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Relationships between Maritime Container Terminals and Dry Ports and their impact on Inter-port competition

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Master Thesis in Business Administration - ILSCM Programme

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Abstract

Globalization of the world's economy, containerization, intermodalism and specialization have reshaped transport systems and the industries that are considered crucial for the international distribution of goods such as the port industry. Simultaneously, economies of location, economies of scope, economies of scale, optimization of production factors, and clustering of industries have triggered port regionalization and inland integration of port services especially those provided by container terminals. In this integration dry ports have emerged as a vital intermodal platform for the effective and efficient distribution of containerized cargo. Dry ports have enabled port and hinterland expansion increasing the competitiveness of container terminals at seaports. In consequence, container terminals and dry ports are establishing formal and informal relationships to strengthen the competitiveness of their hinterlands and to improve their role in the physical distribution of goods.

This study assesses the characteristics of relationships between container terminals and dry ports. Such assessment is conducted based on a set of relationship characteristics proposed in a relationship assessment model for customer/supplier, in which dry ports are given the role of suppliers of port services to container terminals. In addition, the research assesses the impact of the relationships between container terminals and dry ports on inter-port competition. The main findings of the research led to conclude relationships between container terminals and dry ports are characterized by medium mutuality, low particularity, low co-operation, low conflict, low intensity, low interpersonal inconsistency, high power/dependence and medium trust. Additionally, it was concluded that such relationship characteristics impact inter-port competition in two main ways. In one hand by driving container terminals to maximize the utilization of dry port's capabilities such as container transport/delivery, container storage, customs clearance, information systems and intermodal connections to industrial clusters. On the other hand, by constructing channels of interaction through which dry port's benefits for hinterlands such as increase of container terminal capacity, reduction of road congestion, increase of modal shift and hinterland expansion are used as leverage in competition for containerized cargo.

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List of Acronyms

3PL	Third party logistics
4PL	Fourth party logistics
APM Terminals	Arnold Peter Moller Terminals
ASEAN	Association of Southeast Asian Nations
CFS	Container Freight Station
CRM	Customer Relationship Management
CSI	Container Security Initiative
CT	Container Terminal
DP World	Dubai Ports World
ESCAP	Economic and Social Commission for Asia and the Pacific
HPH	Hutchison Port Holdings
IAPH	International Association of Port and Harbors
IMO	International Maritime Organization
ISM Code	International Safety Management Code
ISPS Code	International Ship and Port Facilities Security Code
LSP	Logistic Service Provider
OECD	Organization for Economic Co-operation and Development
PSA International	Port of Singapore Authority
RAP Model	Relationship Assessment Process Model
SLC	Skaraborg Logistic Center
SRE Model	Supply Relationship Evaluation Model
SRM	Supplier Relationship Management
TEU	Twenty-foot Equivalent Unit
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
WTO	World Trade Organization

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1 Introduction

The globalization of the world economy, the internationalization of production, the international division of labor, the deregulation of strategic industries and the rapid evolution of technology have triggered economic growth and have boosted up international trade (Dicken, 2011). These trends have modified transportation industries and the global transportation system itself (S. Eriksson, personal communication, 2011-05-04). In addition, the implementation and massive use of containers in tandem with the expansion of intermodalism have contributed also to the rapid growth of the global economy (Vaneslander, 2008). The markets of today are global. Geographical and technological barriers that used to limit the maximization of production factors do not exist anymore (Dicken, 2011). Maritime transportation has played an important role in this process. It is considered not only the cheapest transport mode, but also the one that enable economies of scale in production processes (Stopford, 2009). Recent statistics about international seaborne trade registered that approximately 80% of total world trade (measured in tons) is transported by sea (UNCTAD, 2011). Close to shipping is the port industry. The port industry is directly derived from trade and shipping, therefore port activities have also gained importance.

Historically, the close interrelation of the port industry and the shipping industry has made them growth with similar pace through iconic advances. These advances are identified in the modern and flexible organization of ports and shipping lines, the technology implemented to operate merchant ships, modern handling equipment at ports, and the wide range of operational concepts used today to offer transportation of goods in a global basis with a deeper integration of shipping with port services and inland transportation (Grant, Lambert, Stock & Ellram, 2006). However, the specialization of ports is considered the most important of such advances (Ma, 2006). Today, ports are organized in specialized terminals for the different types of cargo. They include general cargo terminals, liquid bulk terminals, dry bulk terminals, car terminals, passenger ships terminal and container terminals (Alderton, 2008). Even though all of them are important, container terminals have gotten special attention and relevance. The main reasons are the increasing rate of containerized goods, specialization on containers of shipping lines and road/rail transport operators, and the implementation of intermodalism (UNCTAD, 2007). The common denominator of these trends is the container, a box that has transformed global trade and global transport.

Containerization has become a vector of production, distribution and consumption that will continue growing (Rodrigue & Notteboom, 2009). For instance, the world container throughput increased by an estimated 13.3 per cent rate to 531.4 million TEUs in 2010 (UNCTAD, 2011). Therefore, container terminals have become strategic actors for the facilitation of trade, international logistics and supply chains of products and services which are crucial for economic growth. In consequence, container terminals are expected to provide efficient services to ships, shippers and their cargo. These expectations have led to a generational change in container terminals where operational efficiency, quality of logistics, security, safety and supply chain management have become key factors for their competitiveness (Notteboom, 2004).

Seaports have been considered as one of the most important nodes for the transfer of goods in international and domestic trade. Since the world war periods of the 1910s and 1940s until the 1980s before the end of the Cold War, the port's hinterlands were considered captive markets due to their embryonic land transport infrastructure (Alderton, 2008). In consequence, the traditional practice of shipping lines was to call at all ports where cargo needed to be shipped to and from (Constatinos, Apostolos & Athanasios, 2003). However, the development of land transport specifically road and rail in the most productive regions of the world has allowed ports and its container terminals to extend their hinterlands and reach captive markets from other ports of their region (Rodrigue, Comtois & Slack, 2009). Similarly, transshipment container terminals known as port-hubs have gained access to markets of ports and terminals in other geographic regions making them their new foreland (Haralambides, 2002). These trends have increased what is known in the maritime industry as *inter-port competition*. This competition is understood as the competition that takes place between ports and/or terminals located in the same service range.

Inter-port competition could be seen as positive for the economic development of the region in which it takes place. Its presence in theory leads to productivity improvements, efficiency and increase of market share (Voorde & Winkelmans, 2002). This is why, today competition environments and competitive strategies are considered as strategic issues in the management of container terminals (Bichou, 2010). The competitiveness of a container terminal is usually assessed by shipping lines based on factors such as waiting time, berth occupancy, loading/unloading speed, turn-around time, container handling equipment, container stacking capacity, information & communication technology (ICT) systems supporting the operations, additional services to the cargo, ship´s waste reception facilities and inland transport connections (Song & Yeo, 2004). Among these, inland transport connections has become a crucial aspect due to saturation of stacking capacity in terminals and the wide implementation by shipping lines of the *Hub-and-spoke* distribution strategy (Ducruet & Notteboom, 2012). These aspects have demanded on ports to seek inland terminals strategically located and well connected to transport modes.

Dry ports are one type of inland terminals and they have been playing an important role in the expansion capacity of container terminals (UNCTAD, 2004). Dry ports have developed strategic relationships with world leading manufacture producers and with wide networks of logistic service providers (ESCAP, 2010). Such trends are having an impact on the business relationships that container terminals have traditionally established with dry ports and shipping lines. Additionally, those relationships are impacting the competitive environment faced by container terminals (Notteboom, 2008). Therefore, the interaction between container terminals and dry ports and its impact on the competition dynamics of the port industry is of interested to public and private sectors, logisticians, scholars and supply chain managers.

2 Disposition of the Thesis

The present paper illustrates the application of a relationship assessment model to container terminals and dry ports in which dry ports are given the role of logistic services suppliers of container terminals. Additionally, the paper illustrates a qualitative view of container terminal and dry port managers over the impact of such relationships on inter-port competition. The structure of the paper is as follows: in section three and four the problem and purpose of the study is described. In section five the methodology applied in the study is described and explained. In section six the main theoretical concepts related to container terminals and dry ports are reviewed with association to inter-port competition. Section seven presents the empirical findings of the study. Section eight presents the analysis of the findings in association with the research questions. Such analysis includes the assessment of relationships between container terminals and dry ports, and their impact on inter-port competition. In section nine the main conclusions of the study are presented. Finally, section ten discusses some general aspects related to the findings obtained in the research.

3 Problem definition

Inter-port competition has been traditionally approached by container terminals (CTs) based on the requirements of their main customers. The main customers of CTs are shipping lines from the sea side. From the land side the most important container terminal´s users are export/import manufacture companies, freight forwarders and trucking companies (UNCTAD, 2006). However, the change factors that reshaped the world economy such as those previously mentioned, also triggered the internationalization of logistics activities, the implementation of Supply Chain Management practices and the introduction of more flexible production strategies (Langley, Coyle, Gibson, Novack & Bordi, 2009. These trends have been demanding form ports and CTs the implementation of new and innovative transportation concepts. As a result, the transportation system has been transformed and new distributions concepts have been implemented (Dicken, 2011). The implementation of new distribution concepts that can satisfy effectively the demands of globalization of sourcing and internationalization of production has demanded the creation of additional logistics services nearby port areas (Vaneslander, 2008). Consequently, shipping lines, transport companies and logistics services providers (LSP) have started to provide a wider range of services than just transport of goods. Such services include warehousing, information processing, consolidation of cargo, forwarding, packaging, labeling, customer service, marketing and even minor forms of customization of products for domestic markets (UNCTAD, 2004). The availability and access to these services are perceived nowadays by container terminals and port users as important factors for the competitiveness of a port area.

Dry ports are categorized as one type of LSP. They provide logistics services such as the ones mentioned before, but with a specific focus on containerized cargo. Theoretically dry ports are defined as inland intermodal terminals directly connected to a seaport by rail, where customers can leave and/or collect their standardized units as if directly to the seaport (Roso, Woxenius & Lumsden, 2008). Previous research carried out by Rodrigue et al. (2009) has shown that dry ports has not only facilitated the integration of transportation systems worldwide, but also that they has increased considerably the capacity and logistics capabilities of container terminals. These trends along with several port performance indicators have led researchers to conclude that nowadays dry ports play an important role in the transportation and distribution of containerized cargo around the world (Notteboom, 2008). Consequently, it has been also concluded that dry ports impact the competitiveness of ports and container terminals (Roso, 2009). This is because the existence of dry ports has demanded from CTs to reassess constantly their customers, to redefine traditional competition concepts such as that of hinterland, foreland and captive markets, and to extent their role in the supply chain through the inland integration of port services (Notteboom & Winkelmans, 2004).

In this context, it is possible to assume that CTs and dry ports are both suppliers and customers of each other in the business of transportation of containerized cargo. Therefore, there must be some formal and informal relationships that emerge from the interactions that take place between them with regard to containerized cargo. But, what are the characteristics of such relationships? Supply chain management theory suggests that relationships between two integrated industries are usually characterized by mutuality, particularity, co-operation, conflict, intensity, interpersonal inconsistency, power/dependence and trust (Johnsen, Johnsen & Lamming, 2008). These types of relationship characteristics are associated to the quality, variety and efficiency of the services to containerized cargo that port users commonly seek to obtain. This is why previous and current observations made over the performance of the container terminal's industry all around the world suggest that the more integrated a container terminal is to nearby dry ports, the more attractive it is for port users (Notteboom & Rodrigue, 2005). These observations imply that relationships between container terminals and dry ports impact the competition for containerized cargo faced by container terminals, which is known as *inter-port competition* (Winkelmans, 2003). Inter-port competition determines public and private investments in port infrastructures and inland intermodal connections such as dry ports (Meersman & Voorde, 2002). It also impacts the growth of seaborne trade, and consequently the growth of transport and logistics activities in regional levels. These two impacts alone, positioned the phenomena of *inter-port competition* as one form of competition that impacts directly and indirectly the facilitation of world trade and the economic development of the world.

3.1 Problem statement

Taking into account the previous context, it is considered that relationships between container terminals and dry ports impact inter-port competition. The problem addressed in this study refers to the non-clear understanding about the characteristics of such relationships, neither about how those relationship's characteristics impact the competitiveness of container terminals as customers of dry ports. A lack of understanding on this issue could in one hand mislead the strategies applied by container terminals and dry ports with regard to the competitiveness of their distribution models. On the other hand, it could limit the role of those two entities on the inland integration of port services

4 Purpose

The purpose of this research is to identify the characteristics of the relationships that exist between container terminals and dry ports. Additionally, this research seeks to identify how those relationships impact the competition for containerized cargo that takes place between container terminals. In order to clarify the purpose of the study the following research questions have been formulated:

What are the characteristics of the relationships between Container Terminals and Dry ports?

How do the relationships between container terminals and dry ports impact inter-port competition?

5 Methodology

Research is defined as 'the systematic process of collecting and analyzing information or data in order to increase our understanding of the phenomenon about which we are concerned or interested.' (Leedy & Ormrod, 2005, p.2). According to this definition a researcher must have clear the topic that will be subject of research and the methodology that will be applied to analyze such a topic. Previously, the purpose of this research was described. Such purpose was also stated and framed through two research questions. This section, seeks to describe the methodology that has been applied in the study in order to answer the research questions.

5.1 Reasoning

Research according to Patton (2002), especially fundamental or basic research aims to generate or test theory and contributes to knowledge for the sake of knowledge. Such knowledge could be focused on the what, where and when of a phenomenon for which usually quantitative research methods are applied (Svenning, 1999). It could be also focused on the why and how of a specific matter or phenomenon for which qualitative research methods are applied (Svenning, 1999). This research seeks to create complementary knowledge about the characterization of the relationships between two specific business entities (namely Container Terminals and Dry Ports), and how those relationships impact a specific competitive behaviour. Therefore, it was considered appropriate to apply qualitative research methods in this study. Qualitative research is designed to reveal a target population's range of behaviour and the perceptions that drive it with reference to specific topics or issues (Easterby-Smith, Thorpe & Jackson, 2008). Qualitative research is powerful as a source of grounded theory because it is 'theory inductively generated from field work, that is, theory that emerges from the researcher's observations and interviews out in the real world rather than in the laboratory or the academy.' (Patton, 2002, p.11). This is why usually qualitative research uses in-depth studies of small groups of people to guide and support the construction of hypotheses (Shank, 2002). Consequently, the results of qualitative research are descriptive rather than predictive, as the results obtained in this study.

In this context, the observations and analysis made in this research are based on a systematic empirical approach through which experience of container terminals and dry port managers are interpreted in the natural settings of the industries they are part of. This systematic empirical approach takes previous theory on the topic as reference and correlates it with facts and insights expressed by the interviewees. The interviewees' perceptions and opinions have been organized and classified based on an academic model for relationships assessment. In this model container terminals are analysed as customers of dry ports, and dry ports were given the role of suppliers of logistics services in the business of transportation of containerized cargo. Such model for the assessment of business relationships was also used to guide the data collection. The model also framed the impact relationship characteristics could have on the competition environment of container terminals regarding containerized cargo. Taking into account that some issues related to competition and business relationships were considered relevant for the study, it is important to note that in the analysis section some logical assumptions and educated guesses were made in order to contextualize the findings obtained. For these cases, examples and previous research related to the subject matter were used to validate such assumptions.

5.2 Data collection

The collection of data in this research followed a triangulation approach. Triangulation in research is defined as the combination of two or more data sources (Denzin, 1970) within the same study (Patton, 2002). The purposes of using different data sources are to give a multidimensional perspective of the phenomenon (Foster, 1997) and also to provide rich, unbiased data that can be interpreted with a sufficient degree of reliability (Säfsten, 2012). In this research the three kinds of qualitative data such as interviews, observations and documents as classified by Patton (2002) were used. Additionally, two descriptive surveys were carried out. The literature review was used to map out and frame the topic the research questions attempted to embrace. Therefore, the literature review focus on inland integration of port services, regionalization of ports, dry port concept, competition theory, inter-port competition, supplier/customer relationships' assessment, container terminals operations, drivers and influencers of inter-port competition.

As it was mentioned, a model for the assessment of business relationships guided the collection of data. Such model was the Relationship Assessment Process (RAP) model made in 1996 by researchers of the Centre for Research in Strategic Purchasing and Supply of the School of Management at the University of Bath. The RAP model develops an understanding of the relationship based upon a single, combined or integrated experience and perspective that is shared uniquely by two parties in the dyad (Lamming, Cousins & Notman, 1996). This model was reviewed in 2007 and jointly with the Business School of Bournemouth University and the University of Southampton in UK a model for Supply Relationship Evaluation (SRE) was proposed. The SRE model intends to fill the application gaps of the RAP model and introduced a revised set of relationship characteristics (Johnsen et al., 2007). This set of relationships characteristics was used to frame the relationship type that could exist between container terminals and dry ports as the latter being the supplier of logistics services to containerized cargo of the former. This assessment was done from a supply chain perspective and embracing the perception of both container terminal managers and dry port managers.

In this context and keeping in mind the purpose of the study, the impact of the relationships between container terminals and dry ports on inter-port competition was identified and typified by data collected through interviews to practitioners and scholars of the transportation industry in Sweden and abroad. The interviews were in their majority semi-structure and most of them were carried out in person by the researcher. For each interview an interview guide was elaborated in order to adjust the questions to the interviewee's profile (see interview guide in appendix 1). In some cases, questions were sent prior to the interview allowing a sort of contextualization of the interviewees. However, most of the interviewees preferred to engage the questions in the interview appointment. A total of twelve interviews were scheduled. Two were cancelled and ten were finally conducted. Two out of the ten interviews were conducted through telephone communication and answers to the interview questionnaire by e-mail. The interviews lasted between 30 minutes and one hour and a half. All the interviews performed in person were recorded with the authorization of the interviewee. The interviewee's selection was made based on their expertise in the topic, the experience in the transportation industry and the most convenient geographical location for the researcher. The interviewees, their position and general information about the interview are presented in table 5.1.

Table 5.1 Interviews performed during the research (Source: constructed by the author, 2012)

Interviewee	Position	Date	Media	Length	Location
Zoroz Kajohnprasart	General Administrative Officer – Laem chabang Port – Port Authority of Thailand	March 10/2012	In person /Telephone /E-mail	30 min. In person 35 min. Telephone	Sriracha Chonburi - Thailand
Poonsak Thiapairat	Managing Director – Eternity Grand Logistics	March 13/2012	In person /E-mail	35 min.	Bangsaothong District - Thailand
Ruth Banomyong	Thamasat Business School	March 16/2012	In person /E-mail	30 min.	Bangkok - Thailand
Leif Bigsten	Project Manager - Skaraborg Logistics Center	March 26/2012	In person	1 h 29 min.	Fällköping - Sweden
Erik Niklasson	Operations Planner – APM Terminals (Port of Gothenburg)	March 27/2012	In person	47 min.	Gothenburg - Sweden
Claes-Göran Axelsson	Terminal Manager – Green Cargo Göteborg	March 28/2012	In person	1 h 30 min.	Gothenburg - Sweden
Claes Mårdstrand	Terminal Manager – BANESERVICE Kombiterminal	March 29/2012	In person	45 min.	Gothenburg - Sweden
Vipin R. Menoth	Traffic Manager & IAPH Coordinator – Cochin Port Trust	April 02/2012	Telephone /E-mail	30 min. Telephone	Cochin - India
Violeta Roso	Chalmers University – Division of logistics and Transportation	March 29/2012	In person	1 h 31 min.	Gothenburg - Sweden
Anders Wittskog	Logistics Manager – Höglandsterminalen AB	April 05/2012	In person	1 h 21 min.	Nässjo - Sweden
Interviews that were scheduled and cancelled					
Johan Woxenius	University of Gothenburg - Logistics and Transport Research Group	March 30/2012			
	Copenhagen-Malmö Port	April 03/2012			

In addition to the previous interviews, complementary information was collected through two surveys that were carried out simultaneously to the interviews. The first survey was performed over a population of 100 container terminal managers (which will be referred as Survey 1) and the second survey was performed over a population of 70 dry port managers (which will be referred as Survey 2). The complete list of container terminals surveyed is presented in appendix 2, the complete list of dry ports surveyed is presented in appendix 3.

The selection of the companies and organizations surveyed was done based on the official directories of the organizations and associations listed on table 5.2.

Table 5.2 Organizations consulted to select companies surveyed (Source: constructed by the author, 2012)

Directories consulted to select companies surveyed	
Name	**Website**
European Intermodal Association	http://www.eia-ngo.com
International Association of Ports and Harbours	http://www.iaphworldports.org
European Sea Ports Organization	http://www.espo.be
Intermodal Association of North America	http://www.intermodal.org
Association of American Railroads	http://www.aar.org
Ocean Carrier Equipment Management Association	http://www.ocema.org
American Association of Port Authorities	http://www.aapa-ports.org
Latin American Association of Ports and Terminals	http://www.latinports.org
ASEAN Ports Association	http://www.aseanports.com
European Railway Review	http://www.europeanrailwayreview.com
Hutchison Port Holdings	http://www.hph.com
Port of Singapore Authority International	http://www.internationalpsa.com
APM Terminals	http://www.apmterminals.com
Dubai Ports World	http://webapps.dpworld.com
Ports America	http://www.portsamerica.com

The surveys consisted of a questionnaire with 20 close-ended questions related to business relationships characteristics and competition aspects in both container terminals and the dry port industries (see example of questionnaire in appendix 4). In section 7 of the study is described in detail the type of questions formulated, their intended purpose and the rating scale applied. The surveys were supported by an online application powered by Google (Google Docs), which allowed the population reached to answer the questions in a friendly manner with an average lasting time of five minutes. The surveys started on March 16 of 2012 and finalized on April 20 of 2012. During this time, one initial communication and three reminders were conducted. The third and last reminder was carried out by individual e-mails and telephone calls directed to companies from the initial list that were consider important for the study. The response rate achieved for the surveys were of 31% for Survey 1 and 35.7% for Survey 2. It is important to note that the online application used in the survey powered by Google, facilitated the approach of companies surveyed through e-mail and the tracing and tracking of responses. Such application also facilitated actions and processes to increase the response rate and the organization and interpretation of the data.

5.3 Delimitations, limitations and scope

The research focuses on the relationships that take place between container terminals and dry ports regarding containerized cargo and the impact of such relationships on inter-port competition. Container terminals and dry ports in practice interact alternatively as both suppliers and customers depending of the logistics flow of the cargo and the range of services provided by dry ports. In this research, container terminals are studied as customers of dry ports, and dry ports are given the role of logistics service providers in the business of transportation of containerized cargo.

As it is reviewed in the following sections, *inter-port competition* could take place between maritime ports and also between terminals handling different type of cargo. The phenomenon could also be analysed from a geographical perspective in which location is the focus, or it could be analysed in terms of destination and origin of the cargo handled at the terminal. In this research, *inter-port competition* is exclusively studied taking into consideration only containerized cargo. Additionally, it is important to mention that in practice maritime ports and container terminals sometimes engage competition for containerized cargo intentionally with full awareness of the phenomenon's mechanics, and sometimes they do not. Occasionally, maritime ports and container terminals are not fully aware of their involvement in *inter-port competition*. Some terminal managers, consultants and seaport's practitioners particularly in emerging economies interpret the ups and downs in the container throughput as a vector of the level of captivity of their markets and their hinterland's manufactured output. As a result it is possible to find in the industry opinions referring to ports and container terminals that are not involved in any kind of competition. On the other hand as it is discussed in the literature review of this study, scholars in the maritime industry and port economists agree on that due to the globalization mechanism every single commercial port is subject of competition. This is why, for the purpose of this study it is assumed that container terminals located in the same geographical service range are subjects of *inter-port competition* whether their engagement in the phenomenon is intentional, unconscious or forced by the modern dynamics of the shipping industry.

The research questions are answered and discussed from the perspective of competition theory and supply chain management. The scope of the research is only over *inter-port competition* between container terminals at sea ports and relationships between them and dry ports. Dry ports could be used to storage cargo different to containers and they could be linked to container terminals by all modes of transport. However, this research only considers those dry ports dedicated exclusively or in its majority to handle and storage containers, and those that are connected to container terminals by rail and road transport.

5.4 Quality Assessment

The quality of the research was continuously assessed based on an assessment criteria for qualitative research (see appendix 5) proposed by Patton (2002). In the context of such criteria, initially the themes in the literature review, the research strategy, the interview guide and the survey questions were presented and approved by the supervisor assigned. The literature review was carried out over recent textbooks and peer-review scientific articles obtained from book collections and academic databases available at Jönköping University library. Secondly, a perspective for the study was chosen. Such perspective was a *Supply Chain perspective* which was integrated to the data collection and the analysis of the data. Thirdly, the units of analysis were chosen. These units were structured-focused, specifically on container terminals and dry ports. Then, with regard to the surveys random purposeful samples of container terminals and dry ports were selected to be surveyed from the list of organizations presented in table 5.2. With regard to the interviews, an emergent sampling approach was used based on the geographical closeness faced by the researcher to Gothenburg's hinterland and a fieldtrip conducted in Thailand from 2012-02-14 to 2012-03-05.

The sample size for the surveys were chosen considering the tools available to process the data and the time available to collect it, aiming for a minimum response rate of 30% to add credibility, reduce bias and allow generalizations and representativeness over the sample.

Regarding the data collection, a fieldwork was designed considering the role of the researcher, the perspective selected, the profile of people and respondents approached, the duration of the observations and the concepts reviewed in the literature. The interviews conducted were semi-structure with standardized questions to provide each interviewee the same stimulus and to allow comparison in the analysis. The majority of the interviews were conducted in person and most of them were recorded. The surveys were conducted through an online application powered by Google in order to ensure standardization of formats, rating scale, visual presentation and channel of submission.

5.5 Reliability and Validity

The results of the data analysis in the research demonstrated consistency not only among the interviewees, but also across the theory reviewed. Additionally, the empirical findings presented in section 7 are reliable in the sense that they are an accurate and typical representation of the container terminal and dry port industries. Such findings and the observations conducted during the study were characterized by a high degree of stability, replicability and repeatability. This may be a consequence of the clear contextualization of the interviewees and survey's respondents applied in the study.

In order to ensure validity and reliability in the study, a peer-review business model related to the purpose was used. Such model namely the RAP model and its revised version the SRE model were used to frame the data collection (interviews and surveys) and to guide the analysis. This approach ensured collection of data directly related to the purpose of the research. Additionally, the study contemplated interviews and surveys in order to allow the conduction of triangulation in the analysis to test the observations obtained and to strengthen the conclusions of the research.

6 Theoretical framework

The frame of reference of this research was guided by the problem and purpose described in section 3 and 4. Therefore, it was considered relevant in this research to review theory related to forces impacting industries, inland integration of port services, the dry port concept, competition theory, inter-port competition with its drivers and influencers, and supplier/customer's relationship assessment. These topics are reviewed in the following subsections in association with the purpose of the research.

6.1 Forces shaping economic environments and industries

The world's economy is being shaped by factors such as globalization, technology development, organizational consolidation, the empowered consumer, government policy and the deregulation of industries (Langley et al., 2009). Such trends have triggered economic growth in most regions of the world and have boosted the growing rate of international trade. For instance, the world merchandise exports grew in value from 3.676 Billion dollars in 1993 to 14.851 Billion dollars in 2010 (WTO, 2011). As international trade grows, so it does the transportation industry, which is derived of it. In consequence, the transportation of goods through the different transport systems (air-road-rail-maritime transport) has also increased (Dicken, 2011). Despite this, the industry has been limited by its own features. The transportation industry has been historically capital and labor intensive and the infrastructure needed for its function requires time to be built and in most of the cases heavily public participation (Grant et al., 2006). These trends have pushed the transportation systems into the search of operational efficiency and organizational flexibility (Rodrigue et al., 2009). The most outstanding results of such efforts during the last three decades could be perhaps the introduction and worldwide implementation of containerization and intermodalism in the transportation of goods (Rodrigue & Notteboom, 2009).

The increase in containerization and the implementation of intermodalism have led to the specialization of some industries within the transportation systems. This is the case of maritime, rail and road transport in which ships and vehicles are built exclusively to transport containers (Stopford, 2009). Maritime ports have also specialized according to the type of cargo handled and today most maritime ports have at least one or several container terminals that are designed and equipped to handle exclusively containerized cargo (Notteboom & Winkelmans, 2004). Containerization enables economies of scale, modal shift in the transportation chain, safety in the cargo handling operations, security for goods and transport infrastructure, standardization of cargo handling equipment, cost saving and operational efficiency for transportation systems and supply chains (Notteboom, 2004). Therefore, it has remarkably increased since its implementation with a tendency to expand in the future. For instance, today containerized goods accounts for 56% of world's seaborne trade in terms of volume (UNCTAD, 2011), and for approximately 70% of the world trade in terms of value (WTO, 2011). As a result, container terminals have become the primary interface of sea/land transport for containerized goods and one of the most important actors in international logistics and supply chain management. In consequence, container terminals play a critical role not only on the sustainability and facilitation of the world trade, but also in the supply chains of the industries that depend on maritime transport to source their production processes. Additionally, the role of container terminals is also important because its capacity has been challenged constantly by the increasing carrying capacity of ships and the growth of container traffic. Consequently, CTs capacity is being expanded by the inland integration of port services and the establishments of regional maritime and port networks (Ducruet & Notteboom, 2012). The following section reviews the most relevant features of this trend and introduces the dry port concept in association with the purpose of this research.

6.2 Inland integration of port services and regionalization of ports

Container shipping has grew during the last two decades in a pace that has surpassed the port capacity available (Notteboom, 2008). Container terminals are going beyond their own facilities to accommodate additional cargo and to provide value added services considered nontraditional in the industry (Vitsounis & Pallis, 2012). These kinds of services are expanding the role of ports and container terminals in the supply chains of manufacturers and shippers generating a high level of integration between maritime and inland transport systems (Bergqvist, 2012). This integration it is being complemented by a trend called port regionalization. According to Notteboom & Rodrigue (2005), port regionalization is characterized by strong functional interdependency and even joint development of a specific load center and logistics platforms in the hinterland. They argue that the current stage of inland integration is the result of 6 main port development phases. In those phases ports that used to be geographical scattered started to penetrate and capture hinterland, then to interconnect and concentrate, consequently to centralized cargo to achieve economies of scale followed by a decentralization of cargo by the insertion of transshipment hubs, and currently they are regionalizing port areas through the establishment of inland load center networks (Notteboom & Rodrigue, 2005). These inland networks create value for manufacturers and industrial clusters by expanding the scope of markets they can economically access and by reducing the delivered cost of manufacture products (ESCAP, 2009). These networks also enable ports and container terminals to participate in specialized port service niches and to engage inter-port competition through differentiation by ways different than price and turnaround times (Nam & Song, 2012).

