Strategic port development: identifying business opportunities for the Port of Aalborg

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Abstract
This paper introduces a strategic framework for developing a port’s collaboration with its hinterland. This is done with the use of statistical information about import/export and with use of literature that support the goal of investigating new avenues of growth. The paper is based on empirical input from a port and on literature relevant to port development. A framework that guides the port through a series of steps to find possible new business ventures is provided. The framework is general and would benefit from a series of test cases; however, it provides a series of steps to increase a port’s integration with its hinterland based on literature.

Keywords: Port strategy, port development, supply chain, hinterland, integration

1 Introduction
Ports play a central role in many supply chains as a logistics gateway and intermodal hub. As this connection between ports and supply chains grow stronger, the development of ports will have a more proactive/integrated approach to supply chains (Beresford et al., 2004), especially those supply chains that have relations to the ports geographical hinterland. Another trend in port development is applying “agility”, where ports take a more proactive role in strategic development through market analysis and being more knowledge-based when approaching new customers (Paixão and Marlow, 2003). Most models and literature related to ports are done on the basis of cases in larger ports such as Rotterdam and Antwerp. This presents some challenges towards applying new strategies on smaller ports. There is a need for a new approach that takes into account that smaller ports needs to be more actively engaged in the development of companies supply chains, in the ports hinterland, i.e. a focus on specific products or product types to find avenues of growth.

(Pettit and Beresford, 2009) describes different port roles in terms of demand characteristics and ports transition from gateways to logistic hubs. The role of the port depends on the type of supply chain, as well as the supply and demand characteristics. This means that the functions and facilities the port should provide change with the supply chain type. An example of strategic port development is presented in (Van den Berg and De Langen, 2011) showing the case of the port of Barcelona. The development of Barcelona’s strategy has gone from a very port centric strategy to proactively supporting customers supply chain development. There is, however, still a need for a method that will support the process of choosing strategic direction.
This paper is part of an on-going project with the Port of Aalborg. The goal is to improve the port system’s logistics, regarding strategic, tactical and operational development, see MPC model (Vollmann et al., 2004). This paper will focus on strategic development of services provided by the port, in terms of attracting new customers. It will be done by creating an understanding of their needs and supporting these with relevant solutions. This analysis will be based on theory and import/export data from the ports hinterland.

In any industry it is sometimes difficult to find new ways and areas to grow in. Regarding ports, there are two general directions to go about finding more customers.

- Focus on current customers and find ways to increase the amount of activities current customers take to the port.
- Find new business partners by analysing potential markets. Are there any potential customers in the hinterland?

This paper will primarily focus on the latter.

One big motivation for smaller ports, especially in outskirt areas in Europe, is to engage in supply chain development/integration by improving the sustainability, both in regard to the environmental footprint but also ensuring the growth of the ports hinterland, hereby ensuring economical sustainability.

2 Research methodology

A generic marketing strategy process (Berry et al., 1995) has been adapted to the context of ports. One aspect of such a process is consumer analysis. Therefore, a detailed analysis of goods flowing in Region Nordjylland (based on export/import data from Danish Statistics) will be conducted. This is expected to result with identification of an industry, and/or company(ies) with intensive import and export profile. Second, as a part of generic market strategy process, an analysis of the competencies and capabilities of the Port will be conducted in order to identify the strengths and weaknesses. This will not be part of this version of the paper because of confidentiality.

Further analyses will be a basis for developing business cases that enhance the attractiveness of the Port and support sustainable logistic solutions, by identifying the most prominent industries in Nordjylland, resulting from the goods flow analysis.

As a result of this, strategic directions for Port of Aalborg will be identified, followed by suggestion for services Port of Aalborg should provide to their customers, e.g. extra feeder lines, extended container terminal, cross-docking or production facilities, in order to grow and develop.

3 Literature trends

This section will go through some of the general tendencies of port literature and relate this to the general issue of how to develop a port. This is done in order to create a marketing development framework based on literature.

