chain and with its users. This brought a need for integration of processes and information in order to managing flow of cargoes in the supply chain.*

*The measures of port/terminal supply chain integration have been conceptualized and empirically tested in a study (Dong- wook song & Panayides, 2007) in which data were collected from 300 ports and container terminal worldwide. This study indicated that use of information and communication technology is one of the most important elements in port and terminal integration.*

*Application of information technology (e.g. RFID ,EDI) in container port terminal led to integration of cargo and information processes, and consequently reduced the congestion and facilitated the exchange of the information in port supply chain (Kia et al., 2001).*

*Therefore, IT allows various members of a port supply chain to share real time information, and coordinate in managing the flow of cargos in terminal.*

*The integrated logistics platform concept (Almotairi, 2012) which is formed based on shared information in port logistics, and allowed supply chain visibility for the entire port system is consistent with the philosophy and practice of internal integration in maritime and port supply chain. Based on the above arguments, it is proposed:*

***PI:*** *There is a positive relationship between information technology and internal integration.*

***Research proposition 2: Internal integration and customer value***

*Studies advocated that Supply chain management is an important component to fulfill customer needs (Mentzer et al. 2001; Simchi-Levi et al. 2008; Christopher 2009; Coronado et al. 2012). They explained this by explicitly recognize the existence of two flows through the chain; flow of goods and flow of information. Supply chain integration must comprise both material and information (Prajogo & Olhager, 2012).*

*Lambert et al (1998) points out that SCM adds value for the customers. In further support, Zhang & Liu (2010) proposed that effective SCM creates value for customers. Effective supply chain is defined as a chain in which all the processes such as flow of material and information, purchasing, and sales are centered surrounding the customer value. Additionally, they explain that effective supply chain optimizes the relationship of its members and speeds up the response time. Vickery et al. (2003) conceptualized an integrative supply chain strategy, and investigated a positive relationship between customer service and SC integration within 150 suppliers in an automotive industry.*

*In a study of supply chain integration of shipping companies, Panayides et al. (2012) argued that real time information and the integration of business processes add value to*

transportation chain. Carbone and De Martino (2003) examined the port operator's involvement in a supply chain by adoption a case analysis of the port of Le Havre. They defined a port as a member of supply chain in which different logistics and transport operators are involved in bringing value to the final customers. Additionally, they proposed that the higher integration among the actors, the higher effectiveness for the entire chain.

Centin (2012) in a study on ports and logistics chains, explored a conceptual framework concerning the impact of developments in logistics chains on port's roles and functions. Centin (2012) summarized some of the effectiveness factors of ports, such as supply chain integration practices, developments of information and communication technologies, and customer orientation and satisfaction. He, likewise, highlighted the positive effect of integration within the port operations on customer satisfaction. Thus, the second proposition is:

**P2:** *There is a positive relationship between internal integration and customer value.*

***Research proposition 3: Interaction between internal integration and information technology and customer value***

*A firm's capabilities are of vital importance for creating value for its customers. Thus, a firm should focus on improving those capabilities which allow customers to meet their needs, as well as their perceived values. From the existing literature, it can be concluded that, the components of customer value generally are defined as price, quality, value-add service, and real time information regarding the service/product (Naumann, 1995; Woodruff, 1997; Simichi-Levi, 2008; Christopher, 2011).*

*Ports are servicing several customers, from the suppliers to the end customers. Main port operator's customers and the key players in maritime supply chain are; shipping lines,*



*freight forwarders, and inland transportation companies (Lee et al., 2012). It should be noted that studying the perceived value by end customers is not in the scope of this thesis.*

*The users of the port perceive value in three categories; operational functions, commercial interactions, and structural characteristics of the port respectively. This is advocated by Visounis & Pallis (2012) where they explain, operational function include the delivery process (e.g. loading/unloading containers), and commercial interactions refer to all the communications developed between parties ( service provider and port users) during the moving process of the cargoes and delivering a service in the port supply chain. Structural characteristics of the port (i.e. geographical location) are not in the scope of this thesis, and I took this element out of my study.*

