



Status report "Railport Skaraborg" – part of EU Interreg IVB project "Dryport – a modal shift in practice"



Kommunledningsförvaltningen Utveckling

Background and current status

Municipality of Falköping has for some time been actively working with a process regarding the establishment of an intermodal terminal in Skaraborg. The process has been driven in active collaboration with the regional industry and academia. As for the research part it has been the most active cooperation with the Gothenburg University, Chalmers and to some extent the University of Skövde. Furthermore, it has also been an ongoing dialogue with Region Västra Götaland, the Swedish Transport Administration and Port of Gothenburg who are our partners in the Swedish part of the Dryport project.

This report provides an overview description and account of what happened in connection with the Dryport project "Railport Skaraborg". The report outlines the activities since the project start. The report also account for project activities related to the other partners in the Swedish part of the Dryport project.

Based on the facts developed in the process, Falköping have, through expansion and investment in the existing intermodal terminal, established a new business that allows container handling in cooperation with the Port of Gothenburg. Added to this is also an expanded and improved terminal for timber handling and cargo handling related to the segments of chipboard, roofing and paving stones, bulky goods and logistics related to rail infrastructure work. All commercial activities are managed by private operators on municipality-owned infrastructure.



The activities are conducted under the concept "Skaraborg Logistic Center". The concept features a holistic approach on logistics and with intermodality as a base but also includes other services and activities in the area of logistics, such as service, inventory management and education.

In the ongoing second establishment phase the concept Skaraborg Logistic Center is under expansion and development. In collaboration with private and public partners, a new timber terminal (Stora Enso Skog AB) has been developed and the decision has been taken to establish yet another major timber terminal (Södra Skogsägarna). There are also plans ready for the establishment of a new major intermodal terminal with multi-functionality including Dryport functionalities. Concrete activities are also underway for

the start of a new container shuttle to the Port of Gothenburg, planned to start 2012/2013. This shuttle will during startup operate from the currently existing intermodal terminal. The re-launch of the shuttle is a prerequisite for developing and establishing the Dryport concept more clearly.

There are also a number of ongoing business discussions on establishing operations in direct connection to a new larger intermodal terminal. The second development phase is on a brand new, 70-acre establishment area called Marjarp. A new master plan for the terminal's location and design has been developed during the project. Planning issues, track solutions, water and wastewater solutions, etc., have been developed in collaboration with municipality of Falköping, the Swedish Transport Administration and others. Continuous dialogue has taken place with private stakeholders. The result now allows clarification/clearance of the trains on the municipality's industrial tribal tracks including handover yard, minimizing the risk of conflict with other traffic on the Western Main Line. The establishment area, tracks etc. have been planned and dimensioned to handle future expansion.



In the new area (Marjarp) there is a timber terminal built and funded by Stora Enso Skog AB. In connection to this establishment, the municipality has conducted tendering, procurement and construction of the new tracks, including the new handover yard etc. Construction of the new track facility was completed in November 2010 and has been a very big commitment by the municipality throughout 2010. Startup of the new timber terminal was the 15th of November 2010. The official opening of the new timber terminal and the new track facility was on the 5th of May 2011 with around a hundred special guests. The day began with a special logistics seminar.



The total level of investments related to the Dryport project, is approximately 65 million SEK.

Stora Enso's timber terminal, new tracks including the new handover yard, etc. creates the physical conditions for an additional timber terminal which will now be built by Södra Skogsägarna (investment from Södra Skogsägarna approximately 20 million and municipality of Falköping approximately 7 million). In direct connection to these terminals (including the new intermodal terminal) there are large areas for a major logistics park. Municipality of Falköping owns all the land in the area.

Through the upcoming investment by Södra Skogsägarna's timber terminal, the Dryport project has generated infrastructure investments totaling over 90 million SEK, creating a solid foundation for continued growth.

Visualization of the new area and pre-planning of the new Dryport terminal has been completed. Ramböll Consultants on behalf of the project worked out a solid design containing everything from electrified tracks, proposed track route, track lengths, connections between intermodal and timber terminals, road connections for building phase one and the final phase and visualized a logistics park adjacent to the intermodal terminal.



Our aim is to establish the new Dryport terminal in 2013.

The project has with Bo Aldurén as a consultant working and in collaboration with various stakeholders developed the final master plan for the area which now adds the definitive, physical basis for further development. This Master Plan has among other things taken into account the needs of track reserves for future expansion.

The intermodal terminal activities are developed in close collaboration with our partners, including the private terminal operator for the municipality-owned intermodal terminal, TBN Åkeri AB. TBN became the new terminal operator July 1, 2011 after acquiring the business from the terminal operator at that time ISS Trafficare AB. Before ISS Trafficare AB started operating the terminal 1 July 2009, Terminal Skaraborg AB, which was jointly owned by two local trucking firms, was operator.

Today's terminal operator, TBN Åkeri AB, has a strong local presence and is working to expand its business in different segments and invest progressively on the development of storage services and 3pl services. TBN Åkeri AB has previously served as a subcontractor to ISS Trafficare in Falköping.

Municipality of Falköping currently owns the warehouses that are on the currently existing intermodal terminal. There are ongoing negotiations to sell the warehouses to the municipality's industrial real estate company. The reason for this is to create a more professional property management in connection to terminal operations.

After a quieter period during the financial crisis we now notice a clear increased interest in the activities of Skaraborg Logistic Center. The financial crisis meant among other things that the container shuttle to Port of Gothenburg was closed down due to lack of profitability and this meant of course that the project had to be redirected somewhat.

2011 has resulted in a growing business in the existing terminal. New and increased activities includes increased traffic through round wood (e.g. Södra Skogsägarna entered the track area Stora Enso Skog AB left in connection with the launch of their new timber terminal), particleboard from Germany, stones and roof tiles from Germany, imports of steel pipes from the U.S. to Parker Hannifin, etc. The terminal now has traffic of about 1.5 trains per day on average, which generates considerable economic and environmental contributions for its operators and users. The increased interest means that efforts to continue to develop the terminal are more important than ever before.



The positive trend has been further strengthened during 2012. Skaraborg Logistic Center is now complemented by a new timber terminal on approximately 60,000 square meters built by Södra Skogsägarna. The area Södra Skogsägarna leave on the original intermodal terminal will then be reserved for a new planned container shuttle starting from year 2012/2013 and for wagonload handling. We have received further concrete business discussions during 2012. The discussions relate to storage of track materials, dedicated trains and wagon load traffic. With a positive outcome, these discussions require investment in both a new intermodal terminal and

adjacent warehouses. This development also includes an effort to analyze the possibilities for longer vehicles during haulage.

Business growth is managed within a structured infrastructure planning for both rail terminal surfaces and adjacent road system. Investments can thus be directly linked to industrial demand. The development of the Dryport concept can through this elaborate planning be developed in parallel to the establishment of the timber terminal and wagon load activities.



In 2012 BS Mekaniska has also started construction of a new large workshop adjacent to its existing operations at the roundhouse in Falköping. This plant is directly connected to the other terminals.

BS Mekaniska will build a 30x90 meter workshop with three railroad tracks at the roundhouse in Falköping. In this workshop Euromaint will be responsible for the maintenance of Västtrafik's new commuter train X61 planned to be in service by the end of the year. The establishment will generate some 20-25 new jobs in the railway sector in Falköping and strengthens the further development of Skaraborg Logistic Center.

Through a special government decision, BS Mekaniska could take over the some tracks from the state railway, which was one of the prerequisites for the whole deal. BS Mekaniska got support in this case by the municipality of Falköping and through the contacts which has been developed within the framework of the Dryport project and Skaraborg Logistic Center.

Discussions are also ongoing with BS Mekaniska on establishing a developed business for wagon maintenance. These are essential elements for the future development of the Dryport concept and Skaraborg Logistic Center.

Contact has also been established in 2011 and 2012 with the Port of Hamburg in order to develop the future possibility of direct connections from the continent to the west of Sweden and Skaraborg Logistic Center. Collaboration with partner Dryport Emmen/Coevorden may also lead to direct trains from the Netherlands in the future.

The EU-project

The steering group with representation from the Swedish Transport Administration (Banverket, Vägverket), Port of Gothenburg, Region Västra Götaland, Falköping and representatives from university has held ten meetings during the project period.

Kaj Ringsberg and Tomas Arvidsson has participated in the project as experts (specific knowledge providers). The latter mainly as marketer. Michael Malmquist was involved until autumn 2010 and worked mainly on strengthening contacts with Banverket.

The project has an agreement of co-operation with Chalmers University of Technology and Gothenburg University concerning the development of the projects different WP's. A certain group of academics are, in order with the agreement, discussing the projects current situation, its results as well as its future. These meetings have taken place twice a year. Assistance from the University and its scientist's has been essential in order to create a theoretical platform for the Dryport concept. The agreement with the University's has also resulted in necessary discussions and analyses in relation to the physical work, which has taken place in Falköping. An academic's report is described later on in this report.

"Railport Skaraborg" has used the Dryport projects 4 WP. Initially, the project focused on the physical design of the Dryport terminal with its connection rail tracks, goods reloading tracks and a brand new logistics centre. On-site design, tracks, connecting roads, location of distribution centre etc. have been important tasks in this work. With this work out of the way, we have been able to focus our work on possible market stakeholders. The Swedish Transport Administration has, within the Dryport project, performed a RDIF-project, which is described later on in this report.

"Railport Skaraborg" and the different WP's have overlapped in time. Looking at them separately, the work is completed as planned.

Market analysis (WP1)

We have performed a SWOT-analyse as for "Railport Skaraborg" (Roso V and K. Lumsden "The Dry Port Concept - The Case of the Falköping Terminal", The SWOT report for Banverket 2009). We have worked together with a number of private companies in order to find the right attributes for development of businesses in Falköping. One company (Benders) has during the project received MarcoPolo II funding to improve its transports and the terminal in Falköping has been part of this improvement. This has helped to write a report about business support models (Bergqvist, R "Affärsstödmöjligheter för överföring av gods från väg till järnväg" December 2008).



By the turn of the year 2009/2010, the current rail operator of container transports between Port of Gothenburg and Falköping re-signed. This caused a stand still in the container rail traffic in early 2010. The reason why the rail operator stopped offering the rail service was due to the recession.

Within the Dryport project, in co-operation with the former terminal operator ISS, a report has been written (Bergqvist, R., 2010, "Regionala utvecklingsmöjligheter för kombinerade transporter -ett Skaraborgs perspektiv", projektrapport, EU-Interreg IVB projektet *Dryport*). The purpose of the report is to enable a long lasting service when it comes to rail shuttle and sales activities.

During 2010 Green Cargo signed a rail operator agreement and at the same time the terminal operator ISS was working hard to improve the business at their terminal. Such improvements were for example better contact with the market. Green Cargos rail shuttle never had much success though. One reason was because the different goods owner's had found new means of transports during the stand still. Another reason was because of the tough competition (price and slot-times) between rail operators in the Port of Gothenburg. The rail shuttle was due to this never able to resume its services.

Since then, the members of the project have worked hard to find new and more competitive ways of transports. This together with an increased interest from a significant goods owner in the area, the chances of starting a new rail shuttle between Falköping and the Port of Gothenburg as of the turn of the year 2012/2013 are high. If agreements and the business side fall in to place, this rail shuttle will have a more steady flow of goods than earlier rail shuttles. This will give us the opportunity to keep implementing the different stages in terms of what has been decided in the Dryport project.

We have discovered that a terminal with only one purpose (containers) is more "vulnerable" than for example a multi-terminal. This has changed the focus of the development to a multi-terminal that could handle timber due to the growing market of bio energy. It is also important that the multi-terminal could house trailers and wagonloads.



Region Västra Götaland and Skaraborg Municipality have financed a pre-study regarding market analysis and cluster logistics. The study is focusing on Skaraborg and the market of particleboards. The result of the study will be presented during the autumn of 2012.

Organisation and Strategy (WP1)

We have been able to analyse current terminals in Sweden and other parts of the world in terms of organisation and strategy. It is not an easy topic and no clear solutions can be found.



