NSB CoRe

Port of Hamburg MARKETING

Best Practices

of Intermodal Nodal Points

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Contents

List of Figures 4
List of Abbreviations 5
Executive Summary 6
1. Introduction 7
1.1 Background and structure 7
1.2 Definitions 9
1.3 Overview on selected intermodal terminals 10
2. BP of Intermodal Nodal Points: Infrastructure and Equipment 13
2.1 Accessibility 13
2.2 Proximity to market 14
2.3 Terminal area 16
2.4 Storage capacity 18
2.5 Truck parking spaces 19
2.6 Cranes 20
2.7 Rail tracks 22
3. BP of Intermodal Nodal Points: Operation 23
3.1 Emissions 23
3.2 Opening hours 24
3.3 Utilisation rate 24
3.4 Terminal capacity 25
3.5 Service Frequency and production system 26
3.6 Further important KPI for terminal operation 27
4. BP of Intermodal Nodal Points: Logistics Services and Quality 29
4.1 Safety and security standard 29
4.2 Value added services 29
4.3 Staff qualification 31
4.4 Further important KPI for logistics services and quality 32
5. Hinterland concept – Dry port 33
5.1 Dry Port 34
5.2 Effects of dry ports 35

5.2.1 Traffic density effects 35
5.2.2 Economic effects 36
5.2.3 Ecological effects 38
5.3 Market Requirements 39
5.4 Key success factors of a dry port concept 41
6. Recommendations for logistics centres 42
7. Summary and Outlook 47
Bibliography 49

List of Figures

Figure 1: Total ranking of European freight villages 8
Figure 2: The NSB CoRe intermodal terminals (yellow) 11
Figure 3: Main relations between intermodal connectivity and other port performance indicators .. 13
Figure 4: Special Economic Zone 15
Figure 5: Developed area and expansion options of Freight Villages in Europe 17
Figure 6: Rail port Hamburg accessibility 26
Figure 7: Intermodal carriage at Terminal Intermodale Nola in numbers 30
Figure 8: Ports along the North Sea-Baltic corridor 33
Figure 9: The dry port concept 35
Figure 10: Interrelation between costs, distance and amount of containers for hub and direct transport (schematic) 37
Figure 11: Location of Prilesie logistics centre and connection with the main transport corridors .. 43
Figure 12: SWOT of Top 20 Freight Villages 47

List of Tables

Table 1: Intermodal Terminals - Accessibility 14
Table 2: Intermodal Terminals - Proximity to market 16
Table 3: Intermodal Terminals - Terminal area and possibility to expand terminal 18
Table 4: Intermodal Terminals - Storage capacity 19
Table 5: Intermodal Terminals - truck area 20
Table 6: Intermodal Terminals – Cranes 21
Table 7: Intermodal Terminals – rail tracks 22
Table 8: Intermodal Terminals – opening hours 24
Table 9: Intermodal Terminals – utilisation rate 25
Table 10: Intermodal Terminals – terminal capacity 25
Table 11: Intermodal Terminals – train departures per week and production system 27
Table 12: Intermodal Terminals – value added services 31

List of Abbreviations

BSR	Baltic Sea Region
BSRP	Interreg Baltic Sea Region Programme
CCTV	closed circuit television
CEN	Comité Européen de Normalisation / European Committee for Standardisation
ILU	intermodal loading unit(s)
KPI	key performance indicator(s)
LC	logistics center
LU	loading unit(s)
NSB CoRe	“North Sea Baltic Connector of Regions” project
TEU	twenty foot equivalent unit

Executive Summary

Intermodal nodal points play a key role in the organization and functioning of the North Sea-Baltic TEN-T Core Network Corridor. Intermodal terminals are the interface between the different modes and thus are key to access intermodal services to ensure efficient and road-competitive intermodal supply chains throughout Europe.

Major key performance indicators for intermodal terminals can be clustered in infrastructure and equipment, operation and logistics services as well as quality. Looking at the best practices regarding these indicators, the aim is to learn from the best practice, to compare it to one's own business and to make sound decisions for one's own business.

The concrete rating of a best practice is relative, not absolute. It depends on the region, context and time. Thus even though terminals along the North Sea-Baltic corridor rank comparatively small and specialised, they serve the region well, providing even free capacity and extension possibilities for future increasing volumes. They are located in close distance to sea ports and/or capital regions. They further have good train connections not only between the North Range ports and the Baltics, but also to the Silk Road to China. While this will offer opportunities in the future, terminals have to make sure to be up to date regarding terminal infrastructure, technology and equipment. Here benchmarking with other terminals might reveal untapped potential. The dry port concept as well as recommendations derived from several EU projects might give valuable impulses.

Looking at the intermodal map, it further becomes clear that the density of terminals is way higher in Western Europe than in the Baltic Sea region. A further development of the network as well as the terminals might support a higher share of intermodal transport in the latter one. This would contribute to a greening and implementation of a sustainable transport corridor system in the EU and beyond.

1. Introduction

1.1 Background and structure

The NSB CoRe project enhances regional development in the Baltic Sea Region (BSR) by improving internal and external accessibility of the region along the North Sea-Baltic TEN-T Core Network Corridor. The acronym NSB CoRe stands for “North Sea Baltic Connector of Regions”.