*Usage of information and communication technology has become an important part of business process within logistics and supply chain. Flows of information surrounding the flow of physical cargo and related processes are important both for tracking and controlling logistics chains (Asbjørnslett et al., 2012). The effectiveness adoption of RFID and EDI (Kia et al. 2000; Bichou, 2009) in port terminal operations, from both commercial and operational aspects, has been examined in a number of studies. Bicou (2009, p. 197) explains that “the main utilization of EDI in ports is in Port Community System (PCS), a system or an entity that delivers relevant data and information to port users and customers”.*

*Kia et al. (2000) by developing a computer simulation model in two different container terminals (a container terminal equipped with electronic devices versus a terminal without such devices) investigated the importance of information technology in port operations. For this purpose, they tested the data transmission system in a computerized terminal (e.g. equipped with RFID, EDI, Voice recognition, etc.). They*

*listed the following benefits provided by such a system: faster discharging and loading of containers, better monitoring of the movement process of containers, high level of accuracy of information, and high level of consistency of the information given to various parties in the chain of transport.*

*Therefore, I can conclude that by applying technology in port terminal which is one of vital connection node in maritime and global supply chain, there is a possibility for port users to meet some of their perceived value. These values can be categorized as access to real time information about the cargo from its departure point to/from the port, being able to track the flow of cargo and information, and making sure about less traffic in the port area. Thus, the third proposition is:*

***P3: The interaction between information technology and internal integration will have a positive effect on customer value.***

***Research proposition 4: Interaction effect of internal integration, customer value, and collaboration***

*Customers are not a demand target for the firms, but a source of value creation (Prahalad & Ramaswamy, 2004), and they do value their relationships with the suppliers once they made a purchase decision (Naumann, 1995).*

*Vitsounis & Pallis (2012, p. 160) states that “Port service providers are embedded in port value chain aiming to generate value for their users” (See appendix B). Port users and service providers develop relationship within business-to –business structure, while the stress is placed on the value which derives from this relationship (Vitsounis & Pallis, 2012).*

*Vitsounis & Pallis (2012) carried out an exploratory study in port settings (see appendix A), to search for the role of relationships between port users in co-creating value. In this study, data was provided through performing semi-structured interviews with major port*

*stakeholders (e.g. shipping lines, freight forwarders, etc.). The result of this study shows the importance of the upstream-downstream parties' relationships in co-creating value within the port supply chain. The importance of involved parties' relationships in co-creating value in port supply chain is aligned with the work of Lee et al. (2012) where all the players in upstream and downstream maritime logistics system, are well coordinated as a single team. Lee et al. (2012) explain that this coordination lead to creating value for customers, as well as the entire maritime logistics system.*

*Value in ports relies on relationship, and collaboration between partners adds value to ocean transportation, therefore, higher value leads to increase the total value of maritime and port supply chain (Lagoudis et al. 2006; Lee et al. 2012; Vitsounis &Pallis 2012). Dongwook song and Panayides (2007) found that the relationship of ports with shipping lines has beneficial effects on reliability and responsiveness of ports. Internal integration effects on collaboration and is recognized an enabler of collaboration in supply chain management (Zhao et al. 2011; Mangan et al. 2012; Christopher 2011).*

*Spekman et al. (1998) conducted an empirical investigation on partnerships in supply chain management to understand how to develop and sustain collaborative supply chain relationships. The study was done based on collected data from suppliers and buyers across five broad industry groupings (life sciences, oil and gas, consumer products, utilities and manufacturing). They proposed that a number of advantages accumulate to firms that implement integrated supply chain practices and processes, and a firm can create competitive advantage through collaboration between downstream and upstream partners.*

*Zhao et al (2011) in an explorative study, collected data from manufacturing firms, in order to test a model which specified the relationship between internal integration,*

*relationship commitment, and external integration. In this study, they found a positive correlation between internal integration and external integration. In this sense, external integration has been defined as the relationship between customers and suppliers. Thus, it is proposed:*

