The Port Logistics Platform

BADI ALMOTAIRI

Department of Technology Management and Economics
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden, 2010
1 INTRODUCTION

“It is clear that ports are now operating in a new environment – which is globalized, corporatized, and privatized and is exceptionally competitive; it is also a logistics-restructured environment.” Ross Robinson (2002, page 245)

…indeed the trajectory of the theoretical discourse on the modern seaport has not been a linear one; this is true where former models and concepts appear to be increasingly divorced from empirical reality (Olivier and Slack, 2006). It is nothing less than a paradigm shift in port studies. A new paradigm seeks to ground the port within themes of logistics/SCM and value-adding chains…

1.1 Background and problem area

Ports and maritime transport have existed for some thousands of years and have developed in line with the evolution of international trade which has been inherent in shaping the modern world (Mangan et al., 2008). It is the backbone of global trade, where more than 2000 ports around the world, from single berth locations handling a few hundred tons a year to some of the world’s largest ports such as Shanghai, Singapore and Rotterdam (World Bank, 2001).

![Figure 1 World container traffic/country league top 10 – 1981~2008 1000 TEUs (Containerization International Yearbook, 2010)]

1
Although total freight varies according to regional economic structure, types of commodities and freight origin/destination, global trade expressed in TEUs (world container traffic) at country league top 10 trade corridors has grown exponentially in recent years (see Figure 1).

The globalization of shipping and trade is resulting in increasing pressure on ports in terms of re-exploring an interface between transport and economic activities. Thus, the port industry is constantly confronted with challenges in order to be a functional element within supply chains. These challenges trace back to two broad categories: the containerization growth implications and the industrial business dynamics, and in particular the recent movement toward demand management strategy, i.e., customer focus and quick response.

Liner shipping has experienced an explosion in container ship size. The maritime part of the intermodal transport chains has employed ever larger ships to cope with increasing transport demand and for facilitating lower unit costs as discussed by Cullinane and Khanna (2000). With the latest vessels on order reaching 14,000 TEU (World Cargo News, 2006) to fully utilize the economies of scale, progress in ports and hinterland operations must match (Parola and Sciomachen, 2005; McCalla, 2007). Such a dramatic increased capacity entails various input scenarios upon container operation and the port logistics system (Cullinane and Khanna, 2000). As a natural impact, one of the independent shipping consultancy estimates is that growth in container volumes has exceeded 10 per-cent annually over the last fifteen years. Worldwide, container port demand is expected to nearly double by 2015 as shown in Table 1.

<table>
<thead>
<tr>
<th>Region</th>
<th>2004</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>159.1</td>
<td>240.5</td>
<td>303.4</td>
</tr>
<tr>
<td>Americas</td>
<td>62.2</td>
<td>90.7</td>
<td>118.8</td>
</tr>
<tr>
<td>North America</td>
<td>41.1</td>
<td>56.9</td>
<td>71.8</td>
</tr>
<tr>
<td>Europe/Mediterranean</td>
<td>74.1</td>
<td>105.8</td>
<td>139.5</td>
</tr>
<tr>
<td>Others</td>
<td>36.8</td>
<td>58.2</td>
<td>85.6</td>
</tr>
<tr>
<td>Total</td>
<td>332.2</td>
<td>495.1</td>
<td>647.3</td>
</tr>
</tbody>
</table>


However, the sea/land interface is only one element in the landside logistics equation; the considerably more difficult task, though little regarded, is that of defining the functionality and capacity of the sub-systems linked into the terminal (Robinson, 2002). These sub-systems are to reshape the landside logistics patterns, which are a complex multimodal transport of networks linking the main
gateway position (seaport) with the correspondent network of nodes as conceptualized and explained by Lumsden (2006). According to Bichou and Gray (2005), the port system not only serves as an integral component of the transport system, but is also a major sub-system of the broader production, trade and logistics systems. In a practical world, ports are continuously interacting with a variety of businesses and market players (Bichou and Gray, 2005). Carbone and De Martino (2003) investigate the changing role of the ports with the current evolution of international maritime trade patterns, which gives rise to the port industry as a dynamic node in the international production and distribution network. They claim that port has gained the status of a crossroad between the production and distribution spheres. As a link in a larger logistics chain, the role of port exceeds the simple function of service to ship and cargo. Apart from their role as the traditional sea/land interface, ports are a good location for value-added logistics, in which members of different channels can meet and interact (Bichou and Gray, 2004).

In this kind of business process transformation, Carbone and De Martino (2003) take the initiative to analyze port operator integration processes with the automotive supply chain (between port of Le Havre and Renault’s supply chain). The authors call for a wider supply chain analysis due to potential opportunities for creating customer value-added. These opportunities encompass a wide range of logistics and value-added activities, developed in conjunction with industrial and commercial businesses (Paixão and Marlow, 2003). With this development as a natural effect by constant industrial changes and expansion toward sea access, the port industry has engaged in activities beyond its boundaries and ought to cope with industrial uncertainty. Paixão and Marlow (2003) propose an agile port concept—ensuring that port remains proactive elements along the supply chain and to prevent the supply drifting apart from the demand. It’s no wonder that the emphasis of the growing link between ports and economic growth increased recently, especially with the introduction of demand management strategy. Gattorna (2006) argues for a dynamic capability in supply chain designs so that they can respond to any changes. A global supply chain taxonomy developed by Christopher et al. (2006) with four supply chain strategies has been proposed to highlight some roles that ports can handle in the context of different supply chain strategies (Mangan et al., 2008).

