Organisation of Swedish dry port terminals

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terminals, but vague statements have been made by Banverket that also smaller terminals might enjoy funding and at least not
create worse conditions. Nevertheless, the relative competitiveness of smaller terminals close to the national terminals might suffer.

**Keywords:** dry port terminals, intermodality, inland terminals, organisation, rail network, seaport terminals.
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A REPORT IN THE EU INTERREG NORTH SEA PROGRAMME
SUSTACCESS

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Preface

This report is commissioned by Falköping Municipality as part of the EU Interreg IIIB North Sea Programme project SustAccess. The purpose of the study is to describe the dry port concept, and to identify and classify existing dry port applications in Sweden. Responsible for the report is Division of Logistics and Transportation at Chalmers University of Technology.

The work with the report has been significantly facilitated by some persons. First, we want to express our sincere thanks to professor Kaj Ringsberg, co-ordinating the project, and Leif Bigsten, municipality developer, Municipality of Falköping. Our colleague Fredrik Bärthel has provided valuable information for an earlier version of the description of the Swedish intermodal transport industry. We also wish to extend our gratitude to all industry representatives that has supplied us with facts for the study.

Göteborg and Kristianstad, February 2006

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Summary

This report is commissioned by Falköping Municipality as part of the EU Interreg IIIB North Sea Programme project SustAccess. SustAccess intends to contribute to an improved and sustainable accessibility between rural areas and gateways around the North Sea. The improved accessibility between gateway and hinterland should be achieved by promoting and by delivering sustainable transport solutions.

The purpose of this report is to describe the dry port concept, and to identify and classify existing dry port applications in Sweden. The emphasis is on organisational forms of the dry ports as well as on roles of the actors involved in the implementation process. The report will be used as a base for the future work within SustAccess. Responsible for the report is Division of Logistics and Transportation at Chalmers University of Technology.

After presentation of a theoretical framework with the dry port concept, the Swedish intermodal transport system, that is the context in which the terminals work in, is explained. Then a terminal inventory including intermodal rail-road terminals that handle unit loads and have or develop a rail connection to a seaport is forwarded. Data about the surveyed terminals is also presented in an appendix. The issue of intermodal terminal development is deepened in the five case studies Älmhult, Eskilstuna, Åmål, Alvesta and Jönköping. The terminal developments are selected for illustrating and investigating different aspects and they represent different scales of operation, ownership and maturity.

Swedish terminals range from small loading/unloading platforms to large freight centres offering a wide range of transport related services. The surveyed Swedish terminals range from small terminals that handle no more than 2000 TEU/year and only offer transhipment services to large terminals handling more than 70 000 TEU/year offering services such as transhipments, forwarding, maintenance of units, customs clearance, etc.

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. Many of the surveyed terminals are owned either entirely by a municipality or jointly by a municipality and commercial actors within the system, such as rail operator or shipper.

Even within CargoNet’s terminal network, ownership differs; those terminals situated in the ports of Trelleborg, Norrköping and Helsingborg are owned and operated by the ports. While, for example, Älmhult is operated by CargoNet but owned jointly by CargoNet, the municipality and IKEA. However for many of the CargoNet terminals, the rail tracks are owned and maintained by Banverket, and the land is owned by Jernhusen.

Activities regarding the implementation of the Åmål terminal went in a very informal way probably due to the fact that a transhipment terminal already existed and only had to be moved to another place. In addition, the terminal is of a small-scale and simple type. Therefore no official planning report was made nor were consultants involved in the planning of the terminal; however the implementation was financed by various actors, including the EU programme Mål2 Västra.

Compared to Åmål, where goods flows already existed at the old terminal and was just moved to the new one, Eskilstuna terminal was built to create a flow, i.e., to attract H&M in the area. Hence, the terminal was a pawn in a larger game aiming at attracting logistics activities to
Eskilstuna. The Eskilstuna terminal implementation was then financed entirely by the public utility organisation Eskilstuna Energi & Miljö.

Ålmhult is an example of a mature terminal that was the first to diverge from the norm of being owned and operated by the national railway. The terminal was initiated and is partly owned by the dominant shipper IKEA, a fact that reputedly has deterred other shippers from using the terminal. The reasoning is that IKEAs strong role might imply that the terminal pays less attention to other shippers’ load units. Alvesta is an example where the location at an intersection between main rail lines has fostered an interest in developing a terminal.

Jönköping, finally, has a terminal in Ljungarum and the area is likely to be appointed a national intermodal terminal. The issue is that Ljungarum is old, restrained in capacity and extension possibilities are meagre while the logistics activities are expanded in Torsvik. The local and regional authorities and shippers together with transport operators and infrastructure administrations have been strongly committed to the task. Personal commitment by the municipality’s development manager and by some strong shipper representatives has been instrumental for the development.

For the future structure of the Swedish intermodal terminal network, the awaited freight transport bill will be of utmost importance. The risk is that the increased interest and funding by the government will imply further concentration to fewer and larger terminals, but vague statements have been made by Banverket that also smaller terminals might enjoy funding and at least not worse conditions. Nevertheless, the relative competitiveness of smaller terminals close to the national terminals might suffer.
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Appendix 1: Intermodal Terminal Data

Appendix 2: Questionnaire
1. Introduction

Here follows a short description of the background of this report, its purpose and scope, methods used and some definitions of important terms used in the report.

1.1. Background

SustAccess is a co-operation project initiative under the Interreg IIIB North Sea Programme that intends to contribute to an improved and sustainable accessibility between rural areas and gateways around the North Sea. The improved accessibility between gateway and hinterland should be achieved by promoting and by delivering sustainable transport solutions. Therefore SustAccess aims at:

a) making it easier for passengers to change from being dependent on the use of private cars to more “environmentally friendly” traffic modes, like bicycles, rail and sea – and to public transport in general.

b) facilitating a change for freight transport by road to rail and sea, as well as at increasing the efficiency of transport nodes and corridors.

The project explores the spatial planning and other methods to stimulate this improvement; as well as spreads best practice among North Sea regions in two “strands”, passenger transport and freight transport.

Ten partners from the seven North Sea countries participate in the project: Aberdeenshire - UK, Southend - UK, Essex - UK, Västra Götaland (Lidköping and Falköping)- Sweden, VestAgder - Norway, Kortrijk – Belgium, Sluis - The Netherlands, Perth, Padborg – Denmark and Emsland – Germany, Figure 1-1.

![Diagram](image)

**Figure 1-1. Partners within the project regarding goods or passenger strand.**

Falköping is involved as a partner within the goods transport strand, Figure 1-1. The basic concept of the Falköping project is to develop a logistics interaction, in a form of a dry port, between a gateway, the Port of Göteborg, and the hinterland in the Falköping area. The dry port, as a logistic centre, would consist of terminal facilities for consolidation and coordination of goods flows to and from surrounding industries shipped through the Port of Göteborg.
1.2. Purpose

The purpose of the study is to describe the dry port concept, and to identify and classify existing dry port applications in Sweden. The emphasis is on organisational forms of the dry ports as well as on roles of the actors involved in the implementation process. The report will be used as a base for the future work within SustAccess.

1.3. Scope

The terminal inventory includes intermodal rail-road terminals that handle unit loads\(^1\) and have or develop a rail connection to a seaport. Other types of cargo are not included due to the scope of the project.

1.4. Method

To get an overview of Swedish intermodal terminals, data collection was conducted through a questionnaire sent either by e-mail, mail or fax. The questionnaire consists of 20 questions; the first ten questions are of a general nature like the number of TEUs handled or services offered; while the rest are organisation and implementation oriented questions. Some information was retrieved from the Internet but since these sources were insufficient, further contacts by phone were made.

The questionnaire was translated into Swedish and sent to 28 Swedish intermodal terminals which were assumed to handle unitised goods or have direct connection by rail to a seaport. 13 out of 28 surveyed terminals replied to the questionnaire meaning the responsiveness was 46%. However, replies from some terminals were excluded since they didn’t fit into the study. All collected data for intermodal terminals as well as the questionnaire in English are presented in the appendices of this report.

Moreover, data for five case studies were collected through interviews and archival records.

1.5. Definitions

By definition, an intermodal transport is:

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

*By extension, the term intermodality has been used to describe a system of transport whereby two or more modes of transport are used to transport the same loading unit or truck in an integrated manner, without loading or unloading, in a [door to door] transport chain.*

(UN Economic Commission for Europe, 2001, p. 17)

Of particular interests to this study are terminals with a rail connection. According to the UN Economic commission for Europe:

*An Intermodal terminal is a place equipped for the transhipment and storage of Intermodal transport units (ITUs).*

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\(^1\) In this case ISO containers, swap bodies and semi-trailers.
A dry port is a particular type of inland intermodal terminal:

A Dry Port is an inland intermodal terminal directly connected to a seaport, with high capacity traffic mode, where customers can leave/collect their goods in intermodal loading units, as if directly to the seaport.

(Leveque and Roso, 2001, p. 58)

Apart from transhipment, which a conventional inland intermodal terminal provides, services like storage, consolidation, depot, track and trace, maintenance of containers, and customs clearance are usually available at dry ports.

An intermodal transport unit (ITU) is a term for different types of unit loads used for intermodal transportation of goods. The most common one, the container is defined as:

A generic term for a box to carry freight, strong enough for repeated use, usually stackable and fitted with devices for transfer between modes.

(UN Economic Commission for Europe, 2001, p. 44)

Most maritime containers are ISO containers, two main standards exist in terms of length: 20 and 40 feet (6.10 and 12.20 meters), one and two TEUs (twenty feet equivalent unit) respectively.

The second type of unit load dealt with in this report, the swap body is defined as:

A freight carrying unit optimised to road vehicle dimensions and fitted with handling devices for transfer between modes, usually road/rail.

(UN Economic Commission for Europe, 2001, p. 49)

A swap body is equipped with folding legs on which the unit stands when not on the vehicle. Originally swap bodies were not capable of being stacked or top-lifted, but nowadays there are examples of swap bodies that can be stacked and top-lifted.

The third type of ITU typically used in intermodal transport is the semi-trailer, that is:

A non-powered vehicle for the carriage of goods, intended to be coupled to a motor vehicle in such a way that a substantial part of its weight and of its load is borne by the motor vehicle.