**P4:** *The interaction between internal integration and customer value will have a positive effect on collaboration.*

### ***Discussion and Further Research Direction***

#### ***Discussion***

*This study contributes to research stream on customer value by investigating the potential interactions between internal integration, technology, and customer value. Specifically, this study applied the supply chain management context. The result of this study summarized in four propositions.*

*First, it demonstrates that information technology positively relates to internal integration, and this proposition is consistent with the previous studies (Christopher, 2011; Bichou, 2009; Simch-Levi et al. 2008; Dong-Wook song & Panayides 2007; Kia et al. 2000) which suggested that the adoption of information technology (e.g. EDI) led to sharing information within the supply chain, and allowed the involved parties to have access to real time data. This smooth and transparent communication, connected the parties, and integrated the functions within the chain. Second, this study also highlights that this integral integration has a positive effect on customer value. This proposition is aligned with the empirical studies (Vickery et al. 2003; Carbone & De Martino, 2003; Centin, 2012; Panayides et el. 2012) where they found the positive effect of integration on customer satisfaction.*

*Third, this study demonstrates that, the interaction between information technology and internal integration may have a positive effect on customer value. As mentioned earlier, internal integration cannot be achieved without the support of technology, and this integration will enhance the connection between customer and firm. To define customer value, studies (Naumann, 1995; Prahalad & Ramaswamy, 2004) has put more emphasize on the value which is created through the relationship between customers and suppliers. This*

value is identified as a new source of value creation for both parties. That is why, on the track of main purpose, the focus of this thesis regarding the customer value concept is about relationship value.

Fourth, the study also states the positive effect of interaction between internal integration and customer value on collaboration. According to Vitsounis and Pallis (2012) the upstream-downstream' parties relationship is of importance in co-creating value. To further support, the vital role of internal integration in enhancing collaboration has advocated in several studies (Zhao et al. 2011; Christopher, 2011; Mangan et al. 2012).

### **Further Research Direction**

With the growing importance of long term relationship value within the supply chain, there is a need to have more empirical and exploratory researches to measure customer value within port and maritime supply chain. As clarified from the beginning this thesis assumes customer value as relationship value, and also this thesis considered some of the key port and maritime players in order to present the conceptual model.

Further research is required to measure the identify propositions in this thesis. Without, a valid and reliable empirical results, generalizes implications and strategies cannot be accomplished for port, shipping companies, and maritime logistics operators.

So far, mostly the reviewed studies in port and maritime logistics, investigated the adoption of technology, value creation, and the integration concept in container terminal and dry bulk terminal operations, while the focus is on shipping companies and freight forwarders. Therefore, a more in-depth understanding of all the relationships between port and its users and technology-enabled coordination strategies, should be the focus of future

## *CUSTOMER VALUE IN PORT OPERATIONS*

*research. In addition, investigating the relationship between port users and end users within the port logistics system is indicated as an important aspect as well.*

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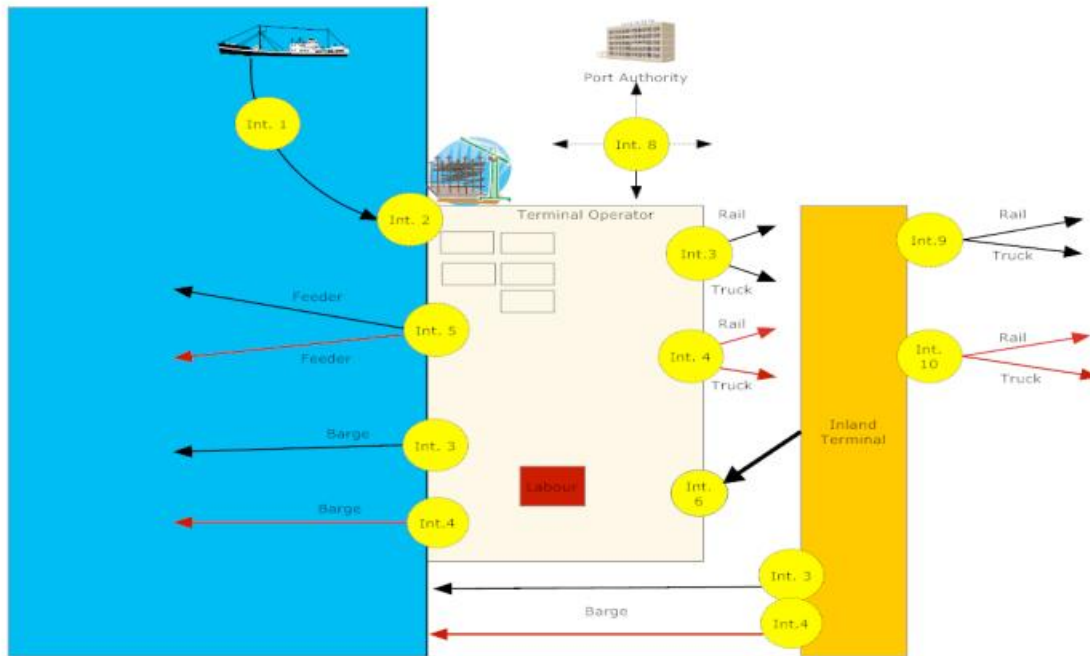
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*Appendix A*