During the time of the project we have come across certain local issues with the terminal operators in Falköping. The first terminal operator ended their

operations as of the 30th of June 2009. We have analysed the reasons, which made the operator to end their operations and it is obvious that the terminal must be used more than just for one purpose. With this in mind, we let several operators tender on the rights to operate the terminal. This gave us the opportunity to select the strongest operator with good knowledge and dedication in the Dryport concept. TBN Åkeri AB started operating as a new terminal operator as of the 1st of July 2011. ISS Trafficare AB, who had been the terminal operator since The 1st of July 2009, has now acquired TBN Åkeri AB. TBN Åkeri AB had been a supplier to ISS Trafficare in Falköping.

We have in our co-operation with Chalmers and University of Gothenburg been discussing the idea to establish a Regional Development Company in order to bring the logistical science closer to the industry's implementation. We have not yet had the opportunity to proceed with the matter but this will be attended to in the future.

During spring 2010 we established a part-regional Logistics Competence Centre (Skaraborg). This was made in co-operation with Chalmers, University of Gothenburg, University of Skövde, School of Falköping as well as help from private companies in the region. This Logistics Competence Centre will serve as a party for exchange together with the possible future Regional Development Company. The operations in the Competence Centre will in time be built on lectures, networking etc. The Chamber of Commerce in Skaraborg is a collaborator for this Competence Centre.

Falköping municipality employed a part-time marketer in the end of 2010 with the purpose to market the terminal for future establishments. The work has been successful and given way for a large number of possible arrangements of services for the future.



A collaboration together with the Dryport project's partner in Emmen has taken place, this in order to help the marketer with a job description. The reason for the collaboration is because Emmen has also employed a marketer. After the collaboration, the Dutch part-project has decided to found a political steering group, partly to gain approval for all decisions on a national level. This has taken place after studying our Swedish project.

A slight change in the budget has been made between Falköping municipality and Region Västra Götaland. The reason is the employment of the marketer. Other changes in the budget have been made between Falköping municipality and Port of Gothenburg.

Stakeholder Model and Terminal Services (WP1)

The work with the Stakeholder Model and Terminal Services has now started. The focus is to clarify the relationship between a port and a dryport, both economical and operational. This work started during 2010 in collaboration with the former terminal operator ISS Trafficare. The new terminal operator TBN Åkeri AB has an important role in this work. The terminal has signed a Railport agreement with Port of Gothenburg and is focusing on establishing a customs procedure for the start of the rail shuttle of containers between Falköping and Port of Gothenburg. This is planned to take place on the terminal sight with start during 2013. We think this is essential to establish the Dryport concept in relation to Skaraborg Logistic Center.

University of Gothenburg and Chalmers have studied the effects of a clearer co-operation between terminals when it comes to service offerings and the terminals roles in a more developed logistics system. The scientist's have also studied the conditions of sequencing, buffering, ramfreight etc.

A thesis has been written about the demand of services for Skaraborg Logistics Center (Skaraborg Logistics Center – En undersökning av efterfrågade tjänster från en kombiterminal med Dry- port, 2011). Violeta Roso has been the tutor of this thesis.

Thesis' about Public-Private Partnerships as well as the development of Skaraborg Logistic Center has been written in coordination with University of Gothenburg under the supervision of Rickard Bergqvist.

IT and operations (IT och drift) (WP3)



Final report Dryport RFID – Starbright consulting, Per Sjöholm

The project aim is to develop, design and set effective Hinterland intermodal freight transport nodes - Dryports that are fully integrated with the

Gateway's freight handling systems, to adapt a public concept to a private sector model, to monitor CO² effects and to integrate Dryports into the EU Motorways of the Sea concept.

In a fully developed Dryport concept the seaport controls operations, but the terminal itself must not serve only one port, as it can (should) be part of a larger network. Dryports are used more consciously than inland terminals in order to deal with increased (container) flows, with a focus on security and control through information and communication systems. The real difference is that the gates of the port are extended and that the forwarder sees the Dryport as an adequate interface towards port and shipping lines.

Dryport RFID

One highly crucial factor when creating efficient transport flows is the smart utilization of information technology. Dryport RFID has its basis in the potential of improving information sharing between intermodal supply chain actors as well as providing means to gain better control of rail transport movements between seaports and dryports.

Dryport RFID was initiated in the fall of 2008 with process mapping of the, at that time, existing supply chain activities involved when transporting an intermodal container between a seaport and a hinterland dryport. The outcome of the initial project phase shed light on the high degree of manual work involved in the supply chain administration. A potential for process improvement across the supply chain soon became evident.

The following project phase (2009) further identified and defined the supposed effects of an automated handling of the intermodal transport flows, such as production streamlining and deviation management. During the same time, the Swedish Transport Administration completed a pre-study covering which RFID standard to use to identify rail wagons in the Swedish rail network. STA became project members and the decision was taken to plan for a demonstrator based on the RFID and information standard designated by STA on rail wagon level.

In 2010 the project focused on the planning of such a demonstrator in the transport relation between the Port of Göteborg and the dryports in Örebro and Eskilstuna operated by the rail operator Tågfrakt and terminal operator m4 respectively. The demonstrator was then performed during the fall/winter of 2011.

The demonstrator and the project as a whole show possibilities and explore gains in the transports between hinterland terminals and seaports through efficient information sharing in the intermodal supply chain by the application of RFID and standardized communication.

Summary

Project scope

The demonstrator is based on the previous phases in the project; from the initial process mapping of intermodal rail transports to/from the Port of Göteborg, further on to the effect assessments of an RFID system and to the actual preparations of the demonstrator.

The demonstrator is a close co-operation between the port, the rail operator (in this case also one of the dryport operators) and the STA. The demonstrator aims at creating an infrastructure and information base by implementing a set of RFID readers along STA's railway tracks, RFID tagging of railway cars and the use of the traceability web application developed in the project. The ultimate aim is then to verify the theoretically mapped effects from a shared RFID system in railway transports.

Connections to other organizations and/or projects

STA, together with the standards organisation GS1, has a strong focus on creating a national and European RFID standard in the railway sector. STA has initiated and participated in a number of pilots and projects within the area during the last couple of years. Dryport RFID is an important project from STA's point of view since it provides the authority with valuable evaluation data regarding hardware as well as software and information transactions. Partly based on the experiences from the Dryport RFID demonstrator, STA will begin to implement its RFID infrastructure in Sweden during 2012.

Conclusive experiences

The project has implemented six RFID read points along the distance between Gothenburg and Örebro. During the demonstrator three read points have been utilized. The project has produced a web-based application "Dryport RFID web" which has been utilized during the demonstrator to visualize the RFID information from the RFID tagged rail wagons. RFID has only been applied on rail wagon level and not on container or other load unit levels.

The demonstrator indicates positive effects of using RFID technology in rail transports. It is evident that access to a shared data set between different parties involved in the rail transport and handling operations between a seaport and a dryport is of mutual interest. The choice of rail traffic in the demonstrator has involved limitations in terms of successfully evaluating the effects of the system. The designated rail operator is considered "best-in-class" in terms of administrative routines and operational handling, why effects identified earlier on in the project have been difficult, if at all possible, to identify.

The RFID technology in itself has proven to be relatively trustworthy, but cannot be considered 100% accurate based on the demonstrator findings. STA has carefully noted this information and will continue to work on solutions on how to eliminate deviations to occur in the future.

The project was terminated in February 2012. All involved project parties can see benefits of utilizing the technology in a wider scale, but no decisions have been taken on further steps.

Modelling and simulation of the terminal (WP2)



The procurement and the work with the visualisation of the new logistic area in Falköping are now completed. The outcome shows the current space being used as well as in a visionary perspective. The outcome has also become a tool of which is being used to develop the area the utmost concerning used space, future expansions, interaction between different traffic and terminals etc.

The visualisation is the foundation both for future planning as well as marketing the terminal in a purpose of founding businesses. A discussion has taken place about possible partnerships for collaboration and business support and Falköping Municipality have employed a marketer. The municipality's Manager of Public-Private Partnership's have also been involved in the work of developing this part of the business. Data from the visualisations have been published on the municipality's website in order to explain the ongoing for the public and what the project will come to be.

The visualisation and the design were studied closely in a Dryport workshop in Falköping 1st-2nd of June 2010. The suggestions for this came from an international project group meeting in Manchester in March 2010 where Skaraborg Logistic Center was suggested to be the form of discussion for how to design a Dryport site.

All data and information can be found on the projects website www.skaraborglogisticcenter.se.

Physical planning of the terminal (WP2)

Falköping municipality has introduced a plan for the area of the terminal including water and draining. The first planning of the area was set and determined during spring 2011. The next planning should be ready in the second half of 2012. The work has been connected to the visualisation project (see above). Stora Enso Skog AB has established their terminal for timber and Falköping municipality together with the Swedish Transport Administration (rail department) have come up with a good solution of rail track connections. This rail track connection is necessarily for being able to

develop the new Dryport, which is the main purpose with this EU-project. The rail track connections and the rail terminal were finished in November 2010. The next establishment in the area will be a new timber terminal, which will be built by Södra Skogsägarna and is planned to be ready by the turn of the year 2012/2013. Business discussions are being held at the moment regarding different system solutions for the railway and this will help establishing a new terminal and on site warehouse.

The Swedish Transport Administration (road department) has together with Falköping municipality analysed the traffic on the roads to and from the area of the Dryport, partly for the new infrastructure plans for the area. The work has resulted in a plan to strengthen the surrounding road infrastructure as well as the initial development of the terminal. First priority was the need for lighting, which was completed during the summer of 2011. A pre-study regarding a new roundabout in connection to the terminal has been done during spring 2012. The Swedish Transport Administration (road department) is working with consultants for these tasks, all within the boundaries of the EU-project.



Environmental interface (WP4)

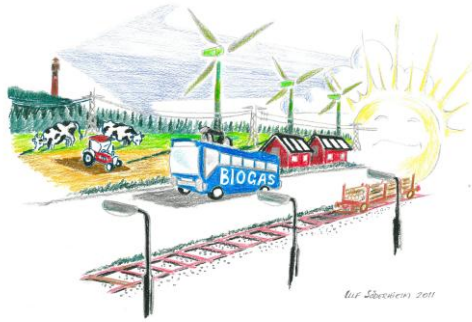
A first study of the environmental perspectives has been made in connection to the establishment of the Dryport in Falköping (Bergqvist, R., 2008, ”Railport Skaraborg – ur ett miljöperspektiv”).

Together with the work with the physical planning and the visualisation project for the terminal, we have also included the necessary conditions to visualise the logistic area from a sustainable point of view.

Falköping municipality has been working with eco-labelling the terminal and which conditions necessary to fulfil the labelling. This work has occurred together with the Swedish Society for Nature Conservation and their eco-labelling “Bra Miljöval”. Handels Consulting has made the study and presented the work in a report called ”Kartläggning av kommunens kombiterminals miljöpåverkan”.

Falköping municipality received 12 million SEK from the Swedish Society for Nature Conservation for their physical investments in the terminal. Final decision about the support was in 2011 when the municipality could present

a certain grade of environmental friendliness following the development of the terminal.



Related projects

Chalmers and the University of Gothenburg have received funding from Region Västra Götaland regarding a project called “Gröna Korridorer” (Green corridors). This project analyses the possibilities to drive truckloads between the terminal and larger goods owners with lengths above the maximum allowance. This will benefit the efficiency in the whole value chain (value added services) as well as decrease the environmental impact.

Region Västra Götaland and the County Administrative Board have financed a project concerning co-ordinated goods distribution. The project’s goal is to make the local distribution more efficient through a higher degree of co-ordination, planning and a physical distribution central as a hub. The project has positive effects on the environment and enables local producers to reach the market. This project has a close connection to the project “Railport Skaraborg”. Operations started in spring 2012 and will be assessed after 2 years.