(UN Economic Commission for Europe, 2001, p. 37)

1.6. Division of work

The report is written jointly by the authors, but the responsibility for the chapters has been divided following this scheme:

2. The dry port concept: Woxenius and Roso (based on earlier published work)
3. The Swedish intermodal transport industry: Woxenius (significantly updated from earlier work with Fredrik Bärthel)
4. Terminal ownership and policy in Sweden – an overview: Woxenius
5. Inventory of rail-road freight terminals: Roso
6. Case studies:
Alvesta: Olandersson
Eskilstuna: Roso
Jönköping: Woxenius
Älmhult: Olandersson
Åmål: Roso
7. Conclusions: Roso and Woxenius
2. The dry port concept

The main problems seaports face today, due to growing containerised transport, are lack of space or inappropriate inland access done in a conventional way. Conventional hinterland transport is based upon numerous links by road and a few by rail as shown in the figure below with an example of ten shippers outside the seaport city. Rail transport is generally limited to serving major conurbations at rather far distances from the seaport.

![Figure 2-1 A seaport with conventional hinterland transport.](image)

Van Klink (2000) states that the pressures for good inland accessibility come from various, interrelated, directions like the growth of containerised transport, resulting in congestion in the ports themselves and on the routes to the hinterland. In addition, shippers and carriers increasingly rate ports on their accessibility, for example the frequency of inland transport services and transit times, or because of society’s demand for more environmentally friendly transport. To benefit from the opening up of new markets, ports need to improve their access to areas outside their traditional hinterland.

According to Zimmer (1996) an ideal terminal is not a certain physical configuration of pavement and tracks, but an organisation of services integrated with a physical plant that meets the business needs of a specific marketplace. These physical plants may take many forms, which are influenced by the characteristics of the landscape, their proximity to the seaport or major industrial complex, their location relative to the main rail infrastructure, and their distance from the country’s highway network. This conscious and strategic development of intermodal terminals in the hinterland is approaching what we denote dry ports:

“A Dry Port is an inland intermodal terminal directly connected to a seaport, with high capacity traffic modes, where customers can leave/collection their goods in intermodal loading units, as if directly to the seaport.”

(Leveque and Roso, 2001).

Apart from the basic service, transhipment, that a conventional inland terminal provides; services like storage, consolidation, depot-storage of empty containers, maintenance and repair for containers, customs clearance, etc. should be available at full-service dry ports. The quality of access to a dry port and the quality of the road/rail/waterway interface determines the quality of...
terminal performance therefore it is necessary to have scheduled, reliable, transport by high capacity means to and from the seaport. Thus, dry ports are used much more consciously than conventional inland terminals with the aim to improve the situation caused by increased container flows, focus on security and control by use of information and communication systems. The real difference is that the gates of the port are extended as described by van Klink above and that the shipper or forwarder see the dry port as an adequate interface towards the port and the shipping lines. Hence, the dry port concept goes beyond just using the rail and barge modes for high capacity transportation in the hinterland.

The dry ports are mostly located interior from the coast, thus the name dry port, but it does not exclude cities with sea access. In the case of Sweden, Göteborg is the main port and the concentration of flows with a high frequency together with the fact that calling Ports of Stockholm implies a significant detour around southern Sweden, means that most containers are moved by rail across Sweden. Between the seaport and the dry ports, relatively large goods’ flows are being concentrated, giving room for other traffic modes than road.

2.1. **Dry port classification**

Based upon the function and location of a dry port, they can be categorised as distant, mid-range and close dry ports. This section is an adapted excerpt from an earlier own article (Woxenius et al., 2004).

### 2.1.1. Distant dry ports

A distant dry port is the most usual of the three and has the longest history. The main reason for implementing it is simply that the distance and the size of the flow make rail or barge viable from a strict cost perspective. The figure below shows a seaport and its hinterland with the implementation of a distant dry port.

![Figure 2-2: A seaport with a distant dry port.](image)

Compared to conventional rail shuttles to and from ports, the difference is mainly referred to the functions offered at the distant dry port and the moved interface towards shippers. The more structured approach increases the competitiveness of rail against road and the shippers 3, 6 and 7 are now served by the dry port. Benefits from distant dry ports come also due to the modal shift from road to rail, resulting in reduced congestion at the seaport gates and its surroundings.
Since one train can substitute 40 trucks in Europe, the external environmental effects along the route are reduced. Apart from environmental benefits, a distant dry port also brings competitive advantage to a seaport since it expands the seaport’s hinterland by offering shippers low cost and high quality services.

Van Klink (2000) states that the pressures for good inland accessibility come from various, interrelated, directions like the growth of containerised transport, resulting in congestion in the ports themselves and on the routes to the hinterland. In addition, shippers and logistics service providers increasingly rate ports on their accessibility, for example the frequency of inland transport services and transit times, or because of society’s demand for more environmentally friendly transport. To benefit from the opening up of new markets, ports need to improve their access to areas outside their traditional hinterland. Mourão et al. (2002) agree and argue that ports compete not only in terms of transhipment efficiency and tariffs, but also in terms of speed and reliability of shipments to destinations on the continent. That 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.

Rail operators obviously benefit from distant dry ports because it increases the scale of their business. This is particularly important for rail transport depending on economies of scale and can make continental services, for instance between the inland conurbation and the seaport city, viable although ports are reluctant to bring in ILUs not relating to shipping. At least, the fixed costs of the intermodal terminal itself can be distributed between more transhipments when adding the dry port flows. Road transport operators are not benefiting from this configuration directly since the aim is to move transport of containers from road to rail, but they are still involved in the intermodal transport chains. As they are not particularly paid for waiting in congestion or at crowded gates at the port, they can serve the dry port surroundings with shorter hauls with better total revenues.

From the shippers’ perspective, a well implemented distant dry port offers a greater range of logistics services in the dry port area. For environmentally conscious shippers it brings a possibility of using rail instead of road and thus decrease the environmental impact of their products. The seaport city benefits from decreased road traffic saturating the streets and decreasing the quality of life for the citizens. Less traffic might also leave valuable area around the city centre for other purposes than traffic.

One example of a distant dry port is Isaka Dry Port in Tanzania, which used to be a conventional intermodal terminal:

Isaka Dry Port is an inland container terminal, which acquired the Dry Port status in 1999. The conversion of Isaka into a Dry Port means that all the customs documentation may be done at Isaka instead of Dar es Salaam Port. Importers can now accomplish all the necessary documentation and take delivery of their cargo at Isaka. (…) Isaka provides a convenient interface for traffic to Rwanda and North Eastern Democratic Republic of Congo.

(Tanzania Railways Corporation, 2004)

According to Mande (2000), the Isaka facility is very profitable because of the increasing exchange of containers that is done with neighbouring land-locked countries such as Rwanda and Burundi. Before the conversion, shippers had to do custom and port clearance directly in the
seaport of Dar es Salaam some 800 km away. Instead of a week it now takes only two days to send a container to the seaport.

### 2.1.2. Mid-range dry ports

A mid-range dry port is situated within a distance from the port generally covered by road transport as shown in the figure below. Here shipper 2, 3 and 9 are served directly by the dry port while shippers 7 and 8 are served by a closer conventional intermodal terminal. The mid-range dry port here serves as a consolidation point for different rail services, implying that administration and technical equipment specific for sea transport, for example x-ray scanners needed for security and customs inspections, are just needed in one terminal.

![Figure 2-3](image.png)  

**Figure 2-3**  
A seaport with a mid-range dry port.

The high frequency achieved by consolidating flows together with the relatively short distance facilitates loading of containers for one container vessel in dedicated trains. Hence the dry port can serve as a buffer relieving the seaport’s stacking areas. If this is a severe constraint, shippers with comparable distance to the seaport and the dry port (e.g., shipper 9) can then be directed to the dry port if it is made cost neutral to them. In other dimensions, the benefits are similar to those of a distant dry port.

The Virginia Inland Port (VIP) is an example of a mid-range dry port that moves the interface between lorry and rail for the transport of containers to and from the Port of Virginia, mainly their terminals in Hampton Roads. The VIP is located at Front Royal some 330 km from Hampton Roads and serves as a “US customs designated port of entry” where the full range of customs services is available to shippers. It has been consciously developed in order to increase the hinterland of the Port of Virginia (Bray, 1996) serving the Ohio valley in competition with Port of Baltimore (Woodbridge, 2004/a). The VIP has attracted investments of some 100 MUSD in distributions centres for Home Depot and Sysco securing import container flows for the seaport (Woodbridge, 2004/b).

### 2.1.3. Close dry ports

With ever growing containerised maritime transport, the main problems seaports are facing today are lack of space or inappropriate inland access. To meet the demand, seaports can increase their terminal capacity by establishing a close dry port in their immediate hinterland or
at the rim of the seaport city. With increased terminal capacity comes the ability for increased productivity, since bigger container ships may call the port.

The close dry port consolidates road transport to and from shippers outside the city area offering a rail shuttle service to the port relieving the city streets and the port gates. In this case, shippers 1-3 and 7-10 use the dry port and the seaport generates no road transport or gate congestion from shippers at long or mid-range distances.

Figure 2-4  A seaport with a close dry port.

Compared to the other types of dry ports, a close dry port offers larger possibilities for buffering containers and even loading them on the rail shuttle in sequence to synchronise with the loading of a ship in the port. This obviously requires a very reliable rail service not to risk increased dwell times of container vessels and then, at least at a start, the short distance with a dedicated track is a prerequisite.

Road hauliers lose a marginal market share in terms of road-kms but would still benefit from speedier operations. In cities not allowing long or polluting road vehicles, calling a close dry port is an alternative for splitting up road vehicles or changing to less polluting ones.

The 32 km long Alameda Corridor connects the ports of Los Angeles and Long Beach to intermodal terminals near downtown Los Angeles. It can be referred to as an example of a close dry port project since the containers were previously trucked between the terminals and the ports or used degraded small railway lines. Some 200 street-crossings were eliminated by letting the tracks run in a trench. Road congestion is significantly decreased and the containers move at more than double the speed than before. The ports carry about 20% of the construction costs amounting to 2.4 billion USD and the railway operators are supposed to pay it by user fees (ACTA, webpage.

Before improving the local road network, containers were also moved by a 15 km rail shuttle between Schenker’s general cargo terminal and the Port of Göteborg. Currently, a local rail shuttle connects the port and a container freight station in downtown Göteborg some 10 kms away. In order to move out space-demanding activities from the crowded port, parts of the stuffing and stripping activities are now moved to the neighbouring port Uddevalla 85 kms from Göteborg, by using a rail shuttle.
Moreover, a close dry port is planned at Enfield some 18 km from Sydney’s Port Botany (Sydney Ports, 2003). The Enfield Intermodal Terminal should facilitate more effective clearance of containers from the port and increase the productivity and capacity of existing port lands. A special dimension is that the expansion of the port is questioned for ecological reasons and the dry port is one of many measures to mitigate the consequences.