The second work package focuses on intermodal logistics, the activity 2.2 is a nodal point infrastructure analysis. Activities in 2.2 focuses on providing stakeholders with the instruments and framework conditions to support the investment into new intermodal infrastructure and services for the North Sea-Baltic corridor area. Through this intermodal transport is promoted and the economic competitiveness is strengthened.

The report on hand provides an overview on best practices for intermodal terminals. The best practices describe KPI or parameters making a terminal outstanding. Selected terminals are held against this best practice in forms of a tabular comparison.

The KPI defining the best practices of intermodal nodal points are clustered under three aspects:

- Infrastructure and equipment,
- Operation and
- Logistics Services and Quality.

For most KPI their significance is described and/or one best practice example is highlighted, either from the BSR or from another European terminal. A table for most parameters highlights how selected BSR terminals rates against this best practice.

In 2015 a ranking[1] of European freight villages was carried out by Deutsche GVZ-Gesellschaft mbH. From the Baltic Sea region only terminals from Germany and Poland were ranked in the TOP 20 (ref. figure 1). However in the sections climber as well as newcomer also Finnish, Estonians and Lithuanian terminals were ranked. This highlights on the one hand the considerable backlog of terminal development in the BSR, but on another hand also the potential and latest development of these terminals.

[1] DGG (2016)

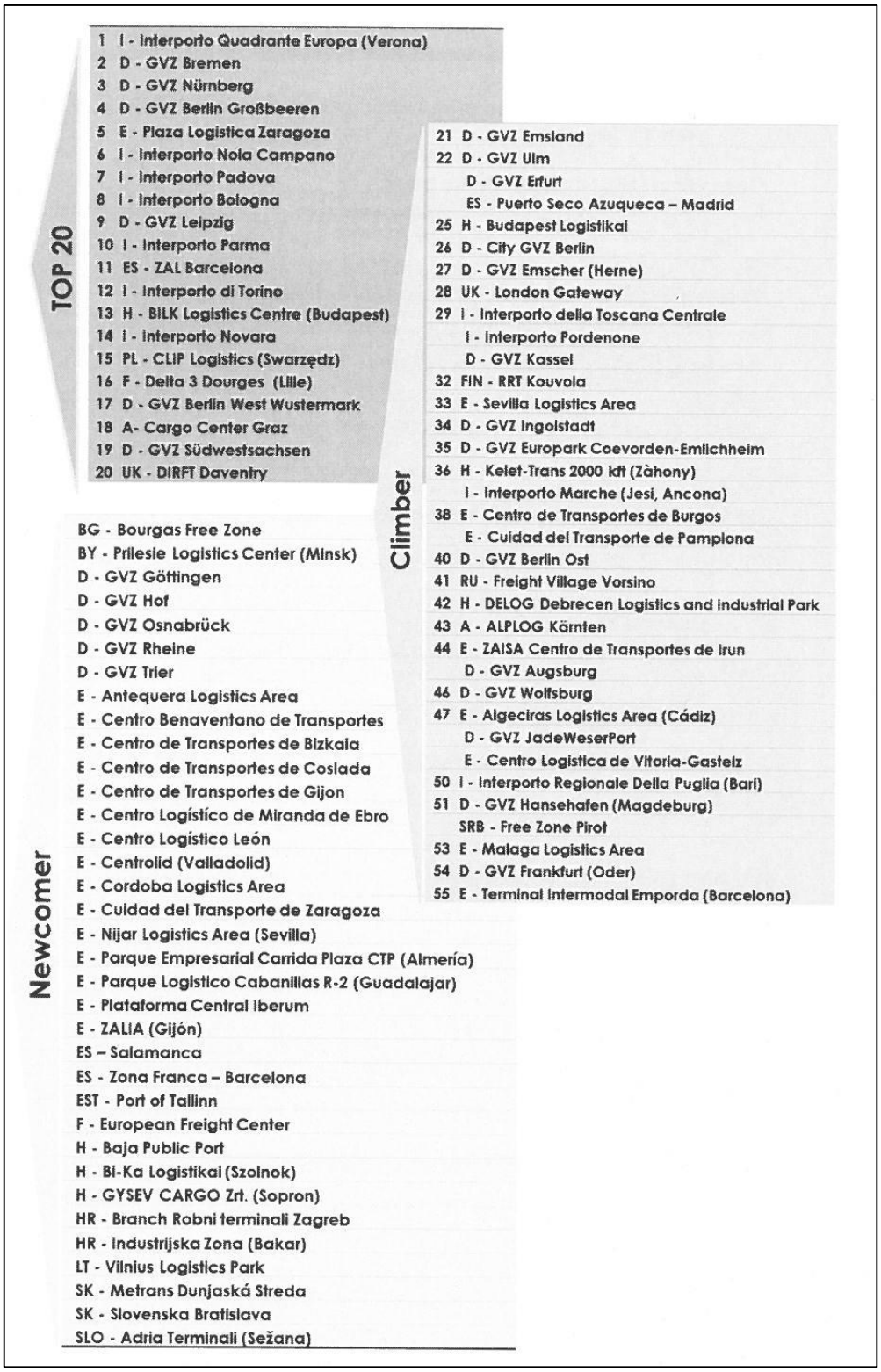

Figure 1: Total ranking of European freight villages

Source: DGG, 2016, p. 128

The report uses the results of previous NSB CoRe outputs. Definitions are based on the “AS IS ANALYSIS report” (ref. NSB CoRe, WP 2, Activity 2.2.1). Key performance indicators (KPI) were analysed and defined in the “Summary of assessment indicators and criteria for nodal point infrastructure” (ref. NSB CoRe, WP 2, Activity 2.2.3). A pre-selection of important intermodal nodal points on the NSB Corridor was made in activity 2.2.1. The best practices presented in the report on hand refer to this selection as basis for the best practice comparison.