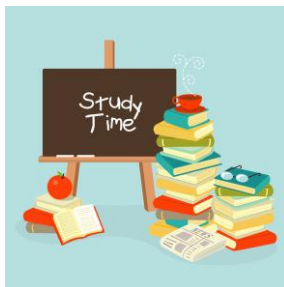
The Dryport project – research report

Rickard Bergqvist* and Violeta Roso**

**Logistics and Transport Research Group, Department of Business Administration,*

School of Business, Economics and Law at University of Gothenburg

***Logistics and Transportation, Chalmers University of Technology, 412 96 Göteborg, Sweden*

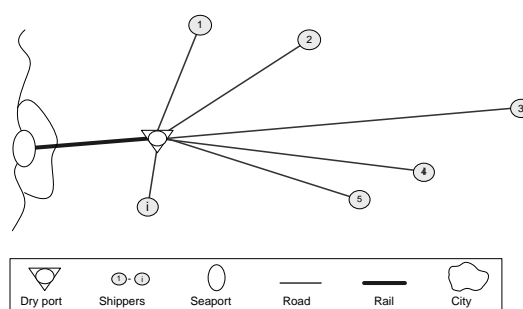


This report is a summary of the outputs produced by School of Business, Economics and Law at University of Gothenburg and Chalmers as a part of EU project Interreg IVb which is a cooperation project between UK, Belgium, the Netherlands and Sweden; that aims to develop, design and set effective inland intermodal freight transport nodes -dry ports- that would be fully integrated into the seaports' freight systems, to adapt a public concept to a private sector model, to monitor CO² effects and to integrate dry ports into the EU Motorways of the Sea concept. A short discussion about the concept of Dry Ports act as point of departure, followed by a short description of Skaraborg Logistic Center and a summary of publications related to the Dryport project.

Dry port concept

Differentiation between “conventional” transshipment terminals and the various types of large scale intermodal logistics centres, as well as aims on finding a unique definition for the same has been an issue among researchers as well as practitioners for some time now. The problem is that the concept for intermodal logistics centres varies from country to country, although there is a common background: it should contribute to intermodal transport, promote regional economic activity, and improve land use and local goods distribution (Höltgen, 1995). These features may also be applied to a dry port which is an inland intermodal terminal that has direct rail connection to a seaport (Figure 1), where customers can leave and/or collect their goods in intermodal loading units, as if directly to the seaport (Roso et al., 2008). As well as transshipment, which a conventional inland intermodal terminal provides, services such as storage, consolidation, depot, track and trace, maintenance of containers, and customs clearance are available at dry ports.

Figure 1 Basic idea behind the dry port concept



The basic idea behind the concept of dry port is shift of flows from road to rail resulting in reduction of road transports to/from the seaport once a dry port is implemented in the transport system (Figure 1). The quality of the access to a dry port and the quality of the road–rail interface determines the dry port's performance. However, the quality of inland access depends on the behaviour of a large variety of actors, such as terminal operators, freight forwarders, transport operators, and port authorities. Scheduled and reliable high-capacity transportation to and from the seaport is essential. Implementation of a close dry port in a seaport's immediate hinterland

increases seaport's terminal capacity that might result in increased productivity since bigger container ships will be able to call at the seaport. With dry port implementation seaport's congestion from numerous trucks is avoided because one train can substitute some 35 trucks in Europe (Roso, 2007). With reduced number of trucks on the roads congestion, accidents, road maintenance costs and local pollution are reduced as well. A dry port may also serve as a depot, empty containers storage. Road carriers would lose some market share but in some countries where long trailers are not allowed to pass through cities for safety reasons a dry port implementation is a good solution, if not indispensable, from their perspective as well. The benefits from distant dry ports derive from the modal shift from road to rail, resulting in reduced congestion at the seaport gates and its surroundings as well as reduced external environmental effects along the route. The distant dry port extends the gates of the seaport inland, with shippers viewing the dry port as an interface to the seaport and shipping lines. However, Ng and Gujar (2008) indicate that the current solution, where shippers often choose dry ports located closest to their production base, is not necessarily the optimal solution in terms of the minimisation of transport cost, mainly due to government policies and dry port's inability in providing value-added services needed to the shippers. The implementation of the dry port is not the only factor in relieving seaport congestion or improving seaport inland access; however, it is a significant component in improving seaport productivity (Roso et al., 2008). With dry port implementation CO₂ emissions should decrease, congestion at seaport terminals and seaport city roads should be avoided, and the risk of road accidents reduced. Besides the general benefits to the environment and the quality of life by shifting flows from road to rail, the dry port concept mainly offers seaports a possibility to increase the throughput without physical expansion at the site (Roso, 2007).

The case of Falköping and the port of Göteborg

The port of Göteborg is the largest container seaport in Scandinavia, handling more than 900000 TEUs a year (Port of Göteborg, 2010). The port is no railway operator but a very important driver for developing the Swedish intermodal system in general and rail based hinterland services in particular. The port works on increase of its container rail volumes by cooperating with other actors of the transport systems; today there are 24 rail shuttles for different destinations that run daily services from/to the port (Port of Göteborg, 2011).

Swedish inland terminals range from small loading/unloading platforms, handling no more than 2000 TEU/year, to large freight centres offering a wide range of transport related services (Roso et al, 2006). As there are differences in sizes of terminal areas, in TEUs handled a year, or in range of services offered there are also differences in organisational forms and types of ownerships of the same (Roso et al, 2006). Most of Swedish inland terminals are owned either entirely by a municipality or jointly by a municipality and commercial actors within the transport system, such as rail operator or shipper. The latter is the situation with Falköping terminal. In early 2000 came a proposal from the Falköping municipality for implementation of an intermodal terminal in the area due to existing

volumes already being transported to the port by trucks. The very first and expected problem, apart from financing, was a suitable location for the terminal. However, it was not until the end of 2006, when Swedish biggest forest products company, StoraEnso, showed interest in establishing a terminal in the area, that tangible work on building the terminal started. Once the location was chosen and the terminal built, in 2007, new problems, this time unexpected, arrived; such as deficient volumes, further development issues, competition with another terminal in the area, and collaboration with the Port. The terminal is situated 124 km rail distance from the port (

Figure 2). The rail shuttle operates four times a week in both directions, reaching approximately 11 000 TEU a year, however nowadays the terminal handles somewhat less. After further development and extension of rail sidings increase in volumes is expected and therefore one more shuttle a week should be introduced. So far the terminal offers services of transshipment between rail and road, road hauling and storage of containers. Future plans are to develop the terminal from the conventional one to one serving as a dry port, which means offering further services such as customs clearance, maintenance of containers, warehousing as well as some extra services for Stora Enso. The customs clearance is feasible since commonly there is no need for physical inspections of containers and therefore no need for presence of customs officers at the site, except in special circumstances.

Figure 2 Southwest Sweden – Falköping terminal position



From an environmental perspective shift of transports from purely road to intermodal road-rail by use of the terminal would result in significantly lower environmental effects. This intermodal solution would lower emissions such as CO, NO_x, HC, etc; in particular CO₂ emissions would decrease for approximately 900 tons a year with today's volume (Bergqvist, 2005). If 70% of potential goods in the region would be handled via the

terminal, as it is hoped and expected, the CO₂ emissions would decrease for approximately 2200 tons a year (Bergqvist, 2005). However, emissions are not the only environmental impact that would be decreased by reduced number of trucks on the roads, there is road congestion, potential for road accidents as well as road maintenance costs that would be reduced as well. The terminal offers possibilities for new services to new customers in the region as well as attracting new customers to the region. Apart from offering service to the port of Göteborg such as storing, maintenance and customs clearance the terminal might also offer some other added value services that would be more affordable for the final customers to perform at the terminal than in the port. Furthermore there is Volvo that nowadays has about 7% of the flows in the region and therefore is potential partner/customer as well. Stora Enso is going to establish a well functional terminal in the area, for storing and transshipment of timber, to be operative in 2009. However the company already has a small non paved terminal in Falköping and therefore the place is very appropriate for further development. Moreover there is Göteborgs Energi's interest in establishing own terminal for timber preparation as well.

The results of the SWOT analysis are summarized in Table 1.

Table 1 Results of the SWOT analysis

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> • Lower environmental impact • Suitable location • Infrastructure is in place • Direct rail link to the port • Fast service • Operator/owner is very determined • Creates new jobs in the area • Short distance to the port 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> • Insufficient marketing • Lack of awareness about new customers • Coordination between the actors • Dependence on the sole port traffic • Short distance to the port
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> • Increasing interest in intermodality • Potential volume growth • Higher shuttle frequency • New customers in existing market • New markets • New services for new markets • New services for the port 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> • Overall economic crisis • Port of Göteborg facing ownership issues • Another terminal in the vicinity

Value added service

A survey conducted on exiting and potential Falköping terminal's customers indicates that well functioned IT system is considered to be the highest importance for the customers followed by sequencing, stripping and stuffing of containers and consolidation. However, the most important attributes recognized by the customers for the terminal are reliability and the price for the service. Inclusion and expansion of different value added service will play an important role in further integration of intermodal transport. A service provider can include value added service in his service portfolio in order to be able to offer his clients different types of benefits. However, these services seem to have no value if there are deficiencies in the basic services (amount or quality). The value of service a provider offers its clients can lie in the reduction of costs, or increase the customer's revenues (by influencing the service levels). Cost reductions can be achieved both in the providers operation and at the shippers side. And this needs further investigation to describe the effects and where they occur. However, it is clear that it is not only the shippers that benefits directly from the use of value added services the providers may also reduce their costs by economies of scale.

Skaraborg Logistics Center has been the focus of much research as illustrated below for the different publications. Much interesting research has been generated in the Falköping context over several years at the same time decision-makers have showed responsiveness to current research.

Summary of publications and research

In this section research related to the Dryport project is presented and summarised. The research is structured on the basis on the international publications it has produced.

- Bergqvist, R. and N. Egels-Zandén, 2012, **Green Port Dues - The Case of Hinterland Transport**, submitted to *Research in Transportation Business & Management*.

Summary

As the economy becomes more and more specialised and globalised, the importance of logistics increases. In these global transportation systems, seaports play a key role as transshipment hubs. With seaports incorporating and coordinating hinterland logistics activities with the activities of the port, ports' strategies influence decision making of logistics service providers both locally and globally. From an environmental and social perspective, seaports are thus key actors in transportation systems and many ports have also developed corporate social responsibility (CSR) strategies. This paper examines one such strategy – “green” port dues – showing how integration of hinterland logistics and ports opens the possibility for differentiated port dues as a tool to internalize externalities in the transportation systems and ensure hinterland transport effectiveness.

- Bergqvist, R., Wilmsmeier, G. and K. Cullinane, 2012, Introduction – A Global Perspective on Dryports, in R. Bergqvist, G. Wilmsmeier and K. Cullinane (eds.), *Dryports – A global perspective, challenges and developments in serving hinterlands*, Ashgate Publishing Limited, forthcoming, ISBN 978-1-4094-4424-4.

Summary

The importance of logistics increases as the economy becomes more and more specialised and globalised. Changes in the business environment like globalisation, production patterns, urbanisation and environmental awareness further support this trend. Since production and logistics arrive at the consensus of producing every individual product or module in regions where the comparative advantages are the greatest, there is an increased focus on hinterlands and logistics. Traditionally ports have been in the focus as logistic centres of maritime logistics chains, but changes in production patterns are supported by the development of rapid transport of goods over long distances.

As a result the relevance of port hinterland transport, high utilisation of transport resources and infrastructure through the consolidation of goods flows and extending the influence of ports in their hinterlands to increase their competitiveness has become even more important. This development emphasizes the connection between the intra-regional transport systems, and the larger inter-regional transport systems, since this is where much of the consolidation of freight flows occurs. From an environmental perspective, it is untenable to await direct solutions based on significant technological breakthroughs in the field of alternative energy sources or increased engine performance. Therefore, other more indirect measures are useful for improving the transportation system. The increased utilisation of transportation resources, coordination and consolidation of goods flows and increased use of more environmentally friendly means of transport and intermodal transportation are examples of such indirect measures which rest upon logics of collaboration in a regional setting.

Global container trade and particular container ports are facing challenges related to capacity expansion, environmental considerations, community restrictions at the same time freight transport and logistics functions are more and more integrated into global supply chains.

The challenges for container trade and liner shipping have moved inland from the sea, first to the ports and then to the hinterland (cf. Notteboom, 2002). The increased scale of ships puts more pressure on ports as it has to handle large volumes of load units during a short periods of time. Being able to effectively and efficiently distributed the load units to and from the hinterland is crucial for overall efficiency at the ports and in the end for the whole supply chain. As a consequence, costs and lead time are increasingly being generated in the smaller routes rather than in the arteries (Bergqvist and Woxenius, 2011).

The use of high capacity transport modes, such as trains and barges, is one measure to increase the capacity of hinterland transport. Both rail and inland waterway presents some advantages in terms of decreased environmental impact, economies of scale, faster throughput in ports and less delay related to road congestion. Maximising the hinterland effectiveness and efficiency is

a matter of finding the optimal mix of transport modes and setups rather than identifying a single service or solution.