**Port strategy development**

Port development as a research trend gained attention with the UNCTAD\(^1\) commissioning an investigation of how ports have developed historically and what level of maturity the port is on regarding the different services it provides. The UNCTAD model segments ports into three different generations; these generations signify a stage of development. The first generation is ports that acts as landlords and gateways, and do not participate in the supply chain other than this. Going to the third generation where the port operates as an integrated part of the supply chain, and as an active partner.

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(Beresford et al., 2004) reviews the UNCTAD model and the Workport model. The Workport model is a research project that seeks to find what impact developing technologies and other external developments have played in the development of ports. (Beresford et al., 2004) concludes that the UNCTAD model is too rigid, as it defines ports as being on one of the three generations. This is however far from the reality as some ports have some parts of the port system that are highly developed, and some that are very old fashioned. Further the shift from one generation to another is not done in jumps, but a more continuous manner.

According to (Brooks et al., 2010) small/medium sized ports need to focus on developing their coordination skills in terms of operations and collaboration skills in terms of other ports and companies. This can be seen as the key to converting a port from a gateway to an integrated logistics hub. (Bichou and Gray, 2004) have previously also described the concept of integrated port systems. Integrated port system is the integration of supply chain partners, in regards to cash flow, information flow and physical flow. (Bichou and Gray, 2004) also focus on the performance management (KPIs) as a tool for measuring and supplying incentive for more and better integration between actors at and around a port.

Regionalisation
Regionalisation is the process where a port develops into a defining transportation hub for an entire region, e.g. Hamburg, Rotterdam. Regionalisation does however still apply for smaller ports such as the Port of Aalborg, because it describes how to evolve the hinterland, and the functionality of the port in order to create a greater need for the products delivered by the port. Whether regionalisation also applies to single product type e.g. windmill wings, needs to be addressed and developed. Also, (Notteboom and Rodrigue, 2005) discuss some of the obstacles often present in this development, e.g. governance issues, capital raising, coordination and cooperation between partners. The Port of Barcelona (Van den Berg and De Langen, 2011) has recently developed their hinterland based on regionalisation, terminalisation and the use of inland terminals to support the port. This has resulted in Barcelona becoming the primary logistics hub in a larger geographical area. This has actually created a situation where the entire region have become more competitive and connected to the global trade channels.

Terminalisation
In connection with integrating and developing port and hinterland, there has been increased focus on activities being value adding, when goods pass through the port. The term, terminalisation, has gained awareness with (Rodrigue and Notteboom, 2009), where they present two main forms of terminalisation. Bottle-neck derived terminalisation is when the port is a delaying part of the supply chain, either by lack of resources or poor quality of planning and operations. The other form is warehouse derived terminalisation, which is e.g. when distribution centres are placed in a port to increase service level and decrease delivery time to the local supply chain.

An interesting observation by (Rodrigue and Notteboom, 2009) is that they see warehouse-derived terminalisation as way for ports to become a value adding part of a supply chain, as opposed to bottleneck-derived terminalisation. Bottleneck-derived terminalisation is when a terminal, because of either lack of capacity or low-quality operations is a delaying link in the overall value chain, when this is true the value chain adapts with change in the demand for the ports products. If this is the case customers will seek to find other ports or transport solutions or find new ways of transporting their goods. On the other hand, the warehouse-derived terminalisation is where a transport gateway, such as a shipping port is used e.g. as a regional distribution centre. This should be done as opposed to sending goods further into the supply chain, i.e. many local warehouses. The reason this adds value is because the need for stock is reduced with the number of storage locations. However, the warehouse derived terminalisation mostly applies to large continental ports. (Rodrigue and Notteboom, 2009) also points to the shift from bottleneck to warehouse terminalisation as a change from push to pull logistics.
Port system development

There is a trend of looking at the activities of a port more and more as a production system. One of the trends is the use of Lean and Agile as a way to make the port system more responsive towards the demand (Paixão and Marlow, 2003). (Pettit and Beresford, 2009) focus among other things on the demand and says that the type of demand defines which methods and concepts are relevant for the port subsystem in question. Stable/steady demand would benefit from Lean. Uncertain fast changing demand would benefit from QRM/Agile type setup. (Stahlbock and Voß, 2007) and (Stahlbock and Voβ, 2008) have done a thorough review of the different methods for scheduling and configuring the operations in the port production systems, such as terminals. Development of the port system is required as part of the general framework as this defines the performance of the port system and thereby the competitiveness of the port system.