Despite the complex nature of the port, from the managerial and entrepreneurial point of view, due to multipart organizations in which institutions and functions often intersect at various levels (Robison, 2002; Carbone and De Martino, 2003; Bichou and Gray, 2004, 2005), the port industry searches for different strategies to cope with the prevailing and pervasive restructuring of the logistics or supply chain environment (Robinson, 2002; Bichou and Gray, 2004; Bichou and Gray, 2005; Robinson, 2006; Olivier and Slack, 2006; Panayides and Song, 2008; Mangan et. al., 2008). One of these strategies aiming at integrating the sea/land interface with inland-logistics is based on a concept of the logistics platform that is the focus of this thesis. The concept emerges as natural ingredients of the logistics/SCM components aimed at exploring a firm’s value-chain mechanisms. This is to point out the importance of creating dynamic relationships between
member-firms to adapt to high-variety strategies. The common threads linking these strategies are the increasing integration of ports into the transport network, the growing recognition of the port as a natural focus for industrialization and value-addition, and the development of port-related logistics activities taking account of corporate commercial strategies, technological developments and market forces (Pettit and Beresford, 2009).

To summarize, there is a demand to re-explore interfaces between transport and economic activities in the port industry due to globalization effects. This was evidenced by an epistemological shift in re-conceptualizing the port, from a single, fixed, spatial entity to a network of logistics and transport operators in a common platform vicinity. With the increased demand in container port operation and industrial progress in developing value-added logistics in close proximity to ports, a systematic integration between supply chain interfaces has become a prerequisite for the entire logistics system to function. Whereas the port industry incorporates commercial strategies as integrated elements within the supply chain environment, eventually many researchers will suggest addressing the port industry from logistics/SCM and value-chain points of view. This thesis emphasizes the importance of systematic integration between supply chain interfaces that might be obtained by a common platform of logistics and information transactions, whereas common obstacles and segmentation of the port business in terms of trade, logistics and supply chain are thought to be adequately solved. In addition, there is an indication that the current state of knowledge on maritime transport and ports appears to be modest as far as business economics research is concerned (Carbone and De Martino, 2003; Bichou and Gray, 2004; Mangan, 2008).

1.2 Purpose and research questions

The literature review shows a lack of research regarding the changing role of the port industry in the new logistics-restructured environment, particularly the integrated logistics between supply chain interfaces; therefore, this thesis intends to contribute to the knowledge of the logistics platform concept.

The purpose of this thesis is to understand the key characteristics of the port in the newly logistics-restructured environment and to develop the same through the identification of key elements and mechanisms for systematic integration of the logistics platform.

The changing role(s) of the port industry has been the trigger to investigate to what extent the port industry has been involved in the supply chain from a literature perspective, through a systemic approach of an integrated supply chain framework. Furthermore, the study is devoted to identifying relevant value-added attributes in port supply chain systems, paying special attention to those of inter-link function, capable of facilitating further the objectives of supply chain integration. With this, the research applied contributes to the purpose by the identification of key elements and mechanisms for successful implementation of the integrated logistics platform concept.
The study deals with new trends in the port industry that are devoted to re-exploring the interfaces between transport and economic activities aimed at enhancing integration efforts. In this type of research, the formulation of the research problem depends on the researcher’s competence and how research progress in this field; is to be more precisely in line with other researchers in the same discipline. Therefore, the question that crosses the research discipline is understanding the changing role(s) of the port industry. To reflect on this evolving need and to build up a solid starting point for further research work, the logical departure would be with literature reviews, complemented with real-world examples in order to mirror the contemporary port logistics set-ups; therefore, the starting or primary research question is:

**PRQ**: What are the key principles characterizing the contemporary port logistics set-ups?

The main idea behind this research question is to conduct a comprehensive theoretical analysis and to understand the changing role(s) of the port industry; this was achieved by adopting a suitable integration framework—supported by real-world examples. Once the same is done, the next task is to identify relevant value-added attributes in port supply chain systems, specifying significant value-added attributes disclosed from different domain perspectives.

**RQ1**: What are the significant value-added attributes that have an inter-link function in the port supply chain systems?

Research question one is devoted to searching for relevant value-added attributes from literature perspectives; these value-added include activities, services and tasks. More precisely, it compromises physical and virtual value added which are mutually dependent and interacting elements. Once these value-added attributes are identified, a proper methodological construct is obtained to rank and prioritize the findings. This is to spot those value-added attributes with an inter-link function, which are highlighted by different domain perspectives, i.e., academic, experts and decision makers (DM). By determining the significant value-added attributes across different domain perspectives, port organizations can seek the most rewarding value-added attributes in terms of value-preference that are capable of connecting different stakeholders together. The study optimizes the value-chain idea as a sort of competitive advantage to engender the overall performance and to capture the synergy of intra- intercompany linkage optimization.