2.1.4. A fully implemented dry port concept

Comparing a combination of the three types of dry ports with the original example, as is done in the figure below, shows that the port and its surrounding city can be relieved from all road connections referring to locations outside the city area. In the example the shippers closest to the port (1, 2, 9 and 10) call the close dry port, two at medium distances (7 and 8) call the mid-range dry port through another intermodal terminal while the shippers furthest away from the port (3-6) use the distant dry port.

The distant dry port is here directly connected to the port since the flows were already large enough to ensure a full train service. If any of the mid-range or close dry port is used as a consolidation point coordinated with ship calls by dedicated trains, then the distant dry port would be served by a shuttle to the consolidation point. The same principle applies for the mid-range dry port if the close dry port is used for coordination or sequenced loading related to individual ships. Regardless of if the containers pass several dry ports, they can obviously use the same railway line into the port.

![Diagram showing comparison between conventional hinterland transport and an implemented dry port concept.](image)
It is not only the number of direct road connections that changes. There are opportunities to transfer activities currently causing congestion at the seaport gates to the dry ports. These activities include customs clearance, security checks and information handling. Also physical handling such as stuffing and stripping as well as buffering laden and empty containers can be done at the dry port and thus saving precious space in the port.

2.2. Implementing a dry port

The design and layout of a dry port is specific to each location depending on traffic volume, traffic pattern, special trade requirements and local conditions. Therefore it is not possible to give one generally accepted design. However, a dry port usually includes a rail siding, a container yard, roads, pavements, office buildings, etc. Before commencing the design the following should be determined:

- The initial volumes of goods
- Estimated volumes for a ten years horizon
- The type of facilities that customers will require

According to Beresford and Dubey (1990), the factors to consider in the location analysis for a dry port site are:

- Traffic flows with between centres of production and consumption and the ports
- Modes of transport available and network capacities
- Transport infrastructure in the vicinity of the site
- Existing auxiliary transport related services in the vicinity of the site
- Possible reduction in tonne-km by road transport with the introduction of the dry port
- The actual functions of the dry port, such as road haulage, stuffed and empty container storage, shunting, customs clearance, etc.
- Scope for future site expansion

Data for location analysis can be obtained either through field observation with internal data collection or through secondary sources like ports. There is also a possibility to use data from forecasting models.

The dry port implementation may be funded by the public sector, the private sector or a combination of these two. Each way brings its own advantages and disadvantages. A publicly owned dry port may give an impression of a greater security to the actors involved in the operations since chances for malpractice or unreasonable tariffs are minimized. On the other hand privately owned dry ports can be more flexible to trade, when changes in tariff structure or, for example, changes in daily operations are needed.
3. The Swedish intermodal system

The Swedish intermodal transport system is presented in this chapter. Focus is on the operators and their operations in order to present the context, in which the terminals are an integral part. Some of the intermodal operators also operate terminals. The rendering is mainly based upon a report by Woxenius et al. (2003) but it is significantly worked up and updated and parts were also published in Woxenius et al. (2006).

Since the 1980s, three major changes in the industrial organisation of intermodal transport have occurred. First, the infrastructure authority was separated from the operative part of the former Swedish State Railways in 1988. Second, the Swedish Parliament voted for establishing competition for freight transport on all Swedish tracks in 1995. And finally in 2001 Green Cargo, the former Freight transport division within SJ became a limited company. These changes and the Swedish parliament’s strive to an efficient and effective rail sector created large surplus of rail engines and to some extent engine drivers and thereby opportunities for new entrants to launch operation on the Swedish network.

3.1. Port of Göteborg Rail System

The Port of Göteborg 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 container shuttles connected to the port is the success story of Swedish rail-based intermodality. The system has been developed over a number of years, and currently 18 full train shuttles are operated by seven different railway operators. Most of the shuttles offer a daily frequency.

![Figure 3-1 Port of Göteborg Rail System as of November 2005. Source: Port of Göteborg, 2005.](image)

The volumes have increased in line with the number of shuttles. The number of TEU more or less doubled between 2001 and 2005 and at the current increase, market shares are taken from road. The total number of TEUs transhipped in Port of Göteborg was 788 000 in 2005 (Port-GotNews, 2006). Hence, rail has a market share of 28%.
Figure 3-2  Rail volumes in Port of Göteborg in TEU (ISO-containers, semi-trailers, tank containers and swap bodies). Source: Port of Göteborg, 2005.

Although the port’s rail terminal facilities and its connecting railway lines are getting congested, there are plans to implement new railway shuttles. Some might compete with existing ones while others will penetrate new markets.

Figure 3-3  Planned shuttle services as of November 2005. (Source: Port of Göteborg, 2005).

The newest addition (from January 24, 2006) is Uddevallapendeln (the Uddevalla Shuttle) connecting Port of Göteborg and Uddevalla, 80 kilometres north of Göteborg. The connection will
start with weekly trains in each direction. The train carries containers to be loaded and unloaded by Uddevalla Hamnterminal, the port operator at Uddevalla. Container consolidation is hence a part of the concept. Uddavallapendeln is a venture undertaken by Uddevalla Hamnterminal and Swanfalk Shipping in co-operation with the rail operator BK Tåg (PortGotNews, 2006).

3.2. Green Cargo

Green Cargo AB, the former freight transport division within SJ, was established in 2001, when the former national railway authority SJ was divided into a number of limited companies. Green Cargo is fully owned by The Ministry of Industry, Employment and Communications (Näringsdepartementet) and has 3 150 employees including the subsidiaries. The turnover in 2004 was 6 billion SEK and the transport work carried out amounted to 13 billion net tonkms (Green Cargo, webpage). Thereby Green Cargo is one of Sweden’s largest logistics and transport companies with a market share of almost 20 % of the total transport work in Sweden or 80 % of the freight transport carried out by rail.

Like many other European railway authorities, the Swedish State Railways (SJ) has gone through significant structural rationalisation and adaptation to market requirements. For the freight division, the aim at profit rather than volume during the 1990s led to cost rationalisation, for instance by more direct connections and a decrease from twelve to three marshalling yards. Thereby the core business dedicated trains and wagon-loads strengthened their competitiveness, mainly in the segments of raw material and semi-finished products, while significant unprofitable markets were abandoned. Today, Green Cargo shows business economic profitability, 137 MSEK for 2005 (Green Cargo, webpage).

Today rail transport is the core operations of the company, but lorry distribution and third party logistics constitute important parts in the business. Of the turnover, 80% is attributed to rail freight services, 13% to road transport and 7% to third party logistics (Green Cargo, webpage). Green Cargo offers complete logistics solution door-to-door and has high ambitions to remain a major player in the future transport market or in some relations be a refined subcontractor of pure transport services. The aim, alone or in strong alliances, is to offer a broad spectrum of logistics services with complete responsibility for their customers’ logistics activities.

![Figure 3-4 Services offered by Green Cargo AB. (Source: Green Cargo, webpage).](image)

Rail traffic is offered to more than 300 terminals and third party logistics is offered at four logistics centres with a total of 180 000 m² warehousing area. They operate 436 locomotives, 7700 wagons and 140 lorries. In addition, they offer services by 250 contracted hauliers.
A current problem with the wagon-load system is the cost and time drivers as marshalling and
shunting to private sidings. Especially the last distance to the customer is very time and cost
consuming and thus limiting the competitiveness of the wagon-load system for small and dis-
persed freight flows. This indicates a need for development of new intermodal transport sys-
tems in order not to further impoverish the wagon-load network and also going further down in
the shipment sizes.

In close co-operation with large shippers, Green Cargo develops, operates and markets inter-
modal shuttle trains. Examples are the shuttles between Insjön and the ports in Göteborg and
Gävle. The container terminal in Insjön and the shuttles are results of close co-operation be-
tween the regional authorities, Green Cargo and the customers Bergkvist-Insjön AB and To-
moku Hus AB. Green Cargo, who has equipped the terminal with a reach stacker and a semi-
trailer tractor, leases the terminal. Earlier 70% of the 5000 containers were transported to the
ports by road. Another example is the service between Port of Göteborg and Nässjö.

3.2.1. TGOJ Trafik

The core business of TGOJ Trafik AB, a subsidiary to Green Cargo, is to operate local or re-
gional rail traffic, focusing system trains and local rail haulage. In the intermodal business, it
operates a number of trains on behalf of Intercontainer (Scandinavia) AB (see below):

The Göteborg Shuttle: Göteborg – Eskilstuna – Södertälje
Göteborg – Eskilstuna – Gävle
Göteborg – Eskilstuna – Norrköping
Södertälje – Eskilstuna – Gävle
Gävle – Eskilstuna – Göteborg
Norrköping – Eskilstuna – Gävle – Göteborg

The Helsingborg Shuttle: Helsingborg – Göteborg v.v.

3.2.2. Discontinued: Green Cargo’s Light-combi

Green Cargo has taken various initiatives to recapture some of the markets abandoned by
wagon-loads and conventional intermodal transport, and to capture new markets for semi-
finished and finished products. The approach has been to develop transport systems for small
and dispersed flows by re-engineer the whole transport system rather than only the tranship-
ment function. One such project, Light-combi, was initiated in 1995, and the aim was to recap-
ture geographically abandoned markets with a fine-meshed network of some 30-40 small-scale
terminals. This in order to target the transport market of full container loads and part loads over
distances in the range of 200-500 kms. The concept is based upon fixed-formation train sets
that make short stops – 15-30 minutes – at sidetrack terminals approximately every 100 kilome-
tres. At the terminals, swap bodies are transhipped under the overhead contact line by use of a
forklift truck carried by the train and operated by the rail engine driver. The offered service
included local road haulage.

The service offered by the Light-combi pilot, The Dalecarlian Girl, included, except from the
transport, handling and distribution of temperature sensitive goods from the wholesaler Dagab
in Borlänge to 37 Hemköp stores. These stores are situated in the southern and middle parts of
Sweden. The system was initially intended to include transport of colonial products and chilled
goods requiring controlled temperatures.
The Light-combi technique used in the customer pilot, was rather simple and inexpensive and worked technically well. The customer pilot performed well and the customer was satisfied with this as well as the producer. Still, the customer pilot was closed down in April 2001, due to the difficulty in pricing and to achieve economy in the system without the large investments required for adding more customers (Bärthel and Woxenius, 2003).