The port services that now are shifted into land transport infrastructure can be categorized as general logistics services and value-added services (Bergqvist, 2011). Nevertheless, they include container storage, loading and unloading, stripping and stuffing, groupage, consolidation, distribution, repackaging, assembly, quality control, testing, repair, equipment maintenance, equipment renting and leasing, cleaning facilities, tanking, safety, security services, offices, and information and communication services of various kinds (Brooks, Schellinck & Pallis, 2011). This inland extension of port services has gain importance among producers who apply now more flexible production processes such as speculation and postponement using transportation as leverage (Boone, Craighead & Hanna, 2007). Consequently, it has generated new markets for such services and the emergence of companies that offer full service logistics solutions to major manufacturers (Lemoine & Dagnaes, 2003). These companies are called *logistic service providers* (Bolumole, 2003) and they have achieved substantial strength when dealing with shipping lines, container terminal operators, and other port service suppliers, adding to the growing complexity of inter-port competition (De Langen & Pallis, 2006).

Today, LSPs make decisions that affect all parties involved in the supply chain and industrial networks (S. Hertz, personal communication, 2011-10-24), including container terminals and port service suppliers such as dry ports. LSPs manage the combined logistics requirements of logistics clusters and commonly that of large global shippers as their main customers (Wallenburg, 2009). These developments are changing the way port services are bought and sold. For instance, alliances and consolidation among ocean carriers and LSPs are emerging in order to ensure cargo volume and to improve container distribution through package deals that would provide lower prices and wider geographic coverage (Ducruet & Notteboom, 2012). Despite the benefits of inland integration of port services, from a port's perspective there can be serious drawbacks in inter-pot competition. LSPs can divert economic activity away from the ports hinterland area and open the possibility of competition from ports of different service ranges (Rodrigue, 2010). As one kind of LSP, dry ports are considered important actors in the progressive inland integration of port services and the regionalization of ports (Woo, Pettit & Beresford, 2012). The following section seeks to review briefly the development of the dry port concept and its definition for the purpose of this study.

6.3 Dry port concept

The formal conception of dry ports can be traced back to the early 1980s when it was identified by the transport industry that containerization was a crucial practice for the efficient international transport of goods. By then, the transport industry referred to Inland Terminals which were defined by UNCTAD in 1982 as ‘an inland terminal to which shipping companies issue their own import bills of lading for import cargoes assuming full responsibility of costs and conditions and from which shipping companies issue their own bills of lading for export cargoes’ (UNCTAD, 1991, p. 2). Those places were also referred to Inland Logistics Centers, or Multifunctional Logistics Centers as described by Hanappe (1986) who defined them as a place where a variety of firms were operating and performing logistics activities (cited in Roso & Lumsden, 2010). Later on the United Nations Economic Commission for Europe (UNECE) highlighted the important role of the concept as a common user facility in the transport of goods and the UNCTAD issued the first Handbook on the Management and Operation of Dry Ports defining the concept as a customs clearance depot located inland away from seaports giving maritime access to it (UNCTAD, 1991).

The concept gained some importance during the 1990s and 2000s thanks to the increase of containerization and the lack of container handling capacity faced by seaports. By then, intermodal infrastructure started to be built worldwide in order to maximize the benefits of containerization (Corbett & Winebrake, 2008). New definitions were introduced addressing aspects such as ownership and services. For instance, such logistics centers started to be called Intermodal Terminals and Inland Clearance Depots or Inland Freight Terminals (IFT) as introduced by UNECE (1998). UNECE described the IFT as ‘any facility, other than a sea port or an airport, operated on a common-user basis, at which cargo in international trade is received or dispatched’ (UNECE, 1998, p. 4).

Even though these definitions were considered comprehensive enough, they did not address whether or not those logistics centers/intermodal terminals were connected to sea ports neither they addressed in detail the range of services offered by such centers. It was then the economic trends of the early 2000s the ones that triggered a new formality for the concept. Trends such as the globalization of the world’s economy, application of supply chain management and the implementation of intermodalism gave to inland logistics centers a more formal role in the international distribution of goods (OECD, 2002).

The actors and stakeholders of the international transportation system realized the need of inland integration of port services. They started to talk about combined transport and in a conference of European Ministers of Transport and the European Commission in 2001 formally a dry port was defined as ‘an inland terminal which is directly linked to a maritime port’ (UNECE, 2001, p. 59). This marked an evolution of the concept that took inland intermodal terminals to a higher level in the transportation system. In parallel to this evolution, during the last decade countries all over the world have started to build through private and public initiatives a large number of inland intermodal container terminals that are directly connected to main sea ports by road, rail or river (World Bank, 2006).

More recently the dry port concept has been defined in a more comprehensive manner based on its function in the transport chain and the specialized services that a dry port provides to cargo. For instance, Roso, Woxenius and Lumsden (2008, p. 341) define a dry port as ‘an inland intermodal terminal directly connected to seaport (s) with high capacity transport mean (s), where customers can leave/pick up their standardized units as if directly to a seaport’. Additionally, dry ports have been categorized into different kinds based upon their location and function. According to Roso et al. (2008) dry ports are categorized in close dry ports, midrange dry ports and distant dry ports.

As illustrated in figure 6.1, distant dry ports are usually located over 500 kilometers from the seaport and their main advantage is the capability to provide transportation of containerized cargo over long distances (Henttu, Lättilä & Hilmola, 2010). This kind of dry port makes rail transport more accessible to shippers located further away from the seaport, making their location more competitive and resulting in reduced congestion at the seaport gates (Roso et al., 2008). Midrange dry ports are situated within a distance of approximately 100-500 kilometers from the seaport between close and distance dry ports (Henttu et al., 2010). The midrange dry port functions as a cargo consolidation point for different rail services making available the provision of administrative and technical services for containers. It could contemplate dedicated trains for specific container vessels resulting in a very important relieving of the seaport´s stacking areas (Roso et al., 2008). Finally, close dry ports are those located in the immediate hinterland of the seaport within a distance of less than 100 kilometers (Henttu et al., 2010). This kind of dry port usually has rail shuttle services to the seaport and function as container depot increasing considerably the capacity at container terminals (Roso et al, 2008)

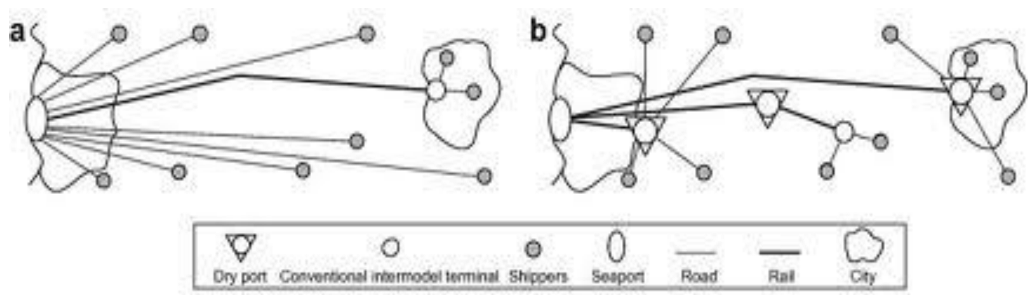


Figure 6.1 Comparison of a conventional transport and an implemented dry port concept. (Source: Roso, 2009)

In this context, and ideal dry port concept seeks to transfer logistics activities towards inland away from the seaport with the purpose of preventing a further overcrowding of limited seaport infrastructure, making possible that these activities will not be performed again at the seaport (Notteboom & Rodrigue, 2005). This is why nowadays dry ports offer a large range of services to cargo that go beyond the transport and storage of containers. For instance, dry ports assembly freight in preparation for its transfer, they control the logistics flow of the cargo until its final destination, they consolidate cargo, they do maintenance of containers, customs clearance of merchandise and they perform other value-added services such as packing, labeling and warehousing (ESCAP, 2009). There are several actors involved in the dry port concept who interact within the concept either by their business relationship with the dry port or by the benefits that are gained from the existence of the dry port. These actors are seaports, seaport cities, rail operators, road operators, shippers and society (Roso, 2009). Table 6.1, summarizes the range of benefits that are gained from the three main types of dry ports regarding the main actors of the transport system. These benefits have been integrated in this study as frame of reference to identify potential enablers, influencers and benefits associated to the relationships that exist between container terminals and dry ports.

Table 6.1 The dry port's advantages for the actors of the transport system (Source: Roso, 2009)

	Distant Dry port	Midrange Dry Port	Close Dry Port
Seaports	Less congestion	Less congestion	Less congestion
	Expanded hinterland	Dedicated trains	Increased capacity
	Interface with hinterland	Depot	Depot
		Interface with hinterland	Direct loading ship-train
Seaport cities	Less road congestion	Less congestion	Less road congestion
	Land use opportunities	Land use opportunities	Land use opportunities
Rail operators	Economies of scale	Day trains	Day trains
	Gain market share	Gain market share	Gain market share
Road operators	Less time in congested roads	Less time in congested roads	Less time in congested roads
	and terminals	and terminals	and terminals
			Avoiding environmental zones
Shippers	Improved seaport access	Improved seaport access	Improved seaport access
	"Environment marketing"	"Environment marketing"	
Society	Lower environmental impact	Lower environmental impact	Lower environmental impact
	Job opportunities	Job opportunities	
	Regional development	Regional development	

In this context, the implementation of the dry port concept has not only support extensively expansion of container terminal capacity, but it has also impacted the relationships between seaports and the distribution network of the hinterland (Notteboom, 2008). Additionally, this integration of ports services towards the hinterland has also impacted the competition environment of ports (Slack, 1985). As containerization has growth greatly the competition for containerized cargo has become more intense and fierce (De Langen & Pallis, 2005). Today, container terminals operators are approaching inter-port competition through aggressive competitive strategies to attract containerized cargo. These strategies are designed with regard to port users' needs and the industrial profile of the hinterland (Noteboom, 2008). Therefore, it is considered that relationships CTs hold with port users and other stakeholders are critical for inter-port competition. This is why for the purpose of this research, it was considered relevant to also review the phenomenon of competition and its application on the port industry. The following section presents a review of the phenomenon, it constructs from that review a definition of the concept and introduces the specific features, types and mechanics of inter-port competition.

6.4 Competition

Historically, competition has been defined from a social perspective according to Samuel Johnson (cited in High, 2002, p. 1) as 'the act of endeavoring to gain what another endeavors to gain at the same time'. Economic theory of the 1950s defined the concept from a more market oriented perspective. From this perspective it is argued that value, cost and scarcity of production factors demand their exchange within industries and between them, having as a result from this exchange and environment of competition (Stigler, 1957). This view was widely accepted by academics. However, through history the concept of *competition* has evolved greatly. For instance, McNulty (1967) in his research about the definition and applicability of the concept proposed that a fundamental distinction should be made between *competition* as a market structure and *competition* as a behavioral activity. Today these views still widely accepted, but modern economist continuo debating the phenomenon, its definition and its application in public and private matters. As a result of those debates, economists have reached consensus about what was suggested in late 1950s by George Joseph Stigler – Nobel Prize in Economic Sciences in 1982. He suggested that due to the wide application of the concept of competition, it could be preferable and acceptable to adapt it to changing conditions (High, 2002). Taking this view into account and considering the changing economic environment in which transport systems are involved, an adaptation to the definition of *competition* has been made. For this research, *competition* is viewed not only as a behavioural activity that arises from the rivalry between individuals to obtain the best share of something not available for all, which has been identified for the container terminal industry as a profit, but also, as a behaviour that is influenced by the market structure where it evolves from.

But, analysing competition in an industry which is influenced by the behaviour of competitors and at the same time for the environment where the industry performs, (as it is for container terminals and dry port industries) is a rather complex process. This is because no matter the country or the market where the business activity takes place, there are numerous differences between firms in an industry even when the product/service is homogeneous (Porter, 1980). Those differences include size, culture, organization, productivity, vision, financial capacity, network, good-will and experience (Grant, 2008). Due to these differences, two features can be identified through which competition works in an industry, namely incentives and selection (Carlin & Seabright, 2007). Both of them are essential in illustrating the importance of competition. On one hand, because from incentives and selection come several economic benefits and guaranties not only for the demanders of the industry's products/services, but also for the industry itself. On the other hand, such features are important because they involve efficiency and optimality. These two elements embrace most of the economic motivations for economics units such as container terminals and dry ports influencing their behaviour in business relationships. Thus, efficiency and optimality deserve some attention in the context of this research.

In economics the term efficiency is usually defined as 'the relationship between scarce factors inputs and outputs of goods and services' (Pass, Lowes & Davies, 2000, p. 158), and optimality can be interpreted as the process to obtain 'the best possible outcome within a given set of circumstances' (Pass et al., 2000, p. 380). However, they are elements that could explain industry behaviour such as that of *inter-port competition*. For instance Baumol (1977, p. 5) stated that 'optimality analysis should serve as a relative good predictor of economic behaviour' which means, he added, 'it should provide a reasonably good explanation of actual economic decisions and activities' and can explain how the 'efficient calculator of optimal decisions…' (as he refers to the economic units) '…would perform in its business activities'. This observation leads to conclude that efficiency and optimality must be important for container terminals in the context of inter-port competition. Moreover, location and transportation theory in industries suggest that efficiency and optimality for container terminals are enhanced or weakened by the role of intermodal hinterland terminals (such as dry ports) and logistics parks connected by transport modes to seaports (Rodrigue et al., 2009). Therefore, it could be said that these two elements set up the arena in which industries such as those of container terminals and dry ports behave to achieve competitiveness. As a result, highly competitive industries seek for the right strategy, the right relationship with the parties they interact with, and they also seek for the optimal allocation of their tangible and intangible assets to achieve competitive advantages (Porter, 1998). This section has presented the view and perspective of competition that was applied on the research. Following, the features and mechanics of inter-port competition are described.

6.5 Inter-port competition

The market structure of port industry and that of container terminals can be expressed from a holistic political perspective or from the point of view of an individual terminal. The former is related to a situation where a container terminal is considered to be a unit under a national or even higher level of administration and competes or cooperates with other terminals (Wang, Cullinane & Song, 2005). Complementary, the latter is related to the different actors and stakeholders of a port and the nature of their role within the port (Wang et al., 2005). In this context, port competition refers in general to the process where ports seek to maintain complete or partial control over customers, market share and hinterland (Marlow & Paixao, 2001). Complementing this perception, Song and Yeo (2004, p. 35) argue that ‘port competition refers to the development and application of differentiated strategic alternatives so as to attract more customers to competitive ports’. These two arguments suggest that port competition involves competitive behaviors from ports and container terminals within their business environments.

Complementary, Meersman and Voorde (2002) referred to a more practical definition constructed by Verhoff in 1981. In this definition is argued that seaport competition unfolds under four different levels. Verhoff´s port competition levels are: competition between port undertakings, competition between ports, competition between port clusters (a group of ports in the same region with common geographical characteristics), and finally competition between ranges (ports located along the same coastline or with the same hinterland) (Meersman & Voorde, 2002). Researchers and practitioners of the maritime and port community agree on that these levels of competition could be considered as the main strategic frame of port competition but since they interact with each other, they cannot be addressed individually. Previous research has also conclude, that such classification does not consider the composition of traffic structure of port undertakings (Winkelmans, 2003), which in the context of terminals specialization is very important in port competition. The previous definition addressed ports and terminals as if they were similar when in reality nowadays they are very specialized and segmented (Voorde & Winkelmans, 2002). For instance, container terminal operators do not compete with liquid bulk or bulk terminal operators, neither against car terminals or passenger cruise terminals operators. Consequently, Voorde and Winkelmans (2002) complemented the concept arguing that competition only takes place between ports involved in the same traffic and terminal operators who are equally categorized within the transport chain. From this definition, scholars and researchers in the topic have classified port competition into three main types.

This classification in one hand represents the comprehensive concept of port competition and in the other hand explains the relationship between ports and port undertakings. The port competition types are: inter-port competition, intra-port competition and inter-port competition at port authority level (Cariou, 2007). This research refers exclusively to *inter-port competition*, which based on the previous arguments is defined as the competition between different ports or terminals with regard to the type of cargo and trade routes they are involved.

Referring to Verhoff's levels of competition, *inter-port competition* can accordingly be classified into three subcategories. The first category is competition between a whole range of ports and coastlines such as the competition hold between the ports in the Hamburg-Le Havre range and the ports of the Southern Mediterranean. The second category is the competition between ports in different countries such as the competition between Antwerp in Belgium and Rotterdam in the Netherlands or between Vancouver in Canada and Tacoma in the United States. The third category is the competition between individual ports in the same country. Such kind of competition exists when there are similar ports in a country that have overlapped hinterlands such as the competition between Long Beach Port and Los Angeles Port in California's hinterland or between Dalian Port and Qingdao Port in Northern China's hinterland. The previous review of competition, port competition and inter-port competition, led to conclude that competition between container terminals for containerized cargo can be influenced by several factors that are relevant for the purpose of this study. This is why in the following subsection the factors this study considers to be the most influential on inter-port competition are briefly reviewed.

6.5.1 Factors that affect inter-port competition

The factors influencing competition between ports may vary among different levels. They include political, economic, social, organizational and production aspects. However, the competitive strength of individual undertakings such as those performed by container terminals within a port is determined mainly by certain inputs such as skilled workers, capital and technology (Slack, 1985). On the other hand, competition between ports/container terminals, port clusters and port ranges is also affected by some regional factors such as the geographical location, the availability of infrastructure, the degree of industrialization, the governmental policy and the level of port performance (Chlomoudis & Pallis, 1998). Port performance is crucial on inter-port competition and it is normally measured in terms of alternative variables, such as the frequency of liner services, the transshipment cost, storage capacity and connection to hinterland (De Langen, 2007).

This traditional approach to port competition paves the way for another approach based on competition between supply chains in which seaports are links (Woo et al., 2012). In this approach the most important element to consider is the total cost of the transport chain. As a result, port performance is now being measured for capabilities that go beyond container handling or container throughput. Indicators such as warehousing capacity, distribution network of goods and hinterland connectivity are also factors affecting competition between ports (Ducruet & Notteboom, 2012). Moreover, at managerial and port authority levels, port competition is also affected by some other factors such as the organizational and management structure, political and regulatory framework, socio-economic stability, know-how of port authorities, implementation of electronic data interchange (EDI), degree of government intervention, existence and volume of niche markets, port potential productivity, quality of facilities/equipment and the creation of added value (Bichou & Gray, 2004). Based on these parameters, there are a variety of elements that should be considered when evaluating the competitiveness level of a container terminal.

There are number of elements that should be put into consideration when addressing inter-port competition. They could be typified in general as the expansion capacity, new investment in port facilities, renewal of equipment, identification of the present and potential development of different transport routes and the improvement of port operation efficiency and effectiveness (World Bank, 2006). However, referring to a more specific set of elements Song and Yeo (2004) classified the most important criteria for the assessment of port competition into five groups. The first group is the cargo volume which implies the ability of ports to handle more cargoes including import, export and transshipment. The second group is the port facilities which comprise both port infra and superstructure in the sense that the greater the capacity, the higher the competitiveness level of a port.

The third group embraces port location which explains the importance of the geographical location and accessibility of a port/container terminal in port competition. The fourth is the service level as the higher the quality of services provided to the port users, the higher the competitiveness level of the port. The fifth group is the port expenses which includes port dues, tariff, terminal handling charges in the sense that the cheaper the port expenses, the higher the competitiveness level of a port. In this research, these elements will be associated to the relationships characteristics that exist between container terminals and dry ports in order to identify relevant patterns of influence. Table 6.2 illustrates in details the elements that should be considered when evaluating the competitiveness of a port or terminal.

Table 6.2 Elements of Port competitiveness (Source: modified from Song & Yeo, 2004)

Application of EDI system	Ability of port personnel
Average hours of port congestion	Port accessibility
Berth/terminal availability	Port facilities
Building port MIS	Port marketing
Capacity of transportation connectivity	Port operation
Capacity/status of facilities available	Port operation by government
Cargo volume of handling transshipment	Port operation by local autonomous entity
Changes in social environment	Port operation by private sectors
Changes in transport and cargo function	Port ownership
Complete preparation of multimodal transport	Port productivity
Concentration of volume by export/import	Port service
Customs clearance system	Port size
Economic scale of hinterland	Port tariff
Effectiveness of terminal operations	Price competitiveness
Existence of cargo tracing system	Response of port authorities concerned
Financial factors of port	Road network to be fully equipped
Free time of container freight station	Securing fairway
Frequency of ships calling	Securing railroad connection
Handling charge per TEU	Terminal facilities
Handling volume of export/import cargo	Trade market
Inland transportation cost	Trade/commerce policy
Inter-linked transportation network	Transportation distance
Internal politics	Types of port operation/management
Loading time	World business
Location factors of the port concerned	Nearness to hinterland
Market position within the area	Nearness to main trunk
Mutual agreement of port users	Number of liners calling at ports

The elements of port competitiveness described previously have been analyzed in this research as elements that could be impacted directly or indirectly by relationships between container terminals and dry ports. Therefore, the relationship assessment between container terminals and dry ports made in this research was conducted in association with the most relevant elements previously illustrated. This range of elements may represent the competitiveness in terms of productivity and operational efficiency of a container terminal. They could even be the first information to look at by shipping lines in port selection processes. However, the forces that today shape the economic environment have introduced new elements to port competition. These new elements have emerged from Supply Chain Management philosophy (Woo et al., 2012) and new trends in economies of location and transportation of industries (Rodrigue et al., 2009). They represent the main drivers and influencers in the industry and this is why they are reviewed in the following subsection.

6.5.2 Drivers and influencers of inter-port competition

The first driver in the competition environment of container terminals is the increase of competition for global markets in the shipping industry (Hayashi & Nemoto, 2012). This has created a need to restructure port operations to deal with the external factors that affect port selection, including national competition for global markets, changes in port and transport technology, and increased competition among ports and container terminals. Port institutional models developed in the 19th and early 20th century significantly constrained ports from competing effectively on a service quality basis, limiting their agility and market responsiveness in a world economy of mobilizing resources, and they constrained also their ability to share risks with private sector partners (World Bank, 2006). Consequently, the port business is more competitive today than it was when most port authorities were originally chartered and rigidly structure.

The second important driver in the port industry is the private participation in infrastructure development and service delivery (Notteboom, Pallis & Farrell, 2012). This trend is supported by transnational financing institutions. For instance, the World Bank has observed that in recent years world’s governments and lending agencies have come to acknowledge that private sector participation can be a powerful force for enhancing the performance of port assets (World Bank, 2006). Another important driver in the port industry is the diversification and globalization of investors and terminal operators (Woo, Pettit, Beresford & Kwak, 2012). The globalization of shipping has also developed a global market for port services in specialized areas each of them containing a number of national and international companies that offer very specialized service capabilities. They are classified in three main groups namely global stevedores, financial holdings acting as regional terminal operators and shipping lines investing in terminals (Rodrigue, 2010).

Another driver of competition in the port industry is the highly globalization of maritime shipping (Rodrigue, 2010). In one hand currently more than 70% of the world fleet (measure in tonnage) is under flag of convenience (UNCTAD, 2011). This enables ship-owners to enter and exit maritime freight markets easier than in the past, impose less regulation for ship’s operation, lower the registry costs including taxation and lower operation costs (Stopford, 2009). In the other hand, the maritime shipping industry is not merely a port user, it is also the main actor in the demand of port services. Therefore, today the shipping industry is highly globalized in terms of operation and ownership. The globalization of maritime shipping has led to another important driver of inter-port competition that impacts more directly container terminals. This driver is the establishing of shipping networks with specific distribution patterns and by using transshipment hubs (Stopford, 2009). As containerization has growth in maritime shipping, cargo distribution patterns have increasingly evolved into a *hub-and-spoke* network (Wang & Wang, 2011). This has made facilities for devanning, clearing, staging, and storing containers shift towards inland, therefore becoming more decentralized.

Another driver of inter-port competition is the concentration in both the shipping and port industries. The shipping industry has experienced a substantial consolidation over the past decade (Panayides, Wiedmer, Andreou & Louca, 2012). This a trend in all sectors of the industry, but it is most apparent in container shipping where it is estimated that in 2010, only 10 ocean carriers out of more than 200 account for more than 60% percent of the world container fleet capacity (UNCTAD, 2011). This sector has experienced significant number of major mergers and acquisitions over the past twenty years. Simultaneously, the port industry has also experienced concentration especially in the container sector. The world port container throughput was of 531 million TEUs by December 2010 in which the top 20 container ports account for a share of 47.9 % (UNCTAD, 2011). The largest container terminal operator is Hutchison Port Holding (HPH) a Hong Kong based company with a capacity of 75 million TEUs (HPH, 2012). It is followed by other major operators such as APM Terminals with an estimated capacity of 70 million TEUs, PSA International with 65.1 million TEUs, China Merchant Holdings International with 52.3 million TEUs (UNCTAD, 2011), DP World of Dubai with 49.6 million TEUs (DP World, 2012) and COSCO Pacific with 48.5 million TEUs (COSCOPAC, 2012).

In this context, when the global container volumes still on the rise it could be expected more consolidation through mergers and acquisitions among global container terminal operators to increase their market share, container handling capacity and geographic coverage (Notteboom, 2008). A very recently close related example is the acquisition in January 2012 of Skandia Terminal in the Port of Gothenburg by APM Terminals thereby increasing its aggregated container capacity in approximately 1 million TEUs (Port of Gothenburg, 2012). The consolidation and concentration in the container sector of the shipping and port industries have two major effects on inter-port competition. The first effect is a clear increase of the bargaining power of container terminal operators in the pricing of port services towards main port users namely shipping lines, shippers, freight forwarders and dry ports (Yuen, Zhang & Cheung, 2012). The second effect is that capacity expansion demands a more efficient use of container handling infrastructure and container distribution, giving inland container connections such as dry ports a more important role in the global transport system (Bergqvist, 2012).

The drivers previously described frame part of the analysis carried out in this research. The analysis section in this study is substantially based on the assessment of the relationships between container terminals and dry ports as explained in section 5. In consequence, it was considered relevant to describe the model used in such assessment. The following section seeks to introduce and describe the RAP and SRE model used to assess the relationships characteristics between container terminals and dry ports

6.6 A model for relationship assessment

In today's transport business environment, there is intense pressure to improve the efficiency and effectiveness of the strategic efforts made towards the actors of the transportation system (Dicken, 2011). Supply chain management is now widely accepted and firms involved in the transport industry are seeking to integrate their processes into the large global production chain of goods and services (Bergqvist, 2012). Transport operators and governments are now aware of their role in the efficient administration and operation of the transport modes and port infrastructure (Rodrigue, 2010). They have realized that in order to provide the transport services demanded by the supply chain, it is necessary to co-ordinate and collaborate with the immediate actors in the chain which in usually are direct customers, customer´s customers, direct suppliers or supplier´s suppliers (Langley et al, 2009). This is the case of container terminals and dry ports. From a supply chain management perspective, these two entities are very close related and interact as customer or supplier in the macro process of exports and imports of goods. This is because today dry ports are the origin of large portion of the containerized cargo transferred at container terminals to container vessels in export processes (Rodrigue et al., 2009). Similarly, in import processes dry ports constitute the main destination of containerized cargo that is being shipped through direct or indirect operations from container terminals (Bichou, 2010). Additionally, limitations at container terminals to provide value-added services to containers have led to the extension of those services to dry ports (Veenstra, Zuidwijk & Van Asperen, 2012). Thus, dry ports have become an extended gate of the container terminal and a strategic inland infrastructure that increase container terminal capacity.

The interaction between container terminals and dry ports take place through formal and informal relationships. Previous researched has shown that these relationships are usually determined by aspects such as ownership of the infrastructure, profile of the container terminal operator, size of the hinterland, number of container terminals connected to the dry port, number of dry ports in the hinterland of the container terminal, type of dry port, container traffic of the hinterland, capacity of the container terminal, and conditions of the rail and road connections among others (Notteboom, 2008). These aspects denote general parameters of the environment in which container terminals and dry ports interact. However, no specific assessment of the type and characteristics of such relationships has been carried out. This assessment constitutes part of the purpose of this research and therefore a model to carry it out was found suitable for such purpose. This research has addressed the relationships between container terminals and dry ports from a supply chain management perspective, assuming that they both interact as customer-supplier and vice versa in the transfer of containers and additional services to containerized cargo. In this context, a Relationship Assessment Process model (from now own call RAP) and its revised version the Supply Relationship Evaluation model (from now own call SRE) were used to identify and typify the relationship characteristics that could exist between container terminals and dry ports.

The RAP model was developed by Lamming, Cousins and Notman (1996) researchers of the Centre for the Research in Strategic Purchasing and Supply of the School of Management in the University of Bath – United Kingdom. In the context of supplier-customer interactions the model proposes a set of relationship characteristics such a closeness, relationship depth, actual power, perceived power, benefits, actual dependence, perceived dependence and problem solving. According the model, these characteristics are determined by two dimensions, one being the customer dimension and the other one the supplier dimension. Within these dimensions the model includes a set of influencers and enablers for the relationship characteristics that are associated with the competitive environment, logistics capabilities, the resources committed and the interaction frequency as illustrated in figure 6.2. The RAP model develops an understanding of the relationship between two entities based on a single, combined or integrated experience and perspective that in the context of this research is shared uniquely by both container terminals and dry ports in their interaction in the transportation system.