Improving the hinterland connectivity of ports has become more and more important for addressing today's logistics challenges. The hinterlands of ports have been able to expand due to containerization in combination with intermodal transport possibilities ([Song 2003](#)). As hinterlands expand, the hinterlands of different ports naturally overlaps and inter-port competition intensifies (cf. [Notteboom and Winkelmans 2001](#); [Cullinane and Wilmsmeier 2011](#)). The intensified competition in combination with the complexity of hinterland transport and associated infrastructure and strategic transshipment nodes have made hinterland connectivity an essential part of ports distinct value propositions (Bergqvist, 2011a). Potentials for more effective and efficient hinterland systems, associated with better collaboration and coordination in the supply chain, gives hinterland logistics and associated concepts, such as dryports, an obvious role in designing and managing global supply chains.

The development worldwide concerning “dryports” in its various forms, functions and strategies, addresses many of the challenges facing contemporary logistics and ports. The concept of dryport is more often used in practice at the same time it is given more scientific attention. In 1982, the UN first used the term *Dryport*, underlining the integration of services with different traffic modes under one contract (Beresford and Dubey, 1990). A ‘dryport’ was defined as an inland terminal to and from which shipping lines could issue their bills of lading (UNCTAD, 1982). The concept has evolved from merely focusing on the container segment to other market segments as well, focusing more on the services originally offered at the port but moved inland (Woxenius and Bergqvist 2011; Cullinane and Wilmsmeier, 2011). Parallel to the development of the concept in practice and theory, numerous definitions have been developed (see, for example, Rodrigue et al 2010, Van den Bossche and Gujar 2010; Cardebring and Warnecke, 1995; Ng and Gujar, 2009; UNESCAP, 2006; Roso et al, 2009; Jaržemskis and Vasiliauskas, 2007; Harrison et al, 2002; Leitner and Robert Harrison, 2001; Walter and Poist, 2003). Although, alternative definitions exists, there seem to be a consensus in the importance and potential dryports have to improve cost-efficiency, environmental performance (e.g. congestion, pollution, safety, health, noise) and logistics quality of hinterland logistics (cf. Bergqvist and Woxenius, 2011; Roso et al, 2009; Padilha and Ng, 2011).

This book is comprised of case studies and state of the art examples from measures taken in different parts of the world with varying economic, social, institutional and environmental realities that show the complexity and diverse approaches of this phenomenon.

The benefits associated with dryports and intermodal transport are usually within the categories of cost-efficiency, environmental performance and logistics quality (Bergqvist; 2011b). As the benefits are enjoyed by many stakeholders, the interest into the concept of dryports is multifaceted. Public actors and decision-makers often associate the dryport concept with

improved competitiveness of local and regional businesses, increased attractiveness of the region and sustainable logistics development (Mackenthun and Nobel, 2011; Bergqvist, 2008). As a result, the development of dryports is often a process involving public actors, often in partnership with private actors, i.e. public-private partnerships (Mackenthun and Nobel, 2011; Bergqvist, 2008). The involvement of public actors raises some interesting issues related to the intuitional framework. Tendering, concession agreements, independency of terminal operations, transparency, ownership, responsibilities and roles are examples of difficult aspects that every development process of dryports needs to consider (Bergqvist, 2011b). Case studies suggest that these issues look quite similar regionally (e.g. Europe) as well as globally, however, they are addressed in many different ways (cf. Mackenthun and Nobel, 2011; Shah, 2011; Bergqvist, 2011b; Roser et al., 2011).

Public-private partnerships have the potential to balance the development process of dryports by accounting for objectives and benefits from both a private and public perspective. The partnership may with great advantage utilise the characteristics and benefits of the different actors, e.g. the private actors' closeness to the market and the public actors' access to infrastructure investment funds and long-term perspectives to name a few. The issue of aligning the different time-perspective by different actors and aligning them with the funding sources and planning schedules is an important part of a successful development process (Monios and Lambert, 2011; Bergqvist, 2008).

In order to cope with these challenges and aspects a number of key factors have been identified, e.g. local enthusiast, formal arrangements and operational framework (Bergqvist, 2011b), PPP (Mackenthun and Nobel, 2011), information exchange (Furió, 2011), port connectivity (Kunaka, 2011), aligning stakeholder objectives with funding sources and planning schedules (Monios and Lambert, 2011).

The concept of dryports are continuously developing and new generations of dryports are emerging with an increasing number of sophisticated services being offered (Kunaka, 2011; Gille and Bozuwa, 2011; Mackenthun and Nobel, 2011; Bergqvist, 2011b). The increasing number of dryports and the interest to collaborate and explore market opportunities of intermodal transport between each other have led to an increasing interest and pressure on the interconnection between nodes, i.e. the railways, and the overall transport efficiency and capacity (Kunaka, 2011; Bergqvist, 2011b). The concept of dryports has generated great benefits globally and the concept has proven to provide logistics efficiency, low environmental impact and high logistics quality. Regional and local transport policies and infrastructure plans, needs to consider and address contemporary challenges associated with the development of intermodal transport in general and dryports in particular, deriving at the best incentives for developing effective, efficient and sustainable transport systems. In this context, it is important to recognize that dryports are a global phenomenon with local characteristics.

- Bergqvist, R., 2012, Hinterland Transport in Sweden - the Context of Intermodal Terminals and Dryports, in R. Bergqvist, G. Wilmsmeier and K. Cullinane (eds.), *Dryports – A global perspective, challenges and developments in serving hinterlands*, Ashgate Publishing Limited, forthcoming

Summary

This chapter illustrates the historical development of hinterland transport in Sweden and tries to identify and describe important factors related to successful intermodal terminal developments and operations in Sweden.

The development of dry ports and associated rail shuttles in Scandinavia has been remarkable during the last decade. The central components in the system are Port of Gothenburg (PoG) and 26 hinterland rail shuttles to 23 different destinations and dry ports in Scandinavia. Each shuttle has a frequency of at least three departures per week in each direction.

Parallel to the development of the hinterland transport system, an intense establishment of intermodal terminals and dry ports has taken place. There are numerous reasons for this, firstly, the competitiveness of intermodal transport has increased and also the interest of market actors to invest in intermodal transport services and terminals. In Sweden, many municipalities view the development of intermodal terminals as a mean to attract business to the region. Parallel to the development of an intermodal terminal, a logistics park for logistics-related establishments is often planned. The vast interest by municipalities to develop intermodal terminals and dry ports have contributed to the growth in the intermodal transport segment at the same time it has profoundly changed the institutional and regulatory framework of intermodal terminal development as a new type of infrastructure owner entered the system. The Swedish Transport Administration has been required to develop a specific strategy and framework related to the issue. Overall, the involvement of new actors into the system has increased and contributed to new innovative solutions and services that hopefully will ensure the future development of a cost-efficient and sustainable hinterland transport system.

- Bergqvist, R., 2012, Hinterland Logistics and Global Supply Chains, in D-W. Song and P. Panayides (eds.), *Maritime Logistics – A Complete Guide To Effective Shipping And Port Management*, Kogan Page, ISBN: 9780749463694

Summary

As a shipper, the hinterland transport system is a crucial part of your supply chain. The modes you select, the supplier choice and the long-term perspective of your strategy are all important considerations when designing an effective and efficient hinterland transport system and supply chain strategy. In order to make the right considerations, it is important as a shipper to understand that hinterland logistics have unique characteristics and dynamics.

As a logistics service provider, the hinterland transport system is no longer an isolated part of the supply chain, but an integrated part of your total network and total offerings. An attractive logistics service provider must be able to manage both horizontal and vertical coordination and collaboration in the supply chain. Horizontal coordination is done by offering single, multiple and combinations of transport modes; vertical coordination is carried out by integrating different actors in the supply chain, such as hauliers, shipping lines, ports, terminals, infrastructure manager, etc. Only by doing so is it possible to manage the inherent advantages and disadvantages of individual transport modes and manage the coordination challenges between actors.

In conclusion, hinterland logistics have become an integrated part of global supply chains and their management. An in-depth understanding and knowledge of hinterland logistics, and its unique conditions in each situation, are a crucial part of effective design and strategy regarding transport systems, and ultimately of efficient global supply chain management.

- Cullinane, K., Bergqvist, R. and Wilmsmeier, G., 2012, The Dry Port Concept – Theory and Practice, *Maritime Economics and Logistics*, Vol 14, no. 1, pp.1-14.

Summary

Although no clear consensus has been produced as to an unequivocal definition of a ‘dry port’, the content of this Special Issue does highlight the diverse range of possible ‘dry port’ scenarios, with the ‘extended gate’ form emerging as the ultimate manifestation of the ‘dry port’ concept. Most importantly, the content also reveals a number of key common features of ‘dry port’ development:

1. With the exception of the pure ‘extended gate’ version of the concept, a ‘dry port’ does not necessarily have to be initiated, controlled, owned and/or operated by the port(s) to which it is linked.
2. There is scope for both private and public sector involvement in all aspects of ‘dry port’ development and implementation, with most applications in practice exhibiting quite significant degrees of public-private cooperation, collaboration or even partnership.
3. Depending on the objectives of the entity that is driving the initiative, the justification for ‘dry port’ development may be purely financial (profit maximisation) or economic (social welfare maximisation). However, in both cases, environmental considerations are exerting an increasing influence and are becoming an important *raison d’être* for the implementation of the ‘dry port’ concept; hence the focus on intermodal solutions in most of the literature, including this Special Issue.
4. Irrespective of the extent of its direct involvement, government has a role to play in formulating appropriate policy and regulatory controls to both foster and facilitate suitable ‘dry port’ developments, while delivering on environmental goals.

5. The success or failure of ‘dry port’ projects can be commonly attributed to the inadequacy of policy and/or regulatory regime and/or to the existence of institutional barriers which prevent the efficient and effective operation of a ‘dry port’.

Ultimately, however, it is apparent that the ‘dry port’ concept will continue to evolve as it is increasingly applied across the globe as a response to the challenges facing contemporary logistics in general, and ports and their hinterlands in particular.

- Wilmsmeier, G., Bergqvist, R. and Cullinane, K., 2011, Ports and hinterland – evaluating and managing location splitting, *Research in Transport Economics*, V. 33, No. 1, pp. 1-5.

“Lines of fracture, inversions, splits, rifts: there is, as it were a line beyond which, for every expanding system – every system which, by dint of exponential growth, passes beyond its own end – a catastrophe looms.”
(Baudrillard, 2005: 191)

Ports have traditionally been facilitators of international trade and port development has exhibited a strong correlation with international trade growth. Re-emerging economic growth and the resulting international trade volumes are leading to the return of capacity restrictions and constraint on land availability after the temporary alleviation of these problems at container ports during the financial crisis.

Cullinane and Wilmsmeier (2011) define port development as a “discontinuous, cumulative process, which develops and appears as a series of innovations” and argue that it is necessary to differentiate between ‘growth’ and ‘structural transformation’. Based on the product lifecycle theory and following the arguments from Schaetzel (1996), Cullinane and Wilmsmeier (2011) argue for ‘location splitting’ (Standortspaltung) as a means to extend the port life cycle when limitations in feasible rationalisation, investment and access are reached. The creation of such a subsidiary location in the hinterland provides a potential solution that avoids an inevitable decline, invoked either through the inappropriateness of the actual port location or a newly emergent competitive regime.

The ‘structural transformation’ of a port or port system as a response to *exponential growth* in demand for its services can be multifaceted and has been instigated in different forms such as inland ports, dry ports and intermodal hinterland terminals. Rodrigue et al. (2010) relate this multiplicity of terms to the variety of geographical settings, functions, regulatory settings and the related range of relevant actors.

Ports represent a complex geographical relationship with various markets. Traditionally, the hinterland of a port was physically captive, as shippers experienced few choices regarding moving cargo to and from markets. With increasingly efficient inland transport infrastructure, physical distance is no

longer the sole criterion for a hinterland. Now, the port's potential hinterland can be defined as the area that can be reached at a cheaper cost or in a shorter time than from another port. As a result, hinterlands overlap. Therefore, ports and carriers compete to service locations in these overlapping segments in a setting where landside factors such as intermodal infrastructure are of increasing relevance (Hayuth, 2007). With the advent of inland terminals, inland ports and dry ports, hinterlands are now extended even further inland, adding to the complexity of the analysis of port economics and logistics activities.