3.3. Cargo Net

As a complement to conventional rail, Green Cargo (then SJ) introduced intermodal services in the late 1960s. While the conventional rail services primarily are retailed to shippers, the intermodal road-rail services are traditionally wholesaled to forwarders, shipping agents and hauliers. The business unit for intermodal transport became a limited company in 1992 and was named Rail Combi. In 2002, Rail Combi became part of CargoNet A/S and from 2005 it operates under the name CargoNet AB. The Swedish and Norwegian networks are gradually being merged and CargoNet currently operates trains to 14 terminals in Sweden and 12 in Norway. CargoNet is owned to 55% by NSB and to 45% by Green Cargo and the top management is dominated by Norwegians. Cargo Net has a turnover of approximately 1.4 billion NOK (180 million EURO) with some 935 employees (CargoNet, webpage). The Swedish and Norwegian operations are now merged and figures for the Swedish part are no longer available, but for 2004 the Swedish operations lost 26 MSEK. In 2002 it had 174 employees, a turnover of 456 MSEK (app. €50 million) and the total volume, mainly semi-finished and finished products, was about 2.5 million tons. Some 475 000 TEU were handled during 2003.

CargoNet still dominates the Swedish intermodal market, but the services have suffered from problems related to capital-intensive terminals, insufficient resource utilisation and a hardening competitive environment. The latter relates to all-road and increasingly also to competition within the intermodal industry. As is evident from this chapter, the new entrants have particularly aimed for the relatively lucrative market for port shuttles. Rationalisation has implied a halved number of served terminals and a strategy towards direct trains between the terminals.

From January 2006, Cargonet’s services include the terminals Luleå, Umeå, Sundsvall, Gävle, Hallsberg, Stockholm, Norrköping, Jönköping, Nässjö, Göteborg, Ålmhult, Helsingborg, Malmö and Trelleborg. They operate the following domestic shuttles:

- Malmö-Hallsberg
- Malmö-Norrköping
- Malmö-Göteborg
- Scania-Stockholm
- Scania-Northern Sweden
- Nässjö-Umeå/Luleå
- Göteborg-Stockholm
- Göteborg-Northern Sweden
- Stockholm-Northern Sweden

This extended focus on shuttle trains with full capacity control is complemented by a deepened co-operation with Green Cargo for relations not allowing for frequent shuttles. For border-crossing traffic, CargoNet have partnership agreements with the UIRR companies Hupac (Switzerland) and Kombiverkehr (Germany) in order to offer the necessary frequencies for intermodal trains.
3.4. **Intercontainer (Scandinavia) AB**

Intercontainer (Scandinavia) AB (ICS) was established in 1993 to provide local support service for the Scandinavian intermodal market, organise agency services for Intercontainer-Interfrigo (ICF) and attract new Pan-European business to ICF. The company is a 100% subsidiary of ICF and provides sales and marketing of ICF’s intermodal transport services to and from as well as within the Scandinavian countries (ICF, webpage). The headquarters is located in Göteborg.

ICS now offers several different intermodal transport services to and from Sweden. Examples are DuisScan that runs from Duisburg in Germany to Denmark and Sweden and Scandinavian Maritime Express Sweden (SME Sweden) that connects the ports of Bremerhaven and Hamburg with several terminals in Sweden. These services are illustrated in the figure below.

![ICF traffic network, left: DuisScan, right: SME Sweden. (Source: www.icfonline.com)](image)

3.5. **BK Tåg Sverige**

KarlssonGruppen was established in 1923 as a bus and lorry operator in Småland. After the deregulation of the Swedish rail system in 1988, the company developed BK Tåg AB. It went into bankruptcy in 2005 but the freight activities were rescued. In June 1999, BK Tåg took over the transport of Absolut Vodka in containers between the ports in Åhus and Göteborg amounting to 10-15 containers each for the sole customer Atlantic Container Line, ACL, for further transport to the USA (BK Tåg, webpage). This service is now jeopardised after ACL and Maersk have lost their contracts with Absolut to the forwarder Panalpina and the container shipping line MSC (Dahllöf, 2006). With the new logistics service providers, it is not likely that the containers will be shipped over Göteborg.

In addition, BK Gruppen owns a third of Vänerexpressen with its subsidiary Mälarexpressen as presented below and BK Tåg Sverige is the operator of both Vänerexpressen (Göteborg-Karlstad) and Mälarexpressen (Göteborg-Västerås). From January 24, 2006, BK Tåg Sverige also operates the weekly Uddevallapendeln (PortGotNews, 2006).
3.6. Vänerexpressen and Mälarexpressen

BK Gruppen together with the regional haulier LBC Frakt established the intermodal operator “Vänerexpressen” in 1998 when an intermodal shuttle for containers was launched between Göteborg and Karlstad in co-operation with the port authority in Karlstad, Vänerhamnarna. The marketing arguments were to relieve the main road between Göteborg and Karlstad and there were not enough volumes for the port authority to transport the goods by ship through the river Göta Älv (Ånghwisslan, 1998).

One major customer, Tetra Pak in Forshaga, provided the concept with a base volume and Vänerexpressen now operates a daily (weekdays) shuttle between the Port of Göteborg and Karlstad for cargo destined to or originating from the Dalsland and Värmland provinces. Full door-to-door transport is offered and they hold the commercial risk in consolidating the rail transport. In this operation they use the terminal services provided by the port, while the pre- and post haulage as well as the rail haulage are bought from the owners LBC Frakt and BK Tåg Sverige. The volumes have increased steadily from 7 500 containers in 2002 to 11 000 in 2005 (Vänerexpressen, website).

In October 2005, Vänerexpressen’s subsidiary Mälarexpressen started their daily (weekdays) services between Port of Göteborg and Västerås, also with BK Tåg Sverige as train operator.

3.7. Tågfrakt

Tågfrakt AB was started in Falköping in 1996 when SJ/Green Cargo phased out its activities there. With ten employees and six rail engines, they offer shunting, terminal and intermodal shuttle services as a supplier to Green Cargo as well as directly to shippers. Since 2005 they offer daily container shuttle departures in both directions between the Port of Göteborg and Örebro.

3.8. Discontinued: IKEA RAIL

The global furnishing store chain IKEA founded its own railway company aiming to transfer large volumes of goods from road to rail. This was a consequence of the environmental policy within IKEA, based upon business considerations as well as the founder/owner Ingvar Kamprad’s ethical and environmental concern. The objective was to increase the share of rail from 18% to 40% for IKEA’s transport needs within Europe. It is now discontinued but it is included here since IKEA is a major customer of intermodal rail services also on other routes.

IKEA Rail signed an agreement with the railway operator Rail Transport Team (RTT)², for rail traffic between Duisburg in Germany and Älmhult in Sweden. In a further perspective the initiative aimed at launching an IKEA Rail Capacity Network in Europe connecting the centre point in Duisburg to the markets in Poland, Sweden, Italy and the Benelux countries. In order to achieve economies of scale in terms of fully utilised trains and balanced flows, IKEA sold free capacity to other shippers (Beijbom, conference presentation, 2002). In the first step, launched in May 2002, 50 long distance lorries were exchanged for rail transport.

² The operator RTT is a consortium of three local train operators; Ruhrkohle Hafen und Bahn AG in Germany, TraXion in Denmark and TGOJ in Sweden, and this consortium is responsible for the operative part of the Älmhult-Duisburg shuttle (X-Rail, 2002).
IKEA also signed an agreement with the three rail infrastructure authorities Banverket (SE), Banestyrelsen (DK) and DB Netz (DE) to secure a fast (65 km/h) and stable timetable using the North-South Rail Freight Freeways. The fact that IKEA Rail itself controlled the train slots distinguishes it from other large shippers’ purchasing or logistics departments, like Volvo Logistics, that merely buy full train services. IKEA invests considerable sums in their network of stores and logistics facilities and expects a steep rise in internal flows (Roos, 2002). Combined with expected congestion on European roads and tracks, IKEA considered the train slots as a critical asset for their future business (Kamprad, 2001).

Nevertheless, IKEA terminated the own operations from 15 January 2004. The reason was mainly that IKEA’s flows migrated eastward faster than anticipated. After delays in the introduction, the trains were actually showing sufficient filling grades, but the share of goods from other shippers was regarded as too high and IKEA risked becoming a transport operator rather than an internal transport company. This was not in line with IKEA’s strategy or core operations so they decided to leave the train operations to ICF. Hence, the trains still run, but not organised by IKEA themselves.
4. Terminal ownership and policy in Sweden – an overview

The issue about who is to operate terminals is a decisive one in most transport systems. Forwarders have traditionally kept the consolidation of general cargo in-house while contracting out the physical movements between terminals. The national railways originally placed the terminals and station buildings in the train operating part and not in the infrastructure part when splitting up. Ports, on the other hand, has generally been regarded as public assets although there are some privately operated ports and some big shipping lines operate own terminals.

Despite the strong position in infrastructure planning, the European Commission has traditionally not been very interested in terminals. According to Höltgen (1995):

“Terminals (like seaports) are an integral part of the Trans-European Network (TEN). The Community Guidelines for the development of TENs explicitly include the improvement of interconnection nodes as a priority measure. However, while the EU has established the main links of the European intermodal transport network, it has not yet provided guidelines regarding the location of the nodes of the network (neither has it so far determined criteria for the selection of port-related projects of common interests). Moreover, the functions of different types of transhipment centres (e.g. regional, national, European) have not been defined at the EU level.”

Consequently, the European Commission has concentrated its efforts to the links and not to the nodes. In an amendment to the above mentioned decision (1692/96/EC), however, the European Commission has identified some 300 seaports as well as 233 intermodal terminals and 35 inland ports for inclusion in the TEN intermodal transport network.

4.1. Intermodal road-rail terminals

The largest intermodal road-rail terminals are still operated by the national railways, directly or through subsidiaries, and thus a public asset by definition. In this section, however, the discussion starts out from whether terminals should be regarded as infrastructure (and thus a public concern) or an operational asset controlled by the transport operators. Public or private ownership of the transport operators is not relevant in such a discussion.

As described above, the European Commission has not clearly defined whether terminals are part of the TEN, mainly by referring it to the Member State level. At the national level, terminals are generally regarded as the operators’ assets. For instance, when SJ was split into Banverket for infrastructure and a “new” SJ for train operations, one of the basic criteria was that facilities and functions which were directly connected with product design and efficiency of traffic operators should not be included in the infrastructure (Jensen et al., 1992). Freight terminals and station buildings were obviously of that category.

It must be stated that it is very risky to invest in terminals without controlling the operations on the links since the demand for transhipment is absolutely derived. Although Swedish road-rail terminals are operated by hauliers, forwarders and shippers, CargoNet AB is consequently the principal of most terminals. One of the terminals is operated by a company jointly owned by CargoNet, the shipper IKEA and the municipality of Älmhult. Port terminals for sea-rail transhipment of semi-trailers and containers are dominated by public interests, and somewhat out-
side CargoNet’s control. CargoNet is, consequently, often directing customers to its own road-rail terminals in Göteborg and Stockholm although many customers would have preferred to go closer to the port terminals. In Norrköping, Helsingborg and Trelleborg, however, the shuttles operated by CargoNet use the ports’ facilities for transhipment. Moreover, the capacity of port terminals have been needed for handling sea-rail transhipments and now the security issues are factors making ports reluctant to bring flows external to the port operations inside their gates.