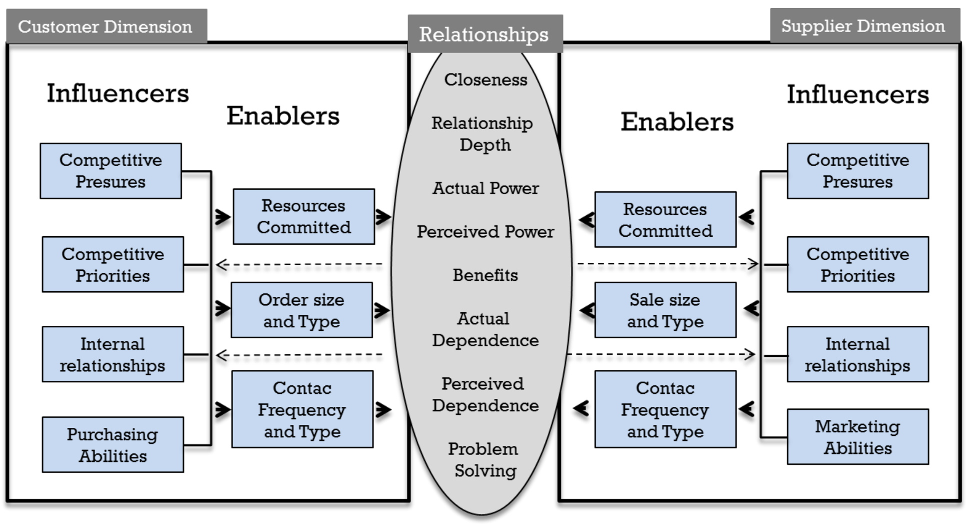


Figure 6.2 The RAP model for relationship assessment. (Source: Lamming et al., 1996)

The RAP model was applied by several industries in the United Kingdom and then revised and upgraded. Such revision resulted in a more comprehensive model called the Supply Relationship Evaluation model (SRE). The SRE model was developed by Johnsen, T., Johnsen, R. and Lamming (2008) researchers of the Centre for the Research in Strategic Purchasing and Supply of the School of Management in the University of Bath; the Business School of Bournemouth University and the School of Management of the University of Southampton in the UK. The SRE model attempts to address the conceptual limitations that were identified in the application of the RAP model. In this context the model introduces an additional set of relationship characteristics such as mutuality, particularity, co-operation, conflict, intensity, interpersonal inconsistency, power/dependence and trust. These relationship characteristics according the model are determined by the strategic priorities and capabilities of the customer and the supplier. As it is illustrated in figure 6.3, the relationship characteristics are also influenced by the capacity, technology and capability limitations/opportunities of the supply network and the performance, requirements, specifications and policies of the customer network.

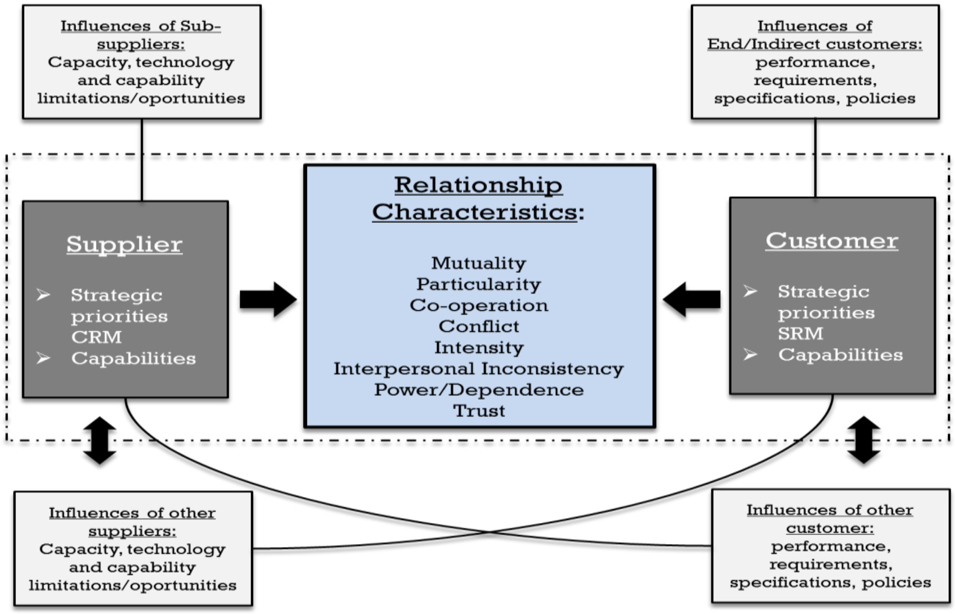


Figure 6.3 Supply Relationship Evaluation Model. (Source: modified from Johnsen et al., 2008)

The perception about the relationship characteristic introduced in the model can differ in terms of concept and context. This is why in this research the definitions given by the model developers were borrowed and used in the data collection process to contextualize the interviewees. Table 6.3 presents the corresponding definitions.

Table 6.3 Definition of Relationship Characteristics (Source: adapted from Johnsen et al., 2008)

Relationship Characteristics	Definition
Mutuality	Extent to which two actors demonstrate their interest in the well-being of one another and how they seek common goals or interests
Particularity	Direction, uniqueness and commitment in a relationship, when compared to other relationships of the companies, or the extent of standardization/adaption of interaction
Co-operation	Extent to which two or more entities work together towards a shared aim or direction for the relationship
Conflict	Extent of perceived differences between parties, causing friction and disputes, but also potential creativity
Intensity	Extent of contact and resource exchange between firms in a relationship
Interpersonal Inconsistency	The personal expectations and individual interests influencing interaction and the extent of perceived variation in others actor's approach to interaction between individuals or departments
Power/Dependence	Extent to which an actor – implicitly or explicitly – can get another actor to do something that they would not otherwise have done. Dependence refers to obverse of power and the lack of power within a relationship perceived as highly needed
Trust	The expectation held by one actor about another that the other responds in a predictable and mutually acceptable manner

The SRE model addresses relationship assessment through a more comprehensive approach that captures the positive and negative impacts of the network in which the entities in interaction are embedded. These features and those of the RAP model were found relevant and suitable for the assessment of relationship characteristics between container terminals and dry ports. Therefore, the combined set of relationship characteristics proposed in the models and the different influencers were used as a guide for the scope and content of the data collected about container terminals and dry ports.

7 Empirical Findings

In section 5.2 (Data Collection) was described that in order to answer the research questions two sources of data were used. Primarily, 10 interviews with container terminal and dry port managers, scholars and experts in the topic were conducted. Secondly, 2 surveys were carried out. Survey 1 was carried over 100 seaport container terminals and Survey 2 was carried over 70 dry ports. The topics addressed in both the interviews and the surveys were related to relationship characteristics between container terminals and dry ports. Additionally, both the interviews and the surveys approached general perceptions of both entities about the impact of their relationships on inter-port competition. This section presents the most relevant data collected from both the interviews and the surveys. In order to present the interviews in a friendly manner, a structure based on the topics addressed was made with reference to interviewees' quotes and interviewees' perceptions. The surveys' results are presented in graphs and tables accompanied by brief descriptions. Even though, this section presents only the most important and relevant findings, the complete results of Survey 1 are presented in appendix 6 and complete results of Survey 2 are presented in appendix 7.

7.1 The Interviews

The four main topics that were addressed in the interviews were: the relationship characteristics between container terminals and dry ports, strategic priorities of both entities, relationship influencers and the impact of such relationships on inter-port competition. Following, the main findings about these topics are presented.

7.1.1 Relationship characteristics between Container Terminals and Dry ports

Based on the RAP model and the SRE model, a set of eight relationship characteristics were addressed in the interviews. They were: mutuality, particularity, co-operation, conflict, intensity, interpersonal inconsistency, power/dependence and trust. As it was illustrated in the interview guide in appendix 1, the interviews were conducted by formulating questions approaching issues and corporate behaviors that constitute the relationship characteristics rather than questioning about the characteristics directly. In the interview's introduction the meaning and definition of the relationship characteristics for the study were explained in order to clarify the context of the questions. The following subsections describe the interviewee's opinions about the set of relationship characteristics addressed.

7.1.1.1 Mutuality

The interviewees manifested various perceptions about the existence or occurrence of mutuality between container terminals and dry ports. The Project Manager of Skaraborg Logistics Center (SLC) in Fällköping-Sweden expressed that there is certain degree of mutuality between container terminals and dry ports. Nevertheless, he thinks that there is more concern in the container terminal's well-being from dry ports than inversely (L. Bigsten, personal communication, 2012-03-26). This perception is also shared by the Manager of Baneservice Kombiterminal in Gothenburg and the Logistics Manager of Höglandsterminalen-AB in Nässjo-Sweden. These two interviewees manifested in different ways that regarding their companies' relationship with APM Terminals, it is possible to say they usually pursue common goals but not always (C. Mårdstrand, personal communication, 2012-03-29 & A. Wittskog, personal communication, 2012-04-05). In contrast, the Manager of Green Cargo Terminal in Gothenburg manifested that there has been concern in the well-being of Green Cargo's terminals from Skandia Terminal during the last five years and no decline of such mutuality is expected in the future from the new terminal's operators namely APM Terminals (C. Axelsson, personal communication, 2012-03-28). It was also pointed out that in the Swedish context and as long as a regional impact is perceived, most of dry ports would be willing to relinquish individual goals in order to increase the positive outcomes for container terminals (L. Bigsten, personal communication, 2012-03-26).

Conversely, the Operations Planner at APM Terminals in Port of Gothenburg perceives that in Sweden mutuality between container terminals and dry ports exists, but he also adds 'we at the Port of Gothenburg want the best for Sweden and the region but never at the expense of losses or inefficiency of the port users'(E. Niklasson, personal communication, 2012-03-27). From an academic point of view, a Professor in Logistics at Thammasat Business School in Thailand stated that in the Thai context 'there is not really mutuality between container terminals and dry ports as each strives to maximize their profits and their operational capability'. He added 'the only way they could have a concern for the well-being of each other will be when they share the same owner'(R. Banomyong, personal communication, 2012-03-16). This issue of ownership was also referred to by PhD. Violeta Roso who is a recognized researcher on the dry port concept at Chalmers University in Sweden. She manifested that there is a tendency of seaports to buy or either invest on dry ports impacting mutuality correspondingly (V. Roso, personal communication, 2012-03-29).

7.1.1.2 Particularity

With regard to particularity all the dry port managers or dry port representatives manifested a constant dedication of individual efforts towards the specific requirements of Swedish container terminals. For instance, it was expressed that frequency and reliability of the train shuttles controlled by the port were a high concern for big Swedish manufacturers such as IKEA and JULA (C. Axelsson, personal communication, 2012-03-28). Therefore, constant efforts are directed towards the administration of the train shuttles at the port and towards the integration of the information systems in dry ports with those at the container terminal to improve container transport and delivery (A. Wittskog, personal communication, 2012-

04-05). Contrariwise, the Project Manager of SLC perceives lack of individual efforts from Swedish container terminals to dry ports that are in development. He manifested that from Port of Gothenburg's view and specifically from APM Terminals' view, projects such as Skaraborg Logistics Center in Fällköping are somehow over dimensioned. Thus, little and not sufficient attention is dedicated to such projects he added (L. Bigsten, personal communication, 2012-03-26).

From a user's perspective of both container terminals and dry ports the Managing Director of Eternity Grand Logistics in Thailand pointed out a relevant observation. He manifested that from a cargo's transporter perspective the importance of a dry port to nearby container terminals is proportional to its size. He also explained in different ways that as long as dry ports or specialized container depots (as they are called in Thailand) are located strategically and increase port capacity, they will be subject of dedicated individual efforts of the port authority or container terminal operators (P. Thiapairat, personal communication, 2012-03-13). From the academic view point PhD. Roso manifested that dry port's concept dynamics have some influence on the particularity container terminals and dry ports could apply towards each other. She added that dry ports are implemented in large extent by a demand of seaports, creating a direct dependence from the former to the latter. Supporting this comment, she explained that taking into account various organizational patterns she has identified during her substantial research about dry ports that dry ports have the tendency to dedicate and commit more efforts than container terminals towards their relationships or interactions (V. Roso, personal communication, 2012-03-29). It is something Professor Banomyong also agreed, adding that 'container terminals are critical for dry ports/container deports as they are the gateways for inbound and outbound freight' (R. Banomyong, personal communication, 2012-03-16).

7.1.1.3 Co-operation

When the interviewees were asked about whether their relationships with container terminals or dry ports are characterized by co-operation or contention, most referred to co-operation as driver of such relationships. For instance, the Operations Planner of APM Terminals in Port of Gothenburg stated that security of cargo and safety in container handling are sensitive issues that demand extensive co-operation between the port and dry ports connected to it (E. Niklasson, personal communication, 2012-03-27). The dry port managers interviewed also perceived that relationships between their companies and the container terminals they are connected to are driven by co-operation. Managers of Green Cargo Gothenburg, Baneservice and Höglandsterminalen AB, which are all dry ports connected by rail and road to APM Terminals expressed that most of their interactions with the port were driven by co-operation and coordination and that only few contentious episodes could be mentioned. They said tariffs rising and preferences in the allocation of train slots sometimes create controversial arguments. However, they also expressed that from their perspective there has been a willingness from APM Terminal's management to co-operate with dry ports and intermodal container terminals (C. Axelsson, personal communication, 2012-03-28; C. Mårdstrand, personal communication, 2012-03-29 & A. Wittskog, personal communication, 2012-04-05). In contrast, the Project Manager of SLC manifested that there has not been co-operation between Skaraborg Logistics Center in Fällköping and APM Terminals. He believes lack of cooperation between container terminals and dry ports in development in Sweden, is the consequence of a hands-off approach applied to the integration of both entities from governmental authorities such as Trafikverket, regional communities and port authorities (L. Bigsten, personal communication, 2012-03-26).

Regarding the role of Port authorities in co-operation, it is considered very important for the Traffic Manager and IAPH Coordinator at Cochin Port Trust in India. He manifested that in India, the Port Authority of Cochin acts as coordinator and enabler of agreements between the Vallarpadam International Container Transshipment Terminal and the intermodal container depots administrated by Container Corporation of India ltda. For instance, he explains that Vallarpadam ICTT is operated by DP World a very strong global terminal operator which has to interact with CONCOR India one of the largest Intermodal Container Depots chain in India. The interviewee stated also that such powerful entities sometimes clash when comes to tariffs and marketing efforts. Therefore, the port authority has to mediate the conflicts trying the reach an agreement beneficial for all (V. Menoth, personal communication, 2012-04-02). Complementing this view, the General Administrative Officer of the Laem Chabang Port Authority in Thailand perceives that co-operation has gone smooth between container terminal operators and dry ports in the Laem Chabang area. He exemplify his statement by mentioning flexible arrangements of train shuttles and improvements of the rail infrastructure between DP World (which is the operator of one of the international container terminals) and the State Railway of Thailand which is the operator of the inland container depot at Lad-Krabang achieving today a capacity of 800.000 TEUs (Z. Kajohnprasart, personal communication, 2012-03-10).

7.1.1.4 Conflict

Regarding conflict, none of the interviewees manifested the existence of conflict among the interactions with container terminals and dry ports. For instance, both managers from the container terminal side and from the dry port side expressed that negotiation of tariffs and adjustments of operational issues have been solved in serene and peaceful terms (E. Niklasson, personal communication, 2012-03-27; C. Axelsson, personal communication, 2012-03-28 & A. Wittskog, personal communication, 2012-04-05). Mr. Bigsten expressed that even though Fällköping municipality disagrees with some of the policies at APM Terminals, such disagreements has never ended in severe frictions or disputes (L. Bigsten, personal communication, 2012-03-26).

7.1.1.5 Intensity

Taking into account the definition of intensity in this study, interviewees were asked about human, material, financial and knowledge exchange between container terminals and dry ports. Furthermore, they were asked about the frequency of management meetings and the extent of management involvement in the relationships of container terminals and dry ports. Mr. Bigsten stated that despite his full management involvement with the stakeholders of the project in Fällköping, there has not been any resource exchange between SLC and Swedish container terminals and that he as project manager rarely met face to face with representatives of APM Terminals (L. Bigsten, personal communication, 2012-03-26). Green Cargo's manager reported very frequent face-to-face meetings with the top management at APM Terminal noting that he has allocated 5 people to exclusively take care of formal and informal matters related to the port in order to enable effective communication channels and rapid problem solving (C. Axelsson, personal communication, 2012-03-28). Mr. Wittskog also reported the allocation of some personnel to exclusively deal with APM Terminal's matters and he actually pointed out meeting Mr. Niklasson at the port in several occasions. He added that management of the relationships with the main customers is a corporative policy at Jernhusen AB which owns Höglandsterminalen AB (A. Wittskog, personal communication, 2012-04-05).

From the container terminal side it was expressed that even though the direct involvement of APM Terminals' top management level in dry ports matters was limited, there have been several efforts to increase the interactions between the two entities. For instance, it was explained that APM Terminals arranges at least 3 to 4 social meetings during the year in which representatives of shipping lines, manufacturers, dry ports and government officials gather to meet face-to-face and to improve communication processes (E. Niklasson, personal communication, 2012-03-27). Regarding intensity, the academics manifested that is an issue of ownership. It was explained that relationships will tend to be intense when dry ports are owned by a global terminal operators or by the port itself (V. Roso, personal communication, 2012-03-29). Likewise, Professor Banomyong manifested a direct correlation between ownership and the intensity of dry ports' relationships. He states that 'in Thailand could be the only case where intensity exits', because from his experience 'there is lack of network integration between container terminal operators and dry ports in the region'(R. Banomyong, personal communication, 2012-03-16).

7.1.1.6 Interpersonal Inconsistency

With regard to interpersonal inconsistency it was asked to the interviewees the degree of differences about how individuals or departments of the two entities interact towards each other. The answer was the same in all the cases. The interviewees expressed that there is no difference in how individuals develop relationships on behalf of their companies to how their companies formally approach each other to discuss mutual concerns. For instance, Mr. Niklasson and Mr. Wittskog manifested that such behavior could be the consequence of strong corporate policies related to formal communications channels and authority to explicitly represent their companies' objectives (E. Niklasson, personal communication, 2012-03-27 & A. Wittskog, personal communication, 2012-04-05).

7.1.1.7 Power/Dependence

The questions asked here were related to levels of influence, persuasion and importance of logistic capabilities for both container terminals and dry ports. At this point, the interviewees were reminded to give their comments in the scenario where container terminals are customers of dry ports. In this context, the answers could be categorized in those who perceived container terminals hold and apply power towards dry ports and those who do not. The interviewees categorized in the first group were Mr. Niklasson, Mr. Menoth, Mr. Menoth, Mr. Thiapairat, Mr. Mårdstrand, Mr. Wittskog and Mr. Bigsten. They all perceived container terminals hold power over dry ports and that there is high dependence from dry ports to container terminals. For instance, such application of power was attributed in part to the traditional way terminal operators with high container throughput see themselves as the anchor for cargo and inland terminals as a mere physical extension of port capacity (E. Niklasson, personal communication, 2012-03-27).

When referring to the Swedish context the dependence from dry ports to CTs was attributed to the organization of the intermodal Swedish system in which APM Terminal ended up holding an strategic position giving to it high bargaining power (A. Wittskog, personal communication, 2012-04-05). Similar perceptions were expressed in the Indian context but exemplifying it with the bargaining power that is hold by a global operator like DP World towards CONCOR ltd. On the other hand, even though Mr. Bigsten also shares the view about power, he does not think dry ports in Sweden are highly dependent of container terminals. He perceives that dry ports could be in many cases more dependent of big manufacturers and logistics parks than the former. He also stated 'in Sweden some dry ports were built as consequence of the establishment of huge manufacturer's warehouses in Swedish middle land…such as those of IKEA' (L. Bigsten, personal communication, 2012-03-26).

The interviewees who perceived there is no power neither dependence between container terminals and dry ports were Mr. Kajohnprasart, Mr. Axelsson and Professor Banomyong. Green Cargo's terminal manager perceives that APM Terminals sees Green Cargo as a partner who is part of a logistic solution the port offers to shipping lines. He notes 'there is off course certain influence on how people at the harbor want things done, but we in Green Cargo never see that as imposition of authority, instead we see it as our part in the shipping lines and shipper's requirements' (C. Axelsson, personal communication, 2012-03-28). In the Thailand context it was mentioned that since Thailand's logistics have an export profile, the role of dry ports such as Lad-Krabang is very important for the services shipping lines and port holdings offer in Asia (R. Banomyong, personal communication, 2012-03-16). Additionally, Mr. Kajohnprasart stated that 'the Port Authority of Thailand have implemented mechanisms to avoid that global terminals operators impose extensive power when it comes to tariffs', he adds 'I think in Thailand and in the rest of the world ports or container terminals and dry ports depend equally of each other because they know that today all their capacity is needed to satisfy the growth of trade' (Z. Kajohnprasart, personal communication, 2012-03-10).

7.1.1.8 Trust

Interviewees manifested that there is a sense of trust with regard to the written agreements between the two entities and in general with regard to quality of services. Two relevant additional comments could be highlighted. The first observation is from the Operations Planner at APM Terminals-Gothenburg who stated 'in today's business nothing is for free, we all know that every organization's goal is to make profit, so is the case of terminal operators and dry ports. Therefore we trust on what is cover by our contracts and make sure that what is not cover does not harm our business' (E. Niklasson, personal communication, 2012-03-27). The second observation is from SLC's Project Manager who believes there is trust between terminal operators and dry ports in Sweden. However, when referring to APM Terminals he adds 'there is no certainty about their commitment with new projects, besides their willingness to be involved is limited…this put tension to our interactions and reduce the trust we could have towards each other's actions' (L. Bigsten, personal communication, 2012-03-26).

7.1.2 Strategic Priorities for Container Terminals and Dry ports

The theoretical framework of this research suggested some strategic objectives of container terminals and dry ports. Previous research also suggested the objectives both entities share such as increase of market share, attraction of containerized cargo e improvement of port services. In this context, the interviewees were asked about how they perceive relationships between container terminals and dry ports affect such strategic objectives. All the interviewees agree on that relationships between both entities could have only positive outcomes and will facilitate the achievement of the strategic objectives mentioned. For instance it was stated 'if we at APM Terminals increase the container throughput, dry ports in Hallsberg and Nässjo for example will also increase their throughput' and it was added 'this is why we try to maintain good relationships with our customers and related industries…including dry ports which we think help us to provide better services' (E. Niklasson, personal communication, 2012-03-27). Interviewees also referred to the issue from a more cultural perspective. For instance, it was stated 'in Sweden we tend to look for common benefits even when it comes to business. We…the harbor and railports know that port services are important for the economy of the region, so we collaborate and use our relationships to integrated the harbor with all the actors of the Swedish economy' (C. Axelsson, personal communication, 2012-03-28).

Academics expressed in general terms that the impact of the relationships between container terminals and dry ports is positive not only for themselves, but also for Sweden. However, they think a lot more work is needed to fully integrate the two industries and to set up joint strategies that lead to achieve the objectives mentioned (V. Roso, personal communication, 2012-03-29). Additionally, they expressed relationships are important for both entities, but it was argued that 'it will be up to the container terminals to convince dry ports of the mutual interest in working together' (R. Banomyong, personal communication, 2012-03-16). On the other hand, SLC's Project Manager seamed worried about the forthcoming development of relationships between container terminals and dry ports in Sweden. He stated 'I am not so sure that we always pursue common objectives' and he added 'here at Fällköping we will do all what it takes to make the logistic center viable and profitable with the participation of Gothenburg harbor or without it' (L. Bigsten, personal communication, 2012-03-26).

The interviewees were asked about which dry ports' capabilities are considered strategic for container terminals. For the interviewees who represent dry ports and the academia, it was asked to answer from the perspective of container terminal's managers. The answers are illustrated in table 7.1.

Table 7.1 Strategic capabilities for Container Terminals and Dry ports (Source: constructed by the author, 2012)

Interviewee	Position	Strategic Capability
Zoroz Kajohnprasart	General Administrative Officer – Laem chabang Port – Port Authority of Thailand	Container storage/stacking
		Container stuffing/stripping
		Container transport/delivery
Poonsak Thiapairat	Managing Director – Eternity Grand Logistics	Container storage/stacking
		Customs clearance
		Container handling
		Container transport/delivery
Ruth Banomyong	Thamasat Business School	Container transport/delivery
		Handling of LCL cargo
		Container repair/fumigation/maintenance
Leif Bigsten	Project Manager - Skaraborg Logistics Center	Intermodal connections to industrial clusters
		Container transport/delivery
		Container storage/stacking
Erik Niklasson	Operations Planner – APM Terminals (Port of Gothenburg)	Container transport/delivery
		Intermodal connections to industrial clusters
		Connections to freight forwarders and trucking companies
Claes-Göran Axelsson	Terminal Manager – Green Cargo Göteborg	Container transport/delivery
		Information systems
		Container storage/stacking
Claes Mårdstrand	Terminal Manager – BANESERVICE Kombiterminal	Container transport/delivery
		Container storage/stacking
Vipin R. Menoth	Traffic Manager & IAPH Coordinator – Cochin Port Trust	Container storage/stacking
		Customs clearance
		Information systems
		Intermodal connections to industrial clusters
Violeta Roso	Chalmers University – Division of logistics and Transportation	Container storage/stacking
		Container transport/delivery
		Customs clearance
Anders Wittskog	Logistics Manager – Höglandsterminalen AB	Container storage/stacking
		Container transport/delivery
		Information systems

7.1.3 Influencers and enablers of relationships between Container Terminals and Dry ports

This part of the interviews aimed to identify the main influencers and enablers of relationships between container terminals and dry ports. In order to do so, the interviewees were contextualized about supply chain management philosophy, network theory and in general about the formal or informal interrelation of industries in a globalized economy. People from the portside such as Mr. Niklasson, Mr. kajohnprasart and Mr. Menoth expressed that shipping lines are for them the main actors influencing any inland extension of their services. For instance, it was stated 'the railports we have shuttles to ensure we can provide to shipping lines the turnaround service we offered, so we talk with the railports and make sure they have the capacity we need' but regarding the transport network he stated "we want to deal only with the railports, as I said our focus are the shipping lines and we let railports deal with trucking companies and other providers of services to containers' (E. Niklasson, personal communication, 2012-03-27).

It was also pointed out that 'in emerging economies logistics parks are being established, in these parks final production is being consolidated…so the location of these parks on one hand affects the dry ports and their arrangements with the seaport, on the other hand their role in the supply chain' (V. Menoth, personal communication, 2012-04-02). Related to this issue it was also expressed that ‘the involvement of the public sector is very important when building the infrastructure that enables container terminals and dry ports to comply with their function’ he adds ‘the Port Authority of Thailand has invested a lot of resources in Laem Chabang Port in order to increase its capacity to more than 8 million TEUs, and in the development plans the road and rail connections to Lad-Krabang dry port are included’ (Z. Kajohnprasart, personal communication, 2012-03-10).

Other interviewees such as Mr. Bigsten also think public involvement is a strong influencer and enabler of successful relationships between container terminals and dry ports. He exemplified his view by referring to regional projects for the development of transport infrastructure. For instance he stated ‘the Väastra Götalands region where SLC is located is included in the Interreg IIIB North Sea Programme which through the initiative SustAccess seeks to improve the accessibility between rural areas/hinterlands and gateways around the North Sea and to develop integration of hinterland areas in national and international transport networks’ then he added ‘we know that road transport is cheaper than rail, but this project sponsored by the European Commission and the Fällköping Municipality emphasizes on the use of more sustainable modes of transport, this is why I think more co-operation with the harbor could make train shuttle tariffs more competitive’ (L. Bigsten, personal communication, 2012-03-26). Mr. Wittskog from Höglandsterminalen pointed out that the relationships his terminal holds with big manufacturers give them some leverage when dealing with APM Terminal, so he sees them as strong influencers. For instance he stated ‘APM Terminals has raised the tariffs more frequently in this year than it used to do, and when we communicate this to IKEA an other companies with warehouses in the Jönköping area they do not like it’, then he adds ‘this is why based on their cargo volume they say they will talk to the harbor and the shipping lines about their concerns’ (A. Wittskog, personal communication, 2012-04-05).

Academics also perceive shipping lines are the main influencers in the supply network of seaports and dry ports. Related to that it was stated ‘in the case of Thailand it is the shipping lines who will have the most power in this network as they own most of the dry ports and container terminals. It is some sort of vertical integration (they also own the 3PLs: for example Maersk line in Thailand)’ (R. Banomyong, personal communication, 2012-03-16). In addition to the influencers and enablers previously mentioned, Green Cargo’s terminal manager pointed out security and safety in container handling as strong influencers in the transportation industry suggesting they somehow impact the interactions between container terminals and dry ports. He also stated ‘you know that dry ports or rail ports are the ones who usually face the end customer, so if something goes wrong with the container we get the blame even though the incident took place somewhere else’ then he added ‘security and safety are sensitive issues for the harbor, for us and for the shippers, therefore is important how we approach them and how we both the harbor and rail ports agree upon security and safety standards’. Additionally, he expressed ‘I think transport networks are very important from the view you are studying the railports. Here in Green Cargo we sold all the trucks we had in 2010, it was the result of an organizational change that was based on focusing on our core logistics activities and use our transport networks more efficiently. It was also done to offer shuttles to Germany…but that is another story’ (C. Axelsson, personal communication, 2012-03-28).

Additionally, during the interviews a list of potential influencers and enablers taken from the theoretical framework was given to the interviewees. The influencers given were: location, industrial area output, government policies, security, safety, community (environmental impact), container storage capacity, shipping lines, other actors (3PLs and 4PLs), manufacturers and competition environment. The enablers given were: regional projects, academic community, ICT systems, public investments, mergers and acquisitions, industrial forums, social meetings within the industry, deregulation of the transport industry, agglomeration of industries, transport networks and other actors (3PLs and 4PLs). The interviewees were asked based on these lists to point out from their perspective the three most important. The answers are summarized in table 7.2.