The European nodal point best practice identification is part of what then builds the foundation for the ‘Recommendation and Action Plan for intermodal nodal points’. Therefor it provides a complement of information to the other reports having another focus (e.g. ICT review).

1.2 Definitions

Nodal points

Nodal points are referred to as the intermodal freight terminals along the NSB CoRe corridor. Intermodal terminals are the interface between the different modes and thus are key to access intermodal services to ensure efficient and road-competitive intermodal supply chains throughout Europe.[2]

Freight terminal

According to the North-Sea-Baltic Core Network Corridor study[3], freight terminal means a structure equipped for transhipment between at least two transport modes or between two different rail systems, and for temporary storage of freight, such as seaports, inland ports, airports and rail road terminals. The report on hand focusses on selected rail road terminals.

Best Practice

Best practices are examples on how to do something in a way it is outclass. The concept is synonymous to terms such as good examples, good practices, success stories, front-line demonstration facilities etc. The concrete rating of a best practice is relative, not absolute. It depends on the region, context and time. The aim is to learn from the best practice, to compare it to one’s

[2] NSB CoRe and ILiM (2018), p. 8.
[3] Proximare (2014)

own business and to make sound decisions for one's own business (depending on the context the best practice is situated in).

In the report on hand best practices are described for defined KPI making an intermodal terminal successful.

1.3 Overview on selected intermodal terminals

The following intermodal terminals were defined as key nodal points for the North Sea – Baltic corridor by the NSB CoRe project:

- DUSS-terminal Hamburg Billwerder (Germany)
- DUSS-terminal Großbeeren (Germany)
- Metrans HUB terminal Poznań (Poland)
- PKP Cargo terminal Poznań-Franowo (Poland)
- CLIP Container terminal Swarzędz (Poland)
- Spedcont container terminal Łódź (Poland)
- Metrans Intermodal terminal Pruszków (Poland)
- Vilnius intermodal terminal (Lithuania)
- Kaunas intermodal terminal (Lithuania)
- Klaipeda container terminal (Lithuania)
- Kuovola rail-road terminal (Finland)

DUSS-terminal Hamburg-Billwerder is located in the North of Germany. It was constructed in 1993. The terminal represents an important node for the transhipment of loading units between rail and road as well as in national and international transfer between trains. It connects different services of operators from southern Europe to Scandinavia, having about 22 direct trains daily.[4]

DUSS-terminal Großbeeren is located south of Berlin in Germany. The terminal was constructed in 1998 and extended in 2005. It is part of the freight village Großbeeren. It is part of the hinterland transport from the seaports to Eastern Europe and vice versa as well as for transports to the Berlin area.[5]

[4] Deutsche Bahn AG (2017)
[5] Deutsche Bahn AG (2017a)