These trends together with the wish for developing the business profile of the port gives a path for developing a framework for finding new business areas for a port. This framework will be based on the general concept of port development with gradual progress.

4 Framework for developing market strategy

Port strategy development, regionalisation, terminalisation and port system development are the general concepts that are referred to in most of the modern port logistics literature. The next step is to develop a strategy based on this terminology.

The port development suggests that ports have to move in a more integrated and ICT based directions, where actions and transactions are supported by a planning/execution system, (Keceli, 2011) and (Perego et al., 2011). Further there are few best practice papers available in literature regarding the transition from craftsman type approach to operations to industry type approach to planning and control in ports. This paper will attempt to integrate the port with the hinterland by gaining more knowledge about the hinterland and a method for filtering this knowledge into manageable volumes.

Regionalisation suggests focusing on the developing and supporting the hinterland, drawing activities to the port from the hinterland by a clear strategic focus on the needs of the hinterland. The need of the hinterland will result in a series of requirements or wishes which the port needs to accommodate. This leads to the concept of terminalisation, as it essential to provide the correct form of terminalisation in order to provide an attractive solution for existing and potential customers. In this paper regionalisation will be used as an overall approach for attracting and consolidating types of industry to a port.

Terminalisation focus on creating value adding and decreasing none value adding activities in the port system. Terminalisation is different from traditional Lean concepts as there is no real production in a port/terminal, and therefore there is need for a different approach to the different activities. Different needs for goods could be:

- Low lead time, distribution facilities, storage facilities, etc.

In terms of this papers concept terminalisation can be used to enquire companies and supply chains about their needs and wishes, and helping them configure their setup at port to fit their needs.

The framework will then focus finding types of goods from the hinterland currently transported by other means, which can be seen as the first step of pursuing regionalisation.

The first and most important factors are general measures like value, volume and weight, as these define whether or not it is optimal to transport goods through a port. These parameters are compared to how they affect other transport types, and especially high weight and high volume as these rules out e.g. air transport.

Framework steps:

1. Analyse import/export data or similar data sample.
2. Identify industry type
   - Based on e.g. weight, volume and value of goods
3. Examine industry
   - How do they transport now?
   - Does the product type have special transport requirements
     - Heavy duty, perishability etc.
4. Location of the foreland
   - Does it make sense to transport by ship?
5. Is the product a candidate for regionalisation?
6. Identify product
   - Is the product part of the port system or is it new?
7. Examine product
   - Demand analysis
     - Takt-time, delivery time, etc.
   - Special requirements for handling goods
     - E.g. cranes, ships etc.
   - Terminalisation of product
     - Can a port add value adding steps to the product's supply chain?
       - E.g. the intermodal solution a port provides or possible distribution facilities.
8. Is the product a candidate for terminalisation?
9. Examine the break-even point for new investments in port
   - Does it make financial sense to invest in the development of the port system?
     - New equipment etc.
10. Is a product already going through
11. Does the product require development of the port system, for a competitive advantage?
   - What are the capabilities of the port for that type of product?
12. Evaluate the consequences of introducing the product to the load of the port system.

These steps ensure correlation with the port literature, and thereby provide a solid framework and method for identifying new business opportunities for small/medium-sized ports, building on the possibilities in the hinterland.

5 Student project

Based on a student report that worked on finding new industry/product types the Port of Aalborg could use in their search for new potential customers. The project was done in collaboration with the marketing department at the Port of Aalborg. Further the students did surveys in some of the companies located at the port.

The report is based on three pillars; 1) Statistics analysis 2) Interviews 3) Theory.