Notteboom and Rodrigue (2005) introduced the model of port regionalisation in order to conceptualise the growing relevance and changing relations in a port's hinterland, adding logistical integration from a functional and organisational perspective as a subsequent development stage to the models postulated by Taaffe et al. (1963) and Bird (1980). Notteboom and Rodrigue (2005) introduce a new phase called regionalisation where logistical integration and network orientation (see also McKinnon, 2001; Robinson, 2002, Christopher, 2005) as well as the globalisation and "terminalisation" of seaports (Slack and Frémont 2005; Notteboom, 2009) explain the emergence of the so-called 'offshore hub ports' and the geographical and functional expansion of load centres to become 'regional load centre networks'. Here, the concept of centrality, that explains to some extent the formation of gateways, is replaced by the concept of "intermediacy" (Fleming and Hayuth, 1994; Ducruet, 2005), where a large direct hinterland market is not a necessary condition for concentrating large traffic volumes. Instead, discontinuous hinterlands are supported by logistics zones and inland distribution centres, which at the same time reflects the degree of logistic integration among carriers and the new "mega carriers". In this sense, the adjusted definition of hinterland becomes one that considers core, congruent and extended hinterlands and which adjusts to the variations in, or functions of, the aforementioned port service demand (Sanchez and Wilmsmeier, 2007).

Wilmsmeier et al. (2011) focus on the drivers and the spatio-temporal development direction of that '*structural transformation*'. They argue that this perspective has not received sufficient attention in the port regionalization concept (Notteboom and Rodrigue, 2005). Further, this "structural transformation" is accompanied, driven and strengthened by supply chain development and increasing vertical integration (e.g. Heaver et al., 2000; Heaver et al., 2001; Frémont and Soppé, 2007; Hayuth, 2007; Olivier and Slack, 2006; Rijssenbrij, 2008; Notteboom, 2008).

Port development in a spatio-temporal perspective can be defined as the process of creation and adaptation to satisfy changing demands of clients. With a shift in requirements from basic port facilities to logistics facilities, the needs in the provision of port services are geared towards logistics and can develop in four directions:

- The geographic scale of port networks ranging from local to transnational presence;
- The complexity of interfaces (referring to the potential of inter- and multimodality in the port);

- The number of activities in the port (ranging from general haulage to high value-added services);
- The degree of specialisation (type of products, shipment sizes etc.).

Since the port represents a physical and functional link between logistics and transport networks, ports need to meet certain requirements in the future and these are influenced by a number of restrictions and external drivers. The challenge to maintaining the viability of ports (Cullinane and Wilmsmeier, 2011) can have various facets. Among others, these include capacity restrictions within the port area, capacity restrictions in the seaport access and related environmental challenges, and increasing competition in the hinterland due to other ports extending their area of influence. This conceptualisation of port development underlines the necessity for decision makers to further develop a clear understanding of the complexity of port development; such knowledge can potentially reduce risks and allow decision makers to see port development in the context of wider impacts on other systems.

Dry ports have emerged as a potential solution. Transposing the original dry port concept, which was originally developed in the context of landlocked countries (UNCTAD, 1982, 1991), can be a potential means of maintaining an old seaport that is no longer viable without that dry port or dry ports and thereby create a functional future port system.

A strategy of ‘Standortspaltung’ can only be successful, however, if the transport link between the port and its subsidiary locations is of significant quality that it allows for a sufficient level of throughput (Cullinane and Wilmsmeier, 2011) and integration of operations.

Consequently, key questions arise such as who is the most effective driver of such a strategy? Cullinane and Wilmsmeier (2011) ask further questions. For example, should a dry port serve several seaports or just one? How does the dry port need to be established and organised and how should it be laid out in order to ensure it becomes a success? Conflicts can be expected at different local, regional and potentially national levels. If a dry port should support only one or a few selected seaports, what happens to the cities that will face a continuing decline in their seaports as a consequence? How should the local economic problems that arise be dealt with?

- Bergqvist, R. and Woxenius, J., 2011, “The development of hinterland transport by rail – the story of Scandinavia and the Port of Gothenburg”, *Journal of Interdisciplinary Economics*, Vol. 23, No. 2, pp. 161-177

Summary

This article analyses the phenomenon of hinterland transport by rail and the remarkable journey that has taken place during the last ten years in Europe, especially in Scandinavia. Furthermore, it includes a brief examination of how current trends affect the role and development of rail for hinterland transport. In fact, particularly in Scandinavia, most of the potential market for hinterland transport of maritime containers is already realised. Nevertheless, stakeholders face new challenges as a result of the current financial crisis and global recession. As a result, transport systems, such as

the Scandinavian rail shuttle system, now show modest growth figures in comparison to the 15 to 20 percent of annual growth over the last ten years. Ultimately, rail shuttle services and dry ports will still play an important future role in ensuring competitive and sustainable logistics systems assuming that these companies are able to cope with the imminent challenges.

- Bergqvist, R. and Behrends, S., 2011, "Assessing the Effects of Longer Vehicles: The Case of Pre- and Post-haulage in Intermodal Transport Chains", *Transport Reviews*, V. 31, No 5, pp. 591-602

Summary

The demand for inland freight transport in Europe is mainly met by road transport, leading to unsustainable impacts such as air pollution, greenhouse gas emissions and congestion. Since rail transport has lower externalities than road transport, a modal shift from road to rail is an accepted policy goal for achieving a more sustainable and competitive transport system. However, intermodal road–rail transport is mainly competitive for long-distance transport, and as a consequence, the potential for modal shift is limited. The cost efficiency of road–rail intermodal transport is particularly sensitive to pre- and post-haulage (PPH) costs, since this activity typically has a larger cost compared with its share of the total distance in the transport chain. For intermodal transportation over shorter distances, for example, below 300 km and where there are substantial PPH activities at both ends of the chain, the competitiveness of the intermodal transport system compared with that of direct road is low. Improving the efficiency of PPH activities is, therefore, of utmost importance for the competitiveness of the intermodal transport system. This paper looks into the issue of improving the cost efficiency of an intermodal transport chain by implementing an innovative and flexible legal framework regarding the PPH activities in the chain. By extending the legal framework with exemptions for longer vehicles in PPH, the cost efficiency could be greatly improved. The purpose of such a framework is to allow and enable, for PPH exclusively, the use of 2×40 foot or even two semi-trailers using only one vehicle in the context of the Swedish regulatory framework. This paper develops a strategic calculation model for assessing and investigating the consequences of such a framework and investigates the framework's potential in terms of cost efficiency. The model in combination with a sensitivity analysis of input variables gives a comprehensive understanding of the effects of PPH under different circumstances. From the results, it is evident that there are substantial positive effects associated with a PPH framework of longer vehicles. Results indicate that a typical shipper may experience cost reductions of about 5–10% of the total costs of the intermodal transport chain. In summary, a more innovative and flexible legal framework regarding vehicle length in the PPH links can contribute to a greater modal shift, improved cost efficiency and more environmentally friendly transportation systems.

- Woxenius, J. and Bergqvist R. 2011, "Hinterland Transport by Rail – Comparing the Scandinavian Conditions for Maritime Containers and Semi-trailers", *Journal of Transport Geography*, vol 19, no. 4, pp. 680-688

Summary

The purpose of this article is to investigate why rail is used to move semi-trailers to and from seaports to lesser extent than it is used to move maritime containers, and which actions can foster an increase of semi-trailer transport by rail. The two types of load units are obviously used in quite different logistics settings. The two transport segments are compared in terms of the transport markets they serve, the competition they face and the operational and technological principles upon which they operate. The empirical setting is the transport of general cargo in load units between Scandinavia, Continental Europe and the UK, although the container segment is analysed as an element of deep-sea liner shipping. Empirical findings are drawn from the case of the Port of Gothenburg and its Scandinavian hinterland.

Sustained double-digit annual growth has led to a situation where most of the potential market for the hinterland transport of maritime containers has already been realised. The challenge for further growth is now to capture the semi-trailer segment. Not surprisingly, this analysis shows that rail is more competitive for the hinterland transport of containers than of semi-trailers, but there are still significant opportunities for reaping the benefits of rail transport of semi-trailer transport in the hinterlands of European ports. An increased integration of rail transport and Roll-on/Roll-off shipping will not only require, but also encourage, changes in the overall system design as well as its competitiveness compared to all-road and all-rail services.

- Jun D. and Bergqvist, R., 2010, Developing a Conceptual Framework of International Logistics Centres, World Conference on Transport Research, 11-15 July 2010, Lisbon, (double-blind refereeing procedure)

Summary

This paper looks into the development and characteristics of logistics centres by conducting literature review. A cluster analysis of diverse terms and concepts relate to logistics centre is conducted. The analysis identifies three clusters of logistics centres, namely; dedicated for production and trade development, specialization in logistics and cargo handling, and comprehensive logistics centres. In order to react on the ongoing process of restructuring of the transport and logistics industry leading to a higher degree of concentration and internationalization, logistics centres either specialize in goods handling and trade development; or become more integrated and comprehensive. Amount of concepts and definitions of logistics centre cover the fundamental aspects of the term, however, international logistics centre as an ultimate development stage should include much more than that. In order to define the concept of international logistics centre, the evolution process of logistics centres is investigated.

- Bergqvist, R. and Flodén, J., 2010, Intermodal Road-Rail Transport in Sweden –on the path to sustainability, World Conference on Transport Research, 11-15 July 2010, Lisbon, (double-blind refereeing procedure)

Summary

Intermodal road-rail freight transport has long been seen as playing a key role in reducing CO₂ emissions from freight transport. The reduction of CO₂ emission is of great importance to reduce the greenhouse effect and create a sustainable society. However, the full potential of intermodal transport for CO₂ reduction remains to be determined. At first glance, the intermodal transport market has showed modest growth compared to other modes of transport, such as direct road. However, there are segments of the intermodal market, in particular in the road-rail segment that has shown significant growth during the last decade. This article looks at the potential for intermodal road-rail transport and describes the remarkable journey that has taken place in the hinterland road-rail segment, especially in Scandinavia. Furthermore, it includes a brief examination of how current trends affect the role and development of intermodal road-rail transport.

Stakeholders currently face new challenges as a result of the current financial crisis and global recession, however, this article identifies a significant long-term potential for modal shift related to the competitiveness of the road-rail intermodal transport segment. This article also outlines the trends that are likely to realise the identified potential for modal shift and the road-rail intermodal market in Scandinavia.

Based on previous research, a study has been conducted in Sweden on the potential reduction of CO₂ from intermodal transport. The potential of intermodal freight transport has been determined, the associated of CO₂ reduction estimated and the potential effect of future trends in the industry has been examined. Modelling has been performed using the Heuristics Intermodal Transport Model, HIT-model, on the national Swedish transport system and detailed modelling for the rail shuttles system of Dry Ports in Sweden. To elaborate on the potential identified, the Swedish segment of hinterland road-rail transport and Dry Ports are examined in more detail, as well as future trends and challenges related to intermodal transport.

The current intermodal transport system in Sweden (including port related shuttles) has a 4% market share (4.1 billion tonnekm) and, thus, results in a reduction of 160 000 tonnes CO₂ annually compared to if all-road transport had been used. The segment of port related hinterland road-rail transport constitutes about 25% of that CO₂ reduction. The identified theoretical potentials for intermodal road-rail freight transport and modal shift is up to 50% of the long-haul transport or 1.6 million tones CO₂ using current technology. The Swedish segment of hinterland road-rail transport could constitute a large part of that potential as strategic scenarios indicate possible emission reductions of up to 500 000 tonnes of CO₂ within a foreseeable future.

In sum, modal shift using current technology have a great potential for decreasing CO₂ emissions. The growing segment of hinterland road-rail transport will most probably constitute an important role in achieving this

potential. With the help of alternative rail engines, handling equipment, changed operating philosophy, new load unit types, etc. the emission reduction potential may be even greater.

- Bergqvist, R., 2010, ”Terminaletablering och logistikutveckling”, projektrapport, EU-Interreg IVB projektet *Dryport*

Because of the environmental impact of heavy road transport is of particular interest to the community to find and strengthen alternative and indirect solutions. Such a possibility is a transfer of freight to more sustainable transport options and solutions. An example is the combination of road-rail, so-called combined transport. Combined transport has enjoyed a growing interest from academia, industry and public sector in general, policy-makers in particular. In line with the general increasing interest in combined transport, increasing competitiveness and increased volumes have also interest in establishing and developing intermodal terminals has increased, such as from municipalities. There is no easy or quick process of establishing intermodal terminals and especially not too often inexperienced players such as local and regional governments and officials in those organizations. A further reason is that the municipalities that establishes and infrastructure owners in this case is not the market itself without recourse to outside operators for the use and operation of the multipurpose terminal. This report aims at and is aiming to introduce and describe the problems and challenges of an establishment terminal and related logistics development can involve. The report tries to identify key issues and actors in the development and establishment process and describe how they interact and influence the process.