The operators that have entered the Swedish intermodal road-rail transport market during the last years have typically decided not to use CargoNet’s terminals. Instead they use the port terminals in Södertälje, Göteborg, Trelleborg, Gävle and Karlstad together with the new terminals like Eskilstuna and Nässjö. Green Cargo uses their own terminal in Insjön.

Trends in the USA point towards an increased role taken by specialised and independent terminal companies creating networks of terminals. The railroads sell or contract out the terminals to two large competitors, mainly ITS and Parsec. Such trends of establishing terminals as an own industry is not visible in Sweden.

It is more or less an accepted fact that the different traffic modes do not fully cover the costs they cause society in terms of pollution, noise, traffic accidents as well as excessive use of energy and land. Until a legal framework levelling the playing field is a reality, and at the current pace this will be a long time, public money has to be spend on supporting the use of rail and sea to a larger extent than today. The question is how to spend the money.

Currently, the Swedish road and rail administrations are investigating possibilities for assigning a status of being a national intermodal terminal to the major ones in Sweden. Practically, it would mean that the government would supply these terminals with excellent connections by road and rail and also carry costs for the tracks and the hardened surface at the terminals. The terminal operators would be charged by the principle of social economic marginal costs and the terminals would need to apply a non-discriminatory attitude towards all railway operators.

In the last proposal from consultants (Network Logistics, 2006), ten terminals are suggested for qualifying as a national intermodal terminal. The selection is based upon a prognosis of volumes in 2015 but terminals in ports are excluded. The last recommendation also included terminals serving a dominant shipper, mainly referring to Älmhult and IKEA, but that restriction is removed. If port terminals were included, those in Göteborg, Helsingborg, Trelleborg and Norrköping all would qualify on volume grounds.

EU funding has also helped to establish some Swedish intermodal terminals. In Luleå, for instance, the EU supported the investment in the new intermodal terminal with 20 MSEK from their structural funds (Target 1). Also the terminals in Åmål and Nässjö have enjoyed funding from the EU.

4.2. Ports

Ports are traditionally a public asset. Its role in the transport chain has also been much less integrated with the transport operators than is the case for intermodal road-rail terminals and intermodal freight centres. Nevertheless, trends point towards an increased interest as the ports will probably span a larger part of the intermodal transport chain than they do today, e.g. by establishing distribution centres, offering non-transport value-added services in the ports as well as establishing dry ports. The emerging networks of ports will also play an important role, but
except for Port of Göteborg, the Swedish ports are regarded as too small for being incorporated in the first expansion phase.

The issue of port governance is delicate since they are municipality assets and the government has been careful in its wishes to control the ports. There are signs, however, that the government through its road and rail administrations is taking a stronger hand on the issue. A seriously delayed bill on transport policy is expected to involve demands for ports in different regions to co-operate. The reasoning is that ports are expensive, but the truly large costs relates to connecting road and rail infrastructure. Hence, the government has a position of power in relation to the municipality ports since the hinterland connections are increasingly important in the competition between ports.

4.3. Intermodal freight centres

Intermodal freight centres are regarded as a matter primarily for local authorities, but there is a clear need for co-ordination at the regional, national and EU levels. Some years ago, a consultant tried to sell the idea (but basically his consultant services) to virtually any Swedish local authority. It makes sense that the local authorities support the development, but only following objectives for better co-ordination and land use at the local level. Public infrastructure money can be much better spend than by local authorities in the competition for jobs with their neighbouring communities. At a higher policy level, Höltgen (1995, p. 314) argues that:

"... there would seem to be no reason to prioritise Europlatforms3 in the development and integration of the European intermodal transport network, which includes more than 500 terminals. Moreover, in view of the limited impact of logistics centres on intermodal transport, the proposition that EU funds should be allocated specifically for these facilities in the context of the TEN-programme has to be rejected."

Höltgen also mentions that at least three sites, Boulogne, Doncaster and Wakefield, have received financial help from the European Regional Development Fund, but he recommends further studies on the actual effects to the society. For a successful transfer of goods to rail and sea transport, he recommends that the public policy should be focused onto the internalisation of the external costs.

The general conclusion from this part of the study is that the public sector should be involved in the terminal planning process, mainly for infrastructure and city planning reasons, but they are not ideally suited for taking part of the day-to-day operations. Nevertheless, until the different traffic modes carry their full social costs, intermodal transport has to be developed using public funds for achieving modal split in favour of rail and sea transport. It is then natural to subsidise or at least favour the terminal function when planning land use and infrastructure investments.

3 Europlatforms is an organisation of intermodal freight transport centres in Spain, France, Britain, Denmark and Germany.
5. **Inventory of rail-road freight terminals**

As a complement to conventional rail, Green Cargo (then the Swedish State Railways’ freight division) introduced conventional intermodal services in the late 1960s when some 40 terminals were established in Sweden. The services suffered from problems related to capital-intensive terminals, bad resource utilisation, unclear market profile and efficiency gains for the competing road transport services. Rationalisation implied a halved number of terminals and a strategy towards direct trains between the terminals rather than operating a true network. During recent years, deregulation has fostered new investments in intermodal terminals. In this chapter an inventory of rail-road terminals in Sweden is presented.

5.1. **Categories of freight terminals in Sweden**

Terminals in Sweden can be divided into the following categories:

- Seaport terminals
- Intermodal freight centres
- Conventional intermodal terminals
- Light-combi terminals
- Wagon-load terminals
- Freeloading sites

5.1.1. **Seaports**

The design of ports depends greatly on the types of goods that are to be transhipped since the transhipment between ships and land-based traffic modes is the core business of ports. Sweden has about 50 public ports, see Figure 5-1, which range from small, specialized facilities to ferry ports and multi purpose ports. The main types of goods handled in Swedish ports are petroleum products, bulk materials, sawn wood products, vehicles and unitised cargo.

5.1.2. **Intermodal Freight Centres**

According to UN EC for Europe (2001), an intermodal freight centre (IFC) or freight village is a geographical grouping of independent companies and bodies which are dealing with freight transport (for example, freight forwarders, shippers, transport operators, customs) and with accompanying services (for example, storage, maintenance and repair), including at least a freight terminal. There are a few areas in Sweden that could be classified as IFCs, namely in Stockholm at Årsta/Älvsjö/Västberga, in Göteborg at Gullbergsvass and along the north bank of the river Göta Älv, in Malmö at the port area and in Norrköping at Händelö.
5.1.3. Conventional intermodal terminals

Conventional intermodal terminals are designed for handling relatively large flows of ITUs. The terminals are equipped with lifting equipment such as a gantry crane, reach stacker, and/or forklift trucks. Most of them have more than one track for loading trains as well as areas where units can be stored and dangerous goods be handled. As operations are regular at these terminals there is an office and staff space in the terminal. Dominating in the category of conventional terminals in Sweden is CargoNet, which has 14 terminals in its network throughout Sweden, Figure 5-2. Not all terminals in the network are directly operated by CargoNet.
5.1.4. Light-combi terminals

The principle behind Light-combi is, as mentioned above, that a forklift truck is transported together with containers and swap bodies on the train and operated by the rail engine driver when there is a need for loading or unloading. Light-combi terminals are situated next to the rail track with a side loading track and a road connection. The terminals have a surface capable of sustaining the weight from the load and loading equipment. In Göteborg, Hässleholm, Nässjö and Linköping new unmanned Light-combi terminals were built. The others were more or less temporary and built under the pre-conditions of being as inexpensive as possible.

5.1.5. Wagon-load terminals

A wagon-load terminal is always equipped with a loading platform enabling loading and unloading from rail wagons with fork-lift trucks. Some of these terminals have weather sheltered platforms. The main railway operator in Sweden Green Cargo operates 16 wagon-load terminals, most of them are situated in the same area as the conventional intermodal terminals and have storage facilities, freeloading tracks and loading platforms capable of serving from a couple of wagons up to 20 wagons. Palletised cargo is handled as well as sawn wood and paper rolls.
5.1.6. Freeloading sites

Freeloading sites are very simple, with an incoming track that is not electrified, a surface capable of sustaining the weight from the load and loading equipment and with a connection to road infrastructure. There is generally no stationery lifting equipment or high capacity truck available for handling ITUs. Cargo handled at these sites is generally of low value, e.g. round timber. There are about 130 freeloading sites, see Figure 5-3, mainly south of Gävle, and approximately half of them have a loading platform.

Figure 5-3. Freeloading sites in southern Sweden. (Source: Banverket, web page)

5.2. Analysis of the surveyed terminals

This survey encompassed 22 intermodal (rail-road) terminals that handle ITUs and are connected by rail to a seaport, see Figure 5-4. Five of the surveyed terminals are situated within seaports, the rest of the terminals are on inland locations, though seven of them are in seaport cities but not on docks.

Borlänge, Gävle, Hallsberg, Helsingborg, Jönköping, Luleå, Malmö, Stockholm, Sundsvall, Umeå and Älmhult belong to the intermodal operator CargoNet which has a network of 14 terminals in Sweden and 12 in Norway serving all major destinations, and, in co-operation with other intermodal operators, a well spread network of terminals in the rest of Europe.

Stockholm is the largest of all surveyed terminals, in number of units handled per year, and also offers the widest scope of services. At Stockholm, apart from the transport terminal that provides customs clearance and storage of containers, there are several forwarders, hauliers and shipping agencies situated. There are also many warehouses situated next to the terminal. Jönköping, which is regarded as a regional terminal, almost reached its maximum capacity due to high demands from the region and therefore has to expand.
Figure 5-4. Surveyed terminals with quantity of units handled per year. Note: From August 2005, the two terminals in Helsingborg are merged into one in the port.