From the previously discussed issues regarding the port logistics platform concept, the changing role of the port industry has been complemented with innovative ways of screening the relevant value-added attributes, from different domain perspectives (Figure 2). This is to find inter-links between different stakeholders within the logistics platform, and to assist in answering the second research question – systematic integration between supply chain interfaces. Therefore, research question two is related to the adoption of a systematic integration between supply chain interfaces: identifying key elements and mechanisms for successful implementation of the concept (see Figure 2).
RQ2: How is a systematic integration of supply chain interfaces in port industry adopted?

Research question two is designed to deal with the systematic integration of supply chain interfaces within the port industry, using SCM components and value-chain mechanisms as inherent elements of the firm’s competitive advantages.

Figure 2 Relationship between research areas and research questions

1.3 Scope and delimitations

The scope of this thesis is the modern seaports in recent development, seeking to integrate the blue-water operations with the landside-logistics activities. It is a combination of maritime transport and port-oriented landside logistics. Meanwhile, transport and logistics interfaces need to be inter-linked; only standardized units involving containers were analyzed in the study. Notwithstanding this broad topic, the research put a focus on supply chain interfaces as an opportunity toward systematic integration and a possible area for future research efforts.

To keep research work consistent with the research domain, some issues were not in focus and therefore not included in this research. These are economical, financial and legal perspectives of the port logistics platform application, such as cost analysis, legal implications or different contract relations between stakeholders. This area was excluded from the study due to its variation from region to region or from case to case.

In general, this thesis attempts to find ways to integrate different supply chain interfaces, particularly in the seaport industry; however, the same has been limited to the study of consequences resulting from integration efforts.
The topic of this thesis discusses recent trends in seaport and maritime transport, which for the most part is still not yet covered. This is evidenced by many researchers calling for more efforts in this field: port, logistics and SCM. Based on this, revealing data having competitive sensitivity was seen as a limitation in this study.

Other limitations refer to the well-functioning of the successful implementation of the integrated logistics platform concept; such detailed information regards either different phases of their implementation process or the development of their operations. However, none of the above has influenced the overall purpose of the study.

1.4 Outline of the thesis

The thesis consists of this covering paper and three appended papers.

1.4.1. The covering paper

The main purpose of the covering paper is to summarize what has been written in the appended papers, and to give an overview as well as an inter-link of the subject. Thus, a review of the current state of knowledge and research in the field is given. This is followed by a frame of reference as a natural departure point of research, whereas a research process with chosen approaches and methods is discussed. Finally, through a summary of the appended papers and their inter-relationship, the contribution of the work to the field is indicated.

1.4.2. The appended papers

The appended papers are presented below with references to the authors and co-authors. Additionally, a brief discussion from the point of the reception they received, i.e., by the journals or conferences was published.

All the three papers are co-authored: papers I and II by my main supervisor Kenth Lumsden; paper III was co-authored by my second supervisor Gunnar Stefansson. Note that in all the three papers, I am the main author.


**Paper III** “Integrated logistics platform – An empirical analysis from the port industry.” Accepted as a full paper to The 22nd NOFOMA Conference, 10-11. June. Kolding, Denmark, 2010
1.5 Terminology

The terminology that is used in the covering paper as well as in appended papers is presented below. The definitions for the following terms are from the “Terminology on combined transport” Economic Commission for Europe (2001), if not marked otherwise.

*Container* is a generic term for a box to carry freight, strong enough for repeated use, usually stackable and fitted with devices for transfer between modes. Most maritime containers are ISO containers. Two main standards exist in terms of length: 20 and 40 feet (6.10 and 12.20 meters), and one and two TEUs (twenty feet equivalent unit), respectively.

*Intermodal transport* is the movement of goods in one and the same loading unit or road vehicle, which successively uses two or more traffic modes without handling the goods themselves in changing modes.

*TEU* is a twenty-foot equivalent unit. A standard unit based on an ISO container of 20 feet in length (6.10 m) is used as a statistical measure of traffic flows or capacities. One standard 40’ ISO Series 1 container equals 2 TEUs.

*Intermodal Transport Unit (ITU)* is a container, a swap body and a semi-trailer suitable for intermodal transport.

*Transshipment* is the movement of ITUs from one means of transport to another.

*Feeder service* is a short sea shipping service which connects at least two ports in order for the freight (generally containers) to be consolidated or redistributed to or from a deep-sea service in one of these ports.

*Multimodal transport* is the carriage of goods by two or more traffic modes.

*Seaports*, in the contemporary role as members of supply chains are considered to be part of a cluster of organizations in which various logistics and transport operators are involved, with the ultimate aim to bring value to the final consumers (Panayides and Song, 2008).