Table 7.2 Influencers and enablers of relationships between CTs and Dry ports (Source: constructed by the author, 2012)

Interviewee	Influencers	Enablers
Zoroz Kajohnprasart Laem Chabang Port – Port Authority of Thailand	Location	Deregulation of transport industry
	Competition environment	Public investment
	Security	Transport networks
Poonsak Thiapairat Eternity Grand Logistics	Container storage capacity	Transport networks
	Manufacturers	Industrial forums
	Government policies	Other actors (3PLs-4PLs)
Ruth Banomyong Thamasat Business School	Location	Regional projects
	Shipping lines	Public investment
	Competition environment	Transport networks
Leif Bigsten Skaraborg Logistics Center	Location	Regional projects
	Industrial area output	Public investment
	Government policies	Transport networks
Erik Niklasson APM Terminals (Port of Gothenburg)	Location	Public investment
	Shipping lines	Mergers and acquisitions
	Competition environment	ICT Systems
Claes-Göran Axelsson Green Cargo Göteborg	Location	ICT Systems
	Security	Transport networks
	Manufacturers	Public investment
Claes Mårdstrand BANESERVICE Kombiterminal	Location	Transport networks
	Shipping lines	ICT Systems
	Competition environment	Public investment
Vipin R. Menoth Cochin Port Trust	Location	Public investment
	Government policies	Industrial forums
	Competition environment	Transport networks
* Violeta Roso Chalmers University – Division of logistics and Transportation	Location	Regional projects
	Community (Environmental impact)	Deregulation of transport industry
	Industrial area output	Transport networks
Anders Wittskog Höglandsterminalen AB	Location	Public investment
	Manufacturers	ICT Systems
	Government policies	Mergers and acquisitions

*PhD. Violeta Roso was not given the list of influencers during the interview. The priority presented was extracted from her extensive research about the dry port concept which is consigned in her thesis for the degree of Doctor of philosophy at Chalmers University of Technology published in 2009.

7.1.4 Inter-port competition and relationships between Container Terminals and Dry ports

At this point in the interviews, the interviewees were given the context and meaning of inter-port competition for the purpose of this research. Subsequently, they were asked to express their views about the influence or impact relationships between container terminals and dry ports could have on the issue. Interviewees such as Mr. Niklasson, Mr. Menoth, Mr. Kajohnprasart and the academics Violeta Roso and Ruth Banomyong were well aware of the phenomenon. They all expressed in one way or another that interactions and relationships between container terminals and dry ports do impact the competition environment of container terminals. For instance, referring to the importance of hinterland connections a port must have to be attractive to shipping lines it was stated 'shipping lines seek for fast container handling, good inland transport connectivity and enough hinterland output to ensure vessels leave the terminal fully loaded', in consequence he adds 'the most important dry ports for us are those who are used by shippers that guarantee high and frequent shipments'. Then he said 'Älmhult, Jönköping/Nässjo, and Hallsberg are examples of this because big Swedish manufacturers have warehouses there and their transport requirements make port of Gothenburg more attractive to shipping lines' (E. Niklasson, personal communication, 2012-03-27).

Other relevant statements were for example 'the official implementation of Lad-Krabang intermodal container depot has given more competitiveness to terminals at Laem Chabang Port'. He adds 'terminals at Laem Chabang compete with terminals at Bankgok for domestic cargo, and for transshipment cargo with Westports located at Port Klang in Malasya'. Subsequently he said 'Westports is operated by Hutchison Port Holdings who is a big terminal operator and we all depend of the transshipment throughput that comes from Singapore' (Z. Kajohnprasart, personal communication, 2012-03-10). Mr. Menoth also agreed upon the important role of dry ports in competition. He stated 'in India the biggest container port is Nhava Sheva in the area of Mumbai, they handled more than 5 million TEUs per year and some terminals are leased to DP World and APM Terminals' then he adds 'containerized cargo coming to Southern India from Sri Lanka and Singapore was traditionally shipped to Mumbai, but with the implementation of Vallarpadam special economic zone where the dry port is located Cochin Port has become a key destination in the shipping industry' he then added 'DP World has ensure investments in infrastructure that will give Vallarpadam Terminal in Cochin a capacity of 5.5 million TEUs in 2014, so I believe the special economic zone has given more competitiveness to the port' (V. Menoth, personal communication, 2012-04-02).

The perception from the dry port representatives was quiet similar. Even though not all of them were fully aware of the inter-port competition phenomenon, they knew the mechanisms of port selection applied by shipping lines and global transport networks, giving relevant observations. For instance, it was stated 'shipping lines are seeking for complete packages of logistics solutions, so we try to design arrangements with our transport network so the harbor can promote them with the shipping lines. We are not always successful. For example we tried to arrange in 2009 intermodal shuttles between Germany and Sweden in the route Hanover-Malmö-Krefeld, it was not profitable, not attractive, Green Cargo lost some money, but what is important is that people in the harbor get involved because they know is a win-win situation' (C. Axelsson, personal communication, 2012-03-28). Mr. Bigsten has no doubts about the impact that relationships between container terminals and dry ports have on the competition environment. He referred again to the public involvement and states 'the infrastructure ports need whether they are at the sea or inland is costly, so there is no way to gain competitiveness in the business of containers without combining efforts and without regional coverage'. He also said 'I think the impact of dry ports at least in Sweden could even go beyond national borders. Here at Fällköping we still in a development phase but we have already gotten in contact with terminals in Hamburg like Bremerhaven who said are interested in establishing transport solutions including Fällköping when the Logistic Center will be finished' (L. Bigsten, personal communication, 2012-03-26).

Mr. Wittskog expressed in different ways the important role of dry ports in the competition for cargo between ports. For instance he stated 'we know that we are important for the harbor, we both the port and us know that manufacturers, transport companies and shipping lines not only want fast operations and compliance of security and safety standards'. Then he started to explained how Höglandsterminalen was trying to give better services to the port by stating 'value added services provided in areas like Jönköping can be offered cheaper than in seaport areas, so we can make the port more competitive, we need information systems to coordinate times and schedules of the shuttles accurately, but certainly we do it well and I think the port sees the benefits'. Then referring to such value added services he added 'we provide custom clearance, consolidation of shipments, packaging, warehousing, tracking and tracing of cargo and we also have good relations with the companies established in Jönköping area which is good for the port also' (A. Wittskog, personal communication, 2012-04-05).

7.2 The Surveys

The surveys were performed between March 16 and April 20 of 2012. The details and characteristics of the surveys are described in the methodology section. Even though, an extensive amount of data was gathered in the surveys, in this section only the most important findings will be presented. Nevertheless, in appendices 5 and 6 complete summaries of Survey 1 and 2 are presented.

7.2.1 Survey 1

Survey 1 was performed over 100 container terminals. The response rate achieved was 31%. Table 7.3 presents the respondents with some general characteristics of the companies they represent.

Table 7.3 Container Terminal operators' respondents to Survey 1 (Source: constructed by the author, 2012)

Company	Country	Container Througput	Dry ports connected to the terminal
BACTSSA Hutchison Port Holding	Argentina	300.000 - 500.000 TEUs	2
EXOLGAN Container Terminal	Argentina	300.000 - 500.000 TEUs	1
Dalian Port Container Terminal	China	1 - 2 Million TEUs	Between 3 and 5
Shanghai Pudong International Container Terminal	China	2 - 4 Million TEUs	Between 3 and 5
Sociedad Portuaria de Cartagena	Colombia	1 - 2 Million TEUs	None
CMP Copenhagen-Malmö Port	Denmark	100.000 - 300.000 TEUs	Between 3 and 5
Marseille FOS	France	500.000 - 1 Million TEUs	Between 3 and 5
Port Authority of Piraeus	Greece	1 - 2 Million TEUs	None
Thessaloniki Port Authority S.A.	Greece	100.000 - 300.000 TEUs	None
HongKong International Terminals	HongKong	1 - 2 Million TEUs	Between 3 and 5
Cochin Port Trust	India	300.000 - 500.000 TEUs	Between 6 and 10
PSA Chennai Container Terminal	India	1 - 2 Million TEUs	Between 3 and 5
Port Authority of Genoa	Italy	1 - 2 Million TEUs	Between 3 and 5
West Ports Malasya	Malasya	4 - 10 Million TEUs	2
Colon Container Terminal Evergreen SA	Panama	1 - 2 Million TEUs	1
Colon Container Terminal SA EVERGREEN	Panama	1 - 2 Million TEUs	1
GCT HPH	Poland	2 - 4 Million TEUs	Between 3 and 5
International Port Services Co Ltda Damman	Saudi Arabia	1 - 2 Million TEUs	2
Pusan Newport International Terminal	South korea	1 - 2 Million TEUs	Between 3 and 5
DP World Terragona	Spain	500.000 - 1 Million TEUs	2
Puerto de Alicante Autoridad Portuaria	Spain	100.000 - 300.000 TEUs	1
APM Terminals Skandia Terminal	Sweden	500.000 - 1 Million TEUs	Between 3 and 5
Hutchison LaemChabang Terminal CO ltda.	Thailand	300.000 - 500.000 TEUs	2
Thai Laemchabang Terminal CO Ltda.	Thailand	100.000 - 300.000 TEUs	2
MERSIN International Port PSA Int.	Turkey	1 - 2 Million TEUs	1
POMTOC	United States	500.000 - 1 Million TEUs	1
Port of Oakland	United States	2 - 4 Million TEUs	2
Yusen Terminals Inc Tacoma	United States	1 - 2 Million TEUs	2
SP PSA International Vietnam	Vietnam	1 - 2 Million TEUs	2
*	*	500.000 - 1 Million TEUs	None
*	*	300.000 - 500.000 TEUs	None

*Respondents who did not provide the name of their companies neither the country where the company is located.

The survey included a total of 31close ended questions. The following figures and tables illustrate the questions asked and the answers obtained from the respondents. They are group by the main topics approached in the survey followed by a description of the most salient findings.

7.2.1.1 Mutuality

As illustrated in figure 7.1, 55 % of the companies in the survey are concern in a large extent about the well-being of the dry ports connected to it and 23% in certain extent.

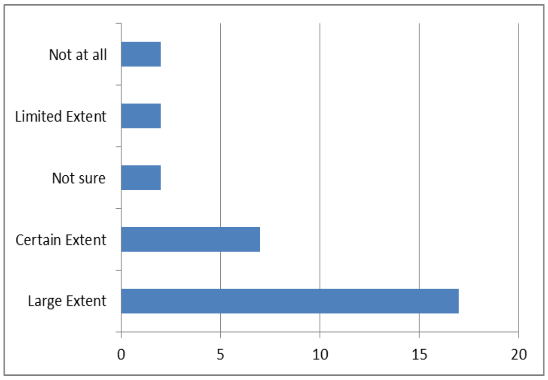


Figure 7.1 CT's concern for Dry ports' well-being. (Source: own calculations, 2012)

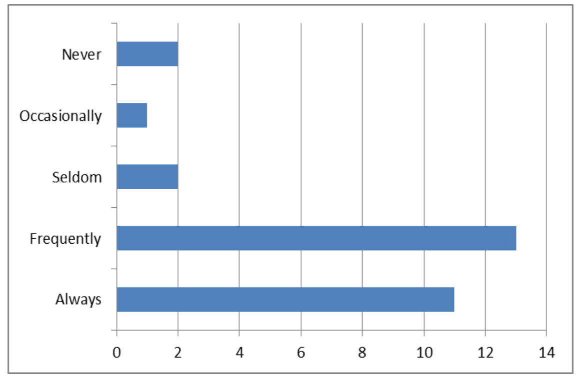


Figure 7.2 Frequency of common goals pursued with Dry ports. (Source: own calculations, 2012)

Regarding common goals figure 7.2 illustrates how 42% of the container terminals surveyed answered they frequently pursue common goals to those of the dry ports, while 35% answered they always pursue the same goals. Regardless of the mutuality from container terminals to dry ports shown in the previous figures, figure 7.3 illustrates that from the sample, only 3% of the companies said they are willing to relinquish individual goals in order to increase positive outcomes for dry ports, while 29% said that is unlikely.

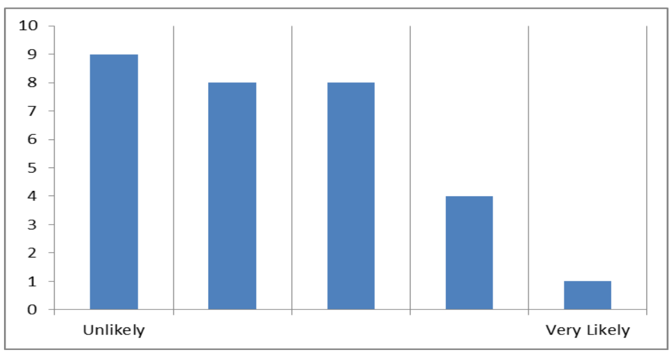
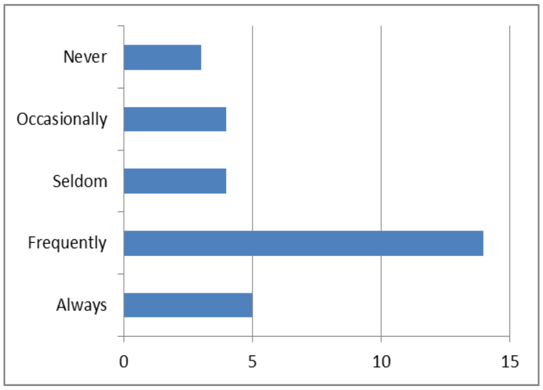


Figure 7.3 Likeliness of CTs to relinquish individual goals to increase Dry ports well-being. (Source: own calculations, 2012)

7.2.1.2 Particularity

Regarding particularity, figure 7.4 illustrates that 45% of the respondents said their companies frequently dedicate individual efforts towards the specific needs of dry ports, 16% said they always do it and 10% of the companies in the sample answered they never dedicated individual efforts to such purpose. In the other hand, when companies were asked about the commitment towards dry ports in comparison with other relationships in their portfolio, 65% said is very high and only 6% said is very low as shown in figure 7.5.



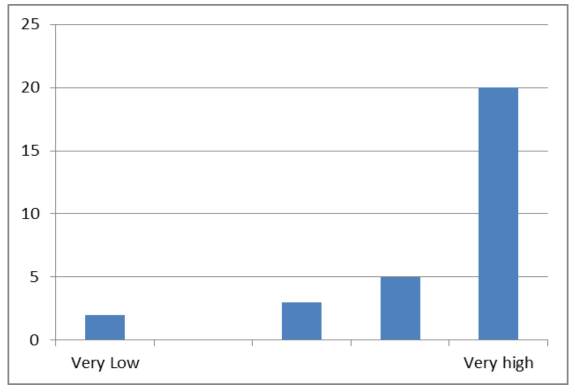
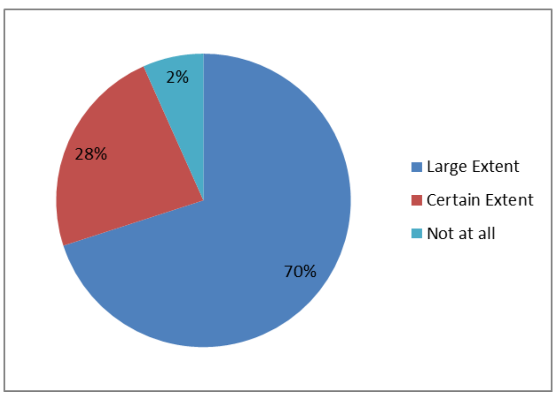


Figure 7.4 Frequency of efforts towards Dry ports. (Source: own calculations, 2012)

Figure 7.5 Commitment towards Dry ports. (Source: own calculations, 2012)

7.2.1.3 Co-operation

The perception of companies surveyed about co-operation is relatively positive. As figure 7.6 illustrates, 70% from the sample answered they co-operate in large extent with dry ports and only 2% manifested no co-operation at all. Additionally, as figure 7.7 illustrates 73% of the companies manifested their relationships with dry ports are in large extent characterized by co-operative rather than contentious interactions.



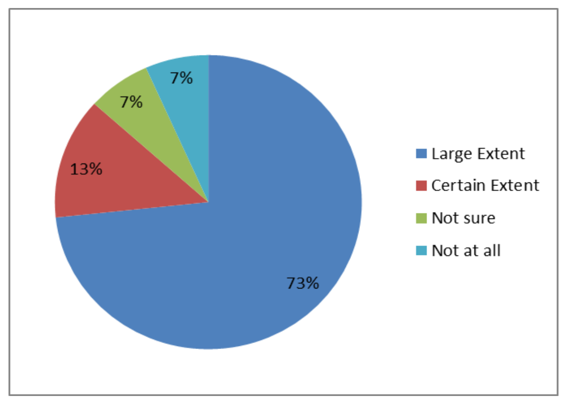


Figure 7.6 Co-operation with Dry ports. (Source: own calculations, 2012)

Figure 7.7 Extent of relationships characterized by co-operation. (Source: own calculations, 2012)

7.2.1.4 Intensity of relationships with Dry ports

In the surveys companies where asked to give the number of staff exclusively involved in formal relationships established with dry ports. Companies were given 5 ranges of groups: 0, 1-5, 5-15, 5-15, 16-30 and more than 30. The results were: 58% answered between 1 and 5 and 35% answered no staff is exclusively assigned to manage relationships with dry ports. Additionally, companies were asked about the extent of senior management involvement in relationships with dry ports. 45% of the companies answered such extent is certain and only 35% answered there is involvement by managers in large extent. Figure, 7.9 shows the complete results. Furthermore, companies were asked about the frequency their representatives met face-to- face with dry ports' representatives. As it is shown in figure 7.8, 65% answered they either do it permanently or frequently, while only 6% said they never do it.

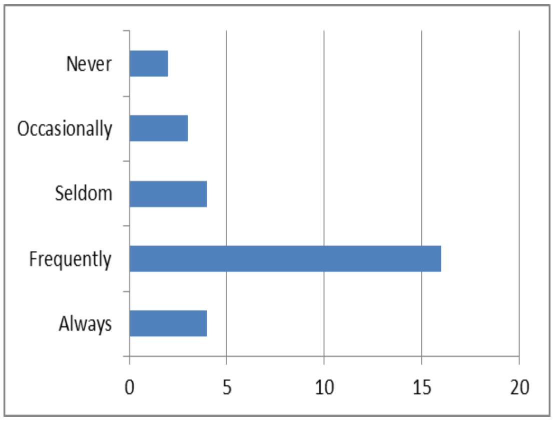


Figure 7.8 Frequency of meetings with dry ports. (Source: own calculations, 2012)

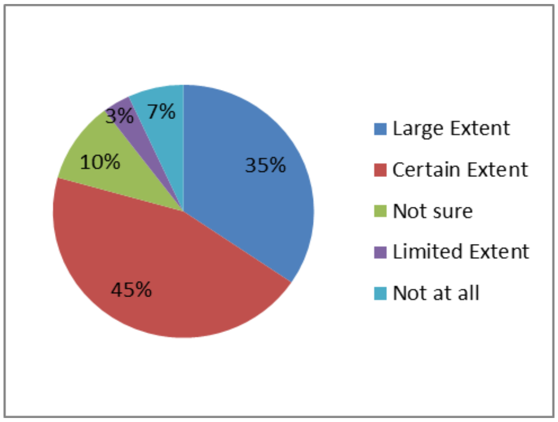


Figure 7.9 Management involvement in relationships with dry ports. (Source: own calculations, 2012)

7.2.1.5 Power and dependence on Dry ports

The surveys intended to measure some indicators of power and dependence from container terminals towards dry ports. Three questions were asked to the container terminals' surveyed. The first question was related to the influence containers terminals perceive they have on the decisions and actions taken by dry ports. The complete results are illustrated in figure 7.10 from which could be pointed out that 67 % of the companies answered their influence is neither very weak nor strong and only 2 respondents manifested such influence is very strong. In the second question companies were asked about the importance of container storage and handling capacity in dry ports. 68% of the sample answered it is important and only 10% said is not important.

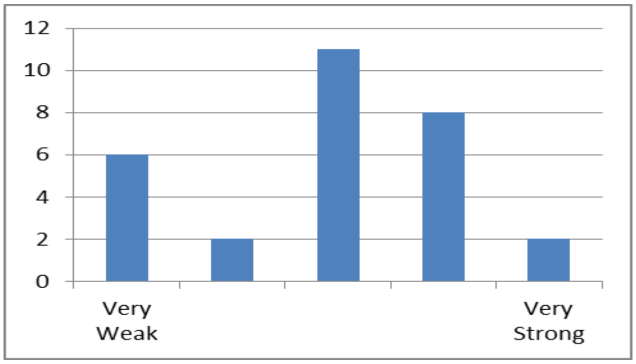


Figure 7.10 Influence of CTs on Dry ports' decisions. (Source: own calculations, 2012)

It was also asked to the companies what proportion in percentage of their annual container throughput is originated in dry ports. Different ranges of throughput were presented to them obtaining the results that are presented in table 7.4.

Table 7.4 Container throughput originated in Dry ports (Source: constructed by the author, 2012)

Respondents in %	Container Troughput originated in Dry ports
13%	0 - 5 %
19%	6 - 15 %
19%	16 - 30 %
23%	31 - 50 %
19%	More than 50%

7.2.1.6 Influence of relationships with Dry ports on competition

In the survey it was asked to the companies to rate the importance of some logistics capabilities offered by dry ports. These logistics capabilities were taken from the theoretical framework of the study. The scale rate given constituted three options: Not important, Important and Very important. The answers are summarized in table 7.5.

Table 7.5 Importance of Dry port's capabilities to Container Terminals (Source: constructed by the author, 2012)

Dry ports Logistic Capabilities	Rate of importance given by respondents		
	Not Important	Important	Very Important
Container Transport and Delivery	6%	32%	58%
Container Storage/Stacking	3%	39%	55%
Container Handling	6%	35%	55%
Customs Clearance	3%	26%	68%
Intermodal connections to industrial clusters	0	26%	71%

The second research question in the study is related to inter-port competition. Therefore it was intended to approach the issue more directly in the survey. In this context, companies were asked to rate the impact of their relationships with dry ports on competition for containerized cargo with other container terminals. The results illustrated in figure 7.11 shows that 64% of the respondents perceive a strong impact while 6% perceive a weak impact. Additionally, companies were asked about the importance of the good arrangements dry ports usually have with other actors in the supply chain such as shipping lines, trucking companies, freight forwarders, manufacturers and rail operators. The most relevant finding is that 71% of the respondents from the sample rated those arrangements as very important for their companies.

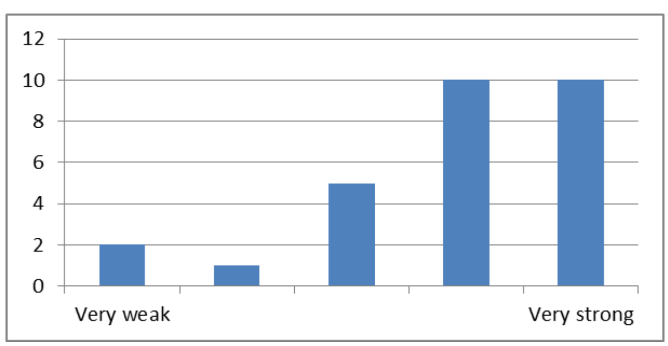


Figure 7.11 Impact of relationships with dry ports on inter-port competition. (Source: own calculations, 2012)

Finally, the companies surveyed were given a list of benefits for port areas and hinterlands that are usually obtained from dry ports. The list of benefits was based on the theoretical framework of the study. In the survey, companies were asked to rate the importance of relationships with dry ports for the maximization of the given list of benefits. The results obtained are summarized in table 7.6.

Table 7.6 Importance of relationships with dry ports on benefits for port areas (Source: constructed by the author, 2012)

Benefits for Port area/Hinterland	Rate of importance given by respondents		
	Not Important	Important	Very Important
Increase of container terminal capacity	3%	39%	55%
Increase of container terminal productivity	26%	45%	26%
Reduction of congestion at the terminal	10%	42%	45%
Modal shift	6%	32%	58%
Increase of market share	3%	45%	48%
Reduction of risk for road accidents	29%	58%	6%
Reduction of road maintenance costs	26%	61%	6%
Reduction of environmental impact	10%	61%	26%
Expansion of hinterland	6%	19%	68%

7.2.2 Survey 2

Survey 2 was performed over 70 dry ports and inland intermodal container terminals. The response rate achieved was 35.7%. Table 7.7 presents the respondents with some general characteristics of the companies they represent.

Table 7.7 Dry ports respondents to Survey 2 (Source: constructed by the author, 2012)

Company	Country	Container Throughput	Container Terminals served by road/rail
Antwerpen ATO	Belgium	500.000 - 1 Million TEUs	Between 3 and 5
CentrePort-Canada	Canada	500.000 - 1 Million TEUs	Between 3 and 5
Advanced World Transport	Check Republic	50.000 - 70.000 TEUs	Between 3 and 5
Contargo Container Escaut Service SAS	France	50.000 - 70.000 TEUs	Between 3 and 5
Bremen Bremerhaven	Germany	More than 1 Million TEUs	Between 6 and 10
Contargo GmbH & Co. KG	Germany	More than 1 Million TEUs	More than 10
DB Intermodal Kassel	Germany	More than 1 Million TEUs	Between 3 and 5
POLZUG Intermodal GMBH	Germany	500.000 - 1 Million TEUs	Between 3 and 5
IFB Muizen Dry Port	India	100.000 - 150.000 TEUs	1
The Thar dry Port	India	500.000 - 1 Million TEUs	Between 3 and 5
Cikarang Dry Port Indonesia	Indonesia	500.000 - 1 Million TEUs	Between 3 and 5
Interporto Bologna	Italy	100.000 - 150.000 TEUs	2
Interpuerto San Luis Potosi	Mexico	More than 1 Million TEUs	Between 3 and 5
HUPAC Intermodal Transport	Netherlands	500.000 - 1 Million TEUs	Between 3 and 5
RSC Rotterdam	Netherlands	300.000 - 500.000 TEUs	2
SPEDCONT	Poland	0 - 50.000 TEUs	Between 3 and 5
Puerto Seco IDITS Mendoza	Argentina	100.000 - 150.000 TEUs	Between 3 and 5
Baneservice Göteborg Kombiterminal	Sweden	50.000 - 70.000 TEUs	1
Green Cargo Göteborg	Sweden	150.000 - 300.000 TEUs	1
Hallsberg Intermodal Terminal	Sweden	50.000 - 70.000 TEUs	1
Höglandsterminalen AB	Sweden	70.000 - 100.000 TEUs	1
SRT Lat Krabang	Thailand	500.000 - 1 Million TEUs	Between 6 and 10
North Carolina Ports Charlotte Inland Terminal	United States	70.000 - 100.000 TEUs	1
Union Pacific Railroad - Long Beach	United States	More than 1 Million TEUs	Between 6 and 10
Virginia Port Authority	United States	More than 1 Million TEUs	Between 3 and 5

The survey included a total of 35 close ended questions. The following figures and tables illustrate the questions asked and the answers obtained from the respondents. They are group by the main topics approached in the survey followed by a description of the most salient findings.

7.2.2.1 Mutuality

As illustrated in figure 7.12, 72 % of the companies in the survey are concerned in a large extent about the well-being of the container terminals they served and 24% are concerned in certain extent.

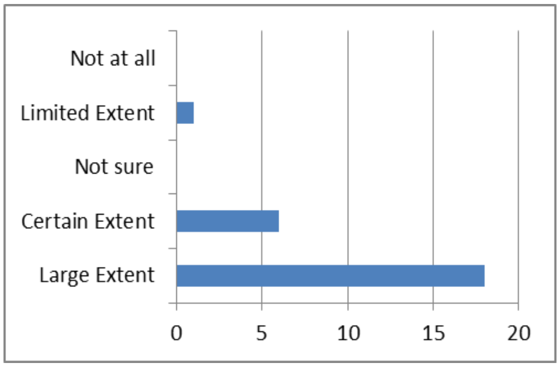


Figure 7.12 Dry ports concern for CT's well-being. (Source: own calculations, 2012)

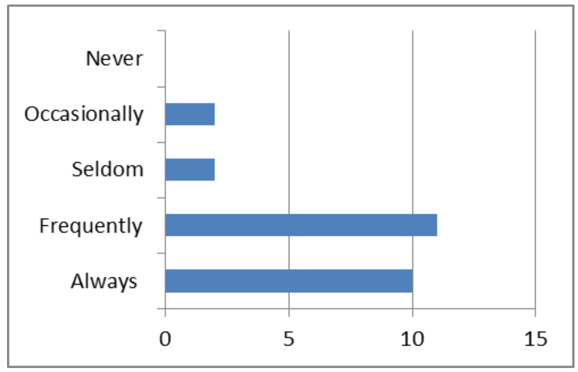


Figure 7.13 Frequency of common goals pursued with Container Terminals. (Source: own calculations, 2012)

Regarding common goals figure 7.13 illustrates how 44% of the dry ports surveyed answered they frequently pursue common goals to those of container terminals while 40% answered they always pursue the same goals. Additionally to the mutuality shown from dry ports surveyed to container terminals in the previous figures, figure 7.14 illustrates that from the sample, 40% of the companies said they are likely to relinquish individual goals in order to increase positive outcomes for container terminals, while only 12% said that is unlikely.

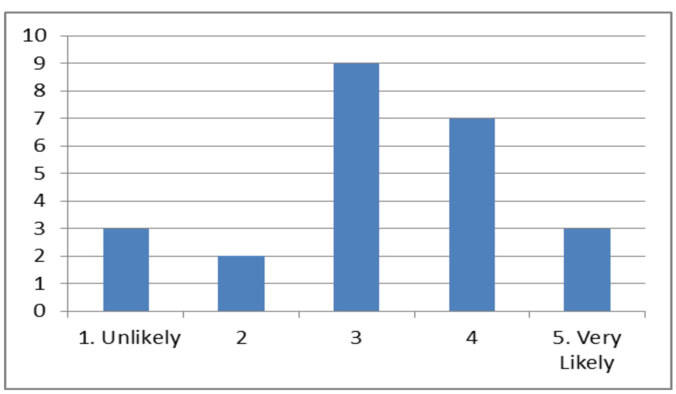


Figure 7.14 Likeliness of Dry ports to relinquish individual goals to increase CT's well-being. (Source: own calculations, 2012)

7.2.2.2 Particularity

Regarding particularity, figure 7.15 illustrates that 68% of the respondents said their companies always dedicate individual efforts towards the specific needs of container terminals, 16% said they frequently do it and 12% of the companies in the sample answered they occasionally dedicated individual efforts to such purpose. In the other hand, when companies were asked about the commitment towards container terminals in comparison with other relationships in their portfolio, 80% said is very high and none said is very low as shown in figure 7.16.