Eskilstuna, Insjön and Nässjö might be considered as a special group since they are rather new and their main purpose is to serve the Port of Göteborg. Eskilstuna is the only terminal in Sweden that actually uses the notion of dry port in its official name, Eskilstuna Dryport. Apart from transhipment, the terminal offers storage of containers and handling of dangerous goods. Nässjö is operational since the end of 2004. At Insjön, local companies together with Municipality of Leksand created conditions for a logistic solution and increased volumes transported by train. Currently, the terminal even faces capacity problems (Östlund, 2006)

Karlstad-Vännerterminalen, located on the shores of the lake Vänern 277 kms from Göteborg, offers the full range of services that inland ports usually offer, such as customs clearance, storage of containers, handling of dangerous goods, etc. Ämål-Värmdal is the newest, started to operate in January 2005 with a plan to handle 2000 units and expectations to double them. Together with Karlstad, it is the only terminal with access to inland waterways.
According to Ballis and Golias (2002), the intermodal rail-road terminals provide the space, the equipment and the operational environment for transferring ITUs between the different traffic modes. Rail-road terminals consist of a wide range of installations, ranging from simple terminals providing transfer between the two traffic modes, to more extensive centres providing a number of value-added services such as storage, empties depot, maintenance, repair, etc. Considering Ballis and Golias’ definition, a majority of the surveyed terminals can be described as simple intermodal terminals or simple dry ports, to emphasize the fact that they are connected to the seaport.

Categorization regarding volumes or types of goods would be rather difficult since volumes handled differ a lot between the terminals as well as types of goods, with no apparent pattern. In many cases the terminal operators had no knowledge about types of goods transported in the containers. Moreover, the data regarding volumes handled at the terminals have a different reference year as well as different ways of presentation.

There is no certain pattern for the surveyed terminals’ ownership. Type of ownership differs among them, see the table below and Appendix 1; nine of the surveyed terminals are owned either entirely by a municipality or jointly by a municipality and commercial actors of the system, such as rail operator or shipper. Even within CargoNet’s terminal network, ownership differs. CargoNet terminals situated in the ports of Helsingborg, Norrköping and Trelleborg are owned and operated by the ports. While, for example, Älmhult is operated by CargoNet but owned jointly by CargoNet, the municipality and IKEA. On the other hand, their terminals in Gävle, Jönköping, Malmö, Sundsvall and Umeå are operated by CargoNet, the rail tracks are owned and maintained by Banverket, and the land is owned by Jernhusen which is owned by the Swedish State. More data about the terminals is submitted in Appendix 1.

**Table 5-1. The terminals’ owners and rail operators.**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Owners (land and infrastructure)</th>
<th>Rail operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borlänge</td>
<td>The Municipality of Borlänge</td>
<td>CargoNet</td>
</tr>
<tr>
<td>Eskilstuna Dry Port</td>
<td>Eskilstuna Energi &amp; Miljö AB (The Municipality)</td>
<td>ICS</td>
</tr>
<tr>
<td>Göteborg Green Cargo CFS</td>
<td>Green Cargo</td>
<td>Green Cargo</td>
</tr>
<tr>
<td>Gävle CT</td>
<td>Banverket &amp; Jernhusen</td>
<td>CargoNet</td>
</tr>
<tr>
<td>Hallsberg CT</td>
<td>The Municipality of Hallsberg &amp; Green Cargo</td>
<td>CargoNet and Euroshuttle</td>
</tr>
<tr>
<td>Helsingborg Port</td>
<td>Port of Helsingborg</td>
<td>ICS, CargoNet</td>
</tr>
<tr>
<td>Insjön</td>
<td>The Municipality of Insjön, Bergkvist AB &amp; Green Cargo</td>
<td>Green Cargo</td>
</tr>
<tr>
<td>Jönköping CT</td>
<td>Banverket &amp; Jernhusen</td>
<td>CargoNet</td>
</tr>
<tr>
<td>Karlstad - Vånerterminalen</td>
<td>Vånerhamn AB</td>
<td>Vånerexpressen AB</td>
</tr>
<tr>
<td>Luleå CT</td>
<td>Luleå CT AB</td>
<td>CargoNet</td>
</tr>
<tr>
<td>Malmö CT</td>
<td>Banverket &amp; Jernhusen</td>
<td>CargoNet</td>
</tr>
<tr>
<td>Norrköping Port - Öhmansterminalen</td>
<td>Norrköping Hamn &amp; Stuveri</td>
<td>ICS, CargoNet</td>
</tr>
<tr>
<td>Nässjö</td>
<td>The Municipality of Nässjö</td>
<td>Green Cargo</td>
</tr>
<tr>
<td>Stockholm-Arsta CT</td>
<td>CargoNet, Banverket &amp; Jernhusen</td>
<td>CargoNet</td>
</tr>
<tr>
<td>Sundsvall CT</td>
<td>Banverket &amp; Jernhusen</td>
<td>CargoNet</td>
</tr>
<tr>
<td>Södertälje Port</td>
<td>The Municipality of Södertälje</td>
<td>ICS</td>
</tr>
<tr>
<td>Umeå CT</td>
<td>Banverket &amp; Jernhusen</td>
<td>CargoNet</td>
</tr>
<tr>
<td>Ähus port</td>
<td>The Municipality &amp; private persons</td>
<td>BK Tåg AB</td>
</tr>
<tr>
<td>Amål - Omlastningterminal Värmland</td>
<td>The Municipality of Amål</td>
<td>Vånerexpressen AB</td>
</tr>
<tr>
<td>Älmhult CT</td>
<td>CargoNet, The Municipality of Älmhult and IKEA</td>
<td>CargoNet</td>
</tr>
</tbody>
</table>
6. Case studies

In this chapter, a number of case studies are presented. They have been selected for reasons of being informative in relation to the development in Falköping, having special characteristics or mirroring trends rather than for being representative. They are either in a rather infant stage, on the drawing board or in an early planning stage.

6.1. Älmhult

Älmhults Terminal AB is located close to the southern trunk line between Malmö and Stockholm. It serves the main ports in the south of Sweden such as Malmö (120 km), Trelleborg (150 km), Helsingborg (120 km) and Göteborg (200 km).

![Figure 6-1. The railway network for Älmults Terminal AB. (Source: Eniro, web page, modified).](image-url)

Every day the terminal has four to five calls of train shuttles to the seaports. One is the shuttle to Göteborg and Oslo and one to Stockholm and the north of Sweden (Umeå) and the south shuttles go via Hässleholm to Trelleborg, Helsingborg or Malmö. The final destination for those daily south shuttles, are the Ruhr area in Germany. The trains are normally not full train sets from Älmhult but will be build to full sets in the connection points of Hässleholm for the south shuttle and Nässjö for the North shuttle.

The main shipper IKEA initiated the project as part of their internal company strategy. In the process of realisation of the terminal, both SJ and the municipality were involved at the early stage. The terminal was a joint investment between the Municipality of Älmhult, IKEA and CargoNet (then SJ Freight Division). Those three actors own one third of the terminal in Älmhult each. As mentioned, the structure in the operations company has been the same since the start in 1992. The railway tracks are built as a single loop back and forward to the main rail line with one connection point.
In 2004, the terminal handled 154,200 units of which 144,000 units were containers, 3,000 units were semi-trailers and the rest were swap bodies. The terminal offers services of loading and unloading with two reach-stackers as well as coordination of transports to and from the terminal for road transports. The terminal also offers maintenance of units as well as a container depot. The largest customers for the terminal are IKEA and the transport company Van Dieren. The terminal has five people employed. Two of the employees are fully paid by IKEA, one is paid by CargoNet and Älmhults Terminal AB pays the remaining two persons. However it is one organisation and the team works as an integrated unit at the terminal.

The cargo flow with the south ports is expected to increase. There are no major plans for changes except expanding the terminal in correspondence with the increase in volumes over the years. However, some attention will paid to the development in the southern ports of Sweden and then particularly the potential of a train shuttle connecting to Karlshamn and Karlskrona with Jönköping and Älmhult. Another study (Woxenius et al., 2006), however, could not identify significantly large flows for justifying a shuttle to the Port of Karlskrona.

6.2. Eskilstuna

Eskilstuna Dry port is the only terminal in Sweden that actually uses the notion of a dry port in its official name. The terminal is situated 380 kms from the Port of Göteborg and handles daily container trains with the port. There are also rail shuttles from Eskilstuna to Gävle five times a week. The terminal used to run a train to the Port of Trelleborg but stopped due to low volumes.

Although it is a rather new terminal that started to operate in March 2004, it already handles approximately 20,000 TEUs/year. The flow is not entirely balanced since 9,500 TEUs/year are transported from the Port of Göteborg to the terminal and 5,000 TEUs/year back; plus 5,000 TEUs/year from the terminal to the Port of Gävle.

The terminal area is 9,000 m² with a storing capacity of the container depot of approximately 800 TEUs. It has a sidetrack and going-through-track, each 150 m long. Apart from transhipment with the use of reach stackers, the terminal offers services of handling dangerous goods, road haulage and storage of containers. However, road haulage and storage of containers are done by subcontractors. The terminal has only two employees.

The terminal was realized through cooperation between Eskilstuna Municipality and its public utility organisation Eskilstuna Energi & Miljö, the rail operators ICS and Green Cargo. Eskilstuna Energi & Miljö is the owner while a local haulier Sörmlast AB runs the terminal today, although Green Cargo was in charge of the terminal operations at the beginning.

The idea for the implementation of the terminal came in the autumn 2002 when Eskilstuna municipality promised to build a terminal to attract H&M to the area. Almost two years past from the idea to the realization with the following stages:

- Negotiations between the municipality and H&M to establish their facilities in the area
- Agreement with ICS to run the terminal
- Agreement between ICS and Green Cargo to operate the trains
- Financing of the implementation by Eskilstuna Energi & Miljö

The terminal was built on a place with existing rail tracks, therefore the total cost of the implementation was no higher than 4.9 MSEK.
As the biggest advantage from the implementation of the terminal, the actors pointed out attractiveness of the municipality for new logistics activities in the area. That advantage is already proved with the recent movement of semi-trailers from road to rail, mainly for Lidl, which will result in 60% increased rail volumes. There are demands for more storage space and therefore the terminal’s future plan is to build a warehouse. The terminal has not experienced any significant problems so far, but they wish more train operators to be involved in the terminal services. Apparently, the terminal is very dependent on the one already operating.

6.3. Åmål

Åmål Transhipment Terminal Värmdal, located on the shores of the lake Vänern 180 kms from the Port of Göteborg, is one of the very few terminals in Sweden with access to inland waterways. The terminal started to operate in January 2005 and therefore may be considered as one of the newest rail-road terminal in Sweden. Before the implementation of the new terminal, Åmål had an old rail-road terminal that handled about 2000 containers per year, but it was situated next to the passenger terminal and due to safety reasons as well low capacity, it had to be moved to another place.

The new terminal handles container trains with the Port of Göteborg five times a week; the train arrives at the terminal in the morning (approximately at 7 am) and leaves for the port in the afternoon (approximately at 4:30 pm). It has already reached the figure of 2000 units and has expectations to double the quantity, at least. However, the goods flow is unbalanced since stuffed containers are transported to the port while empty containers are transported back. In 1999 Vänerexpressen succeeded Green Cargo as train operator.