- Bergqvist, R., 2010, ”Regionala utvecklingsmöjligheter för kombinerade transporter -ett Skaraborgs perspektiv”, projektrapport, EU-Interreg IVB projektet *Dryport*

Summary

Terminals and Port shuttle development has traditionally been a regional character and may thereof considerable local attention. This also has good local support and knowledge that can facilitate cargo transfer from road to rail. However, there are also a number of factors that can prevent and delay. A very common example is the emergence of conflicts at the regional level such as several nearby towns and cities to establish an intermodal terminal. When such conflicts is a need for actors / authorities who can take greater responsibility for the logistical efficiency or changed view of the interactions and transport. A weak commitment and lack of initiative in these matters can delay development. Overall, the port shuttle system is an important role in the future to ensure a competitive and sustainable Scandinavian transport provided that it is allowed to grow based on the demand that exists. Perhaps the most important prerequisite is the availability of adequate capacity in both the endpoints of the intermediate infrastructure. Herein lies both the investment and expansion in physical infrastructure as priorities within the existing infrastructure.

- Bergqvist, R., G. Falkemark and J. Woxenius, 2010, “Establishing intermodal terminals”, *International Journal of World Review of Intermodal Transportation Research (WRITR)*, Vol. 3, No. 3, pp. 285-302

Summary

This study examines the development process of intermodal road-rail freight terminals. Of particular interest are factors affecting the development process and the time needed to establish intermodal road-rail terminals. The results are intended not only to be interesting to researchers, but also of practical use to actors developing intermodal terminals. Based on rational choice theory and two Swedish case studies, Falköping/Skaraborg and Nässjö/Jönköping, factors identified and analysed are: profitability, financiers, political entrepreneur, location, large local shippers, and the traffic authorities. Profitability combined with an enthusiastic and committed political entrepreneur are the most vital factors for the success and pace of the development process.

- Bergqvist, R., 2009, Hamnpendlars betydelse för det Skandinaviska logistiksystemet, BAS Publishing

Summary

Port shuttle system in Scandinavia has a very short time developed into an efficient and large-scale system for combined transport. The impact in terms of reduced costs and environmentally efficient transportation has been and still are great. This report aims to examine and appreciate significance in terms of costs, environmental impacts (emissions) and jobs that current systems have, and future prospects dependent on a number of scenarios. When developing the scheme was very rapid and obvious, it is of utmost importance that there are different future scenarios to discuss the basis for all concerned.

- Bergqvist, R., 2009, “Place Marketing in a Logistics Context – A Swedish case study and discourse”, *Place Branding and Public Diplomacy*, Vol. 5, No. 1, pp. 54-66

Summary

Distance challenged regions, geographically or demographically, need to engage in the development of unique and strategic logistics capabilities in order to support existing business and to attract new business. However, the development of logistics capabilities is not sufficient; place marketing is essential for attracting new business. Today, many regions use place marketing. There is, however, great homogeneity in the way regions market themselves using logistics arguments. The level of differentiation concerning logistical arguments is very low.

Approaching the same audience with similar arguments has little chance of attracting investments, as no unique capabilities or features are emphasised in the marketing mix of arguments. The lack of differentiation deters decision-makers, as they have difficulty evaluating location alternatives.

This absence of strategic marketing planning constitutes a window of opportunity that, when opened, creates a possibility for the local to have the global ear. This paper provides an insight into the story of a small region in Sweden that has been surprisingly successful in attracting business through its efforts in developing strategic logistics capabilities and using logistics arguments in its place marketing.

- Roso, V (2012) The battle for the sea is won inland – Dry ports as the means of competition between the seaports in New Zealand, ISL conference, South Africa, 2012.

Summary

Competition requires seaports to focus on transport links, on the demand for services in its traditional hinterland and also on development in areas outside their immediate market. The purpose of this paper is to investigate if the implementation of dry ports contributed to competitive advantage of seaports in New Zealand. Data for the case studies on ports of Tauranga and Auckland and their existing intermodal facilities was collected through face-to-face interviews; literature reviews have been carried out in order to accomplish the purpose. In general seaports are not getting involved in the development of their hinterland connections, i.e. inland access, unless threatened by competition or congestion. New Zealand ports' cases where, in a way, no exception from this rule! The results show that implementation of a dry port brings a competitive advantage to a seaport since it expands the seaport's hinterland, i.e., it improves the seaport's access to areas outside its traditional hinterland by offering shippers low-cost and/or high-quality services. Although the Ports of Auckland has received substantial financial support, which was largely spent on equipment improvement, such as on large quay cranes and straddle carriers, it still under-performs (WCN, 2011). The Ports of Auckland estimated crane productivity is 19.9 moves per hour compared to 31.8 at Port of Tauranga (ibid). Functional inland access to seaports is becoming an important decision making factor in the development strategies of seaports; as well as a significant factor that affects shipping companies' port choice. A seaport's natural or immediate hinterland is no longer defined only by geographical distance but by competition with other seaports, i.e. by the quality of the service at the seaport terminals as well as at their inland facilities. Simply, the battle for the sea is won inland!

Both studied cases identified market-driven Outside-In development of their inland intermodal facilities with the aim to increase market share. Furthermore, the results showed that rail could be viable on short distance, likely due to this Outside-In development that generates higher level of integration between the seaports and their inland intermodal facilities – dry ports. The ultimate goal of cooperation strategies such as this is to decrease costs and that might be crucial for short haul rail. However, viability of rail on short distances is very market dependent; there is a hardly one system configuration suitable for all.

- Roso, V. and Rosa, A. (2012) Dry port in concept and practice. Chapter in the book *Maritime Logistics - A Complete Guide*, pp. 179-195. ISBN/ISSN: 9780749463694

Summary

A dry port is an inland intermodal terminal directly connected to seaport(s) by rail where customers can leave/pick up their units as if directly to a seaport. The physical connection –the rail link used by intermodal services– is one aspect which is made fully operational by the procedural set up allowing shippers to refer to the gates of the dry port as if they were at the seaport. Dry ports are thus inland extensions of the seaports, and consciously set up as such, and are not limited to the provision of mode transfer but include coordinated and efficient services such as storage, maintenance of containers, Customs clearance, and tracing and tracking. Dry ports may bring advantages for all operators involved as well as for the environment thus making green logistics interesting rather than something perceived as an added cost. Operators' advantages include cost and time savings (due to reduced road congestion but also to the inland interface of the port and the efficient document handling), bundling of containers flows and economies of scale, spaces added to those in space-constrained seaports, regional development. Environmental advantages are fostered by rationalisation of flows and by the use of intermodal transport and may include reduced congestion, less pollutant emissions, lowered accident risks, avoided need of using port cities' roads and crossing environmental zones with trucks. Regional development and job opportunities are further advantages for society as a whole. Dry ports are to some extent extensions of seaports inland and as such are part of the process of regionalisation of seaport characterised by Notteboom and Rodrigue (2005). In that process and due to the importance of inland distribution, seaports expand their hinterland reach through a number of strategies including close links with inland freight centres based on higher functional integration. The paper reports three examples of dry ports in Europe (Hallesberg in Sweden, Coslada in Spain, Rivalta in Italy) and more have been developed elsewhere in the world.

- Roso, V (2011): The role of dry ports for viability of short haul rail in Australia. Proceedings of the 16th LRN Conference "Smarter Logistics: Efficiency, Performance and Austerity", pp. 42.

Summary

A close dry port - intermodal terminal with direct rail connection to a seaport - is a potential solution for seaport terminal congestion as well as for better seaport inland access based on short haul rail. The purpose of this paper is to investigate the viability of rail on short distances through the use/implementation of close dry ports. Data for the case studies on ports of Sydney and Melbourne and their existing and potential close intermodal facilities was collected through phone and face-to-face interviews; likewise, literature reviews have been carried out in order to accomplish the purpose. In addition, a number of secondary sources were used, such as reports and internal documents. Intermodal transport over short distances is heavily

debated by academics as well as practitioners, usually claiming that rail services are generally competitive at distances above 500 km (van Klink, H. A. and G. van den Berg, 1998). However, the cases presented show the feasibility of intermodal transport and the viability of rail on much shorter distances that might be obtained through advance of dry ports. Dry ports are to some extent extensions of seaports inland and as such are part of the process of regionalization of seaports characterized by Notteboom and Rodrigue (2005). In that process, and due to the importance of inland distribution, seaports expand their hinterland through a number of strategies including close links with inland terminals based on a higher level of functional integration that usually results in functional short haul rail or vice versa if the functional rail is the prerequisite for the dry port to succeed. Sydney's Port Botany, with its well functioning close (within 45 km from the port) intermodal terminals with rail connections to the port, however not without impediments, shows that policies and regulations are needed in order to establish fair competition between the traffic modes as well as actors of the transport system. Closing down the two rail shuttles for the Port of Melbourne, which would relieve the city from congestion and also lower the environmental impact, shows that a single interest of a certain actor (a port operator in this case) is above the interests of the society. But even the actor in question would benefit on a long-term basis if not being blinded by short-term profit. Those cases were rather obvious cases of competition between actors of the same supply chain that actually should cooperate for the common good. However, even the government failed in this case by not providing any kind of support for the short rail in question despite the fact that the same government now is pushing forward a proposal, "Shaping Melbourne's Freight Future," with the aim to introduce an intermodal solution to service the growing containerized transport through the city and thus relieve the city from the threatening congestion. That's great, but what are they waiting for? Twenty more years...

- Roso, V (2011) The battle for the sea is won inland!. Logistics Times, 2 (3) pp. 46-48.

Summary

One of my main observations while researching seaports' inland access was that seaports are not getting involved in the development of their inland access unless threatened by two big Cs: competition or congestion. Australia's and New Zealand's cases only proved this!

New Zealand

A few years ago, the Port of Tauranga had no issues with the two big Cs; with no other port in the vicinity to compete with and low volumes handled, the port had to find a way to endure. Currently, the port has a throughput of more than 500,000 TEU, compared to only 100,000 TEU in 1999 when the seaport gained a competitive advantage by establishing a direct rail access to Metroport in the Auckland area. Metroport handles about 40% of the port's containers and the direct rail, operated by KiwiRail, runs three times a day to/from the port with future plans to increase the number of shuttles per day. Nowadays, thanks to this well functioning inland port, the Port of Tauranga is the main competitor to the Port of Auckland!

The Port of Auckland, with the throughput of almost 900 000 TEU, was more threatened by the third C, central location, than competition or congestion. Being centrally located, literally on the waterfront of the city centre, the port is seen as a hurdle by the community, i.e., as an obstacle between the city and the sea. One way to solve the truck related problems is movement of goods from road to rail and the port has done that by implementation of an inland intermodal terminal, Wiri, in the south of Auckland. However, the other reason for the establishment of Wiri is strong competition with Tauranga's Metroport – inland terminal in the same area; that apparently has taken over a great portion of the Port of Auckland's volume.

Australia

The Port of Melbourne with a throughput of 2.24 million TEU in 2009/10 is the biggest container port in Australia, fascinatingly enough with no direct rail access to the docks! This means that train arriving units have to be transhipped onto trucks to the few hundred metres-distant port terminal area. This generates extra costs, which are not negligible, in particular when short haul rail is in question. The problem could be solved with significant investments in infrastructure but so far the port does not seem to have such intentions. However, lowering those extra port charges, which were much higher for the units arriving by shuttle trains than by road, could overcome the problem at least temporarily. Those excessive charges, in addition to high access fees and inconvenient timetables dictated by long distance trains, put out of service two rail shuttles to metropolitan areas: Altona and Somerton. However, the Department of Transport Victoria has realised the importance of rail and put forward a proposal, "Shaping Melbourne's Freight Future," with the aim to introduce an intermodal solution to service the growing containerized transport through the city.