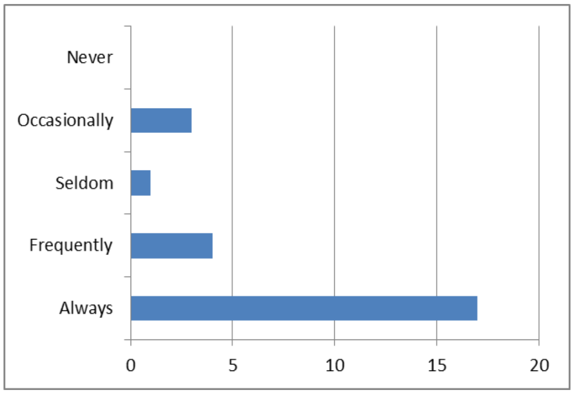


Figure 7.15 Frequency of efforts towards CTs. (Source: own calculations, 2012)

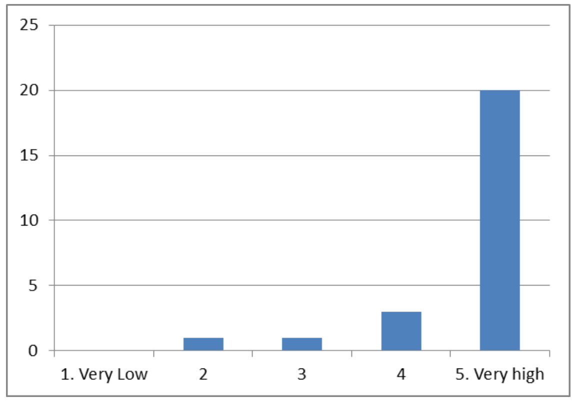


Figure 7.16 Commitment towards CTs. (Source: own calculations, 2012)

7.2.2.3 Co-operation

The perception of companies surveyed about co-operation is very positive. As figure 7.17 illustrates, 88% from the sample answered they co-operate in large extent with containers terminals and only 4% of the respondents manifested limited extent in co-operation. Additionally, as figure 7.18 illustrates 60% of the companies manifested their relationships with container terminals are in large extent characterized by co-operative rather than contentious interactions.

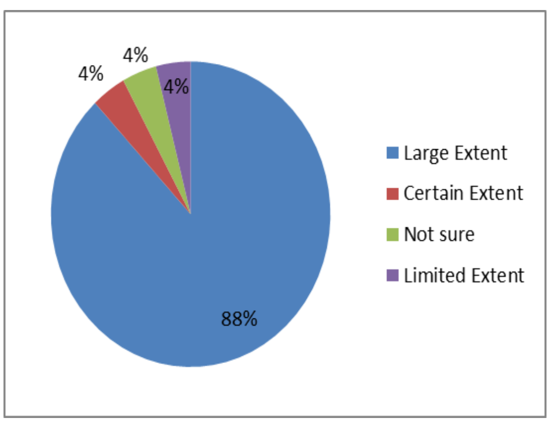


Figure 7.17 Co-operation with CT (Source: own calculations, 2012)

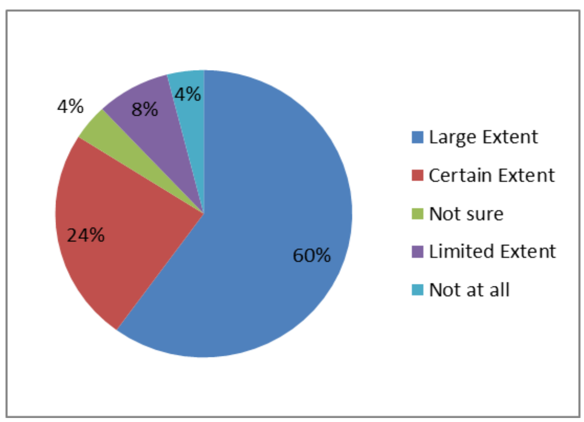


Figure 7.18 Extent of relationships characterized by co-operation. (Source: own calculations, 2012)

7.2.2.4 Intensity of relationships with Container Terminals

In the surveys companies where asked to give the number of staff exclusively involved in formal relationships established with container terminals. Companies were given 5 ranges of groups: 0, 1-5; 5-15, 5-15, 16-30 and more than 30. The results were: 60% answered between 1 and 5, 16% answered between 5 and 15, and 16% answered no staff is exclusively assigned to manage relationships with container terminals. When asked about the extent of senior management involvement in relationships with container terminals, 84% of the sample answered there is large extent of senior involvement while only 4% reported a limited involvement by managers in such relationships. Figure, 7.20 shows the complete results. Furthermore, companies were asked about the frequency their representatives met face-to- face with container terminals' representatives. As it is shown in figure 7.19, all the companies surveyed met face-to-face container terminals' representatives, 84% answered they either do it permanently or frequently, while 12% said they do it occasionally.

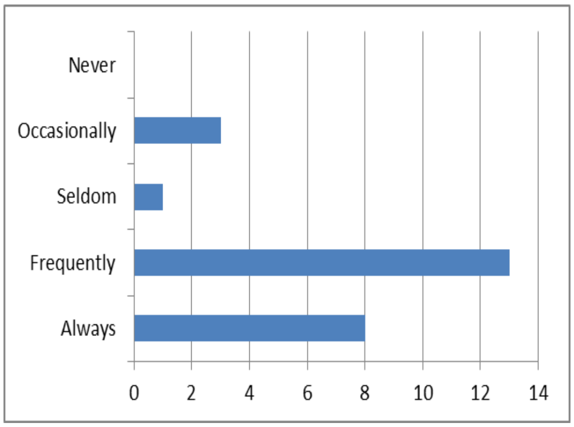


Figure 7.19 Frequency of meetings with CTs. (Source: own calculations, 2012)

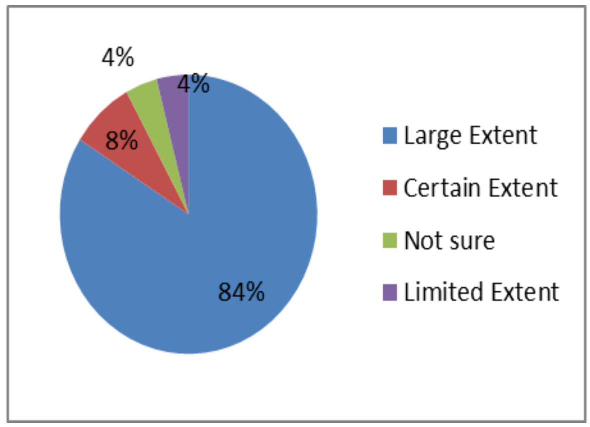


Figure 7.20 Management involvement in relationships with dry ports. (Source: own calculations, 2012)

7.2.2.5 Power and dependence on Dry ports

As it was done in survey 1, survey 2 intended also to measure some indicators of power and dependence from dry ports towards container terminals. Three questions were asked to the container terminals' surveyed. The first question was related to the influence dry ports perceive they have on the decisions and actions taken by container terminals. The complete results are illustrated in figure 7.21 from which could be pointed out that 64% of the companies answered their influence is weak, 28% answered their influence is neither weak nor strong and only 1 respondent manifested such influence is very strong. To the question related to the importance of container storage and handling capacity in container terminals, 48% of the sample answered it is important and only 12% said is not very important

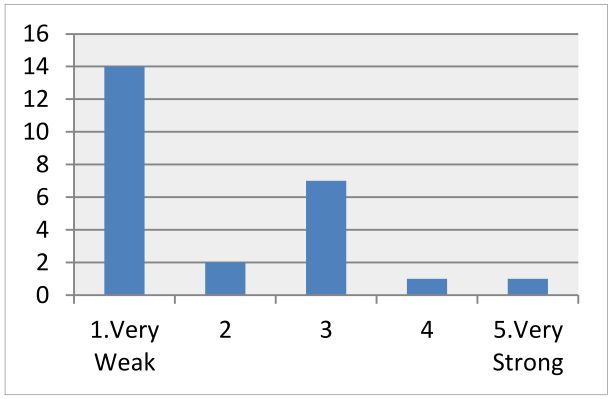


Figure 7.21 Influence of Dry ports on CTs decisions.
(Source: own calculations, 2012)

In the survey it was given to the companies a list of industries that are considered according to the theoretical framework main dry port users. In this case, it was asked to the companies to point out what proportion in percentage of their annual container throughput is originated from the list of industries given. Different ranges of throughput were presented to them obtaining the results that are presented in table 7.8.

Table 7.8 Container throughput generation for dry ports (Source: constructed by the author, 2012)

Industries considered as main Dry port users	Throughput generation (in %)				
	0-5%	5-15%	15-30%	30-50%	More than 50%
Container Terminals	4%	8%	44%	24%	20%
Shipping Lines	80%	4%	4%	4%	4%
Freight Forwarders	16%	28%	32%	12%	8%
Trucking companies	68%	20%	4%	0	4%
Manufacturers	4%	0	8%	28%	56%

7.2.2.6 Influence of relationships with Container Terminals on competition

In the survey it was asked to the companies to rate the importance they perceive container terminals give to some logistics capabilities offered by dry ports. These logistics capabilities were taken from the theoretical framework of the study. The scale rate given constituted three options: Not important, Important and Very important. The answers are summarized in table 7.9.

Table 7.9 Importance of Dry port capabilities for CTs as perceived by Dry ports (Source: constructed by the author, 2012)

Dry ports Logistic Capabilities	Importance given by Container Terminals as perceived by Dry ports		
	Not Important	Important	Very Important
Container Transport and Delivery	0	24%	72%
Container Storage/Stacking	0	16%	80%
Container Handling	0	28%	68%
Customs Clearance	0	32%	64%
Intermodal connections to industrial clusters	0	4%	92%

As it was done in survey 1, in this survey it was also intended to get an insight from the dry port's perspective about inter-port competition. Consequently, companies were asked to rate the impact of their relationships with container terminals on competition for containerized cargo between container terminals. The results illustrated in figure 7.22 shows that 80% of the respondents perceive a strong impact while 12% perceive a weak impact. Additionally, companies were asked about the importance they perceived container terminals give to the good arrangements dry ports usually have with other actors in the supply chain such as shipping lines, trucking companies, freight forwarders, manufacturers and rail operators. The most relevant finding is that 88% of the respondents from the sample rated those arrangements as very important for container terminals.

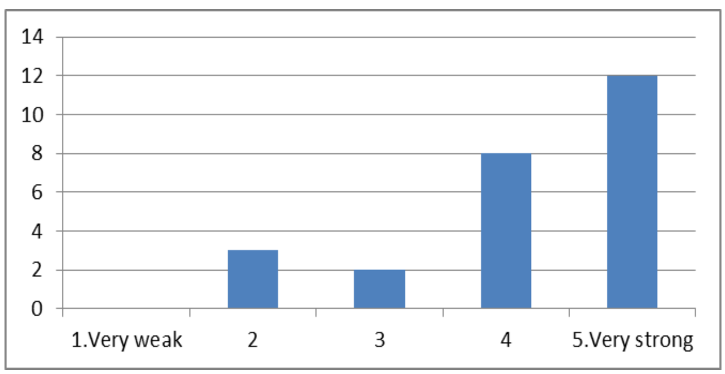


Figure 7.22 Impact of relationships with container terminals on inter-port competition. (Source: own calculations, 2012)

Finally, the companies surveyed were given a list of benefits for port areas and hinterlands that are usually obtained from dry ports. The list of benefits was the same list given to container terminals in survey 1. In the survey, companies were asked to rate the importance of relationships with container terminals for the maximization of the given list of benefits. The results obtained are summarized in table 7.10.

Table 7.10 Importance of relationships with container terminals on benefits for port areas (Source: constructed by the author, 2012)

Benefits for Port area/Hinterland	Rate of importance given by respondents		
	Not Important	Important	Very Important
Increase of container terminal capacity	4%	20%	76%
Increase of container terminal productivity	52%	28%	20%
Reduction of congestion at the terminal	4%	40%	56%
Modal shift	0	32%	68%
Increase of market share	0	64%	36%
Reduction of risk for road accidents	44%	32%	20%
Reduction of road maintenance costs	40%	40%	20%
Reduction of environmental impact	0	52%	48%
Expansion of hinterland	0	36%	64%

8 Analysis

This section seeks to analyze the empirical findings of the study described in section 7 with association to the theoretical framework presented in section 6. The analysis is emphasized on all the information and observations that are related to the research questions. Consequently, it is divided in two phases. The first one is the assessment of the relationships between container terminals and dry ports. The second phase approaches the impact the relationships characteristics assessed in phase 1 could have on inter-port competition.

8.1 Assessment of the relationships between Container Terminals and Dry ports

In section 4 of this paper the purpose of the study was described. Such purpose was clarified through the formulation of two research questions. This section attempts to analyze and discuss the empirical findings associated to the first research question in order to assess the main relationship characteristics between container terminals and dry ports. Thus, the focus of the following analysis is on identifying the degree of existence of the relationships characteristics suggested in the SRE model. This analysis has been carried out based on the theory reviewed on container terminals, dry ports and relationships assessment. Consequently, (as it is explained in the methodology) with reference to the SRE model (where dry ports were given the role of suppliers of logistics services to container terminals) a set of 8 relationship characteristics namely: mutuality, particularity, co-operation, conflict, intensity, interpersonal inconsistency, power/dependence and trust were assessed. The following subsections approach the assessment of each of those characteristics in the context of the SRE model and based on the empirical findings previously presented with association to the theory reviewed. Table 8.2 summarizes the final assessment given to the relationship characteristics using three degrees of existence namely: high, medium and low.

8.1.1 Mutuality

Mutuality in this research refers to the extent container terminals and dry ports demonstrate their interest in the well-being of one another. Additionally, mutuality is measured by how container terminals and dry ports seek common interest when interacting for the provision of logistics services as customer and supplier. In the study the perception about mutuality was assessed in the interviews and the surveys performed. Regarding the interviews two main viewpoints can be identified. In one hand, dry port representatives and container terminals representatives perceive the existence of mutuality with some limitations. These limitations emerge from individual concerns, goals and interests from both entities which for most of the interviewees do not match. However, most of the interviewees are located in Sweden. Thus, their view (even if expressed from an industry perspective) is highly influenced by the Swedish context. In Sweden, there is only one major port which is the port of Gothenburg, it is the main maritime gateway of the country and is where the biggest container terminal in Sweden is located. These conditions give to the APM Terminals a condition with privileges that may explain the lack of mutuality noted by dry port managers. But, at least the official policies applied by the terminal are clearly aiming to create such mutuality which is perceived as beneficial for APM Terminals' top management. The opinions and comments obtained from the other two representatives of port authorities in Thailand and India led to the same conclusion.

It is also observed that the limitations referred to by dry port managers are directly associated with the strategic priorities of both entities and the power container terminals may apply over dry ports. For instance, all the interviewees from the dry port side with the exception of Green Cargo's representative expressed that current mutuality is due to dry ports' initiatives than otherwise. On the other hand, academics perceive that mutuality (in the context given) does not exist, and that even if it would exist, it is not explicit. They also consider that ownership of dry ports by container terminal operators could be a typical scenario where mutuality could be observable. This view may be supported by the two trends of the transportation industry described in the theoretical framework of this study. Those trends are the concentration of both shipping and port industries, and the inland integration of port services through acquisitions and mergers of global terminal operators. For instance, in the Swedish context APM Terminals could be limiting mutuality founded on its ownership and its size. This is because APM Terminals is the second world largest container terminal operator and it is a branch of AP Möller which is the owner of Maersk (the world largest shipping line). Such conditions give APM terminals the capacity to apply mutuality to the extent it is beneficial for the global distribution strategy of AP Möller rather than specific regional or local benefits for the stakeholders of the Swedish transport system.

Alternatively, the results of the surveys show a different perception from the companies representing both industries. According to the findings presented in section 7.2.1.1 more than 70% of 56 companies representing both industries expressed concern for the well-being of the other and more than 70% said they pursue the same goals either permanently or very frequently. These trends show some degree of mutuality among them. However, their likeliness to relinquish individual goals for the well-being of one another may reflect some of the limitations that were noted in the interviews. Only 1 container terminal out of

31 and 3 dry ports out of 25 are likely to do such sacrifice. This may confirm the perception of Mr. Bigsten of Skaraborg Logistic Center (see section 7.1.1.1), but it may also suggest (as discussed in the previous paragraph) that individual priorities in both industries are very different. But, are they according the surveys? The theory reviewed noted that both industries are in the container transport business, both industries are capital intensive, both are geographically close and in both industries there is extensive public participation. Besides, if maximization of profit is taken out of the equation, and mutuality is approached from a supply chain perspective, it could be assumed both industries tacitly share some individual goals. These goals may be already being boosted by relationships between container terminals and dry ports, but they might not be fully aware of. This assumption could be supported by some of the findings related to competition presented in table 7.6 and table 7.10. Companies were asked to rate the importance of relationships with dry ports/container terminals to the maximization of some benefits for the hinterland in which geographically speaking both industries are commonly located. As it is shown in table 8.1, the highest rate given by each group of companies to the list of benefits was compared. Surprisingly, it can be observed that both industries gave the same level of importance to 6 out of 9 benefits. This does not mean container terminals and dry ports have the same individual goals with regard to those 6 aspects. However, it does suggest they give to such aspects the same importance. Thus, opening room for mutuality to drive interactions between both entities regarding those aspects. On the other hand, the three benefits where they do not share the level of influence could be a source of conflict. This pattern is analyzed in following sections. According to this analysis the *degree of existence of mutuality has been assessed as medium*.

Table 8.1 Level of importance shared by Dry ports and CTs on benefits for the hinterland (Source: constructed by the author, 2012)

Benefits for Port area/Hinterland	Tendency of importance given by respondents		
	Dry Ports	Container Terminals	Same general perception
Increase of container terminal capacity	Very Important	Very important	Yes
Increase of container terminal productivity	Not important	Important	No
Reduction of congestion at the terminal	Very Important	Very important	Yes
Modal shift	Very Important	Very important	Yes
Increase of market share	Important	Very important	No
Reduction of risk for road accidents	Not important	Important	No
Reduction of road maintenance costs	Important	Important	Yes
Reduction of environmental impact	Important	Important	Yes
Expansion of hinterland	Very Important	Very important	Yes

8.1.2 Particularity

The empirical findings provided two important observations related to particularity that are analyzed in this section. The first one is that dry ports tend to treat with more uniqueness and commitment the relationships they have with container terminals than CTs do towards dry ports. This is an issue that was expressly validated by all the dry port representatives interviewed and tacitly by the container terminals' representatives. In all the interviews with dry port representatives the importance of container terminals was permanently highlighted in different ways, while container terminal's representatives were always more focused on productivity, operational performance and quality of service for shipping lines. It is certainly perceived that dry ports are more a derived industry from seaports than an industry itself, or a partner in the distribution system. Regarding this trend there is an observation in the literature reviewed which seems to be validated by the findings of this research. This observation is given by Johnsen et al. (2008) in the description of the SRE model. They argued that particularity is not always a matter of choice and that it may be imposed on a company becoming a constrain or burden. This seems to be the case of the interactions that take place between container terminals and dry ports. Besides, various examples given by dry port representatives suggest that particularity could be not only imposed by container terminals, but also by big size manufacturers. Nevertheless, both industries indicate awareness of the globalization of the transport system and certainly of the implications for the particularity applied towards one another.

The second trend is related to the container terminals' capacity that is extended by dry ports. Interviewees manifested directly and indirectly that their specific efforts towards one another were proportional to the level of capacity on container handling and value added services offered by both entities. This was noted as relevant because container terminal's representatives gave the impression of being selective about the extension of port services. They clearly manifested that their focus is on services such as transshipment of containers, Container Freight Station (CFS) and security to the cargo because those are the most profitable. In consequence, it could be assumed that particularity will be applied on the dry ports that have the potential to boost such services the most. In this context, dry ports used the low costs of their inland infrastructure to leverage the services offered to the ports. The challenge here for dry ports is that until now no transport mode is cheaper than maritime shipping, which means that whenever the hinterland's container throughput gives a reasonable efficient option for maritime, road or rail transport; particularity will be always diverted to maritime transport. The role in this issue of public involvement is very important. Thus, the issue will be further discussed later on the study.

The survey's results presented in sections 7.1.1.2 and 7.2.2.2 do not entirely support the previous observations. In the surveys more than 50% of the container terminals surveyed indicated a high frequency of individual efforts towards specific needs of dry ports and more than 80% of them indicated a high commitment to dry ports in comparison with other relationships in their portfolios. One may assumed that the reason for this tendency could be the few number of dry ports located in a port's hinterland. However, when looking at the survey results in detail, only 3 out of the 25 container terminals who express high commitment were connected to one specific dry port, the rest manifested connection to several dry ports. This trend may also be the manifestation of a positive outcome of particularity. This may happen when particularity is used by container terminals to build strategic supply chain relations. Two additional observations in the survey support this assumption. The first one is that most of the container terminals that manifested high commitment, also rated dry port's capabilities as very important including the arrangements dry ports have with other actors in the chain such as trucking companies, freight forwarders and manufacturers. This trend will be further discussed in the context of inter-port competition. According to this analysis the *degree of existence of particularity has been assessed as low*.

8.1.3 Co-operation

The definition of co-operation in this research suggests that co-operation could be measure by the extent to which container terminals and dry ports determine a direction and purpose for their relationships. In this context, the findings from the interviews presented in section 7.1.1.3 show the presence of co-operation. Two important observations could be discussed regarding this characteristic. The first one is that is clear they co-operate with regard to security and safety matters. This is not unexpected. Security and safety has been permanently and issue in container shipping which even if regulated domestically during the 1980s and 1990s, only become a global concern after the terrorist attacks in New York of September 11/2001. Initiatives such as the ISM code (International Safety Management Code & Guidelines), ISPS code (International Ship and Port Facilities Security Code) which were promoted by the International maritime Organization (IMO); and the Container Security Initiative (CSI) launched in 2002 by the United States Bureau of customs and Boarder Protection, have forced actors in the global transport system to work together on such issues in order to preserve the image of the shipping and port industries.

On the other hand, co-operation about tariffs, marketing and some operational issues is not so clear. Several reasons could explain this trend. Yet, two deserve the attention of this research. They are the formalization of co-operation and the way co-operation evolves within relationships between container terminals and dry ports. It seems that there is no clear formalization of the co-operation that should or should not take place between the two entities. With this regard, some of the interviewees give to public authorities such as ministries of transport, commerce and municipalities of port cities the exclusive responsibility of implementing co-operation strategies among the transport chain actors. Other interviewees expressed that even though everyone in the chain talk about co-operation, nobody really co-operates without a financial interest behind. This may imply that not formalized co-operation could be covering individual interests, which in principle are not necessarily beneficial for the two industries. Another observation is that companies may have a different perception about the way co-operation evolves between one another. The theory reviewed suggests that co-operation tends to grow exponentially through the gradual combination of activities and resources. In contrast, the companies interviewed (especially those representing dry ports) appeared to be eager to co-operate based on superficial and short term goals rather than describing a comprehensive strategy behind it. This may suggest that container terminals and dry ports may not have the same perception about what co-operation means, neither about how to properly go about it.

The findings from the surveys presented in section 7.1.1.3 and section 7.2.2.3 show a clear tendency. More than 80% of all the companies surveyed manifested to co-operate either in large or certain extent. Additionally, the same amount of companies pointed out their relationships with dry ports/container terminals were driven by co-operative rather than contentious interaction. These findings clearly support the tendencies observed in the interviews. However, there is one detailed finding that deserves attention in this discussion. It manipulating the data, it was observed that all the container terminals with a high throughput (more than 2 million TEUs) reported to co-operate in large extent with dry ports and to be a branch of a global terminal operator. This observation may support not only the perception of two interviewees about the power of big size operators and its implications on co-operation, but also the tendency reviewed in the theory of inland integration of port services. According to this analysis the *degree of existence of co-operation has been assessed as low*.

8.1.4 Conflict

The definition of conflict in this research allows measuring it in terms of the critical differences between container terminals and dry ports, especially those that hold high level of importance. In this context, there was not really any substantial information from the interviews that could lead to a relevant analysis. As it is presented in section 7.1.1.4, the views from the companies interviewed are quiet standard showing there is no conflict among them. This could be perceived at first glance as positive. However, it could also be the result of different perceptions about conflict that dry port and CTs managers may have. The majority of them expressed the existence of limitations to pursue common goals and interest. Therefore, one may wonder how is that they have no conflicts at all? Certainly, the theory reviewed suggests that all relationships are characterized by a mixture of conflict and co-operation. Additionally, it does point out that perception about conflict arise from expectations, goals, cultural norms, corporate values and principles. This implies in one hand that the interviewees tacitly do not perceive strong differences related to those matters, which is not fully supported by the results on mutuality and co-operation. On the other hand, it does imply that their opinion about conflict may be biased by the company's policies rather than their particular experience, which seems to be the case here. For instance, companies such as APM Terminals, Green Cargo, Cargo Net and Jernhusen AB share Scandinavian background and apply strong corporate policies due to their size. Companies with those conditions may want their employees to see the sources of conflict as challenges rather than mere barriers, that once overcome could improve the relationships. According to this analysis the *degree of existence of conflict has been assessed as low*.

8.1.5 Intensity

Intensity was measured in this research by the extent of contact and resourced exchanged that take place between container terminals and dry ports. In this context, the findings presented in section 7.1.1.5 shows that contact between the entities is frequent in certain extent. Such frequency of contact is noted to be higher when there is a geographical closeness and when there is a strategic interest a stake. This is the case for terminals such as Green Cargo and Baneservice which according the theory reviewed are categorized as close dry ports. These terminals along with others in the area enjoy the closeness to APM Terminals creating fast physical channels that enable contact and easy daily coordination of activities. On the other hand, the situation for distant dry ports, such as Skaraborg in Fällköping, Hallsberg, Höglandsterminalen in Najjso and others, is different. The intensity these terminals face in terms of contact depends on APM Terminals strategic decisions. This is why Hallsberg and Höglandsterminalen perceive a high contact frequency, while Skaraborg Logistic Terminal low frequency contact.

Regarding intensity in terms of exchange of resources the findings do not show a consistent trend. Only one dry port manager reported to dedicate exclusive personnel to interact and attend issues related to the container terminal served. After reviewing all interviewees' comments with this regard, it seemed such exchanged is just an isolated case that it cannot be considered a common practice in the industry. This observation could be validated by the lack of customer relationship programs manifested by the interviewees. Intensity could be also measured by the senior management involvement in the relationships. With this regard, the findings suggest there is management involvement from both sides. However, this involvement seems to have neither direction nor purpose. The meetings companies mentioned, were referred to in the context of social gathering and casual encounters rather than meetings that are part of a plan with strategy and purpose.

The findings from the surveys presented in section 7.1.1.4 and 7.2.2.4 show three tendencies in the sample surveyed. The first one is that dry ports tend to allocate more staff to interact with CTs than container terminals allocate to interact with dry ports. For instance, in more detailed analysis of the data it was observed that 58% of the container terminals surveyed allocate up to 5 people to deal with dry ports while the rest of the sample do not dedicate any personnel at all. In contrast, dry ports surveyed reported allocation of personnel in all the ranges given, even noticing one company which allocates more than 30 personnel to such matters. The second trend is that the frequency of face-to-face meetings between the two entities is equally perceived by companies in the sample. Furthermore, when compared with the container throughput is possible to observe that companies who rated a high frequency of meetings have proportionally more throughput than those manifesting low frequency of meetings. This may validate the academic's opinions about the issue. Their opinions imply that the bigger a CT is, the more intense relationships with dry ports nearby will be. The third tendency identified among the companies surveyed, is that there is more senior management involvement from dry ports towards CTs than from CTs to dry ports. This trend could be explained by the strategic priorities noted previously and by the power and dependence that is apply on one another. Such behaviors will be discussed later on the study. According to this analysis the *degree of existence of intensity has been assessed as low*.

8.1.6 Power/Dependence

Power and dependence as defined previously were considered in this research as interrelated characteristics which implicitly impact one another. In this context, the characteristics were measured by the influence and persuasion both industries could apply on one another based on the importance of their logistics capabilities. Accordingly, the findings presented in section 7.1.1.7 show a variety of patterns. The first one is that dry ports perceive they depend substantially of container terminals, thus there is room for container terminals to apply power. This perception may be supported by the theory reviewed about the evolution of ports services, containerization, container terminals and the dry port concept. In this theory is noted how specialization in the maritime and port industry impacted the inland transport of cargo shaping the extension and integration of port services. As a result, containers terminals seemed to perceive dry ports as an industry derived from port functions. Thus, subject of being influenced and persuade. In other words this perception of power may have historic grounds rather than modern transportation mindsets.

The second trend is that even though dry ports perceive container terminals apply power on them, such behavior does not necessarily result in dependence. This view may be grounded in more modern characteristics of the global transport system. The theory reviewed also noted that technological advances in the transport system plus deregulation in the industry have physically expanded hinterlands and linked commercially industrial regions. Therefore, companies such as certain dry ports are more elastic to whichever influence nearby ports may apply on them. Two initiatives noticed in the interviews exemplify this trend. Both of them are related to dry ports in middle Sweden and Gothenburg attempting to established direct shuttle services to and from container terminals in Hamburg and Bremenhaven in Germany.

The third trend consists on the view that power and dependence do not exist between dry ports and container terminals. This pattern is grounded on a more comprehensive perspective in which both industries are viewed as parts of global supply chains and regional cargo distribution channels. Again, the theory reviewed supports these observations not only on the physical structure of such networks, but also on the conscious application of the supply chain philosophy by ocean shipping carriers, global terminal operators and inland distribution networks. It is precisely this modern behavior what could make some dry port managers and container terminal representatives perceive there is no power applied. However, what could be happening is that power and dependence is being applied in higher levels in the supply chain. It could also be that due to the agglomeration of some industries, power in the container business is being gradually shifted to other actors in the transport system. There was no reference to this in the interviews, but recent supply chain theory suggest that logistics service providers such as 3PLs and 4PLs are adding value to the transportation of cargo. Thus, gaining more importance in the compliance of manufacturer's requirements.

The findings from the survey presented in section 7.1.1.5 and section 7.2.2.5 show some clear patterns in the group of companies surveyed. It can be observed that container terminals perceive to have a relatively strong influence over dry ports, while dry ports perceive to have a very weak influence over container terminals. This is not entirely supported by the origin of the container throughput for container terminals in the sample. According to table 7.4 more than 60% of the container throughput for CTs in the sample is originated in dry ports which could be interpreted as a sort of dependence with no such strong influence. Additionally, it can be noted that the throughput generation for dry ports from container terminals could not be big enough in percentage to leverage the strong influence CTs claim to hold. According to table 7.8 the majority of respondents manifested a generation of throughput from CTs in the range of 15-30%. Unexpectedly, 56% of the dry ports surveyed registered that more than 50% of their throughput is generated by manufacturers. This observation not only questions the power distribution between the two entities, but also validates the trend analyzed in the previous paragraph. According to this analysis the *degree of existence of power from CTs over dry ports has been assessed as high*. Consequently, *dependence of dry ports from CTs has been assessed as high*.