The statistical data was obtained from the Danish central statistics bank, Dansk Statistik. The data is import/export data from the northern region of Denmark, Region Nordjylland, and the data is made up of weight, volume, value of the goods going in and out. The analysis made on the data was sorted after primarily weight, as this was the data type with most complete dataset. Volume and value were also considered, but the data samples were not good enough. The book (Navidi, 2008) was used as statistical reference.

1. Sort data according to Pareto law
2. Eliminate outliers
   - Data samples with erratic behaviour

http://www.dst.dk/
3. Eliminate product groups negatively affected by the crisis
   - Reasoning: Weak growth potential
4. Identify trend and stability
   - Identify trend and stability before the crisis
   - Identify trend and stability through visual inspection
5. Identify industry types
   - The type of goods and their transport needs
6. Identify companies
   - Acquire company information
   - For interviews regarding possibilities
7. Identify origin of import and export
   - Is the transport pattern suitable for ship/train/truck (intermodal) transport?

When this list has been run through at the port will be left with a clearer overview of how their hinterland is in regards to starting more collaborations regarding transport. The next step is to develop the potential product in terms of collaborating with the owner of the product and evaluating if potential investment needs in the port will have a reasonable return on investment.

The model used by the students is perhaps wrongly focusing on current crisis development. This can have the consequence that profitable business possibilities are lost, so in order to rule out a product type, it is necessary to establish a more statistical significant documentation for the product type. A crisis can often have a temporary effect on the demand, whereas if the same declining development has been going on since before the crisis it would be a more weighty reason.

Further the exclusion of statistical outliers is also problematic, as it can involve a lot of possible revenue. Instead the data sample should be expanded to more years and then use this to describe something about trends. And even if the data is just erratic the goods should still be examined, because if the goods represented by the outliers have a substantial value and a reasonable investment cost, it will still be an attractive investment.

The interviews conducted were mainly to find the strength and weaknesses of the port in regards to the output of the model. This is to evaluate where the port needs to invest.

The result of the report was a recommendation for focus the marketing on a certain industry type and a step by step model conforming to the above mentioned list.

6 Results and discussion

Port development is increasingly focusing on supply chain integration and here regionalisation, terminalisation and the use of industry type methods for planning and control is the main concepts in most current port literature. So a strategic framework is built on these concepts in order to integrate and expand a ports connection to its hinterland.

The most prominent result of this work is the method for identifying developmental/business opportunities for a small port, by introducing a framework and leverage parameters that enable decisions support for how an optimal port role can be in a given supply chain configuration.

If comparing the general framework based on the literature and the student project, there is a difference in the methods. The general framework focuses on the strategic aspect and on bringing an overview of the possibilities within different industries and products. Whereas the student project focuses on statistical analysis, which is also important, but it does not relate to the mechanics of recent trends in port development in the same way. This leads to the result being specific and dependent on where and when the analysis is done. The general framework provides a more logistics based method, where the statistical analysis is a tool for finding possible value and growth.
**Implications**
The possible implications are segmented into Managerial/Practical and Research implications.

**Managerial**
Seen from a manager’s perspective in a port, this framework would provide a method for identifying possible new customers in structured step-by-step mode. In terms of strategic management, the framework makes it easier to follow a certain strategy, e.g. deciding to focus on food or IT equipment. This is because the frame asks how to handle the specific types of goods.

**Practical**
With use of such a framework there will be an easier route for moving goods from truck to ship. This will have implications for environmental factors as the footprint for ship transport is lower.

Based on the case by the students, the port have also received input for their future marketing strategy, as they now have an overview of the potential in their hinterland.

**Research**
The research contribution of this paper is combination of the literature based concepts into a framework that enables port ↔ hinterland integration, by facilitating a marketing approach for the port.

Future work would require practical validation of the general model and adjustments for this model where practicality and other literature require it.

Future work would include a more detailed exploration of the steps of the framework. Describing in detail how each step is carried out, and exemplified with case studies.

Also, the Port of Aalborg’s strength and weaknesses regarding the capabilities of the port in will need to be analysed in order to say anything qualitative about what different product types require of the port.

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8 **References:**