Port Botany, belonging to state-owned Sydney Ports Corporation, is the second largest container port, handling around 1.9 million TEU in 2009/10, eighty percent of which are destined to the Sydney area. Despite a scheduled arrival of trucks for picking up or delivering containers, the seaport terminals and gates are threatened by one big C – congestion, creating delays. With a target of a 40% share for rail in moving containers to/from Port Botany, the port has prepared a Port Freight Logistics Plan to improve road and rail performance through maximisation of the use of rail, which should result in minimisation of growth of truck movements through the port and the city; and by that, improve inland access to the port. What makes Port Botany very special, is the fact that there are 7 close (within 45 km from the port) intermodal terminals with rail connections to the port. Port Botany, with its close intermodal terminals, shows the feasibility of intermodal transport on shorter distances, and, as such, offers an important area for further research.

- Roso, V, Lumsden, K, (2010), Double haulage – solution to sustainable pre and post haulage in Sweden, Conference WCTR 2010, Lisbon.

Summary

Reduced energy consumption, optimization of the usage of the main strength of different modes, reduction of congestion on road networks, and low environmental impacts are considered as the main advantages of intermodal (road-rail) transport. However, there are disadvantages such as unease of monitoring due to complexity of the transport chain or high cost for pre-and post haulage. Recently environmental problems have received increasing attention and with them also the role that logistics systems can play in reducing the environmental impact. One of these concepts is a concept of Longer Combination Vehicles, i.e. vehicles of up to 35 m in length. This concept has potential to improve performance of intermodal transport in Sweden; however the same is not allowed by the regulations. Purpose of this paper is to investigate how to improve intermodal freight transports with use of long vehicles; from environmental and economic perspective. This study should support the recent discussions on whether the traffic regulations regarding the length of the vehicles should be investigated. Data for the study are collected through interviews, field observations and internal documents. The results indicate that the use of Longer Combination Vehicles would decrease the number of trips per route and therefore lower the environmental effect on the route. However, to achieve transport cost savings the utilization rate should be high.

- Roso V and Dan Andersson (2010) Development of dry ports by the use of value-added services - The case of Falköping, Dryport Conference Intermodal Strategies for Integrating Ports & Hinterlands, 21 & 22 October 2010, Edinburgh.

Summary

The growing containerized sea transport causes a demand for improved efficiency and increased capacity in the transit through the seaports as well as in transport to and from the seaports hinterland. To stimulate the development of those seamless intermodal transport chains the concept of dry ports has been established. The purpose of this paper is to analyze how value added services can support the development of a conventional inland terminal into a dry port and how an existing dry port can be further developed by the use of value added services. This conceptual paper combines literature from the field of dry ports with literature addressing value added services; with data obtained through interviews with actors in the transport system. Ballis and Golias (2002) and Konings (1996) range terminals from simple terminals offering only transfer between the modes to more extensive centres providing a number of value adding services that are increasing with the development of terminal operations, increased number of customers and the complexity of data in the freight nodes. Inclusion and expansion of different value added service will play an important role in further integration of intermodal transport. A service provider can include value added service in his service portfolio in order to be able to offer his clients different types of benefits. However, these services seem to have no value if there are deficiencies in the basic services (amount or quality). The value of service a provider offers its clients can lie in the reduction of costs, or increase the customer's revenues (by influencing the service levels). Cost reductions can be achieved both in the providers operation and at the

shippers side. And this needs further investigation to describe the effects and where they occur. However, it is clear that it is not only the shippers that benefits directly from the use of value added services the providers may also reduce their costs by economies of scale. Two different generic value creating mechanisms are in play in the investigated cases: exploitation (efficiency) and exploration (innovation). The value of a logistics service can be enhanced by a combination of exploitation (refining the present) and exploration (new thinking) (see e.g. March, 1991). The value added services seem to have elements of both these mechanisms; however this is something which needs to be further investigated. The conclusions indicate that the development of dry ports and their viability depend on different value added services being available at the dry port, once the infrastructure and basic services are in place. Furthermore the availability of value added services may increase the dry port's attractiveness. This paper provides a platform for further research on importance of value added services for dry port's development.

- Roso, V; Lumsden, K (2010) : Review of Dry Ports. *Maritime Economics & Logistics*, 12 (2) pp. 196–213.

Summary

The objective of the paper is to present the previous research on the dry port concept and to review the world's existing dry ports, i.e. freight terminals that use the term "dry port" in their name. Therefore the purpose of the paper is to clarify the concept by showing potential discrepancies or agreements between the theory and practice. Starting from a literature review on the dry port concept, this study presents a review of existing dry ports in the world. A number of qualitative criteria regarding the range of services at dry ports or its features could be theoretically established, although the same may vary depending on the customers' demand. However, the ultimate purpose of the dry ports is the same, irrespective of that range. Regarding the dry ports role as the driving forces behind various advantages for actors of the transport system; all of the reviewed dry ports brought at least two advantages for the actors of the system. Improved customer service and creation of new jobs in the area, advantages both closely related to regional growth, were the most recognized advantages, and particularly so for landlocked countries. Closely related to all the advantages are the impediments, or the lack of the same; the reviewed dry ports have not experienced significant impediments, and some faced no impediments at all; in other words, many had a smooth path on their way to realization. During the review of trade journals, numerous papers regarding future dry port projects in many developing countries have been encountered. These projects have not been included in the review due to the scope of the study; however, the fact that so many developing countries' governments have realized the importance of dry ports is promising. This paper contributes to the study of dry ports by synthesizing a literature review on the subject of dry ports; moreover, it provides an overview of dry ports in the world; and as such makes a contribution to the scarce research on dry port concept.

- Roso, V (2010): Emergence and significance of dry ports. *Baltic Transport Journal*, 38 (6) pp. 44-45.

Summary

One of the concepts that, among other advantages, has a role in decreasing environmental impacts is the concept of a dry port. The first mention of dry ports as 'ports secs' by P. Hanappe dates back to 1986. However, the concept was neglected for many years and only recently resurfaced due to increased interest in environmental issues relating to growing containerized maritime transport. Progress alone in the maritime part of the transport chain (building bigger ships) and in seaports (acquiring bigger cranes), without improvements in seaport inland access, is not sufficient for the entire transportation chain to function. The study of dry ports emphasizes the importance of efficient seaport inland access which might be obtained by means of dry ports; the importance is not only for the seaports but for other actors in the transport system and society as well.

- Roso V. and Lumsden K. (2009) "The dry port concept - Moving seaport activities inland?". *UNESCAP Transport and Communications Bulletin for Asia and the Pacific*, (78 Development of Dry Ports) pp. 87-102. www.unescap.org/ttdw/Publications/TPTS_pubs/bulletin78/b78_fulltext.pdf

Summary

This paper aims to develop the dry port concept and to analyse and compare physical flows and administrative activities at the seaport terminal from the time perspective in the transport system with and without a dry port. The data for the analysis were obtained through literature review and interviews with relevant actors in the transport system. Regarding the assumption on which seaport activities could or should be moved to an inland terminal, there is no general answer. The Port of Virginia is ready to invest in development of inland terminals because the competition between neighbouring ports is the fact, and expansion inland into new markets brings competitive advantage. Faster movement of containers from the port to the final destination also increases the port's capacity. On the other hand, the Port of Göteborg has sufficient volume with no fierce competition and does not strive towards the expansion of its hinterland; problems of congestion at seaport gates and potential delays have not reached a critical point yet. Therefore, the port does not invest in inland transport development as long as there are others such as rail operators, terminal operators and belonging municipalities eager to do so. However, the Port of Göteborg's role is of a supportive nature when it comes to the development of inland terminals and rail shuttles by other actors of the transport system. Significant time savings, as well as financial savings, could be made only by avoiding the queues at seaport gates and by moving container storage inland. Evidently, expansion inland into new markets improves seaport's access to areas outside its traditional hinterland, resulting in new customers generating more profit and promoting the regional economic activity. The question is whether this expansion is going to be in the form of ownership or collaboration; if it is the latter, then on which level? Therefore, this paper also serves as a basis

for further research on the concept, focusing on practical experience of the concept in the world.

- Roso, V (2009) “Emergence and significance of dry ports - The case of the Port of Göteborg” *World Review of Intermodal Transportation Research* , Vol. 2 (4)

Summary

The dry port implementation itself certainly is not a straightforward solution for seaport terminal congestion or for better seaport inland access; however, it could be part of the solution. The quality of access to a dry port and the quality of the road-rail interface also determines the dry port's performance; it is therefore necessary to have scheduled and reliable rail transport between the seaport and the dry port. With dry port implementation, CO₂ emissions should decrease, queues and long waiting times at seaport terminals should be avoided and the risk of road accidents reduced. Besides the general benefits to the ecological environment and the quality of life by shifting flows from road to rail, the dry port concept mainly offers seaports a possibility to increase the throughput without physical expansion at the site. However, this study indicates the expected difficulties with the implementation of the concept since intermodal transport itself has many hindrances. The real-world examples show that dry ports are successfully implemented by several ports (Woxenius *et al.*, 2004). The immediate reasons may vary, but a common dominator is that rail has a role to play as an intermediate traffic mode between sea and road. For implementation, however, costs and benefits must be carefully evaluated and distributed between the actors. There is an interesting observation by Vandervoort and Morgan (1999): “A dry port must fit into a complex system where the necessary supporting infrastructure (roads, railways) is in place, maintenance is assured, and the legislative, regulatory, and institutional systems are properly designed to optimise the involvement of both the public and the private sector.” This might serve as a good answer to the question of whether a dry port implementation will result in success or failure. The conclusions drawn from the research indicated the importance dry ports have for efficient seaport inland access and therefore for the entire intermodal transport chain. Despite the advantages that the dry port concept brings to different actors of the transport system, there are still impediments to the implementation of the same.

- Roso, V and Lumsden K (2009): “The dry port concept - The case of Falköping terminal”. *Maritime Transport IV*, pp. 17-27.

Summary

Ever growing containerized transport derives a demand for efficiency and capacity in the transit through the seaports and further transport to the seaports hinterland. To stimulate the development of those seamless intermodal transport chains the concept of dry ports is established. The purpose of this paper is to describe the concept and to analyze the same through the case of Falköping terminal which is striving to be developed into

a dry port for the port of Göteborg. Although implementation of a dry port into a seaport's hinterland could bring numerous benefits for the actors involved, it shouldn't be taken for granted since the same depends very much on existing infrastructure, institutional systems, regulations and customers attitude. Considering the results of the analysis of Falköping terminal it is rather evident that the strengths and opportunities are very strong and numerous while weaknesses are relatively easy to overcome. The main strength is environmental benefits coming from dry port implementation resulting from use of electrically powered rail instead of only trucks. On the other hand some threats might play crucial role for future activities as well as for the development of the terminal. However, some facts that presently are interpreted as threats might turn into opportunities such for example the overall economic crisis that threatens the world trade and therefore the container transport but the crisis might make truck users to rethink their choice of the transport modes and switch to rail.

- Roso V. (2009) "The Dry Port Concept" Doktorsavhandling, Chalmers.

Summary

Environmental problems have received increasing attention during the last decade and with them also the role that logistics systems can play in reducing the environmental impact; however, logistics concepts in the role of decreasing environmental impacts have not been extensively researched until recently. One of these concepts is a concept of dry port, which is the focus of this thesis. The purpose of this thesis is to define the dry port concept and to develop the same through identification of its impacts as well as factors that influence the implementation of the concept.

The dry port concept is based on a seaport directly connected by rail to inland intermodal terminals, where shippers can leave and/or collect their goods in intermodal loading units as if directly at the seaport. With dry port implementation CO₂ emissions should decrease, queues and long waiting times at seaport terminals should be avoided, and the risk of road accidents should reduce. Besides the general benefits to the ecological environment and the quality of life by shifting flows from road to rail, the dry port concept increases the seaports' throughput without physical port expansion. It also brings a competitive advantage to a seaport since it improves the seaport's access to areas outside its traditional hinterland. This is closely related to regional development that results from the establishment of new businesses in the area once the necessary logistics infrastructure is in place, by means of dry ports.

Although the concept of a dry port should bring numerous benefits to the actors of the transport system, there are still many impediments to the implementation of the same; land use, infrastructure and institutional impediments are identified as the most common. Therefore, a dry port must fit into the transport system where regulations are designed to optimize the use as well as the development of existing infrastructure and its belonging modes of transport.