8.1.7 Interpersonal inconsistency and Trust

Interpersonal inconsistency as defined in this research could be measured by the way individual expectations influence interactions between dry ports and container terminals. It could also be measured by the differences in the way the two industries formally interact with the way their commercial and operational functions interact. On the other hand trust as characteristic of relationships could be measured by the extent parties perform tasks according the agreed terms and conditions. Both characteristics are equally important to those previously analyzed. However, the opinions given in the interviews about them do not indicate they are critical for the purpose of this study. This is why even though general findings related to them are presented in section 7.1.1.6 and section 7.1.1.8, these characteristics are not deeply analyzed. Instead, the perceptions of the interviewees about them were taken as the assessment itself. Therefore, in this study is considered that there is not relevant interpersonal inconsistency between container terminals and dry ports. Likewise, trust is considered to exist between the two entities but only with relation to contractual agreements. According to this observations the *degree of existence of interpersonal inconsistency has been assessed as low and trust has been assessed as medium*.

Table 8.2 Assessment of Relationship characteristics
(Source: constructed by the author, 2012)

Relationships between CTs and Dry ports	
Characteristics	**Degre of existence**
Mutuality	Medium
Particularity	Low
Co-operation	Low
Conflict	Low
Intensity	Low
Interpersonal inconsistency	Low
Power/dependence	*High
Trust	Medium

8.2 Impact of relationships between container terminals and dry ports on inter-port competition

In the literature reviewed, several elements of port competitiveness were reviewed. All of them are important for container terminals to attract cargo. However, the theory reviewed also noted that inter-port competition is being approached more comprehensively. This is to say that today competition between ports is analyzed not only based on operational indicators, but also based on intangible features of port areas and their hinterlands that enable economies of scale and scope. One of those features is the inland integration of port services where dry ports (as reviewed in the theoretical framework) play a critical role. Based on this, the analysis about how relationships between container terminals and dry ports on inter-port competition has been done from two perspectives. The first one is related to how relationships between the two entities impact their strategic priorities with relation to the inland integration of services. The second perspective is related to the benefits port areas or hinterlands enjoy by the existence of dry ports.

8.2.1 Impact of relationships between dry ports and CTs on strategies related to inland integration of port services

The theory on inter-port competition reviewed, pointed out that inland integration of port services is one of the trends that is reshaping the competition environment of seaports. This trend also suggests that sea ports and consequently container terminals must be undertaking passive and active initiatives towards the actors involved in such integration. Consequently, such initiatives must be driven by the strategic priorities of the stakeholders of inland integration of ports services. Since this study is focused on container terminals and dry ports, the data collection also intended to identify the strategic priorities of both entities with regard to such trend. This is because it can be logically assumed that strategic priorities of both entities embrace competitiveness for ports, the inland distribution of cargo and the hinterland itself. This is why, the focus of this section is on how the relationship characteristics previously assessed could impact the strategic priorities of both entities on the inland integration of port services. Subsequently, the interviewees in the study were asked to point out the most strategic dry ports' capabilities in the context of inland integration. The answers are presented in table 7.1. As it is shown in the table, a total of 10 dry ports capabilities were cited as strategic. Even though all are important, it was noted that some of them were referred to more frequently than others. Table 8.3 illustrates the frequency they were mentioned. This frequency indicates which strategic dry port capabilities are more important for the group of companies interviewed. Therefore, only the first 5 will be analyzed in association with the relationship characteristics.

Table 8.3 Frequency of dry ports strategic capabilities refer to by interviewees (Source: constructed by the author, 2012)

No.	Dry ports' Strategic Capabilities	Frequency
1	Container Transport/delivery	9
2	Container Storage/Stacking	8
3	Customs clearance	3
4	Information Systems	3
5	Intermodal connections to industrial clusters	3
6	Connection to freight forwarders	1
7	Container repair/fumigation/maintenance	1
8	Container stuffing/stripping	1
9	Handeling of LCL cargo	1
10	Container handling	1

The impact that relationships characteristics between container terminals and dry ports have on the strategic priorities, is considered to depend on the degree of existence of certain characteristics and the importance the parties could have on the strategic capability. Subsequently, such impact was measured based on the perceptions obtained in the interviews and the surveys' results. Three levels of impact were considered: high, medium and low. As summarized in Table 8.4, the relationships characteristics between CTs and dry ports that have higher impact on *container transport/delivery* are particularity, co-operation, intensity and power/dependence (from CTs to dry ports). This is because transportation and delivery of containers represent not only the core activity of dry ports, but also the activity actors such as shippers and shipping lines seemed to care the most. Dry ports and CTs require well established communication channels to coordinate efficiently operations in a daily basis that *low degree of particularity and intensity* do not fully enable.

The delivery process of containers starts at the port and sometimes ends at the dry port or at a shipper's warehouse who also could have used the dry port either to cross-dock his cargo or to storage it temporarily. These activities demand permanent exchange of information and operational standards based on the end's customer requirements. Therefore, they could be limited by a *low co-operation*. On the other hand, the *existence of power* from CTs over dry ports and *dependence* from dry ports to CTs limits not only the transport operations themselves, but the fostering of positive relationship characteristics. For instance, if power is applied in the negotiation of tariffs or the schedule of train shuttles, dry ports flexibility could be driven to limits where over costs would be diverted to shippers. Additionally it does reduce the flexibility of dry ports to provide customized logistics solutions.

Table 8.4 Impact of relationship characteristics on Dry ports' strategic capabilities (Source: constructed by the author, 2012)

No.	Dry ports' Strategic Capabilities	Impact of Relationship Characteristics							
		Medium Mutuality	**Low** Particularity	**Low** Co-operation	**Low** Conflict	**Low** Intensity	**Low** Interpersonal Inconsistency	*** High** Power/ dependence	**Medium** Trust
1	Container Transport/delivery	Medium	High	High	Low	High	Low	High	Medium
2	Container Storage/Stacking	Medium	Medium	High	Low	High	Low	High	Medium
3	Customs clearance	low	Low	High	Low	Low	Low	Low	High
4	Information Systems	High	High	High	Low	High	Low	High	High
5	Intermodal connections to industrial clusters	High	High	High	Low	High	Low	Medium	High

*High power from CTs over Dry ports / High dependence from Dry Ports to CTs

Note: Table 8.4 illustrates the impact that the degree of existence of relationships characteristics have on the most important dry ports' strategic capabilities. Such impact was measured as high, medium and low based on relationship assessment and the rating given to the dry ports' capabilities by the interviewees.

With regard to *container storage/stacking*, it can be observed on table 8.4 that is impacted the most by relationship characteristics such as co-operation, intensity and power/dependence. This is because container storage/stacking represent a critical capability for container terminals. Land in seaport areas has been historically costly. Therefore, extension of stacking areas in container terminals is limited. In such cases, close dry ports become an important asset for the terminal and high levels of *co-operation and intensity* would be required to make an efficient and optimal used of stacking areas. On the other hand, there are several additional services that are provided to containerized cargo in the stacking areas of CTs and dry ports. These services vary from temperature control, maintenance, security, fumigation, stuffing, stripping to tracing and tracking. Such services again demand flexibility from both parties with regard to labor costs and long term investments that *appliance of power* does not support.

Table 8.4 shows that *customs clearance* is the strategic capability that general speaking is less impacted by the relationship characteristics. Only co-operation and trust were considered to have high impact on it. The reason for this is that customs clearance activities usually follow standard procedures based on legal frameworks to which both CTs and dry port are bound to. Therefore, such activities are not affected importantly from high or low degrees of mutuality, particularity, conflict, intensity, interpersonal inconsistency, or power/dependence. Nevertheless, customs clearance could be impacted by *lack of co-operation and trust* between CTs and dry ports. This is because the clearance of goods is omitted at the CT when it is performed at dry ports and vice versa. In this sense, even though legal frameworks establish clear responsibilities for CTs and dry ports, the responsibility on the coordination of the process rely on both to the eyes of public authorities and the community.

The use of *information systems* is critical for all the container handling operations that take place at seaports and dry ports. They are also critical to ensure accuracy and timing of ships turnaround time. But information systems required the convergence of several efforts to generate the benefits they aim for. For instance, they require permanent information sharing between shipping lines, container terminals and dry ports. Information systems need also a management structure with adequate hardware and software to enable secure financial and information channels. This is why (as shown in table 8.4) it was considered relationship characteristics such as mutuality, particularity, co-operation, intensity, power/dependence and trust have a higher impact on information systems. In the implementation of information systems between CTs and dry ports is critical both entities shared goals and interests. This is because goals/interests will not only set up the characteristics of the system, but also its reach. Additionally, both entities will have to allocate personnel to exclusively administrate the system. Furthermore, CTs and dry port will have to concede on sensitive issues such as investment, control and data sharing. These activities would be difficult to accomplished with *medium mutuality, low particularity, low co-operation, low intensity, high power/dependence* (from CTs to dry ports) and certainly with *medium trust*. In the context of information systems, trust between two entities needs to be comprehensive and it has to go beyond written agreements or contracts. This is because no companies would share sensitive operational information and consider long term investments without enough commitment on one another.

As it is shown in table 8.4 the capability of *intermodal connections to industrial clusters* was considered to be highly impacted by relationship characteristics such as mutuality, particularity, co-operation, intensity and trust. These impacts are grounded in one hand by the high importance CTs indicate on the closeness to industrial clusters dry ports hold. On the other hand, the impact of mutuality and co-operation is high because dry ports need to do substantial financial efforts to generate and maintain closeness to industrial areas. Such kind of efforts would be unforeseen by dry ports who do not identify their own interest with those of CTs. It would be also more difficult to get industrial clusters use dry ports that are perceived to have *limited co-operation* with the port, reducing such closeness. Whether the closeness to industrial clusters is based on intermodal infrastructure or geographical location, it is a capability considered unique to dry ports. It is actually considered to be leverage within the dry port industry when dealing with container terminals. This is why a *high level of power/dependence* does have a *medium impact* on this issue rather than a higher one. The theory reviewed and the empirical findings of this research clearly suggest container terminals benefit substantially from the closeness of dry ports to industrial clusters on aspects such as increase of market share and hinterland expansion.

8.2.2 Impact of relationships between dry ports and CTs on benefits for port areas and hinterlands from dry ports

The theory reviewed noted that competitiveness for seaports and container terminals is directly associated with the features of the hinterlands they served. Whether those features are natural or artificial, they place tangible and intangible conditions that bring a range of benefits for the users of inland transport systems. Consequently, it can be logically assumed that a port/container terminal located in a hinterland with high benefits would be more attractive for shipping lines and manufacturers. Subsequently, it is possible to state within the scope of this research that the higher the benefits hinterlands get from dry ports, the more important relationship between CTs and dry ports are for the competitiveness of the hinterland, and hence for the competitiveness of the seaport. In this context, the two surveys performed in the study also addressed this observation. In the two surveys container terminals and dry ports were given a list of benefits for hinterlands and ports areas (taken from the theory reviewed) that are considered to exist thanks to dry ports. They were asked to rank the importance of relationships with container terminals and dry ports correspondingly for the list of benefits given. Table 7.6 shows the results obtained from a total of 31container terminals and table 7.10 shows the results obtained from a total of 25 dry ports.

Table 8.5 Importance of relationships between CTs and Dry ports for benefits in hinterland areas (Source: constructed by the author, 2012)

Benefits for Port area/Hinterland	Tendency of importance given by respondents	
	Dry Ports	Container Terminals
Increase of container terminal capacity	Very Important	Very important
Increase of container terminal productivity	Not important	Important
Reduction of congestion at the terminal	Very Important	Very important
Modal shift	Very Important	Very important
Increase of market share	Important	Very important
Reduction of risk for road accidents	Not important	Important
Reduction of road maintenance costs	Important	Important
Reduction of environmental impact	Important	Important
Expansion of hinterland	Very Important	Very important

According to the results (as illustrated in table 8.5) the majority of container terminals surveyed considered relationships with dry ports are *very important* with regard to: increase of container terminal capacity, reduction of congestion at the terminal, modal shift, increase of market share and expansion of the hinterland. This importance of these benefits can be associated to the competitiveness gain by container terminals on inter-port competition. For instance, the rapid growing pace of the shipping industry (especially in the container sector) has been demanding more capacity at container terminals which is not possible to be match in the same pace. The typical example is storage and stacking capacity. It is limited and costly in the majority of port areas. Therefore, ports with *limited capacity* will tend to established more formal relationships with dry ports.

The same applies for *congestion at the terminal*. Many shipping lines include in the port selection process the average peak factor of container transit within the terminal which is highly impacted by congestion of trucks or trains. Additionally, congestion for shipping lines and manufacturers is an indicator of capacity and quality of the road and rail network used by the terminal. Consequently, container terminals located in congested ports such as

Los Angeles in North America, Santos in South America, Rotterdam in Europe, Dubai in Middle East, Singapore in South Asia and Shanghai in East Asia will tend to establish relationships with dry ports more formally.

Regarding *modal shift* the impact of relationships with dry ports on inter-port competition can be two fold. In one hand, it could be driven by the operational efficiency that modes of transport bring in specific regions. For instance, in Colombia could be cheaper and faster to transport a container from the Caribbean coast to the Pacific coast through a vessel using the Panama Canal, than by truck. However, with the existence of a rail road connecting the two coasts, the reduction of time in transportation may reduce time and cost making the ports (and their inland distribution network) more attractive and competitive.

The same situation could be seen with regard to other transport modes such as air and river which may register different efficiencies in the different regions. The point here is that the wider the modal shift a port could offer, the more options shipping lines and manufacturers have to apply the most optimal transport solution. But the importance container terminals see on the modal shift offer by dry ports can be also driven by environmental interest. Rail transport is more environmentally friendly than road, air and sea transport. Therefore, terminals with high availability of modal shift from ship to rail, road to rail and air to rail would be considered more competitive than others without these features.

The benefits related to *increase of market share* and *expansion of the hinterland* are directly associated. There are several aspects that could explain the importance for CTs of relationships with dry ports on these benefits. However, the most important is perhaps the geographical closeness of dry ports to industrial clusters. This closeness in the context of inter-port competition could have positive and negative implications for CTs. The positive effect is that shippers and manufacturers located close to a dry port would easily become users of the CT such dry port would establishes train shuttles and road transport to. Such situation will result in increase of market share and expansion of hinterland making the terminal more attractive for shipping lines and shippers in its foreland.

Alternatively, the negative effect comes from two trends. One is the agglomeration of industries, and the other is the economies of location and production commonly applied by industries. In other words, these two tendencies suggest that industries will locate where production costs are low, which is usually inland not close to port areas. This means that closeness of dry ports to industrial clusters open room for other container terminals to consider those dry ports potential intermodal platforms for their distribution network. Subsequently, containerized cargo coming from dry ports located inland could be easily diverted to others CTs in such conditions causing for the initial terminal a reduction of market share and shrinking of its hinterland.

The dry ports surveyed seem to give the same level of importance to almost all same benefits to the hinterland than container terminals did. However, the reasons for this tendency may be different. As illustrated in table 8.5 the majority of dry ports surveyed considered relationships with container terminals *very important* with regard to: increase of container terminal capacity, reduction of congestion at the terminal, modal shift, and expansion of the hinterland. The importance dry ports gave to increase of container terminal capacity in association to inter-port competition can be explained by two main industrial trends where dry ports play a critical role. The first trend is the operational strategies applied by shipping lines. The basis of modern distribution strategies in shipping consists on using terminals at sea ports with high capacity as hubs where intercontinental containerized cargo is shipped to and from through big container ships so called post-panamax vessels with capacities from 6000 TEUs to 18000 TEUs. Subsequently, containers are shipped from this hub to smaller terminals in the region so called feeder ports through small/medium size container and general cargo ships so called feeder ships. This distribution strategy with some variations is known in the industry as *hub-and-spoke.*

In this context, container handling capacity will determine whether or not a container terminal is suitable to be used as a hub or as a feeder port. The utility of a container terminal for a shipping line will then determine the generation of container throughput for the hinterland and for the inland distribution network of that hinterland. Therefore, the competitiveness of a container terminal will be highly impacted by how well they are integrated physically and commercially with dry ports (close, mid-range, distant). Perceptively, dry ports are not only aware of their role in the expansion of such capacity, but also of the effect of CTs competitiveness on their survival as business units. The second trend related to capacity at container terminals with regard to dry ports is modern production strategies implemented by producers of manufacture products. These production strategies are mainly two: postponement and speculation (as reviewed in the theoretical framework of this study). Both strategies require flexible inventories which are being provided by dry ports, who serve as buffers in the inbound and outbound of raw materials/final products of manufacturers. This means that container terminals with high capacity and well-connected would be more likely to attract manufacturers applying speculation. However, if the terminal is considered small (with limited capacity but well integrated to dry ports with high capacity) it would be attractive for manufacturers applying speculation and postponement production strategies.

The importance of reduction of congestion, modal shift and expansion of hinterland for dry ports was implicitly noted in the previous paragraphs. Those discussions referred to the role of dry ports in such benefits. They also represent the concerns in commercial terms of dry ports on the competiveness of the container terminal they are connected to. Nevertheless, the results of survey 2 showed two tendencies in the sample surveyed that do not support some of the aspects related to inter-port competition reviewed in the theoretical framework. These tendencies deserve some attention for the purpose of this research, but also embrace some aspects of general application in container terminals and the dry port industry. Thus, they are further discussed on section 11 of this paper.

9 Conclusions

Regarding the first research question the study led to conclude that relationships between container terminals and dry ports could have a variety of characteristics. However, the study also concluded that when given dry ports the role of suppliers of logistics services to container terminals there are eight specific relationship’s characteristics that are likely to emerge. The assessment of those relationship’s characteristics within the scope of the RAP and SRE models led to conclude that container terminals and dry ports hold medium mutuality, low particularity, low co-operation, low conflict, low intensity, low interpersonal inconsistency, high power from container terminals over dry ports, high dependence of dry ports from container terminals, and medium trust.

Regarding the second research question the study led to conclude that relationships between container terminals and dry ports impact the competition for containerized (inter-port competition) in two main ways. Primarily, with relation to the capabilities dry ports provide to container terminals and secondly with relation to the benefits such relationships provide to port areas and hinterlands. With regard to the former, this research has led to conclude that the relationships' characteristics assessed, drive container terminals to maximize the utilization of dry ports' capabilities such as container transport/delivery, container storage/stacking, customs clearance, information systems and intermodal connections to industrial clusters. Based on these capabilities it was concluded that inter-port competition could be highly impacted by relationships characterized by low particularity, low co-operation, low intensity, high power/dependence and medium trust. Alternatively, this research has demonstrated that inter-port competition does not appear to be highly impacted when relationships between CTs and dry ports are characterized by medium mutuality, low conflict and low interpersonal inconsistency.

With regard to benefits provided by dry ports to hinterlands, it was concluded that such benefits could be used by CTs as leverage on inter-port competition. In this context, this research has led to conclude that relationships between container terminals and dry ports improve in large extent the competitiveness of container terminals in terms of container capacity, terminal productivity, reduction of congestion, availability of modal shift, increase of market share and expansion of the hinterland. Alternatively, relationships between container terminals and dry ports appeared not to improve greatly the competitiveness of container terminals in terms of reduction of risk for road accidents, reduction of road maintenance costs and reduction of environmental impact.

Finally, concerning the general problem addressed in the study it was concluded that relationships between container terminals and dry ports demonstrated to be highly influenced by the community of port areas, the competition environment of container terminals, the container storage capacity at seaports, governmental policies with regard to inland integration of port services, output of industrial areas, location of dry ports, size of manufacturers in the hinterland, security issues and the size of shipping lines calling the terminal. Furthermore, empirical findings of the research led to conclude that the most important enablers of relationships between container terminals and dry ports are: deregulation of the transport industry, information systems, industrial forums, mergers and acquisitions in the transport industry (shipping lines, terminal operators and dry ports), emergence of LSP (such as 3PLs and 4PLs), public investment on transport infrastructure, regional projects to integrate production areas commercially and physically, and implementation of national and transnational transport networks.

10 Further research

The study conducted identified several areas for further research on the assessment of relationships between container terminals and dry ports, and also on inter-port competition.

For instance, the RAP and SRE models could be applied giving container terminals the role of supplier of logistic services to dry ports. Another area of further research would be a deeper assessment of the impact on such relationships by the expansion of global terminal operators and shipping lines into inland transport services. Related to the previous, an interesting area for research would be the degree of concentration of ports and dry ports in specific regions and its impact on the relationships establish among the two industries. Another interesting area of research would be the assessment of the leverage provided by dry port's benefits to inter-port competition, but from the perspective of shipping lines. Finally, this study could set up grounds to construct future scenarios of inter-port competition with dry ports attaining a stronger role. For instance, such scenarios may include new generations of dry ports with expanded and full integrated logistic capabilities that could enable them to behave as direct competitors of container terminals.

11 Discussion

In the results of survey 2 conducted over dry ports, two tendencies were identified. It was considered they deserve some additional discussion in this research. As illustrated in table 8.5 the majority of dry ports considered not important benefits such as increase of container terminal productivity and reduction of risk of road accidents. Regarding the reduction of risk of road accidents there was not relevant theory supporting its importance on inter-port competition more than the safety standards that inland distribution networks should follow to be environmentally and operationally friendly. However, container terminal productivity is one of the indicators used by shipping lines to measure the competitiveness of a CTs. Additionally, container terminal productivity may be impacted directly and indirectly by the presence of dry ports. This impact could be observed in two specific container's terminal productivity indicators. The first is related to container moves and the second is related to vessel's service time.

Container moves at the terminal are important for shipping lines because they determined the speed at which a container vessel is unloaded and loaded. This speed is greatly reduced when at the berth containers are unloaded directly to the transport mode that takes the container out of the terminal to a dry port, warehouse or another vessel. In this case moves to transport the container within the terminal to transfer areas, stacking areas, customs clearance zones or CFS are omitted. Therefore, the direct connection of dry ports through road/rail tracks to container terminals berths is analyzed by shipping lines and manufacturers in port selection processes. The second direct impact is on vessel's service time. The service time in the port industry includes turnaround time (loading/unloading) and other times such as waiting time at the anchor area, transit time and mooring time. These times are proportional in length to the turnaround time. This is because the faster a vessel is served, the less other vessels wait. Ships pay for anchoring and are subject or additional chargers when they stay in the bay areas or access channels of ports. Therefore, terminals with direct road/rail connections to inland distribution networks provide evident cost savings for shipping lines, making them more competitive than otherwise.

Additionally, container terminal productivity could be impacted indirectly from the presence of dry ports. Two indirect impacts could be highlighted. They are the reduction of variable costs and reduction of sunk costs. Variable costs in container terminals are associated mainly to container throughput and container moves within the terminal. This is to say that the higher the throughput and the container movements, the more personnel and handling equipment are used within the terminal. Here the observation is that profit in container terminals is mainly obtained from the unloading/loading of the vessel which sufficiently covers the cost of cranes and crane's gangs. However, the cost of the rest of the moves in the terminal varies greatly depending of the levels of economies of scale applied. This situation is not really relevant for container terminals focused on transshipment cargo. But it is for those terminals handling both transshipment and domestic cargo. Thus, a container terminal could implement a distribution strategy where dry ports are used to minimize container moves until the point in which fix costs are cover, diverting costs variability to other actors in the distribution network such as rail operators, trucking companies or dry ports. With regard to sunk costs, dry ports may also reduce them indirectly. Sunk costs are those costs that are not recovered, they are tied to assets that are critical for industries, but that once acquired or installed make their removal or alternative utility unprofitable. These kinds of costs in the port industry are associated to land, equipment and infrastructure to serve vessels at the berth. Dry ports directly connected to container terminals could reduce the investment of terminals on land and equipment. Thus, reducing their sunk costs and increasing their productivity in aggregated terms.

The aspects discussed previously are complemented by two findings in this research that imply several implications for public authorities in the transport industry at national and transnational levels. These two findings are the influencers and enablers of relationships between container terminals and dry ports. As illustrated in table 7.2 the interviewees in this research pointed out several influencers of relationships between CTs and dry ports. For the interviewees the three strongest influencers are *location of dry ports*, *competition environment* of the container terminal and *governmental policies* with regard to inland integration of port services. All these aspects are determined in large extent by the *involvement of public authorities* such as ministries of transport, ministries of commerce, competition authorities, port authorities and councils of municipalities where national industrial parks are located. This involvement is perceived by the interviewees to be limited and weak with no substantial impact on the issues related to inland integration of port services which according to them deserve permanent attention.

Similarly, the interviewees pointed out *public investment on transport infrastructure*, *implementation of information systems* and *regional projects for implementation and integration of transport networks* as the most important enablers of relationships between CTs and dry ports. On all these aspects, again the involvement of public authorities such as those previously mentioned is critical. The perception from the interviewees' opinion is that both container terminals and dry port industries are willing to interact formally in order to achieve positive outcomes for their corresponding regions and for themselves. However, they perceive to find some limitations in their initiatives that are out of their scope and reach. It is perceived there are roles in the inland integration of port services that cannot be occupied by CTs neither by dry ports, and that certainly are not being addressed by the public authorities with the corresponding competence.

Last but not least, it is important to mention some salient aspects about the experience of using a customer/supplier relationship assessment model on two interrelated industries.

Firstly, it was very helpful for the data collection and analysis of empirical findings to have available a frame of actors and a set of variables that are commonly found in business interactions such as those established by container terminals and dry ports. Secondly, though container terminals and dry ports interact in different contexts, the model includes conditions and criteria that allow specific analysis and close ups on specific behaviors such as those represented by the relationship's characteristics. However, it was perceived that roles of customer/supplier could be difficult to be assigned and kept when applying the model on industries that are too close related. For instance, it was observed that issues such as security and safety impact the industries transversally across all interactions, making difficult to break down behaviors such as co-operation and trust for analysis in different contexts.

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Appendix 1 Interview Guide

1. **Introduction**

- Name
- Thanks comment for time and interest
- Ask permission to record
- Communication of interview time (30-60 minutes)
- Communication of interview structure (Open questions-Clarification)
- Information will be used strictly for academic purposes

2. **Presentation of the researcher (University-School)**

- Active Naval Officer in the Colombian Navy (Maritime Authority)
- Graduated in Maritime Administration
- Specialized in Port Management and Shipping Management (WMU-Malmö)
- Student Master programe ILSCM - JIBS

3. **Brief explanation of the reasons for selecting the interviewee**

- Expertise in the topic
- Knowledge about the phenomena under research
- Relevant representation of the entities subject of research
- Access to real life observations about the issue which will be hard to obtain otherwise
- Position hold is at the top or middle management level in which decision making takes place

4. **Purpose of the research**

The research seeks to analyze the relationships that exist between container terminals and dry ports and how they impact the competition for containerized cargo between container terminals, which is known as *inter-port competition*.

The research assumes that network theory, strategic alliances and Supply Chain Management have modified the traditional concepts of hinterland, foreland and captive market which used to be considered as key by seaports and container terminal operators when addressing competition and market share expansion. On the other hand the growth of containerized cargo and the use of intermodalism have given to dry ports a very important role on inter-port competition. As we know, dry ports extend the capacity of container terminals at the seaports, improving vessel turn-around and service time, container storage, container handling, port costs, provision of value added services to cargo, final distribution of cargo and connectivity to inland industrial clusters. Besides, dry ports have managed to build strategic relationships with shippers, shipping lines, freight forwarders, trucking companies and rail operators. These actors are the most important users of container terminals at seaports and are the ones that create demand of container transportation and port activities. Therefore, the interaction between container terminals and dry ports must have an impact on inter-port competition. This research seeks to identify what type of relationships could be engaging these two entities and how they impact the competition for containerized cargo that is constantly faced by container terminals.

The questions I will ask you are based on a relationship assessment model introduced by researchers of the Centre for research in strategic Purchasing and Supply of University of Bath-School of Management, The Business School of Bournemouth University and the Director of the School of Management at University of Southampton, all located in the UK. The model presents a set of characteristics in relationships, some influencers and some enablers. In my research, I am giving Dry ports the role of logistic service providers to Container Terminals and I am trying to typify and identify the characteristics presented in the model on the relationships that exist between them.

5. **Topics to cover (Open-ended questions)**

Mutuality

In the context I had presented to you.

- Do you think container terminal operators and dry ports have a level of concern in the well-being of each other?
- Do you think they pursue common goals or interests? If so, could you mentioned and example?
- Do you think they are willing to relinquish individual goals in order to increase the positive outcomes of the other party?

Particularity

- Do you think both container terminals and dry ports dedicate individual efforts towards each other to satisfy their specific needs?
- How important do you think container terminals are for dry ports in comparison with other actors in the industry? Such as shipping lines, trucking companies, shippers, freight forwarders, etc.
- How important do you think dry ports are for container terminals in comparison with other actors in the industry?

Cooperation

Do you think the interactions between container terminals and dry ports are characterized by co-operation or contention?

Conflict

Could you identify conflict in such interactions? If so. Do you have an example?

Intensity

- Is there any resource exchange between container terminals and dry ports? Human? Material? Financial? Knowledge?
- Do container terminal managers and dry port managers met face-to-face frequently? If so, how frequently?
- What do you think is the extent of management involvement in the relationships between these two entities?

Interpersonal Inconsistency

According to your experience, Do you think are there great differences between how individuals or departments of the two entities interact towards each other?

Power/Dependence

- Do you think they are in a position to influence decisions and actions of one another?
- What dry ports capabilities are container terminals reliant the most?
- What container terminal capabilities are dry ports reliant the most?
- Do container terminals have the ability to persuade dry ports to do something they do not want to do?
- Do dry ports have the ability to persuade container terminals to do something they do not want to do?

Trust

Do you think is there any level of confidence between container terminals and dry ports about….performance, respect of arrangements, competence?

Strategic priorities

Do you think relationships with dry ports could be considered important for container terminals to achieve their strategic objectives? Such as increase market share, attract containerized cargo, improve port services.