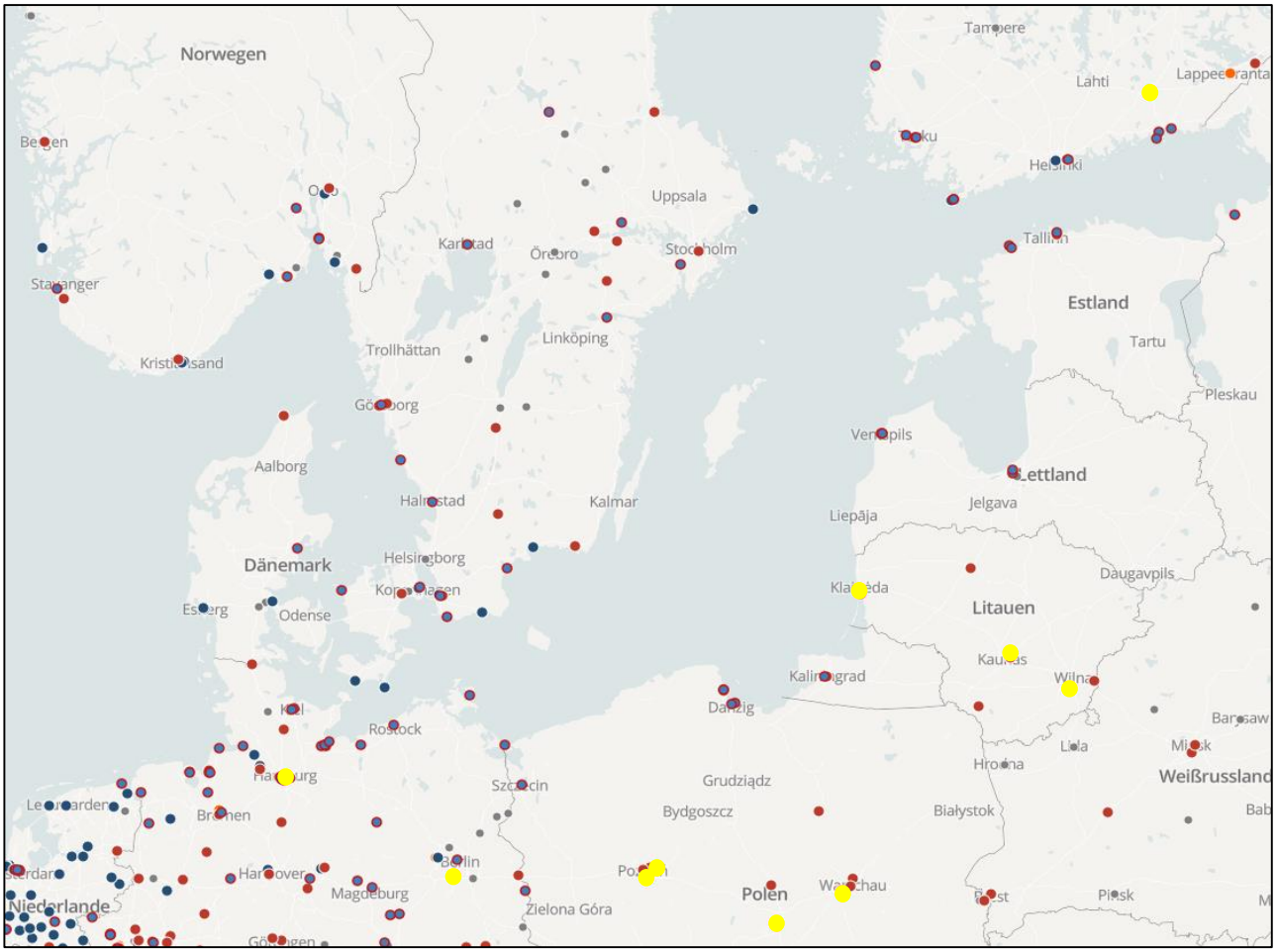

Figure 2: The NSB CoRe intermodal terminals (yellow)

Source: Own, based on SGKV, www.intermodal-map.com, May 2018

Metrans HUB terminal Poznań is located in Gadki near Poznan, one of the most important manufacturing and logistics centres in Poland and on the route between Berlin and Warsaw. Constructed in 2011, it acts as a hub for transhipment of containers in national and international traffic as well as gateway to destinations within western part of Poland. The terminal is operated by Metrans.

PKP Cargo terminal is located in *Poznań-Franowo*, which is the biggest cargo station in Greater Poland capable of shunting operations. It is the newest intermodal investment of PKP Cargo, which is the biggest rail carrier in Poland. The main relations are Gdańsk, Gdynia and China.

CLIP Container terminal Swarzędz is the third modern terminal in the region of Poznań, operated by CLIP. Constructed in 2015, originally the terminal was handling various loading units, mainly trailers (which is unique for Poland). In 2018 the connections‘ network (mainly Rotterdam) was supplemented by pure container connections with Polish ports (Gdańsk, Gdynia).

Spedcont container terminal is located in ***Łódź*** at the crossing of two major routes in Poland: North Sea – Baltic corridor and Baltic – Adriatic corridor (TEN-T). It is an important hub on The New Silk Road due to Spedcont‘s official partnership with rail operator Chengdu. The terminal is also connected with Polish port of Gdansk and Gdynia.

Intermodal terminal Pruszków is located in Pruszkow near Warsaw and plays an important role on the local intermodal market of the Polish capital city. The terminal is owned by Hamburg’s HHLA and operated by Metrans which connects Warsaw with other destinations via HUB in Gadki/Poznan. Due to local conditions, the terminal is focused on imports and has limited potential to expansion.

Vilnius Intermodal Terminal was opened officially in 2015. Not only it represents a common railway object, but a certain “land port” for refrigerated and sea containers. Connected with the port of Klaipėda by direct gauge, it offers the same services as the latter, however, with more attractive conditions: container handling, storage, maintenance, customs warehouses and other services.

Kaunas Intermodal Terminal connects the European and Russian railway gauges and creates transport links between East and West as well as North and South. Vilnius and Kaunas Intermodal terminals are run by the same operator. They are open to all companies on equal terms. Their location is strategically important being next to the I and IX international transport corridors, international airports and Kaunas Free Economic Zone.

Klaipeda container terminal is located at the Port of Klaipeda. The present capacity of the terminal enables to reload 450,000 TEU per year.. About 15 % of containers arrive and depart from the terminal by rail. Reconstruction of the quay and dredging project started in 2018 will upgrade the terminal infrastructure boosting terminal throughput to 650,000 TEU once the project is completed.

Kouvola Rail-Road Terminal is located north of Helsinki in Finland. It has been designated on the regulation of the European Parliament and of the Council the only rail-road terminal on the TEN-T Core Network in Finland. As such it is the most important railway cargo hub in Finland and has the largest railway logistics center of the country.

2. BP of Intermodal Nodal Points: Infrastructure and Equipment

2.1 Accessibility

The KPI “accessibility” relates to the connection of an intermodal terminal to roads and railway lines of significance and to seaports.