*Actors involved and key interactions in port setting (Vitsounis & Pallis, 2012)*



**Appendix B**

*Drivers towards port users' satisfaction (Vitsounis & Pallis, 2012)*

	<b>Shipping Company with dedicated terminal</b>	<b>Shipping company with no dedicated terminal</b>	<b>Feeder shipping company</b>	<b>FF</b>	<b>Shippers</b>
Port setting	<ul style="list-style-type: none"> <li>• Geographical location of the port</li> <li>• Social, economic and political conditions</li> <li>• Connectivity with hinterland – Multimodality</li> <li>• Quality of services</li> <li>• Productivity</li> </ul>	<ul style="list-style-type: none"> <li>• Combination of cost and productivity</li> <li>• Multimodality</li> <li>• Quality of services</li> <li>• Available capacity of hinterland connections</li> <li>• Captive market</li> <li>• Labour (skilled and flexible)</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of cargo</li> <li>• High rates</li> <li>• Cost of services</li> <li>• Time spend in a port</li> <li>• Guarantee of entrance</li> </ul>	<ul style="list-style-type: none"> <li>• Absence of congestion in sea and land</li> <li>• Proximity with the market</li> <li>• Productivity</li> <li>• Cost</li> <li>• Smooth customs clearance</li> <li>• Multimodality</li> <li>• Large number of different stevedores</li> </ul>	<ul style="list-style-type: none"> <li>• No delays</li> <li>• Accuracy</li> <li>• Sequence of port of call in a loop</li> <li>• Cost</li> <li>• Days of arrival and departure</li> </ul>
Shipping lines				<ul style="list-style-type: none"> <li>• Reliability</li> <li>• Space commitments</li> <li>• Cost</li> <li>• Transit time</li> <li>• Direct call (no transshipment)</li> <li>• Equilibrium between vessel size and number of ports of call</li> </ul>	<ul style="list-style-type: none"> <li>• Lead times</li> <li>• Sequence of port of call in a loop</li> <li>• Days of arrival and departure</li> </ul>
Terminal Operator	<ul style="list-style-type: none"> <li>• Adaptation to their needs</li> <li>• Experience</li> <li>• Confidence</li> </ul>	<ul style="list-style-type: none"> <li>• Combination of cost and productivity</li> </ul>	<ul style="list-style-type: none"> <li>• Guarantee of entrance</li> <li>• Time spend in a port</li> </ul>	<ul style="list-style-type: none"> <li>• Productivity</li> <li>• Absence of congestion in sea and land</li> </ul>	
Port Authority	<ul style="list-style-type: none"> <li>• Marketing and promotion (image improvement ) aiming to attract larger volumes of cargo,                             <ul style="list-style-type: none"> <li>• Active role in problems resolving,</li> <li>• Availability and exchange of information,</li> <li>• Coordination of port activities (“chain approach”).</li> </ul> </li> </ul>				