Regarding terminal services, the terminal offers transhipment of containers that is done by a side loading truck, see Figure 6-2. No personnel are employed at the terminal, Lastbilscentral
Värmdal operates the terminal, i.e., is in charge of transhipment as well as of road haulage of containers. For the time being, no storage is available at the terminal, but there is a possibility for expansion.

Next to the terminal lie ten rail tracks, seven of which are in use. There is also a sidetrack for loading/unloading separated from the other tracks by a 400 m long road, see Figure 6-3 and Figure 6-4.

Figure 6-3 The sidetrack at the terminal (Source: Värmdal archive).

Figure 6-4 The rail-road connection at the terminal. (Source: Värmdal archive).
Amål municipality is the owner of the terminal, though the total cost of the implementation, 1,5 MSEK, was financed by different actors. EU programme Mål2 Västra financed the implementation with 500 kSEK, Banverket with 300 kSEK, Sparbanksstiftelsen Väst with 200 kSEK, Amåls Municipality 200 kSEK, and the rest was financed by the Västra Götaland Region, JÅÅJ (Museijärnvägssällskapet) and local industries. A lot of volunteering from different actors was involved in all stages of the implementation.

The idea for the new terminal came from local politicians, i.e. municipality of Amål, in 2001. The implementation of a new, improved terminal was seen as a possibility for development of the municipality; with better logistics services, new industries should be attracted and with them new jobs should open. The main stages of the implementation were the following:

- Dialog between the municipality and local industries which agreed to participate in the implementation. Local industries would benefit from better transport services.
- Planning was based mainly on experiences from other terminals, and the knowledge of the same was collected through dialogs with relevant actors. No consulting was included and no planning reports were written.
- Application for main funding was made through EU programme Mål2 Västra.
- Approval of the project by main actors involved in the process of planning.
- Realisation of the project.

It took more then two years from the first dialog to the opening of the terminal.

The implementation hasn’t only simplified the handling of containers and therefore enabled a better goods flow; it also created new jobs and hopefully will continue to do so as an increase of volumes is expected. The new terminal is also more secure as a working place than the old one.

The terminal’s plans regarding infrastructure are to build a storage area since the one is necessary for the terminal to meet the demand for increasing volumes. Regarding improvement of the services, the plan is to enable customs clearance at the terminal in order to facilitate the handling of the containers in the port.

6.4. Alvesta

Alvesta is situated close to the southern trunk line between Malmö and Stockholm, which crosses the coast-to-coast railway between Karlskrona and Göteborg in Alvesta. At present Alvesta has no intermodal terminal but the municipality investigates some areas and some different projects has evaluated possible locations in the area around Alvesta. The most important connections for Alvesta are the train connections to Kalmar (125km), Olofström (140 km), Värnamo (60 km) and to Hässleholm (170 km). The ports of interest are Karlskrona (190 km), Karlskern, Karlshamn (150 km) and Göteborg (300 km).

Every day Alvesta is passed by 50 sets of cargo trains running along the southern trunk line. In addition, four daily train sets from Volvo Body Parts in Olofström pass Alvesta on their way to Göteborg plus six train sets per day to Värnamo.
As one effect of the hurricane “Gudrun”\(^4\) an old side track in Vislanda, 15 km from Alvesta was reinforced by Banverket in order to support the logistics operation of removing the fallen timber from the area around Alvesta. A loading terminal was established for the Swedish forest company Vida and their chartered trains. For months, daily trains departed to Port of Halmstad with timber for the American market. In addition, a new track has been built for handling the large volumes of timber.

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\(^4\) Gudrun, the strongest hurricane in Sweden since 1969, hit the north of Scania and Småland in January 2005. The forests were severely damaged, and an estimation was that nearly ten years of normal productions fell during the hurricane.
Another large company operating from the area, Stena Metall transports steel scrap to Göteborg with a daily train.

In the near connection points with Alvesta as origin, the calls per day are at present according to the table below. The estimation until 2010 for each of those connections is also indicated in the table. This analysis was done by Banverket in 2005, which also forecasts the development in number of train in the different directions.

Table 6-1 Estimated development for the connections to Alvesta. (Source: Banverket, 2005).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nässjö – Alvesta</td>
<td>50</td>
<td>62 (+24%)</td>
</tr>
<tr>
<td>Alvesta – Hässleholm</td>
<td>54</td>
<td>66 (+22%)</td>
</tr>
<tr>
<td>Alvesta- Kalmar</td>
<td>3</td>
<td>3 (+/-0)</td>
</tr>
<tr>
<td>Alvesta- Värnamo</td>
<td>6</td>
<td>8 (+33%)</td>
</tr>
</tbody>
</table>

Nevertheless, most of the cargo is transit cargo and does not use Alvesta as origin or destination. This can be changed in the future, but then some improvements are needed in the infrastructure network around Alvesta. These changes will be some sort of terminal solution and has to be developed in line with the market growth.

Already in 1998 some local politicians started the project to make Alvesta as the main Swedish marshalling yard for continental traffic (Riksbangård syd). Those plans were not effectuated and the plans for a national marshalling yard were put on standby. In late 2004, an EU co-financed project was established within the LIP/LIMP. The project budget was nearly 5 MSEK.
and the Municipality of Alvesta contributed with 1,5 MSEK. The project is still in an infant stage. As part of this, the municipality has investigated an area north of central Alvesta. This area could be a suitable terminal place with good storing facilities.

“In the future some more local activities have to come in the range of mid-term perspective (3-5 years) for the cargo flows from the Baltic States and from the regions south of the Baltic Sea. An increase in the transports will develop very rapidly but some decisions have to be made where existing infrastructure is changing. When this happens, all good efforts has to be targeted in the same directions and the infrastructure has to be ready for coping with this cargo flow increase”.

(Statement from a local representative at the Municipality of Alvesta)

The activities in Alvesta for a terminal highlight a small-scale terminal facility with potentials to grow when it’s required by industry.

6.5. Jönköping

Jönköping is situated in the middle of south of Sweden and regarding the Swedish demographic situation, it is a popular location for distribution centres and logistics hubs. IKEA and El-Giganten are examples of companies operating Scandinavian distribution centres in the area. The forwarders Schenker and DHL have large terminals in Jönköping and the third largest, DFDS Transport, use Jönköping as a hub in its consolidation network.

CargoNet operates an older intermodal terminal in the Ljungarum industrial area close to the city centre. It is operated with reach-stackers and it is quite worn-out. To CargoNet it has been a bottleneck for increased traffic to and from Jönköping since the terminal is operating at or even over its dimensioned capacity. In addition, the municipality plans to develop other activities in the area and the local road traffic situation is not very good with the most busy part south of Stockholm of the main south-north highway in Sweden (E4).

The Ljungarum terminal was built before the establishment of the logistics centre at Torsvik, 13 kms from central Jönköping. Most new logistics establishments have been located there, notably the very large distribution centres for IKEA and El-Giganten mentioned above.

In order to investigate the possibilities for establishing a terminal in Torsvik, a group of interested parties was formed. The group is lead by the Municipality of Jönköping and included representatives from:

Shippers: IKEA, Electrolux Logistics
Transport operators: Sandahlsbolagen (haulier), Green Cargo, CargoNet
Municipalities: Jönköping, Vaggeryd, Värnamo, Habo, Mullsjö
Other public bodies: Region Jönköping, the county of Jönköping, the public transport authority of the county of Jönköping
Infrastructure administrations: Swedish Rail Administration, Swedish Road Administration

The initiatives are generally taken by a strongly committed development manager, former town planning manager. The group has commissioned several studies (e.g., Ramböll, 2005, SWECO, 2002 and Woxenius, 2002) and public workshops and seminars, all adding to a well elaborated vision of the need for, the consequences of as well as technical design of the terminal and its
connections. Calculations of social economic profitability have also been made. The development has not followed a specific schedule or plan. Nevertheless, as many of the participants are experienced in infrastructure development it has aimed at following the formal steps stipulated for the infrastructure administrations, i.e., idea study, preliminary study, rail track investigation, rail track plan and construction documentation.

The main issue has not been the possibilities for building the terminal as such, but the rail connection to Torsvik. The area has a rail connection today and both IKEA and El-Giganten use conventional wagon loads for inbound flows. The used track via Månsarp, however, is of a poor quality, crosses densely populated and nature sensitive areas and an increase in commuter trains make it a less viable solution for large scale intermodal transport. An option is then to build a track parallel to the highway E4 from the centre of Jönköping, following long-time plans for a high-speed passenger line Stockholm-Helsingborg. For freight trains, however, a more gentle inclination is required, which adds significantly to the costs. It would also imply a significant intrusion in the landscape since the inclination would require that the slope starts with a viaduct directly in the city centre. A cost estimate of 1 billion SEK for the option along the E4 has been made by Sweco (2002). Since any investment in Swedish rail infrastructure has to show a positive return on capital according to social economic costs, the extra costs for the gentle slope has to be carried by freight trains.

The option of building a new line to Tenhult on the line Jönköping-Nässjö (where the trunk line is) was then favoured. The altitude of Tenhult is comparable to that of Torsvik but goes through a moss that adds to the construction costs. The locations of Jönköping, Nässjö, Tenhult and Torsvik appear in the map below.

![Figure 6-7 Map of the area of Jönköping and Nässjö. Torsvik is located between Taberg and Barnarp. (Source: Eniro, webpage).](image)

The options and their pros and cons are explained by the figure below.
Figure 6-8 Problem definition regarding an intermodal terminal in Jönköping. (Source: Woxenius, 2002).

Jönköping is listed as a future national intermodal terminal (see section 4.1), but it is not decided upon if the Ljungarum terminal will be expanded or a new terminal will be built in Torsvik.

The current situation is that the group favours a location to Torsvik and the terminal would probably already be built if it was not for the substantial costs for the new track to Tenhult. That cost has to be carried by Banverket and it is not likely that it will be prioritised in the short run due to budget restraints and many competing projects. Nevertheless, Jönköping is likely to be appointed a national terminal and Banverket might find funds to build the track if the awaited bill includes dedicated money for terminal development. The project group has now suggested a step-wise development and the estimated costs are presented in the table below.

Table 6-2 Estimated cost for a two-stage development at Torsvik. (Source: Ramböll, 2005).