DUSS-terminal Hamburg Billwerder was constructed in 1993 and represents a best practice in terms of accessibility. It is an important node for the transhipment of loading units between rail and road and for the transfer traffic between national and international freight trains. The terminal is located in the Eastern part of Hamburg, close to the main transport industry area and forwarding centre of the city. It is connected to the city’s road network and to the highway A1. The rail services includes transports to/from southern Europe and Scandinavia with up to 20 direct trains daily. The terminal is connected to the main route Hamburg-Berlin the Port of Hamburg railway network.[6]

When the intermodal terminal is linked to a seaport (e.g. DUSS is closely linked to the Port of Hamburg, but also Klaipeda), the KPI accessibility can also be described as intermodal connectivity indicator. Thus it is related to policy objectives and other port performance indicators (ref. figure 1).[7]

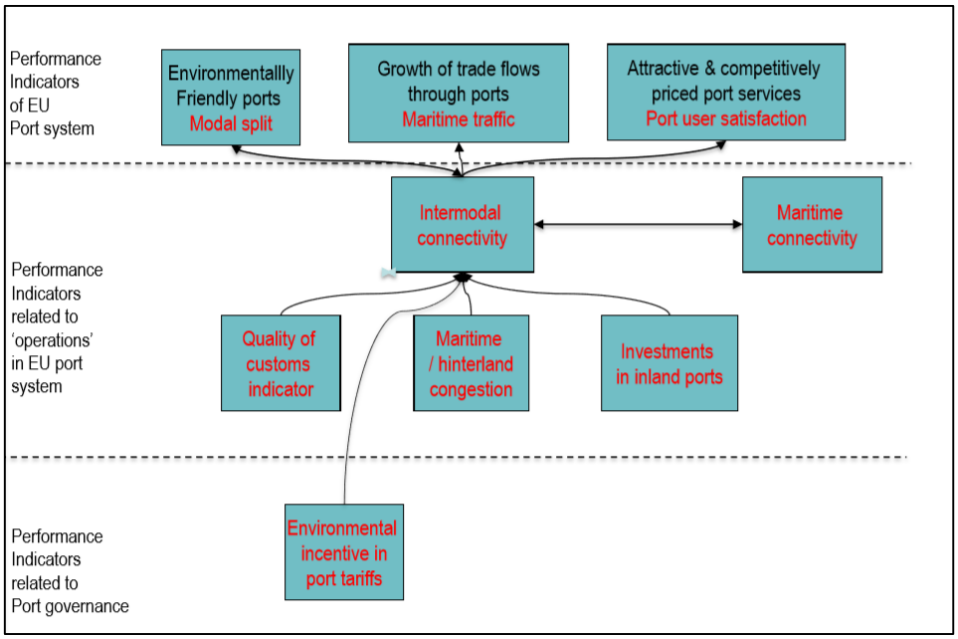

Figure 3: Main relations between intermodal connectivity and other port performance indicators

Source: The PORTOPIA Consortium, 2013, p.10

[6] Deutsche Bahn AG (2017)
[7] The PORTOPIA Consortium (2013), p. 10.

The following table gives an overview about the accessibility of selected intermodal terminals.

Table 1: Intermodal Terminals - Accessibility

Intermodal Terminal	Accessibility		
	Connection to roads of significance	Connection to railway lines of significance	Connection to sea-ports
DUSS-terminal Hamburg Billwerder	Motorway A1, proximity to Hamburg road network	main route Hamburg - Berlin	Hamburg Port Railway network
DUSS-terminal Großbeeren	Federal Road B1010 and Motorway ring A10	main route Berlin - Leipzig	Hamburg
Metrans HUB terminal Poznań	S11 Poznan - Katowice	No. 272 Poznan - Kluczbork	Hamburg, Gdansk, Gdynia
PKP Cargo terminal Poznań-Franowo	S11 and Motorway A2	No 521 and E20	Hamburg, Gdynia, Gdansk
CLIP Container terminal Swarzędz	S5, S11, DK 92, A2, DK 32	E20	Hamburg, Gdynia, Gdansk
Spedcont container terminal Łódź	n/a	n/a	n/a
Metrans Intermodal terminal Pruszków	A2 Warsaw - Poznan	No 1. Warsaw - Grodzisk Mazowiecki	Hamburg, Gdynia, Gdansk
Vilnius intermodal terminal	+	+	+ (via railway)
Kaunas intermodal terminal	+	+	+ (via railway)
Klaipeda container terminal	n/a	n/a	+
Kuovola rail-road terminal	highway connections to six directions	Connections to four main directions. Kouvola is the biggest railway yard in FI.	Connection to Hamina Kotka (1 hr), Helsinki (1,5 hr) and St. Petersburg

2.2 Proximity to market

The proximity of intermodal terminals to market is an important KPI. The market can represent industry zones and/or the catchment area of the terminal. This KPI is kind of similar to the loco quote of seaports. It serves as indication for location-bound cargo volumes and regional effects based on fabrication or processing of goods. These added value activities create or save jobs in the area.[8]

[8] WWF Deutschland (2009), p. 22.