Relationship Management

Whether the relationships we are talking about are formally established or spontaneous due to the continuous interaction of the two entities in the supply chain: Do you think is possible to identify a sort of relationship management from container terminals towards dry ports and viceverce?

External relationship influencers (Supply networks)

Container terminals and dry ports are aware of their role in the international distribution of goods and in the transport systems. They know today that they are only one actor among many in the supply chain of different products and services. In the transportation industry there are other important actors that integrate a large transport network such as shipping lines, freight forwarders, shippers, trucking companies, consolidators, TPLs focused on specific logistics functions and even 4PLs managing whole supply chains.

How do you think these actors and their power in the chain could influence the interactions between container terminals and dry ports?

Inter-port competition

- Do you think container terminals perceive the capabilities provided by dry ports nearby as leverage to gain competitiveness?
- Do you think port users (specifically those focus on containerized cargo) find more suitable and competitive those terminals that are directly connected to dry ports with sufficient capacity and good connectivity?
- Which port services and container terminal's operations do you think are improved by establishing good relationships with dry ports?

6. Ending of the interview

- Thanks comment. (time, interest and important information)
- Reminder that summary of the results will be provided
- Remind you are open to receive additional information if possible

Appendix 2 Container Terminals surveyed

No.	Company Name	Country	E-mail contac	Web site
1	APM Terminals Skandia Terminal	SWEDEN	erik. niklasson@portgot.se	www.skandiacontainer.se
2	Asia Port Services (HPH)	HONG KONG	csd@asiaport.com.hk	www.asiaport.com.hk
3	Autoridad Portuaria de Alicante	SPAIN	puertoalicante@uertoalicante.com	www.puertoalicante.com
4	BACTSSA Buenos Aires Container Terminal (HPH)	ARGENTINA	bactssa_info@bactssa.com.ar	www.bactssa.com.ar
5	Puerto de Castellón	SPAIN	portcastello@portcastello.com	www.portcastello.com
6	Chennai International Terminals (PSA International)	INDIA	tommylow@psa.com.sg	www.citpl.co.in
7	CMP Copenhagen-Malmö Port	DENMARK	soren.balken@cmport.com	www.cmport.com
8	Cochin Port Trust	INDIA	vipin@cochinport.gov.in	www.cochinport.com
9	Colon Container Terminal Evergreen SA	PANAMA	cctmkt@cct-pa.com	www.cct-pa.com
10	COSCO-HIT Terminals (HPH)	HONG KONG	info@cosco.hit.com.hk	www.hph.com
11	Dalian Container Terminal Co Ltd. (PSA International)	CHINA	cttan@psa.com.sg	www.dct.com.com
12	Dalian Port Container Terminal Co Ltd. (PSA International)	CHINA	alfreds@psa.com.sg	www.dpcmterminal.com
13	DeCe Te Duisburger Container Terminal GmbH ECT City Terminal(HPH)	GERMANY	hcdmtplanning@ect.nl	www.decete.de
14	DP World Terragona	SPAIN	sac@porttarragona.cat	www.dpworldtarragona.com
15	Eastern Sea Laem Chabang Terminal (PSA International)	THAILAND	oliver@esco.co.th	www.esco.co.th
16	Ensenada International Terminal (HPH)	MEXICO	info@enseit.com	www.enseit.com
17	Exolgan Container terminal (PSA International)	ARGENTINA	rnegro@itl.com.ar	www.exolgan.com
18	Freeport Container Port (HPH)	BAHAMAS	commercial@fcbahamas.com	www.freeportcontainerport.com
19	Fuzhou International Container Terminal Co Ltd. (PSA International)	CHINA	phchan@psa.com.sg	www.fqct-fuzhou.com.cn
20	Fuzhou Qingzhou Container Terminal Co Ltd. (PSA International)	CHINA	phchan@psa.com.sg	www.fqct-fuzhou.com.cn
21	Gdynia Container Terminal (HPH)	POLAND	sekretariat@gct.pl	www.gct.pl
22	Porto di Gioia-Tauro	ITALY	presidente@portodigioiatauro.it	www.portodigioiatauro.it
23	Grand Port Maritime De Marseille	FRANCE	marseille@marseille-port.fr	www.marseille-port.fr
24	Guangzhou Container Terminal Co Ltd. (PSA International)	CHINA	williamp@psa.com.sg	www.gct.com.cn
25	Harwich International Port (HPH)	UNITED KINGDOM	enquiries@harwich.co.uk	www.harwich.co.uk
26	Hibiki Container Terminal (PSA International)	JAPAN	kpong@psa.com.sg	www.internationalpsa.com
27	Hong Kong International Terminals (HPH)	HONG KONG	gca@hit.com.hk	www.hit.com.hk
28	Huizhou International Container Terminals (HPH)	CHINA	hict@hict.com.cn	www.hph.com
29	Huizhou Port Industrial Corporation (HPH)	CHINA	hpic@hzport.com	www.hph.com
30	Hutchinson Laemchabang Terminal (HPH)	THAILAND	enquiries@hpt-th.com	www.tlt-th.com
31	Hutchison Ajman International Terminals	UNITED ARAB STATES	info@hajt.com	www.hutch-ajmanport.com
32	Incheon Container Terminal (PSA International)	KOREA	leeseok@psa.com.sg	www.psa-ict.co.kr
33	Internacional de Contenedores asociados de Veracruz (HPH)	MEXICO	mac@icave.com.mx	www.icave.com.mx
34	International Ports Services Dammmam (HPH)	SAUDI ARABIA	info@ips.com.sa	www.ips.com.sa
35	Jiangmen International Container Terminals (HPH)	CHINA	jmct@jmct.com.cn	www.hph.com
36	Kandla Container Terminal (PSA Terminal)	INDIA	anujr@psa.com.sg	www.abgworld.com
37	Karachi International Container Terminal (HPH)	PAKISTAN	info@kictl.com	www.kictl.com
38	Kolkata Container Terminal (PSA International)	INDIA	anujr@psa.com.sg	www.internationalpsa.com
39	Kwai Chung Container Terminal - Hong Kong (PSA International)	CHINA	ianlee@psa.com.sg	www.internationalpsa.com
40	London Thamesport (HPH)	UNITED KINGDOM	enquiries@londonthamesport.co.uk	www.londonthamesport.co.uk
41	long beach CT	USA	Bill.Madden@lbcti.com	www.lbcti.com
42	Marseille FOS	FRANCE	gpmm@marseille-port.fr	www.marseille-port.fr
43	Mersin International Port (PSA International)	TURKEY	jphillips@mersinport.com.tr	www.mersinport.com.tr
44	Moerdijk Container Terminals (HPH)	NETHERLANDS	l.smits@cctmoerdijk.com	www.cctmoerdijk.com
45	Nanhai International Container Terminals (HPH)	CHINA	nict@nict.com.cn	www.hph.com
46	Panama Ports Company Balboa Terminal (HPH)	PANAMA	blb-marineserv@ppc.com.pa	www.hph.com
47	Panama Ports Company Cristobal Terminal (HPH)	PANAMA	Ctbl-marineserv@ppc.com.pa	www.ppc.com.pa
48	Piraeus Port Authority SA	GREECE	olp@olp.gr	www.olp.gr
49	Port of Antwep PSA All the Terminals	BELGIUM	caroline.creve@psa-antwerp.be	www.psa-antwerp.be
50	Port of Antwerp	BELGIUM	annelies.dejongh@portofantwerp.com	www.portofantwerp.com

No.	Company Name	Country	E-mail contac	Web site
51	Port of Antwerp DP World Antwerp gateway / Delwaide	BELGIUM	entry@antwerpgateway.be	www.antwerpgateway.be
52	Port of Felixtowe (HPH)	UNITED KINGDOM	enquiries@fdrc.co.uk	www.portotfelixstowe.co.uk
53	Port of Los Angeles APL Terminal	USA	Eddi-Falcon@apl.com	www.eaglemarineservices.com
54	Port of Los Angeles California United Terminals	USA	ron.neal@shipcut.com	www.shipcut.com
55	Port of Los Angeles Yusen Container Terminal	USA	railmnrocu@yti.com	www.yti.com
56	Port of Miami Terminal Operating Company	USA	operations@pomtoc.com.us	www.pomtoc.com
57	Port of Montreal	CANADA	dagenaisd@port-montreal.com	www.port-montreal.com
58	Port of Montreal Bickerdike Terminal	CANADA	goro@empstev.com	www.port-montreal.com
59	Port of Montreal Cast Terminal	CANADA	adm@mtrtml.com	www.mtrtml.com
60	Port of Montreal Maisonneuve Terminal	CANADA	rcarre@termont.com	www.port-montreal.com
61	Port of Montreal Racine Terminal	CANADA	adm@mtrtml.com	www.mtrtml.com
62	Port of New orleans	USA	corporate@portsamerica.com	www.portno.com
63	Port of Newark Container terminal	USA	del.bobish@pnct.net	www.pnct.net
64	Port of Newyork Container Terminal	USA	jatkins@nycterminal.com	www.nycterminal.com
65	Port of Oakland	USA	jkwon@portoakland.com	www.portofoakland.com
66	Port of Quebec	CANADA	marketing@portquebec.ca	www.portquebec.ca
67	Port of San Diego	USA	rconigli@potofsandiego.org	www.portofsandiego.org
68	Port of Vaoncouver Deltaport	CANADA	ljanson@globalterminals.com	www.tsi.bc.ca
69	Port of Vaoncouver Fraser Surrey Docks LP	CANADA	interact@fsd.bc.ca	www.fsd.bc.ca
70	Porto of Genova	ITALY	operations@porto.genova.it	www.porto.genova.it
71	PSA Antwerp (PSA International)	NETHERLANDS	caroline.creve@psa-antwerp.be	www.psa-antwerp.be
72	PSA Dongguan Container Terminl Co Ltd. (PSA International)	CHINA	cwlye@psa.com.sg	www.psa-dgct.com
73	PSA Panama International Terminal (PSA International)	PANAMA	info@psa.com.pa	www.psa.com.pa
74	Puerto de Alicante Autoridad Portuaria	SPAIN	alicanteport@alicanteport.com	www.puertoalicante.com
75	Pusan Newport International Terminal (PSA International)	KOREA	rogertan@psa.com.sg	www.pnitl.com
76	Saigon International Terminals Vietnam (HPH)	VIETNAM	info@sitv.com.vn	www.sitv.com.vn
77	Saudi Global Ports (PSA International)	SAUDI ARABIA	khurram@psa.com.sg	www.internationalpsa.com
78	Shanghai Pudong International Container Terminals (HPH)	CHINA	gca@hph.com	www.spict.com
79	Shantou International Container Terminals (HPH)	CHINA	sict@sict.com.cn	www.hdp.com.hk
80	Sines Container Terminal (PSA International)	PORTUGAL	jorge.dalmeida@psasines.pt	www.internationalpsa.com
81	Singapore Terminals (PSA International)	SINGAPORE	csphua@psa.com.sg	www.singaporepsa.com
82	Sociedad Portuaria de Cartagena	COLOMBIA	operaciones@sprc.com	cisne.puertocartagena.com
83	South Carolina Ports	USA	jbryant@scspa.com	www.port-of-charleston.com
84	South Florida Container Terminal	USA	eddy.montoto@sfct.us.com	www.sfct.us.com
85	SP-PSA International Port Vung TAU (PSA International)	VIETNAM	mikef@psa.com.sg	www.sp-psa.com.vn
86	Taranto Container Terminal (HPH)	ITALY	tct@tct-it.com	www.tct-it.com
87	Terminal Catalunya SA (HPH)	SPAIN	tercat2@tercat.es	www.tercat.es
88	Thai LaemChabang Terminal CO Ltda.	THAILAND	operations@hpt-th.com	www.tlt-th.com
89	Thessaloniki Port Authority SA	GREECE	info@thpa.gr	www.olth.gr
90	Tianjin Port Alliance (PSA International)	CHINA	sqlee@psa.com.sg	www.tianjinportdev.com
91	Tianjin Port Pacific (PSA International)	CHINA	tstay@psa.com.sg	www.tpct.cc
92	Trimodal Container Terminal Belgium (HPH)	BELGIUM	martinehiel@tctbelgium.be	www.ect.nl
93	Tuticorin Container Terminal (PSA International)	INDIA	suraindr@psa.com.sg	www.internationalpsa.com
94	Venice Container Terminal (PSA International)	ITALY	gdanesi@vecon.it	www.internationalpsa.com
95	Westports Malasya Sdn Bhd(HPH)	MALASYA	nanthak@westports.com.my	www.westportsmalasya.com
96	Volos Port Authority SA	GREECE	admin@port-volos.gr	www.port-volos.gr
97	Voltri Terminal Europa (PSA International)	ITALY	francesco.costa@vte.it	www.vte.it
98	Xiamen International Container Terminals (HPH)	CHINA	xict@xict.com.cn	www.hph.com
99	Yantian International Container Terminals (HPH)	CHINA	yict.dm@yict.com.cn	www.yict.com.cn
100	Zhuhai International Container Terminals -Jiuzhou (HPH)	CHINA	zictj@zictj.com.cn	www.hph.com

Appendix 3 Dry ports surveyed

No.	Company Name	Country	E-mail contac	Web site
1	Advanced World Transport	CHECK REPUBLIC	vladkova@awt.eu	www.awt.eu
2	Aken (Hafenbetriebe Aken GmbH)	GERMANY	info@hafen-aken.de	www.hafen-aken.de
3	Algeciras Mercancias (Renfe)	SPAIN	logistica.gerenciasur@adif.es	www.adif.es
4	Antwerp HTA Hupac Terminal Antwerp	BELGIUM	info.hta@hupac.com	www.hupac.ch
5	Antwerp Main-Hub (IFB Antwerpen Main-Hub)	BELGIUM	harald.vanosselaer@interferryboats.be	www.interferryboats.be
6	Antwerpen ATO (Associated Terminal Operator)	BELGIUM	ahmet.altunbay@ato-antwerp.com	www.ato-antwerp.com
7	Antwerpen Cirkeldyk (IFB Antwerpen)	BELGIUM	ahmet.altunbay@ato-antwerp.com	www.ato-antwerp.com
8	Antwerpen Combinant (Combinant NV)	BELGIUM	info@combinant.be	www.combinant.be
9	Antwerpen Zomerweg	BELGIUM	lieven.vanderheyden@interferryboats.be	www.interferryboats.be
10	Athus Container terminal	BELGIUM	info@tca.be	www.tca.be
11	Augsburg-Oberhausen (DUSS Augsburn Oberhausen)	GERMANY	augsburg-oberhausen@duss-terminal.de	www.duss-terminal.de
12	Azuqueca Dry Port (Gran Europa Group)	SPAIN	grupo@graneuropa.com	www.graneuropa.es
13	Barcelona Morrot (Renfe)	SPAIN	icarpio@adif.es	www.adif.es
14	Bari Scalo Ferruccio (Terminali Italia)	ITALY	bafe@terminaliitalia.it	www.terminaliitalia.it
15	Basel Kleinhuningen	SWITZERLAND	info.basel@contargo.net	www.contargo.net
16	Basel-Weil am Rhein	GERMANY	basel@duss-terminal.de	www.duss-terminal.de
17	Beiseförth (DUSS_Beiseförth)	GERMANY	beisefoerth@duss-terminal.de	www.duss-terminal.de
18	Berlin Westhafen	GERMANY	info@behala.de	www.behala.de
19	Berlin-Wustermark (DB Intermodal Services GmbH)	GERMANY	wustermark@db-intermodal-services.de	www.db-intermodal.com
20	Béthune Terminal Conteneurs	FRANCE	michel.gerard@bethune.cci.ft	www.contargo.net
21	Bludenz CCT (Containerdienst Hämmerle GmbH)	AUSTRIA	r.schnetzer@container-haemmerle.com	www.railcargo.at
22	Bologna Interporto (Terminali Italia)	ITALY	aulicino@bo.interporto.it	www.bo.interporto.it
23	Bonneuil-sur-Marne	FRANCE	daniel.calon@interferryboats.fr	www.interferryboats.fr
24	Bremen Bremerhaven	GERMANY	mail@wfb-bremen.de	www.via-bremen.com
25	Budapest BILK	HUNGARY	bilkkombi@bilkkombi.hu	www.bilkkombi.hu
26	Bönen (Logistikzentrum RuhrOst)	GERMANY	boenen@logistikzentrum-ruhrost.de	www.logistikzentrum-ruhrost.de
27	CentrePort-Canada	CANADA	Alberto.Velasco@centreportcanada.ca	www.centreportcanada.ca
28	Cikarang Dry Port	INDONESIA	marketing@cikarangdryport.com	www.cikarangdryport.com
29	Contargo Container Escaut Service SAS	FRANCE	gbredel@contargo.net	www.contargo.net
30	Contargo GmbH & Co. KG	GERMANY	info.aschaffenburg@contargo.net	www.contargo.net
31	CST Container Speditions UND	GERMANY	anke.martens@cst-container.com	www.cst-container.com
32	DB Intermodal Kassel	GERMANY	kassel-ubf@db-intermodal-services.de	www.db-intermodal.com
33	ECORYS Netherlands BV	NETHERLANDS	netherlands@ecorys.com	www.ecorys.nl
34	Faisalabad Dry port	PAKISTAN	farhan@faisalabaddryport.com	www.faisalabaddryport.com
35	Gemeente Emmen	NETHERLANDS	h.dejong@emmen.nl	www.emmen.nl
36	GreenCargo Göteborg	SWEDEN	claes-goran.axelsson@greencargo.com	www.greencargo.com
37	Gäavle Kombiterminal	SWEDEN	sten.johansson@greencargo.com	www.kombiterminaler.se
38	Göteborg Gullbergsvass Kombiterminal	SWEDEN	terminal.got@baneservice.se	www.kombiterminaler.se
39	Hallsberg Intermodal Terminal	SWEDEN	ulf.gustafsson@hallsbergsterminalen.se	www.hallsbergsterminalen.se
40	Hampton Roads Chassis Pool Virginia	USA	aellermann@hrcp2.org	www.hrcp2.org
41	HUB Terminal Poznan	POLAND	gadki.terminal@polzug.pl	www.polzug.de
42	HUPAC Intermodal Transport	NETHERLANDS	info@hupac.nl	www.hupac.nl
43	Höglandsterminalen AB	SWEDEN	anders.wittskog@transab.se	www.jernhusen.se
44	IFB Muizen dry Port	BELGIUM	mark.vandoorne@interferryboats.be	www.interferryboats.be
45	Interporto Bologna	ITALY	info@bo.interporto.it	www.bo.interporto.it
46	Interpuerto San Luis Potosi	MEXICO	operaciones@interpuerto.com.mx	www.interpuerto.com.mx
47	Kinder Morgan Terminals	CANADA	terminals@kindermorgan.com	www.kindermorgan.com
48	Krakov Krzeslawice - Terminal Kontenerowy	POLAND	tkkrakow@spedcont.com.pl	www.spedcont.com.pl
49	North carolina Ports - inland Terminal charlotte	USA	Jeff.Miles@ncports.com	www.ncports.com
50	North Dakota Port Services Inc.	USA	gjohnson@ndportservices.com	www.ndportservices.com

No.	Company Name	Country	E-mail contac	Web site
51	OmniTrax - Alabama & Tennessee River Railway LLC	USA	devans@omnitrax.com	www.omnitrax.com
52	Ostrava-Paskov Terminal	CHECK REPUBLIC	kubicek@awt.eu	www.awt.eu
53	POLZUG Intermodal GMBH	GERMANY	bremerhaven@polzug.de	www.polzug.de
54	Port of Churchill	CANADA	jmceachern@churchillgateway.ca	www.portofchurchill.ca
55	Port of Corpus Christi	USA	Tony@pocca.com	www.portofcc.com
56	Port of Indiana Mount Vernon	USA	jpeacock@portsofindiana.com	www.portsofindiana.com
57	Port of San Antonio texas	USA	Michael.LeMaire@portsanantonio.us	www.portsanantonio,us
58	Port of Takoma	USA	lleviton@portoftacoma.com	www.portoftacoma.com
59	Port of Tucson	USA	jason@portoftucson.net	www.portoftucson.com
60	Port of Victoria	USA	jennifer@portofvictoria.com	www.portofvictoria.com
61	Port of Zeebrugge	BELGIUM	pvc@mbz.be	www.portofzeebrugge.be
62	Province Fryslan	NETHERLANDS	g.c.a.shouwstra@fryslan.nl	www.fryslan.nl
63	Puerto Seco IDITS Mendoza	ARGENTINA	administracionps@idits.org.ar	www.puertoseco.idits.org.ar
64	Rotterdam RSC / Waalhaven	NETHERLANDS	rsc@rscrotterdam.nl	www.rscrotterdam.nl
65	SPEDCONT	POLAND	transport@spedcont.pl	www.spedcont.com.pl
66	SRT Lat Krabang	THAILAND	info@railway.co.th	www.railway.co.th
67	The Port of Virginia	USA	jbridges@portofvirginia.com	www.portofvirginia.com
68	the Thar dry Port	INDIA	info@thethardryport.com	www.thethardryport.com
69	Union Pacific Railroad - Long Beach	USA	railoperations@up.com	www.up.com
70	Virginia Inland Terminal	USA	scrockett@vit.org	www.vit.org

Appendix 4 Survey Questionnaire

Relationships between Container Terminals and Dry Ports

Thank you for taking the time to complete this survey. Your feedback is important to us. This survey is part of an study carried out at Jönköping International Business School - JIBS (Sweden). The study is about the relationships between Container Terminals and Dry Ports and the inflcuence of such relationships on inter-port competition. This survey should only take about 5 minutes of your time. Your answers will be completely anonymous and by filling out the survey you will receive an executive summary of the results which will be of great value for your company. In case you don't know the answer you can skip it in order to progress through the survey. If you have any questions about the survey, please contact us at RobertCastrillonLog@gmail.com or call + 46 764100483. Click the Submit button to submit your survey.

General information of your terminal

What is the name of your company?

We need this information in order to send you the executive summary of the results.

How many dry ports are directly connected to your terminal by rail or road?

- None
- 1
- 2
- Between 3 and 5
- Between 6 and 10
- More than 10

What is the annual container throughput of your terminal?

- 0 - 100.000 TEUs
- 100.000 - 300.000 TEUs
- 300.000 - 500.000 TEUs
- 500.000 - 1 Million TEUs
- 1 Million - 2 Million TEUs
- 2 Million - 4 Million TEUs
- 4 Million - 10 Million TEUs
- More than 10 Million TEUs

Mutuality and Cooperation between your company and Dry Ports

Does your company have a level of concern in the well-being of the dry ports connected to it?

- Large Extent
- Certain Extent
- Not sure
- Limited Extent
- Not at all

Does your company pursue common goals or interests to those of the dry ports connected to it?

- Always
- Frequently
- seldom
- Occasionally
- Never

How likely is your company willing to relinquish individual goals in order to increase the positive outcomes for dry ports connected to it?

	1	2	3	4	5	
Unlikely						Very Likely

Does your company dedicate individual efforts towards specific needs of the dry ports connected to it?

- Always
- Frequently
- Seldom
- Occasionally
- Never

How is the commitment of your company to dry ports connected to it in comparison with other relationships in your company's portfolio?

	1	2	3	4	5	
Very low						Very high

Does your company co-operate with dry ports connected to it?

- Large Extent
- Certain Extent
- Not sure

- Limited Extent
- Not at all

Are the relationships with dry ports connected to your company characterized by co-operative rather than contentious interaction?

- Large Extent
- Certain Extent
- Not sure
- Limited Extent
- Not at all

Intensity of relationships and dependence from Dry Ports

What is the number of staff or groups involved in the relationships your company establishes with dry ports connected to it?

- 0
- 1 - 5
- 5 -15
- 16 - 30
- More than 30

Do your company's representatives met face-to-face with those of the dry ports connected to it?

- Always
- Frequently
- Seldom
- Occasionally
- Never

What is the extent of senior management involvement in the relationships established with dry ports connected to your company?

- Large Extent
- Certain Extent
- Not sure
- Limited Extent

Not at all

How strong is the influence of your company on the decisions and actions of dry ports connected to it?

	1	2	3	4	5	
Very weak						Very strong

What proportion of your annual container throughput is originated in the dry ports connected to it?

0 - 5%

6 - 15%

16 - 30%

31- 50%

More than 50%

How important is for your company the container storage and container handling capacity of the dry ports connected to it?

	1	2	3	4	5	
Not very important						Very important

Influence of relationships with Dry Ports on competition

How important are for your terminal the following logistics capabilities commonly offered by dry ports?

	Not important	Important	Very Iimportant
Container transport and delivery			
Container storage/stacking			
Container handling			
Customs clearance			
Intermodal connections to industrial clusters			

How strong is the impact of the relationships your terminal holds with nearby dry ports on the competition for containerized cargo with other container terminals?

	1	2	3	4	5	
Very weak						Very strong

Dry ports usually have good arrangements with shipping lines, trucking companies and rail operators. How important is this for your terminal?

	1	2	3	4	5	
Not very important	○	○	○	○	○	Very important

How important are the relationships your terminal has with nearby dry ports for the maximization of the following range of benefits?

	Not important	Important	Very important
Increase of container terminal capacity	○	○	○
Increase of container terminal productivity	○	○	○
Reduction of congestion at the terminal	○	○	○
Modal shift	○	○	○
Increase of market share	○	○	○
Reduction of risk for road accidents	○	○	○
Reduction of road maintenance costs	○	○	○
Reduction of environmental impact	○	○	○
Expansion of hinterland	○	○	○

Submit

Appendix 5 Quality Assessment Criteria

QUALITATIVE EVALUATION CHECKLIST

Michael Quinn Patton
September 2003

The purposes of this checklist are to guide evaluators in determining when qualitative methods are appropriate for an evaluative inquiry and factors to consider (1) to select qualitative approaches that are particularly appropriate for a given evaluation's expected uses and answer the evaluation's questions, (2) to collect high quality and credible qualitative evaluation data, and (3) to analyze and report qualitative evaluation findings.