Marketing, fairs, site visits and other contacts



Falköping municipality and the Dryport project attended the Technical Fair in Stockholm in October 2008. Our work was presented in a display and in a seminar during the fair. The display was among other similar projects in a certain section of the fair. Volvo and Kinnarps AB participated in our presentations at the seminar. This was an important element due to the fact that the project was presented to a large number of decision makers from the Stockholm region. The project has also attended the Logistics Fair in Gothenburg in May 2009. To keep spreading the knowledge about the Dryport project, we have attended the Logistics fair in Gothenburg both 2010 and 2011. The visualisation was presented for the first time ever at the fair in 2010. Before the fair in 2010, a film was made to show the importance of an intermodal terminal. The project has also attended the large logistic fair at Elmia (Nordic Rail/Future Transport) in Jönköping 2009 and 2011.

To promote the project, Skaraborg Logistic Center has had an advertisement in the magazines of the fairs. We have also had 2 advertisements in the supplement of two Swedish newspapers; Dagens Industri and Svenska Dagbladet. The promotion and marketing is focused on the Dryport and solely in the industry's papers and magazines. Schenker have a paper published 4 times a year and we have had a series of advertisements, the first to be published in the end of September. During 2012, no advertisements have been published.

Falköping municipality attended to a particular logistics seminar in co-operation with West Sweden Chamber of Commerce and Industry and Skaraborg Local Federation. The project and current trends were presented as well as specific presentations from Volvo Logistics and Kinnarps AB. The invitations were to the regions logistic companies and the regions municipalities. The seminar took place at Volvo in Floby and approximately 50 participants attended the seminar, among them, several people representing SME (Confederation of Swedish Enterprise). The purpose with the seminar was to spread the information, and to gain interest in intermodal solutions.

In connection with the opening of Stora Enso's new timber terminal and Falköping municipality's new connection rail tracks in May 2011, a new logistics seminar took place. The Dryport concept was presented and had

approximately 100 participants from both public authorities and private companies.

Region Västra Götaland organised a seminar together with the Dryport project's Swedish partner, Port of Gothenburg in November 2010. The name of the seminar was "Where shall the terminal be situated?" More than 100 participants discussed the founding of the terminal and listened to a number of lectures from the Dryport project's different partners. Information is available on www.vgregion.se/dryport. Port of Gothenburg now transports 50 % of their flow of goods by rail, all with help from its Railport concept.

Falköping municipality introduced new road signs for the area of the terminal and clear signs are now being used since the end of 2010.

As a result of the projects successful marketing, a number of inquiries about site visits have occurred. A few of the visits are from Katrineholm municipality, Vänersborgs municipality, Vännäs municipality, Borlänge municipality, Sävsjö municipality, Ludvika municipality, Dalslands Logistic Center, Mjölby municipality, Region Örebro and Strömstad municipality. Discussions have taken place at seminars and over the telephone with several other interested municipalities as well. For example presented Falköping municipality the project in a meeting with the Swedish-Norwegian Border Committee.

A part from above mentioned happenings, we have been in contact with as well as been visited by a number of companies. These companies are real estate companies, terminal companies, political parties etc. We have also worked hard to send out information and to meet the projects important goods owners. The project has been presented at meetings with the different municipalities in Skaraborg. The County Administrative Board also held a conference regarding sustainability where the project was presented. This conference was in Borås and had participants from all municipalities of West Sweden.

Region Västra Götaland has set up a marketing strategy (available under "regionutveckling" on the website www.vgregion.se). A template has been made for the use of Powerpoint and an advertisement agency has created a Swedish Dryport presentation, which has been used at the Logistics fair in Gothenburg. A journalist who earlier in his career worked in the transport industry has written all texts. A photographer has been procured to take pictures of the Port of Gothenburg and Falköping - containers way between seaport and dryport.

Region Västra Götaland is responsible for the Swedish information on the website has been updating this regularly. New data information has been published and the communication plan has been audited.

The project and its result have been published in several articles in different journals and papers nationwide. Articles have also been published in local newspapers because of the EU-project, the establishment of Stora Enso, the establishment of Södra Skogsägarna, BS Mekaniska's establishment etc.

International



A large delegation participated in the yearly meeting in Harlingen, Netherlands in the end of September 2009. The topic was inland waterways and is of importance to certain parts of Västra Götaland close to the river Göta Älv. The Swedish delegation therefore consisted of representatives from Fyrbodals Local Federation and Göteborg Region (GR). We were hoping to have an exchange of knowledge between Dutch experts and ourselves but due to the merging of the Road, Rail and Sea department into the Swedish Transport Administration, the meeting never took place.

One of the outcomes of the meeting in Netherlands was that the Chairman and the Development Manager in Falköping municipality were invited to a partner exchange with England. The theme/topic for the exchange was “Public entrepreneurship”. This topic was then a part of the yearly conference in the end of September 2011 in Ipswich, England. The main topic of the conference was public authorities development of infrastructure and the following co-operation and collaboration after ended projects.

During the yearly meeting 2009, the structure of the project was amended due to suggestions from the Swedish side of the partnership. A Project Management Group was founded and held their first meeting immediately in Harlingen. Another meeting was held during an IT and Security workshop in Emmen, Netherlands in November 2009. Christian Bergman attended this meeting via a telephone link.

During the next meeting of the Project Management Group in Manchester March 2010, Leif Bigsten represented the Swedish side of the partnership. A new work schedule was introduced and an expert exchange was decided to take place in the future. Workshops were planned and Falköping were the first organisers with a presentation of their Dryport project.

During the period of October 2010-March 2012, 3 more Project Management Group meetings have taken place. These were held in Amsterdam, Birmingham and Oberhausen, including 2 site visits in Duisburg and Brussels.

In December 2009 our partner TRI Napier from Scotland came to visit us. Jason Monios visited our site in Falköping as well as attended a work meeting at Ramböll regarding the visualisation and simulation.

In February 2010, Christian Bergman from VGR, made a site visit in Scotland. The purpose of this trip was to attend a meeting with SEStrans steering group and to present the Swedish project. He also made a visit to Dundee Port as well as to a potential Dryport inland terminal between Edinburgh and Glasgow.

A seminar was arranged in Falköping the 14th-15th of April 2010. The EU-project TransBaltic was the reason for the seminar with the title "DRY PORT SEMINAR - TRANSBALTIC-PROJECT WP 5.1 DRY PORT DEVELOPMENT". The learnings from the project in Falköping were presented and contacts were made with for example the Finnish side in this project.

A workshop was attended to in Birmingham on the 28th of April 2010. The topic was "Collaboration – The Key to Value Creation in Supply Chain Management?" and was part of the Dryport project.

The main thought with the Dryport project is to lead with example and to create an inland terminal by the making of the Dryport. Skaraborg Logistic Center is the Swedish example of the Dryport and the knowledge made possible were presented in a Dryport workshop in Falköping on the 1st-2nd of June 2010. Participants were representatives from the projects different side projects. The workshop was about the actual work with developing a Dryport (mainly the infrastructure) and the knowledge that follows. The work in Falköping with the visualisation and solutions for the road infrastructure was presented. Smaller groups were looking over the project and a report was put together after the workshop. This report is now published on www.dryport.org

In June 2010 an extension of the international Dryport project was approved. A new partner was introduced in Germany. The University of Bremen with support from important operators in the port were new in the project. At the same time, the partner in Emmen raised their budget of the project and the time for the project was extended with 6 months until June 2012. The Institute of Labour and Work (IAW) studied the social-economic impacts for a sub-region when a dryport is established. They also studied the dryports effects on the local economy. The institute has studied the actual establishment and potential conflicts between different parties involved in the project. IAW have used the work at Falköping as a case study. The extension of the Dutch project might be of interest for Falköping due to the fact that they will develop and promote the north link from Rotterdam/Amsterdam through Bremen/Hamburg and north to Scandinavia. There are cross-border plans to reinforce the road infrastructure and to invest in new rail links between the countries. These plans could be suitable for the current work of "Green Corridors" made by the Ministry of Enterprise, Energy and Communications.

During the meeting for the Swedish steering group in the beginning of September 2010, it was decided to increase the amount of bilateral contacts for the project. An exchange between Babergh County and Falköping was essential due to the English partner's shown interest in our work. Politicians and officers in the municipality of Falköping and Region Västra Götaland were supposed to inform the same level of employers in England. Unfortunately the exchange was interrupted several times due to elections in both countries and the exchange had to take place during the yearly meeting in Ipswich, September 2011.

At the meeting it was decided that the next priority exchange was between Bremen/Jadeport/Hamburg. Contacts should also be made with Zeebrugge due to Stora Enso's shuttle between Gothenburg and Zeebrugge as well as their recent establishment in Falköping. Another, lower priority was an exchange between Scotland and Västra Götaland with wood pellets and cheese being sent to Scotland while smoked goods (whisky) being sent to Västra Götaland. A site visit to Duisburg and Hamburg had also been planned and carried out in November 2011.

Swedish Dryport partners were very much involved in the Dryport conference in Edinburgh in October 2010. Partly by giving lectures (Chalmers, Port of Gothenburg), also by being moderators in 3 workshops as well as publishing 3 reports consisting of 30 papers after the event. Rickard Bergqvist (Gothenburg University) has been the editor together with 2 colleagues from TRI Napier University.

Leif Bigsten lectured at the PortCentric Logistics conference in Birmingham 1st-2nd of March 2011. The topic was "The role of the public sector in shaping supply chain investment strategies – the Swedish model".

Port of Gothenburg has presented the Railport concept at different events, for example at the VTI-meeting in Linköping in January 2011 as well as at the Green Port conference in Venice in February 2011. Region Västra Götaland presented the eco-labelling of a Dryport at the VTI-meeting in Linköping 2011 and then the RFID-project at the VTI-meeting in Linköping 2012.

IAW institute in Bremen visited the Swedish Dryport project's different partners during the winter of 2011. Interviews regarding governance and strategies for public presentations were made. The visit took place in early March and interviews were made with the Swedish Transport Administration, Region Västra Götaland, Gothenburg University, Chalmers University, Falköping municipality and Port of Gothenburg. The data was later put together for a workshop in Bremen in April 2010. The purpose with this workshop was to compare Belgium (Zeebrugge), England (Haven Gateway, Felixstowe), Sweden (pilot project Falköping, Railport concept Port of Gothenburg) and Germany (Bremen).

Region Västra Götaland had a workshop about IT, port community systems and one-window handling of goods in early April 2011.

Skaraborg Logistic Center participated together with Port of Gothenburg and the Swedish Transport Administration as well as a few other Swedish terminals in a display in the large German logistic fair in Munchen in May 2011.

Politicians from Norway and Denmark visited Falköping in June 2012. One of the purposes with the visit was to attend to a presentation of Skaraborg Logistic Center.

Leif Bigsten lectured about the Dryport project and its positive environmental effects at a meeting in Brussels. The meeting was organised by East England and took place at the EU Sustainable Week on the 18th of June 2012.

Other information

The agreement between Falköping and Kaj Ringsberg regarding project management as well as the assistance with the RFID-project ended and was moved on to an agreement between Kaj Ringsberg and Region Västra Götaland. This came natural when Kaj Ringsberg had a more central role in the RFID-project, which involved the whole region.

The Rail Department and the Road Department merged in to the Swedish Transport Administration during the project time. Officers and clerks from both departments continued to work with the Dryport project but kept auditing their work individually to Interreg.

Dryport Sweden has during the project time realised the importance of the project's large scale. The shown interest from other municipalities, associations of local authorities etc are high. The association of the Swedish Municipalities and County Councils (SKL) has written a report and a first conference about the establishment of inland terminals has occurred. The terminal in Falköping is stated as a good example in this report.

On a national level, a meeting about dryports was arranged with representation from the Ministry of Enterprise, Energy and Communications. This meeting related to the Green Corridors concept and useful contacts were made for the future. The meeting also demonstrated that the dryport concept could be an important element for the development of green corridors. Delegates from both Port of Gothenburg and Region Västra Götaland have attended follow-up meetings in Stockholm with the hope to enhance Gothenburg as the logistic hub in a green corridor system.

Falköping municipality has also participated in a task force with members of Gothenburg City, Region Västra Götaland and the Swedish Agency for Economic and Regional Growth. The task force discussed solutions for first level control. Falköping municipality's CFO attended these meetings, and among others, one was organised by the Minister of Enterprise, Energy and Communications in August 2011.

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Leif Bigsten

Manager of Development, Municipality of Falköping
Project Manager "Railport Skaraborg"