The Port of Hamburg has a loco quote of about 30 %. This high share is also of importance for the DUSS-terminal Hamburg Billwerder. Nonetheless the Chamber of Commerce of the City of Hamburg claims greater efforts by the local ministries to increase the quote by attracting companies having an affinity for ports and logistics. For them this is an important cornerstone for the future success of the port and the area.[9]

CLIP site incorporates an 80 ha area within the Special Economic Zone, which provides companies investing there with tax exemptions for a period of 12 years. Businesses setting up operations in the Special Economic Zone are entitled to regional aid in the form of income tax exemptions on two accounts: investment outlays incurred and the creation of new workplaces. Enterprises may also be exempted from local taxes. It is worth noticing that this is the only Economic Zone in Wielkopolska.[10]

Figure 4: Special Economic Zone

Source: CLIP group, May 2018

[9] Handelskammer Hamburg (2018), p. 5.
[10] CLIP group (2018)

The following table gives an overview about the proximity to market (catchment area/ industry zones) of selected intermodal terminals.

Table 2: Intermodal Terminals - Proximity to market

Intermodal Terminal	Proximity to market
DUSS-terminal Hamburg Billwerder	Hamburg, connecting hub to Scandinavia and Southern Europe
DUSS-terminal Großbeeren	Port hinterland and Eastern Europe, City of Berlin
Metrans HUB terminal Poznań	car manufacturing, southern Poland, Hamburg
PKP Cargo terminal Poznań-Franowo	HUB dedicated for distribution of aerial trains with the North Sea ports
CLIP Container terminal Swarzędz	car industry, special economic zone
Spedcont container terminal Łódź	Central Poland
Metrans Intermodal terminal Pruszków	Mazowia region, Warsaw
Vilnius intermodal terminal	Scandinavia, Asia (OBOR), Rail Baltica, Eastern Europe
Kaunas intermodal terminal	Scandinavia, Asia (OBOR), Rail Baltica, Eastern Europe
Klaipeda container terminal	Baltic Sea Region, Hamburg, Rail Baltica, Asia (OBOR), Russia
Kuovola rail-road terminal	Helsinki

2.3 Terminal area

The area of an intermodal terminal depend on its role in the network and on how many services it provides. The terminal area is a rough indicator on the later on described handling as well as storage capacity but also parking spaces.

The DGG did a survey amongst freight villages in Europe. The results might serve as benchmarking and best practice parameters regarding terminal area. Accourding the the survey amongst 90 freight villages (ranking 2015), the average total area is about 180 ha and the average developed area about 140 ha. Therefor the developed area is near 80 % on average. Many European freight villages have the opportunity to expand their area. The average expansion area is about 60 ha. “It should be noted that it is particularly difficult for freight villages in in conurbations to have sufficient space for expansion.[11]

[11] DGG (2016), p. 86 f.

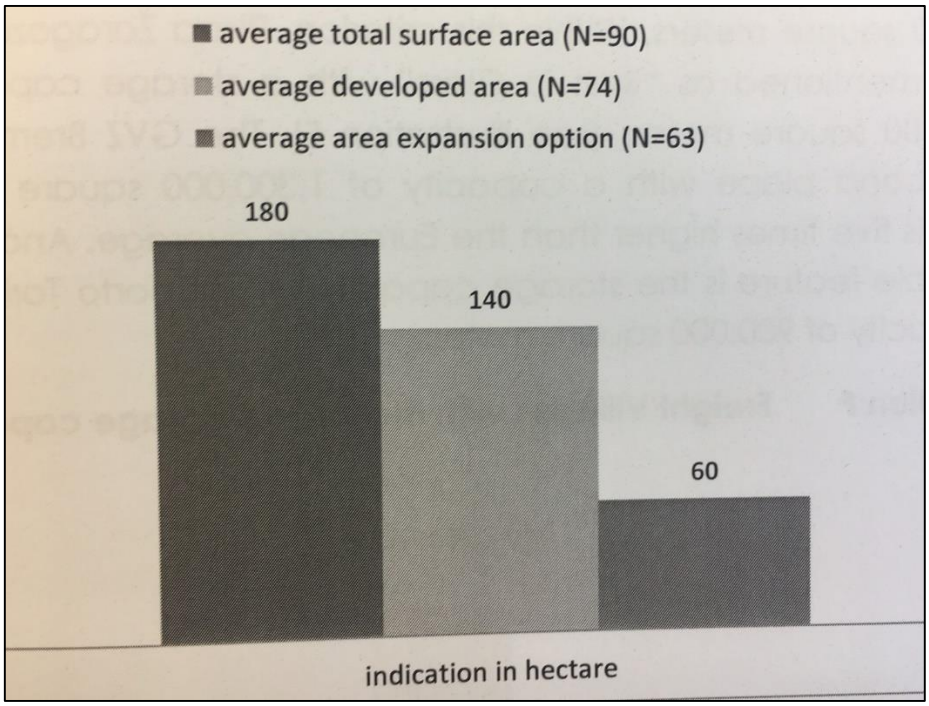

Figure 5: Developed area and expansion options of Freight Villages in Europe

Source: DGG, 2016, p. 87

The CLIP Container terminal Swarzędz is having about 100,000 m² terminal surface. Next to it there are 400,000 m² warehouse space constructed and rented out on a long term basis. Additional 100,000 m² are currently in the planning or construction process. Customer requirements might be taken into consideration. It terminal is located within the Kostrzyn –Slubice Special Economic Zone (SSEZ) allowing investors to get favourable investment conditions (e.g. tax exemptions) which are still valid till 2026. Many companies such as Volkswagen have production facilities in the zone, guaranteeing high transport volumes to the terminal. Additional 36 ha of land are available for further investments e.g. production facilities (expansion possibilities exist depending on investors needs).[12]

The following table gives an overview about the overall area and possibility to expand terminal of selected intermodal terminals.