1. **Determine the extent to which qualitative methods are appropriate given the evaluation's purposes and intended uses.**
2. **Determine which general strategic themes of qualitative inquiry will guide the evaluation. Determine qualitative design strategies, data collection options, and analysis approaches based on the evaluation's purpose.**
3. **Determine which qualitative evaluation applications are especially appropriate given the evaluation's purpose and priorities.**
4. **Make major design decisions so that the design answers important evaluation questions for intended users. Consider design options and choose those most appropriate for the evaluation's purposes.**
5. **Where fieldwork is part of the evaluation, determine how to approach the fieldwork.**
6. **Where open-ended interviewing is part of the evaluation, determine how to approach the interviews.**
7. **Design the evaluation with careful attention to ethical issues.**
8. **Anticipate analysis—design the evaluation data collection to facilitate analysis.**
9. **Analyze the data so that the qualitative findings are clear, credible, and address the relevant and priority evaluation questions and issues.**
10. **Focus the qualitative evaluation report.**

Appendix 6 Complete Results Survey 1

What is the name of your company?	How many dry ports are connected to your terminal by rail or road?	What is the annual container throughput of your terminal?	Does your company have a level of concern in the well-being of the dry ports connected to it?	Does your company pursue common goals or interests to those of the dry ports connected to it?	How likely is your company willing to relinquish individual goals in order to increase the positive outcomes for dry ports connected to it?	Does your company dedicate individual efforts towards specific needs of the dry ports connected to it?	How is the commitment of your company to dry ports connected to it in comparison with other relationships in your company's portfolio?	Does your company co-operate with dry ports connected to it?
Sociedad Portuaria de Cartagena	None	1 Million - 2 Million TEUs	Certain Extent	seldom	3	Never	4	Certain Extent
Port Authority of Piraeus	None	1 Million - 2 Million TEUs	Not at all	Never	1	Never	1	Not at all
Colon Container Terminal Evergreen SA	1	1 Million - 2 Million TEUs	Large Extent	Frequently	4	Occasionally	4	Large Extent
Thessaloniki Port Authority S.A.	None	100.000 - 300.000 TEUs						
	None	500.000 - 1 Million TEUs	Certain Extent		4	Frequently	4	Certain Extent
APM Terminals Skandia Terminal	Between 3 and 5	500.000 - 1 Million TEUs	Limited Extent	Occasionally	1	Occasionally	3	Certain Extent
Marseille FOS	Between 3 and 5	500.000 - 1 Million TEUs	Large Extent	Always	3	Frequently	3	Large Extent
Puerto de Alicante Autoridad Portuaria	1	100.000 - 300.000 TEUs	Certain Extent	Frequently	4	Seldom	3	Certain Extent
Port Authority of Genoa	Between 3 and 5	1 Million - 2 Million TEUs	Not sure	seldom	2	Seldom	4	Certain Extent
Colon Container Terminal SA EVERGREEN	1	1 Million - 2 Million TEUs	Large Extent	Frequently	2	Frequently	5	Large Extent
CMP Copenhagen-Malmö Port	Between 3 and 5	100.000 - 300.000 TEUs	Not sure	Frequently	1	Occasionally	5	Certain Extent
Hutchison LaemChabang Terminal CO ltda.	2	300.000 - 500.000 TEUs	Limited Extent	Always	1	Seldom	5	Large Extent
Thai Laemchabang Terminal CO Ltda.	2	100.000 - 300.000 TEUs	Large Extent	Always	3	Frequently	5	Large Extent
	None	300.000 - 500.000 TEUs	Not at all	Never	5	Never	1	Not at all
POMTOC	1	500.000 - 1 Million TEUs	Certain Extent	Frequently	2	Frequently	5	Large Extent
Yusen Terminals Inc Tacoma	2	1 Million - 2 Million TEUs	Large Extent	Always	1	Frequently	5	Large Extent
Cochin Port Trust	Between 6 and 10	300.000 - 500.000 TEUs	Large Extent	Always	3	Frequently	5	Large Extent
EXOLGAN Container Terminal	1	300.000 - 500.000 TEUs	Large Extent	Frequently	1	Frequently	5	Large Extent
Dalian Port Container Terminal	Between 3 and 5	1 Million - 2 Million TEUs	Large Extent	Always	2	Always	5	Large Extent
International Port Services Co Ltda Damman	2	1 Million - 2 Million TEUs	Large Extent	Frequently	1	Frequently	5	Large Extent
West Ports Malasya	2	4 Million - 10 Million TEUs	Large Extent	Always	3	Frequently	5	Large Extent
PSA Chennai Container Terminal	Between 3 and 5	1 Million - 2 Million TEUs	Certain Extent	Frequently	2	Frequently	5	Large Extent
SP PSA International Vietnam	2	1 Million - 2 Million TEUs	Large Extent	Always	1	Seldom	5	Certain Extent
Pusan Newport International Terminal	Between 3 and 5	1 Million - 2 Million TEUs	Large Extent	Frequently	3	Occasionally	5	Large Extent
DP World Terragona	2	500.000 - 1 Million TEUs	Large Extent	Always	1	Always	5	Large Extent
BACTSSA Hutchison Port Holding	2	300.000 - 500.000 TEUs	Large Extent	Frequently	2	Frequently	5	Large Extent
GCT HPH	Between 3 and 5	2 Million - 4 Million TEUs	Large Extent	Always	2	Frequently	5	Large Extent
HongKong International Terminals	Between 3 and 5	1 Million - 2 Million TEUs	Certain Extent	Frequently	3	Frequently	4	Large Extent
Shanghai Pudong International Container Terminal	Between 3 and 5	2 Million - 4 Million TEUs	Large Extent	Always	2	Always	5	Large Extent
MERSIN International Port PSA Int.	1	1 Million - 2 Million TEUs	Large Extent	Frequently	3	Always	5	Large Extent
Port of Oakland	2	2 Million - 4 Million TEUs	Certain Extent	Frequently	4	Always	5	Large Extent

What is the name of your company?	Are the relationships with dry ports connected to your company characterized by co-operative rather than contentious interaction?	What is the number of staff or groups involved in the relationships your company establishes with dry ports connected to it?	Do your company's representativ es met face-to-face with those of the dry ports connected to it?	What is the extent of senior management involvement in the relationships established with dry ports connected to your company?	How strong is the influence of your company on the decisions and actions of dry ports connected to it?	What proportion of your annual container throughput is originated in the dry ports connected to it?	How important is for your company the container storage and container handling capacity of the dry ports connected to it?	How important are for your terminal the following logistics capabilities commonly offered by dry ports? [Container transport and delivery]
Sociedad Portuaria de Cartagena	Not sure	1 - 5	Occasionally	Certain Extent	2	0 - 5%	1	Very Iimportant
Port Authority of Piraeus	Not at all	0	Never	Not at all	1	0 - 5%	1	Not important
Colon Container Terminal Evergreen SA	Large Extent	1 - 5	Frequently	Certain Extent	3	6 - 15%	4	Very Iimportant
Thessaloniki Port Authority S.A.								
	Certain Extent							Very Iimportant
APM Terminals Skandia Terminal	Certain Extent	0	Frequently	Certain Extent	5	16 - 30%	5	Very Iimportant
Marseille FOS	Large Extent	1 - 5	Frequently	Large Extent	3	16 - 30%	4	Very Iimportant
Puerto de Alicante Autoridad Portuaria	Large Extent	0	Frequently	Not sure	4	16 - 30%	3	Important
Port Authority of Genoa	Not sure	1 - 5	Seldom	Certain Extent	3	6 - 15%	4	Important
Colon Container Terminal SA EVERGREEN	Large Extent	1 - 5	Frequently	Large Extent	4	0 - 5%	3	Very Iimportant
CMP Copenhagen-Malmö Port	Large Extent	1 - 5	Frequently	Limited Extent	4	6 - 15%	5	Very Iimportant
Hutchison LaemChabang Terminal CO ltda.	Large Extent	1 - 5	Frequently	Not sure	4	31- 50%	5	Very Iimportant
Thai Laemchabang Terminal CO Ltda.	Large Extent	1 - 5	Always	Large Extent	3	More than 50%	5	Very Iimportant
	Not at all	0	Never	Not at all	1	0 - 5%	1	Important
POMTOC	Large Extent	0	Frequently	Certain Extent	1	6 - 15%	5	Important
Yusen Terminals Inc Tacoma	Large Extent	1 - 5	Frequently	Large Extent	4	6 - 15%	4	Very Iimportant
Cochin Port Trust	Large Extent	1 - 5	Always	Large Extent	3	More than 50%	5	Very Iimportant
EXOLGAN Container Terminal	Large Extent	0	Frequently	Certain Extent	3	16 - 30%	5	Important
Dalian Port Container Terminal	Large Extent	1 - 5	Frequently	Large Extent	3	31- 50%	5	Very Iimportant
International Port Services Co Ltda Damman	Large Extent	1 - 5	Frequently	Large Extent	2	16 - 30%	4	Important
West Ports Malasya	Large Extent	1 - 5	Seldom	Certain Extent	1	6 - 15%	3	Not important
PSA Chennai Container Terminal	Large Extent	0	Frequently	Certain Extent	3	More than 50%	3	Very Iimportant
SP PSA International Vietnam	Certain Extent	0	Frequently	Not sure	3	31- 50%	3	Important
Pusan Newport International Terminal	Large Extent	1 - 5	Occasionally	Certain Extent	4	31- 50%	4	Important
DP World Terragona	Large Extent	0	Seldom	Certain Extent	1	31- 50%	5	Very Iimportant
BACTSSA Hutchison Port Holding	Certain Extent	0	Seldom	Certain Extent	1	16 - 30%	4	Important
GCT HPH	Large Extent	1 - 5	Frequently	Large Extent	3	More than 50%	4	Very Iimportant
HongKong International Terminals	Large Extent	0	Frequently	Certain Extent	3	More than 50%	5	Very Iimportant
Shanghai Pudong International Container Terminal	Large Extent	1 - 5	Always	Large Extent	5	More than 50%	4	Very Iimportant
MERSIN International Port PSA Int.	Large Extent	1 - 5	Occasionally	Certain Extent	4	31- 50%	5	Very Iimportant
Port of Oakland	Large Extent	1 - 5	Always	Large Extent	4	31- 50%	5	Important

What is the name of your company?	How important are for your terminal the following logistics capabilities commonly offered by dry ports? [Container handling]	How important are for your terminal the following logistics capabilities commonly offered by dry ports? [Customs clearance]	How important are for your terminal the following logistics capabilities commonly offered by dry ports? [Intermodal connections to industrial clusters]	How strong is the impact of the relationships your terminal holds with nearby dry ports on the competition for containerized cargo with other container terminals?	Dry ports usually have good arrangements with shipping lines, trucking companies and rail operators. How important is this for your terminal?	How important are the relationships your terminal has with nearby dry ports for the maximization of the following range of benefits? [Increase of container terminal capacity]	How important are the relationships your terminal has with nearby dry ports for the maximization of the following range of benefits? [Increase of container terminal productivity]
Sociedad Portuaria de Cartagena	Very Iimportant	Very Iimportant	Very Iimportant	2	4	Very important	Important
Port Authority of Piraeus	Not important	Not important	Very Iimportant	1	1	Not important	Important
Colon Container Terminal Evergreen SA	Important	Very Iimportant	Very Iimportant	3	5	Very important	Very important
Thessaloniki Port Authority S.A.							
	Very Iimportant	Very Iimportant	Very Iimportant		5	Very important	Important
APM Terminals Skandia Terminal	Important	Very Iimportant	Very Iimportant	5	5	Very important	Very important
Marseille FOS	Very Iimportant	Very Iimportant	Very Iimportant	5	5	Very important	Very important
Puerto de Alicante Autoridad Portuaria	Important	Very Iimportant	Very Iimportant	3	5	Very important	Important
Port Authority of Genoa	Important	Important	Very Iimportant		4	Important	Important
Colon Container Terminal SA EVERGREEN	Very Iimportant	Important	Important	3	3	Important	Not important
CMP Copenhagen-Malmö Port	Very Iimportant	Important	Very Iimportant	5	5	Very important	Not important
Hutchison LaemChabang Terminal CO ltda.	Very Iimportant	Very Iimportant	Very Iimportant	4	5	Very important	Important
Thai Laemchabang Terminal CO Ltda.	Very Iimportant	Very Iimportant	Very Iimportant	4	5	Very important	Very important
	Important	Important	Important	1	1	Important	Important
POMTOC	Important	Very Iimportant	Important	3	4	Important	Important
Yusen Terminals Inc Tacoma	Very Iimportant	Very Iimportant	Very Iimportant	5	5	Important	Important
Cochin Port Trust	Very Iimportant	Very Iimportant	Very Iimportant	5	5	Very important	Very important
EXOLGAN Container Terminal	Important	Very Iimportant	Very Iimportant	4	5	Very important	Important
Dalian Port Container Terminal	Very Iimportant	Very Iimportant	Very Iimportant	4	5	Important	Important
International Port Services Co Ltda Damman	Very Iimportant	Very Iimportant	Important	4	5	Important	Important
West Ports Malasya	Very Iimportant	Important	Important	3	3	Important	Not important
PSA Chennai Container Terminal	Important	Important	Important	4	5	Very important	Important
SP PSA International Vietnam	Important	Important	Very Iimportant	4	4	Very important	Very important
Pusan Newport International Terminal	Not important	Important	Very Iimportant	4	5	Important	Not important
DP World Terragona	Very Iimportant	Very Iimportant	Important	5	5	Important	Not important
BACTSSA Hutchison Port Holding	Important	Very Iimportant	Important	5	5	Important	Not important
GCT HPH	Very Iimportant	Very Iimportant	Very Iimportant	5	5	Very important	Very important
HongKong International Terminals	Very Iimportant	Very Iimportant	Very Iimportant	5	5	Very important	Important
Shanghai Pudong International Container Terminal	Very Iimportant	Very Iimportant	Very Iimportant	4	5	Very important	Very important
MERSIN International Port PSA Int.	Very Iimportant	Very Iimportant	Very Iimportant	4	5	Important	Not important
Port of Oakland	Important	Very Iimportant	Very Iimportant	5	5	Very important	Not important

What is the name of your company?	How important are the relationships your terminal has with nearby dry ports for the maximization of the following range of benefits? [Reduction of congestion at the terminal]	How important are the relationships your terminal has with nearby dry ports for the maximization of the following range of benefits? [Modal shift]	How important are the relationships your terminal has with nearby dry ports for the maximization of the following range of benefits? [Increase of market share]	How important are the relationships your terminal has with nearby dry ports for the maximization of the following range of benefits? [Reduction of risk for road accidents]	How important are the relationships your terminal has with nearby dry ports for the maximization of the following range of benefits? [Reduction of road maintenance costs]	How important are the relationships your terminal has with nearby dry ports for the maximization of the following range of benefits? [Reduction of environmental impact]	How important are the relationships your terminal has with nearby dry ports for the maximization of the following range of benefits? [Expansion of hinterland]
Sociedad Portuaria de Cartagena	Important	Not important	Important	Not important	Important	Important	Very important
Port Authority of Piraeus	Important	Very important	Important	Not important	Not important	Important	Not important
Colon Container Terminal Evergreen SA	Very important	Very important	Very important	Important	Important	Important	Very important
Thessaloniki Port Authority S.A.							
	Very important	Very important	Very important	Important	Important	Important	Very important
APM Terminals Skandia Terminal	Very important	Important	Important	Not important	Very important	Very important	Very important
Marseille FOS	Very important	Very important	Very important	Important	Important	Very important	Very important
Puerto de Alicante Autoridad Portuaria	Important	Very important	Important	Important	Important	Very important	Important
Port Authority of Genoa	Important	Very important	Very important	Important	Important	Important	Very important
Colon Container Terminal SA EVERGREEN	Not important	Important	Not important	Not important	Not important	Important	Not important
CMP Copenhagen-Malmö Port	Not important	Important	Important	Not important	Not important	Not important	Important
Hutchison LaemChabang Terminal CO ltda.	Very important	Very important	Important	Not important	Not important	Important	Very important
Thai Laemchabang Terminal CO Ltda.	Very important	Very important	Very important	Important	Important	Important	Very important
	Important	Important	Important	Important	Important	Important	Important
POMTOC	Very important	Very important	Important	Important	Important	Very important	Very important
Yusen Terminals Inc Tacoma	Important	Very important	Very important	Important	Important	Important	Very important
Cochin Port Trust	Very important	Very important	Very important	Very important	Very important	Very important	Very important
EXOLGAN Container Terminal	Important	Very important	Important	Important	Important	Important	
Dalian Port Container Terminal	Very important	Important	Very important	Important	Important	Important	Very important
International Port Services Co Ltda Damman	Important	Very important	Important	Important	Important	Important	Very important
West Ports Malasya	Important	Important	Very important	Not important	Not important	Not important	Very important
PSA Chennai Container Terminal	Very important	Important	Important	Important	Important	Important	Very important
SP PSA International Vietnam	Very important	Very important	Very important	Not important	Not important	Important	Very important
Pusan Newport International Terminal	Important	Very important	Important	Not important	Not important	Not important	Important
DP World Terragona	Not important	Very important	Important		Not important	Very important	Very important
BACTSSA Hutchison Port Holding	Very important	Very important	Very important	Important	Important	Very important	Very important
GCT HPH	Important	Important	Important	Important	Important	Important	Important
HongKong International Terminals	Very important	Very important	Very important	Very important		Very important	Very important
Shanghai Pudong International Container Terminal	Very important	Important	Very important	Important	Important	Important	Very important
MERSIN International Port PSA Int.	Important	Important	Very important	Important	Important	Important	Important
Port of Oakland	Important	Not important	Very important	Important	Important	Important	Very important

Appendix 7 Complete Results Survey 2

What is the name of your company?	How many container terminals does your company serve by rail or road?	What is the annual container throughput of your terminal?	Does your company have a level of concern in the well-being of the container terminals connected to it?	Does your company pursue common goals or interests to those of the container terminals connected to it?	How likely is your company willing to relinquish individual goals in order to increase the positive outcomes for container terminals connected to it?	Does your company dedicate individual efforts towards specific needs of the container terminals connected to it?	How is the commitment of your company to container terminals connected to it in comparison with other relationships in your company's portfolio?
Interpuerto San Luis Potosi	Between 3 and 5	More than 1 Million TEUs	Certain Extent	seldom	2	Occasionally	3
Green Cargo Göteborg	1	150.000 - 300.000 TEUs	Large Extent	Frequently	3	Always	5
Baneservice Göteborg Kombiterminal	1	50.000 - 70.000 TEUs	Large Extent	Always	3	Always	5
The Thar dry Port	Between 3 and 5	500.000 - 1 Million TEUs	Certain Extent	Always	4	Seldom	4
Interporto Bologna	2	100.000 - 150.000 TEUs	Large Extent	Occasionally	3	Always	5
Advanced World Transport	Between 3 and 5	50.000 - 70.000 TEUs	Large Extent	Always	4	Always	5
Contargo Container Escaut Service SAS	Between 3 and 5	50.000 - 70.000 TEUs	Limited Extent	Occasionally	4	Occasionally	2
SRT Lat Krabang	Between 6 and 10	500.000 - 1 Million TEUs	Large Extent	Frequently	3	Always	5
Cikarang Dry Port Indonesia	Between 3 and 5	500.000 - 1 Million TEUs	Large Extent	Always	4	Always	5
Bremen Bremerhaven	Between 6 and 10	More than 1 Million TEUs	Large Extent	Frequently	3	Always	5
IFB Muizen Dry Port	1	100.000 - 150.000 TEUs	Certain Extent	Frequently	1	Frequently	5
DB Intermodal Kassel	Between 3 and 5	More than 1 Million TEUs	Large Extent	Always	2	Always	5
RSC Rotterdam	2	300.000 - 500.000 TEUs	Certain Extent	Frequently	1	Frequently	5
Virginia Port Authority	Between 3 and 5	More than 1 Million TEUs	Large Extent	Frequently	3	Frequently	4
Antwerpen ATO	Between 3 and 5	500.000 - 1 Million TEUs	Large Extent	Frequently	1	Frequently	5
POLZUG Intermodal GMBH	Between 3 and 5	500.000 - 1 Million TEUs	Large Extent	Always		Always	5
North Carolina Ports Charlotte Inland Terminal	1	70.000 - 100.000 TEUs	Large Extent	Always	4	Always	5
SPEDCONT	Between 3 and 5	0 - 50.000 TEUs	Large Extent	Always	5	Always	5
Puerto Seco IDITS Mendoza	Between 3 and 5	100.000 - 150.000 TEUs	Certain Extent	Frequently	3	Occasionally	4
Hallsberg Intermodal Terminal	1	50.000 - 70.000 TEUs	Large Extent	Frequently	3	Always	5
Höglandsterminalen AB	1	70.000 - 100.000 TEUs	Certain Extent	seldom	3	Always	5
HUPAC Intermodal Transport	Between 3 and 5	500.000 - 1 Million TEUs	Large Extent	Frequently	4	Always	5
CentrePort-Canada	Between 3 and 5	500.000 - 1 Million TEUs	Large Extent	Frequently	5	Always	5
Union Pacific Railroad - Long Beach	Between 6 and 10	More than 1 Million TEUs	Large Extent	Always	4	Always	5
Contargo GmbH & Co. KG	More than 10	More than 1 Million TEUs	Large Extent	Always	5	Always	5

What is the name of your company?	Does your company co-operate with container terminals connected to it?	Are the relationships with container terminals connected to your company characterized by co-operative rather than contentious interaction?	What is the number of staff or groups involved in the relationships your company establishes with container terminals connected to it?	Do your company's representatives met face-to-face with those of the container terminals connected to it?	What is the extent of senior management involvement in the relationships established with container terminals connected to your company?	How strong is the influence of your company on the decisions and actions of container terminals connected to it?	What proportion of your annual container throughput is originated in the following list of industries? [Container Terminals]
Interpuerto San Luis Potosi	Not sure	Limited Extent	1 - 5	Occasionally	Not sure	1	5 - 15%
Green Cargo Göteborg	Large Extent	Large Extent	1 - 5	Frequently	Large Extent	3	30 - 50%
Baneservice Göteborg Kombiterminal	Large Extent	Large Extent	1 - 5	Frequently	Large Extent	1	More than 50%
The Thar dry Port	Certain Extent	Not sure	1 - 5	Always	Large Extent	1	15 - 30%
Interporto Bologna	Large Extent	Certain Extent	1 - 5	Frequently	Large Extent	1	15 - 30%
Advanced World Transport	Large Extent	Large Extent	1 - 5	Frequently	Large Extent	3	15 - 30%
Contargo Container Escaut Service SAS	Limited Extent	Limited Extent	0	Occasionally	Limited Extent	1	0 - 5%
SRT Lat Krabang	Large Extent	Large Extent	1 - 5	Frequently	Large Extent	1	15 - 30%
Cikarang Dry Port Indonesia	Large Extent	Large Extent	1 - 5	Frequently	Large Extent	2	5 - 15%
Bremen Bremerhaven	Large Extent	Large Extent	5 -15	Always	Large Extent	3	15 - 30%
IFB Muizen Dry Port	Large Extent	Large Extent	0	Seldom	Certain Extent	1	30 - 50%
DB Intermodal Kassel	Large Extent	Large Extent	1 - 5	Frequently	Large Extent	1	15 - 30%
RSC Rotterdam	Large Extent	Large Extent	0	Frequently	Large Extent	1	15 - 30%
Virginia Port Authority	Large Extent	Certain Extent	16 - 30	Frequently	Large Extent	4	More than 50%
Antwerpen ATO	Large Extent	Large Extent	1 - 5	Frequently	Large Extent	1	15 - 30%
POLZUG Intermodal GMBH	Large Extent	Large Extent	1 - 5	Always	Large Extent	1	15 - 30%
North Carolina Ports Charlotte Inland Terminal	Large Extent	Certain Extent	1 - 5	Always	Large Extent	1	More than 50%
SPEDCONT	Large Extent	Large Extent	1 - 5	Always	Large Extent	2	30 - 50%
Puerto Seco IDITS Mendoza	Large Extent	Large Extent	0	Occasionally	Certain Extent	3	15 - 30%
Hallsberg Intermodal Terminal	Large Extent	Certain Extent	1 - 5	Always	Large Extent	1	30 - 50%
Höglandsterminalen AB	Large Extent	Certain Extent	1 - 5	Frequently	Large Extent	1	More than 50%
HUPAC Intermodal Transport	Large Extent	Large Extent	5 -15	Always	Large Extent	3	30 - 50%
CentrePort-Canada	Large Extent	Certain Extent	5 -15	Frequently	Large Extent	3	15 - 30%
Union Pacific Railroad - Long Beach	Large Extent	Large Extent	5 -15	Frequently	Large Extent	3	30 - 50%
Contargo GmbH & Co. KG	Large Extent	Not at all	More than 30	Always	Large Extent	5	More than 50%

What is the name of your company?	How important is for your company the container storage and container handling capacity of the container terminals connected to it?	As a Dry Port manager. How important do you think are for container terminals the following logistics capabilities commonly offered by dry ports? [Container transport and delivery]	As a Dry Port manager. How important do you think are for container terminals the following logistics capabilities commonly offered by dry ports? [Container storage/stacking]	As a Dry Port manager. How important do you think are for container terminals the following logistics capabilities commonly offered by dry ports? [Container handling]	As a Dry Port manager. How important do you think are for container terminals the following logistics capabilities commonly offered by dry ports? [Customs clearance]	As a Dry Port manager. How important do you think are for container terminals the following logistics capabilities commonly offered by dry ports? [Intermodal connections to industrial clusters]	How strong is the impact of the relationships your terminal holds with nearby container terminals on the competition for containerized cargo settled by container terminals?
Interpuerto San Luis Potosi	3	Very Iimportant	Very Iimportant	Very Iimportant	Important	Very Iimportant	2
Green Cargo Göteborg	5	Important	Very Iimportant	Important	Very Iimportant	Very Iimportant	4
Baneservice Göteborg Kombiterminal	5	Important	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	2
The Thar dry Port	2	Important	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	4
Interporto Bologna	5	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	4
Advanced World Transport	5	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	3
Contargo Container Escaut Service SAS	4	Very Iimportant	Very Iimportant	Very Iimportant	Important	Very Iimportant	2
SRT Lat Krabang	3	Very Iimportant	Very Iimportant	Important	Very Iimportant	Very Iimportant	5
Cikarang Dry Port Indonesia	4	Very Iimportant	Important	Important	Important	Very Iimportant	5
Bremen Bremerhaven	1	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	5
IFB Muizen Dry Port	1	Important	Very Iimportant	Very Iimportant	Important	Very Iimportant	3
DB Intermodal Kassel	3	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	4
RSC Rotterdam	3	Important	Very Iimportant	Important	Very Iimportant	Very Iimportant	4
Virginia Port Authority	4	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	4
Antwerpen ATO	3	Important	Very Iimportant	Very Iimportant	Important	Very Iimportant	4
POLZUG Intermodal GMBH	2	Very Iimportant	Important	Very Iimportant	Important	Very Iimportant	5
North Carolina Ports Charlotte Inland Terminal	1	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	4
SPEDCONT	3	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	5
Puerto Seco IDITS Mendoza	4	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	5
Hallsberg Intermodal Terminal	3	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	Very Iimportant	5
Höglandsterminalen AB	3	Very Iimportant	Very Iimportant	Important	Important	Very Iimportant	5
HUPAC Intermodal Transport	5	Very Iimportant	Very Iimportant	Very Iimportant	Important	Very Iimportant	5
CentrePort-Canada	5	Very Iimportant	Important	Important	Very Iimportant	Very Iimportant	5
Union Pacific Railroad - Long Beach	5	Very Iimportant	Important	Important	Very Iimportant	Important	5
Contargo GmbH & Co. KG	5						5

What is the name of your company?	Dry ports usually have good arrangements with shipping lines, trucking companies and rail operators. How important do you think this is for container terminals nearby?	How important are the relationships your terminal has with nearby container terminals for the maximization of the following range of benefits? [Increase of container terminal capacity]	How important are the relationships your terminal has with nearby container terminals for the maximization of the following range of benefits? [Increase of container terminal productivity]	How important are the relationships your terminal has with nearby container terminals for the maximization of the following range of benefits? [Reduction of congestion at the terminal]	How important are the relationships your terminal has with nearby container terminals for the maximization of the following range of benefits? [Modal shift]	How important are the relationships your terminal has with nearby container terminals for the maximization of the following range of benefits? [Increase of market share]	How important are the relationships your terminal has with nearby container terminals for the maximization of the following range of benefits? [Reduction of risk for road accidents]
Interpuerto San Luis Potosi	5	Very important	Very important	Very important	Very important	Very important	Important
Green Cargo Göteborg	5	Very important	Very important	Very important	Very important	Very important	Very important
Baneservice Göteborg Kombiterminal	5	Very important	Very important	Very important	Very important	Important	Important
The Thar dry Port	5	Very important	Important	Very important	Very important	Important	Important
Interporto Bologna	5	Very important	Important	Important	Very important	Important	Not important
Advanced World Transport	5	Very important	Not important	Not important	Important	Important	Not important
Contargo Container Escaut Service SAS	4	Not important	Not important	Important	Important	Important	
SRT Lat Krabang	5	Very important	Not important	Very important	Very important	Important	Not important
Cikarang Dry Port Indonesia	5	Very important	Not important	Important	Important	Important	Not important
Bremen Bremerhaven	5	Very important	Not important	Very important	Very important	Important	Not important
IFB Muizen Dry Port	4	Very important	Important	Important	Important	Important	Important
DB Intermodal Kassel	5	Very important	Not important	Important	Very important	Important	Important
RSC Rotterdam	5	Very important	Important	Important	Very important	Important	Important
Virginia Port Authority	5	Important	Important	Very important	Very important	Important	Not important
Antwerpen ATO	5	Very important	Important	Important	Very important	Important	Not important
POLZUG Intermodal GMBH	5	Very important	Not important	Important	Very important	Important	Important
North Carolina Ports Charlotte Inland Terminal	4	Very important	Not important	Very important	Very important	Important	Not important
SPEDCONT	5	Very important	Very important	Very important	Very important	Very important	Very important
Puerto Seco IDITS Mendoza	5	Important	Very important	Important	Very important	Very important	Important
Hallsberg Intermodal Terminal	5	Important	Not important	Very important	Important	Important	Very important
Höglandsterminalen AB	5	Important	Not important	Very important	Very important	Very important	Very important
HUPAC Intermodal Transport	5	Very important	Not important	Very important	Very important	Very important	Very important
CentrePort-Canada	5	Important	Not important	Very important	Important	Very important	Not important
Union Pacific Railroad - Long Beach	5	Very important	Not important	Very important	Important	Very important	Not important
Contargo GmbH & Co. KG	5	Very important	Important	Important	Important	Very important	Not important

What is the name of your company?	How important are the relationships your terminal has with nearby container terminals for the maximization of the following range of benefits? [Reduction of road maintenance costs]	How important are the relationships your terminal has with nearby container terminals for the maximization of the following range of benefits? [Reduction of environmental impact]	How important are the relationships your terminal has with nearby container terminals for the maximization of the following range of benefits? [Expansion of hinterland]	What proportion of your annual container throughput is originated in the following list of industries? [Shipping lines]	What proportion of your annual container throughput is originated in the following list of industries? [Freight forwarders]	What proportion of your annual container throughput is originated in the following list of industries? [Trucking companies]	What proportion of your annual container throughput is originated in the following list of industries? [Manufacturers]
Interpuerto San Luis Potosi	Important	Important	Very important	0 - 5%	15 - 30%	0 - 5%	More than 50%
Green Cargo Göteborg	Very important	Very important	Very important	0 - 5%	15 - 30%	15 - 30%	More than 50%
Baneservice Göteborg Kombiterminal	Important	Very important	Very important	0 - 5%	5 - 15%	0 - 5%	0 - 5%
The Thar dry Port	Important	Very important	Very important	0 - 5%	15 - 30%	5 - 15%	30 - 50%
Interporto Bologna	Not important	Important	Important	0 - 5%	15 - 30%	0 - 5%	30 - 50%
Advanced World Transport	Not important	Important	Important	0 - 5%	30 - 50%	0 - 5%	More than 50%
Contargo Container Escaut Service SAS	Important	Important	Important	30 - 50%	5 - 15%	0 - 5%	30 - 50%
SRT Lat Krabang	Not important	Important	Important	0 - 5%	5 - 15%	0 - 5%	More than 50%
Cikarang Dry Port Indonesia	Not important	Important	Very important	0 - 5%	15 - 30%	0 - 5%	More than 50%
Bremen Bremerhaven	Not important	Important	Very important	0 - 5%	15 - 30%	5 - 15%	More than 50%
IFB Muizen Dry Port	Important	Very important	Very important	0 - 5%	5 - 15%	0 - 5%	More than 50%
DB Intermodal Kassel	Important	Very important	Very important	5 - 15%	30 - 50%	0 - 5%	More than 50%
RSC Rotterdam	Important	Important	Very important	0 - 5%	0 - 5%	5 - 15%	More than 50%
Virginia Port Authority	Not important	Important	Important	More than 50%	More than 50%	More than 50%	15 - 30%
Antwerpen ATO	Not important	Important	Important	0 - 5%	5 - 15%	5 - 15%	30 - 50%
POLZUG Intermodal GMBH	Important	Important	Important	0 - 5%	0 - 5%	0 - 5%	30 - 50%
North Carolina Ports Charlotte Inland Terminal	Not important	Very important	Very important	0 - 5%	0 - 5%	0 - 5%	More than 50%
SPEDCONT	Very important	Very important	Very important	0 - 5%	5 - 15%	0 - 5%	More than 50%
Puerto Seco IDITS Mendoza	Important	Important	Important	0 - 5%	15 - 30%	0 - 5%	More than 50%
Hallsberg Intermodal Terminal	Very important	Very important	Very important	0 - 5%	More than 50%	0 - 5%	More than 50%
Höglandsterminalen AB	Very important	Very important	Very important	0 - 5%	0 - 5%	0 - 5%	More than 50%
HUPAC Intermodal Transport	Very important	Very important	Very important	0 - 5%	30 - 50%	0 - 5%	30 - 50%
CentrePort-Canada	Important	Important	Very important	0 - 5%	15 - 30%	5 - 15%	15 - 30%
Union Pacific Railroad - Long Beach	Not important	Very important	Important	15 - 30%	5 - 15%	0 - 5%	30 - 50%
Contargo GmbH & Co. KG	Not important	Very important	Very important				