<table>
<thead>
<tr>
<th></th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railway yard</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Intermodal terminal (excl. tracks)</td>
<td>110</td>
<td></td>
<td>110</td>
</tr>
<tr>
<td>Terminal tracks</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Connection tracks</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Triangular track Månsarp</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Track to Tenhult</td>
<td></td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>Arrival railway yard</td>
<td></td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>New intersection E4</td>
<td></td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>150</strong></td>
<td><strong>410</strong></td>
<td><strong>560</strong></td>
</tr>
</tbody>
</table>

Meanwhile, in the neighbouring town of Nässjö, a small side-track terminal has been established at Gamlarp. The investment costs including connection to the main line and the side-tracks amounted to 58 MSEK and was split between the Municipality (11.6 MSEK), the Swed-
ish Rail Administration, the EU and Posten. The terminal is operated as a limited company, Höglandsterminalen AB, owned by the Municipality of Nässjö and Nå-ETB, a constellation of local hauliers (Wittskog, interview, 2004). The distances from Nässjö to central Jönköping is 42 kms and to Torsvik 53 kms. The rail shuttle to Port of Göteborg was an immediate success and the train was full from the start although the intended main shipper, Jysk, did not use the shuttle from start. The shuttle primarily serves the distribution centres in Nässjö, but some of IKEA’s containers related to Torsvik have also been transported by the shuttle despite the detour via Nässjö. If and when a terminal is established in Torsvik or if the Ljungarum terminal has a higher capacity, Höglandsterminalen expects that IKEA will no longer use the terminal.

From January 2006, CargoNet uses the Ljungarum terminal for international traffic only. They operate a shuttle to Oslo, which is also connected to Älmhult reflecting the significance of IKEA as a customer. For domestic transport, they use Höglandsterminalen in Nässjö for a shuttle to Umeå and Luleå in the far north of Sweden (CargoNet, webpage).

Notable from this case study is that the issue of who is to own and operate the terminal was deliberately left aside in order to avoid a gridlock of conflicting interests. The common goal has been to establish a terminal for its role in a wider context rather than for its own sake. Of the current terminal developments in Sweden, this one seems to include the most ambitious planning phase.
7. Conclusions

Swedish terminals range from small loading/unloading platforms to large freight centres offering a wide range of transport related services. The surveyed Swedish terminals range from small terminals that handle no more than 2000 TEU/year and only offer transhipment services to large terminals handling more than 70 000 TEU/year offering services such as transhipments, forwarding, maintenance of units, customs clearance, etc.

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, see the table in Appendix 1. Many of the surveyed terminals are owned either entirely by a municipality or jointly by a municipality and commercial actors within the system, such as rail operator or shipper.

Even within CargoNet’s terminal network, ownership differs; those terminals situated in the ports of Trelleborg, Norrköping and Helsingborg are owned and operated by the ports. While, for example, Älmhult is operated by CargoNet but owned jointly by CargoNet, the municipality and IKEA. However for many of the CargoNet terminals, the rail tracks are owned and maintained by Banverket, and the land is owned by Jernhusen.

Activities regarding the implementation of the Ämål terminal went in a very informal way probably due to the fact that a transhipment terminal already existed and only had to be moved to another place. In addition, the terminal is of a small-scale and simple type. Therefore no official planning report was made nor were consultants involved in the planning of the terminal; however the implementation was financed by various actors, including the EU programme Mål2 Västra.

Compared to Ämål, where goods flows already existed at the old terminal and was just moved to the new one, Eskilstuna terminal was built to create a flow, i.e., to attract H&M in the area. Hence, the terminal was a pawn in a larger game aiming at attracting logistics activities to Eskilstuna. The Eskilstuna terminal implementation was then financed entirely by the public utility organisation Eskilstuna Energi & Miljö.

Älmhult is an example of a mature terminal that was the first to diverge from the norm of being owned and operated by the national railway. The terminal was initiated and is partly owned by the dominant shipper IKEA, a fact that reputedly has deterred other shippers from using the terminal. The reasoning is that IKEAs strong role might imply that the terminal pays less attention to other shippers’ load units. Alvesta is an example where the location at an intersection between main rail lines has fostered an interest in developing a terminal.

Jönköping, finally, has a terminal in Ljungarum and the area is likely to be appointed a national intermodal terminal. The issue is that Ljungarum is old, restrained in capacity and extension possibilities are meagre while the logistics activities are expanded in Torsvik. The local and regional authorities and shippers together with transport operators and infrastructure administrations have been strongly committed to the task. Personal commitment by the municipality’s development manager and by some strong shipper representatives has been instrumental for the development.

For the future structure of the Swedish intermodal terminal network, the awaited freight transport bill will be of utmost importance. The risk is that the increased interest and funding by the government will imply further concentration to fewer and larger terminals, but vague state-
ments have been made by Banverket that also smaller terminals might enjoy funding and at least not worse conditions. Nevertheless, the relative competitiveness of smaller terminals close to the national terminals might suffer.
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Beijbom, C., former CEO of IKEA Rail, Presentation at the VTI conference, Linköping, 2002-01-10.
Nordqvist, Håkan, CargoNet; Manager Safety, Quality and Environment
Östlund, Bo, General Manager, TFK Borlänge, Discussion, 2006-02-14
Roos, K., Transport Manager IKEA Group, 2002-02-20.
## Appendix 1: Intermodal terminal data

### Intermodal terminals

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Rail connection with seaports</th>
<th>Distance [km] from Göteborg</th>
<th>Rail/shuttle operator</th>
<th>Terminal owner</th>
<th>Rail transport frequency</th>
<th>Units handled per year</th>
<th>TEUs handled per year</th>
<th>Terminal area [m²]</th>
<th>Handling capacity [TEU]</th>
<th>Storing capacity [TEU]</th>
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<td>1 Borlänge CT</td>
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<td>470</td>
<td>Cargonet</td>
<td>The Municipality</td>
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<td>12 000</td>
<td>16 000</td>
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<td>2 Eskilstuna Dry Port</td>
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<td>380</td>
<td>GC for Intercontainer</td>
<td>Eskilstuna Energi &amp; Miljö AB</td>
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<td>Vännerexpressen</td>
<td>Vänerhamn AB</td>
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<td>4 t/w</td>
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<td>157 000</td>
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<td>14 Stockholm - Årsta CT</td>
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<td>472*</td>
<td>Cargonet</td>
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<td>The Municipality</td>
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<td>13 000*</td>
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<td>Göteborg</td>
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<td>18 500</td>
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<td>18 Åhus port</td>
<td>Göteborg</td>
<td>279*</td>
<td>BK Tåg</td>
<td>The Municipality &amp; private persons</td>
<td>1 t/w</td>
<td>14 000</td>
<td>25 000</td>
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<td>(300m)</td>
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* by road  * by rail

P. 1
## Appendix 1: Intermodal terminal data

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<tr>
<th>Terminal</th>
<th>Trans-shipment</th>
<th>Storing</th>
<th>Customs clearance</th>
<th>Maintenance of units</th>
<th>Handling dangerous goods</th>
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<td>Sodertälje port</td>
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<td>Åhus port</td>
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<td>Almhult CT</td>
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Appendix 2: Questionnaire

1. What is the name of the terminal?
2. Which seaport the terminal is connected with by rail and how distant is it?
3. What is the terminal area (m²) and capacity (handling and storing in TEUs)?
4. What kind of handling equipment do you have (gantry crane, straddle carrier, forklift truck, reach stacker…)?
5. What kind of information system do you use?
6. Which of the following services does the terminal provide:
   a. Transhipment
   b. Customs clearance
   c. Forwarding
   d. Storage
   e. Sorting
   f. Maintenance of units (containers, swap bodies, semi-trailer, etc.)
   g. Other services:
7. Are the above listed services done by subcontractors (name and activity)?
8. What is the frequency of rail transport to/from seaport (per week)?
9. How many containers and/or semi-trailers are transported by rail to/from terminal from/to the seaport (per year in TEUs)?
10. What kind of goods do you handle in containers and semi-trailers?
11. Who are your main customers?
12. Who is the owner of the terminal?
13. Did the ownership change over the years?
14. Who initiated the implementation of the terminal, when and why (big volumes, better customer services, environmental issues, political issues, etc.)?
15. Who financed the implementation of the terminal?
16. What were the main steps of the implementation?
17. What advantages did the terminal bring since in use?
18. Which problems do you face?
19. What are your expectations?
20. What are the plans for the future concerning the infrastructure, services, ownership, etc.?
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<tr>
<th>TITLE AND AUTHOR</th>
<th>NO</th>
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<td>E-commerce and Logistical Consequences</td>
<td>109</td>
<td>2000</td>
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<td>Ola Hultkrantz, Kenth Lumsden</td>
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<td>Carl Wänström</td>
<td>110</td>
<td>2000</td>
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<td>Case studies of two intermodal transportation chains between Sweden and Germany</td>
<td>111</td>
<td>2001</td>
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<td>Per Olof Arnäs</td>
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<td>Intermodal Transport in Europe</td>
<td>112</td>
<td>2001</td>
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<td>Bottle-necks in a transport context and in a North Sea Perspective</td>
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<td>Jennie Thalenius-Adolfsson, Kenth Lumsden</td>
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<td>Idépromemoria för hållbar tillväxt i innovationssystemet för godstransport och logistik</td>
<td>114</td>
<td>2002</td>
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<td>Johan Woxenius, Sebastian Bäckström</td>
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<td>Engineering Change in the Supply Chain</td>
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<td>2002</td>
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<td>Assessing the Information Quality in the Materials Phase-in/Phase-out Process</td>
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<td>Intermodala Transporter och SJ/Green Cargos Utvecklingsprojekt Lättkombi (Intermodal Transports and SJ/Green Cargo's development project Light-combi)</td>
<td>117</td>
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<td>Utvecklingstrender för lastbärartransport med sjöfart och järnväg (Development trends regarding unit load transport by sea and rail)</td>
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<td>Terminals as part of the Swedish transport system – an overview</td>
<td>119</td>
<td>2003</td>
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<td>Johan Woxenius, Robert Sommar, Violeta Roso, Fredrik Bårthel, Kenth Lumsden</td>
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<td>Verkstadsindustrins logistik – en innovationssystemanalys (The logistics of the manufacturing industry - an innovation system analysis)</td>
<td>120</td>
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<td>Roger Lindau, Johan Woxenius, Pernilla Edlund</td>
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<td>Distributed RFID Systems for Supply Chains – Intelligent Freight Solutions</td>
<td>121</td>
<td>2005</td>
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<td>Kenth Lumsden, Rozbeh Karimibabak</td>
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<td>Possibilities to transfer goods from road to rail to and from the ports of Karlskrona and Gdynia</td>
<td>122</td>
<td>2006</td>
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<td>Organisation of Swedish dry port terminals,</td>
<td>123</td>
<td>2006</td>
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