[12] CLIP Group (2016)

Table 3: Intermodal Terminals - Terminal area and possibility to expand terminal

Intermodal Terminal	Terminal area	Possibility to expand terminal
DUSS-terminal Hamburg Billwerder	30 ha	expanded 2012 by 4 x 585 m tracks
DUSS-terminal Großbeeren	8 ha	Yes and expanded in 2005. Part of GVZ Großbeeren
Metrans HUB terminal Poznań	40,5 ha	YES ('next level')
PKP Cargo terminal Poznań-Franowo	2,8 ha	n/a
CLIP Container terminal Swarzędz	10 ha	Yes
Spedcont container terminal Łódź	14,6 ha	Yes
Metrans Intermodal terminal Pruszków	14 ha	No
Vilnius intermodal terminal	54 ha	Yes
Kaunas intermodal terminal	40 ha	Yes
Klaipeda container terminal	n/a	NO (Baltmax Outerport)
Kuovola rail-road terminal	170 ha	Yes – approx. 270 ha and 500 000 m2

2.4 Storage capacity

The KPI storage capacity can be divided in the parameters ha, in TEU/LU/trailer, availability of storage capacity for reefer containers as well as for dangerous goods.

According to the DGG the average storage capacity of European freight villages is approx. 26 ha. The terminal Zaragoza Plaza ranks first with a capacity of 427 ha.[13] The terminals along the North Sea-Baltic corridor are distinctly smaller than the European average the DGG study is based on.

The following table gives an overview about the storage capacity of selected intermodal terminals.

[13] DGG (2016), p. 88.

Table 4: Intermodal Terminals - Storage capacity

Intermodal Terminal	Storage capacity			
	in ha	in TEU	Available for reefer	Dangerous goods
DUSS-terminal Hamburg Billwerder	n/a	1700 TEU	yes	yes
DUSS-terminal Großbeeren	n/a	430 TEU	on request	yes
Metrans HUB terminal Poznań	16 ha	2600 TEU	yes	yes
PKP Cargo terminal Poznań-Franowo	2.8 ha	1800 TEU	yes	yes
CLIP Container terminal Swarzędz	8 ha	4500 TEU	30	yes
Spedcont container terminal Łódź	6,1 ha	8000 TEU	yes	n/a
Metrans Intermodal terminal Pruszków	13 ha	1800 TEU	yes	yes
Vilnius intermodal terminal	9 ha	1400 TEU	164	yes (incl. DG leakage area)
Kaunas intermodal terminal	7 ha	1120 TEU	16	yes (incl. DG leakage area)
Klaipeda container terminal	n/a	n/a	n/a	n/a
Kuovola rail-road terminal	16 ha indoor, 6 ha terminal	10,000 TEU	on request	on request

2.5 Truck parking spaces

A high number of truck parking spaces smoothes the situation of trucks and truck drivers before and/or after the loading process.

In 2012, due to the difficult parking situation in Großbeeren, the region decided to constuct a new truck parking area near the terminal. It is publicly accessible, open 24/7 and guarded. It is the first of its kind in the wider area oft he German capital Berlin. It has an area of 3,600 m² and tackled the challenge of random parking succesfully.[14]

Also around the Hamburg container terminals, the situatoin on the roads and parking spaces was tense. The Hamburg Port Authority launched the so-called „pre-gate parking“ project. „One possible measure in order to ensure that traffic in the port of Hamburg is managed efficiently is to control approaching traffic at an early stage and to create additional parking space for destination traffic. Such, it was planned within a preliminary study to inform truck drivers approaching the port of Hamburg in advance of current or likely disruptions in the port and then recommend the use of one of the pre-gate parking facilities, which are parking lots located outside of the port area. In particular,

[14] Logistiknetz Berlin-Brandenburg (2012)

they serve as buffers and to pre-register at the place of destination. The driver transmits his destination and desired arrival time to an operations centre which coordinates the truck drivers' requests with the requirements of the logistics service providers. The truck driver will then be allocated a time slot, which allows him to plan his breaks and start off to his final destination in time. The operations centre is in close contact with the traffic control centre of the police and advises truck drivers which is the best route to travel."[15]

The following table gives an overview about the number of truck parking spaces of selected intermodal terminals.

Table 5: Intermodal Terminals - truck area

Intermodal Terminal	Truck parking spaces
DUSS-terminal Hamburg Billwerder	120
DUSS-terminal Großbeeren	5 + 24h secure parking near GVZ Großbeeren
Metrans HUB terminal Poznań	16
PKP Cargo terminal Poznań-Franowo	5
CLIP Container terminal Swarzędz	40
Spedcont container terminal Łódź	0
Metrans Intermodal terminal Pruszków	10
Vilnius intermodal terminal	37
Kaunas intermodal terminal	17
Klaipeda container terminal	7
Kuovola rail-road terminal	100

2.6 Cranes

Small terminals often are equipped with mobile cranes and/or reach stakers, while large terminals use gantry cranes and/or reach stakers to lift the cargo. The amount and type of cranes have an influence on speed of the truck and train operation and thus also affect operational cost, capacity and transit times. The following table gives an overview about cranes and reach stackers as well as loading capacity of selected intermodal terminals.

[15] Dinkel, Hoffmann and Westermann (2012)

Table 6: Intermodal Terminals – Cranes

Intermodal Terminal	Cranes	
	Number	Crane load possible (t)
DUSS-terminal Hamburg Billwerder	7	41
DUSS-terminal Großbeeren	2	41
Metrans HUB terminal Poznań	none, 6 reach stackers	45
PKP Cargo terminal Poznań-Franowo	none, 3 reach stackers	45
CLIP Container terminal Swarzędz	none, 3 reach stackers	45
Spedcont container terminal Łódź	2 + 3 reach stackers	45
Metrans Intermodal terminal Pruszków	none, 3 reach stackers	45
Vilnius intermodal terminal	1	40
Kaunas intermodal terminal	1	40
Klaipeda container terminal	2	40
Kuovola rail-road terminal	None, 5 reach stakers Kalmar	41

2.7 Rail tracks

There are several KPI regarding rail tracks at intermodal terminals. They are of quantitative nature. The following table gives an overview about rail tracks' of selected intermodal terminals.

Table 7: Intermodal Terminals – rail tracks

Intermodal Terminal	Rail tracks					
	Number	Length (in m)	Length of tracks at terminal	Track gauge	Number of buffer tracks	Electrified tracks
DUSS-terminal Hamburg Billwerder	12	7660	4 x 720 m 4 x 680 m 4 x 585 m	1435	4	one sided
DUSS-terminal Großbeeren	4	2100	2 x 700 m 2 x 350 m	1435	1	one sided
Metrans HUB terminal Poznań	5	3050	4 x 610 m	1435	1	no
PKP Cargo terminal Poznań-Franowo	3	1419	2 x 610 m	1435	1	1
CLIP Container terminal Swarzędz	2	4067	1527 m	1435	1	no
Spedcont container terminal Łódź	2	1400	2 x 400 m	1435	2	no
Metrans Intermodal terminal Pruszków	2	1550	1 x 600 m 1 x 350 m	1435	1	no
Vilnius intermodal terminal	3	1811	n/a	1520	1	no
Kaunas intermodal terminal	4	1360	2 x 880 m 2 x 799 m	1435 & 1520	1	yes
Klaipeda container terminal	4	1700	88 waggons capacity	1520	4	no (electrification by 2027)
Kuovola rail-road terminal	2	10,000	4x 500 m	1524	n/a	no

3. BP of Intermodal Nodal Points: Operation

3.1 Emissions

Emission per LU, noise emissions and energy use per LU/tkm are the most commonly used KPI for the environmental performance of intermodal terminals. In addition, a wide range of measures was implemented by terminals across Europe to improve climate protection. The DGG grouped these in the following categories:

- Building oriented measures
- Vehicle oriented measures
- Resource oriented measures
- Organizational measures
- Energy consumption (green energy)
- Intermodality.

“A further outcome is that the hightest share of measures is to be found in the categories which deal with building and vehicle orientated installations. Nevertheless, the other categories are also very important for freight village tenants. The mentioned measures have big influence regarding the improvement of energy efficiency.”[16] Freight villages’ networks are the core network for comined transport. Thus the terminals have a major influence on greener logistics and are a very helpful instrument regarding the reduction of emission rates.

In order to compare the accuracy, transparency and consistency of data regarding energy consumption and green house gas emissions, the European Committee for Standardisation (CEN) introduced CEN norm EN 16258. This CEN norm defines the calculation of energy consumption and green house gas emisisons for transport services. As for intermodal terminals these are mainly caused by:

- Energy consumption of transhipment facilities, terminals, warehouses and offices
- Thermal energy consumption of terminals, warehouses and offices
- Consumption of diesel, LNG or energy for additional equipment such as handling vehicles or folklifts.

[16] DGG Deutsche GVZ-Gesellschaft mbH (2013), p. 117.

- Refrigerant loss of cooling and deep-freeze storages.17

Unfortunatly, the data regarding emission per LU, noise emisisons as well as energy use per ITU or tkm are not accessible regarding the selected NSB CoRe terminals. As a result no comparision is possible at this stage.

3.2 Opening hours

The opening 24/7 is key for terminals handling high volumes daily. Avoiding waiting times due to terminal closure is another step to improving the overall performance of intermodal transport chains compared to pure truck transportation. The number of public holidays play also a role if the terminal is closed during these.

Table 8: Intermodal Terminals – opening hours

Intermodal Terminal	Opening hours
DUSS-terminal Hamburg Billwerder	24 h
DUSS-terminal Großbeeren	24 h
Metrans HUB terminal Poznań	24 h
PKP Cargo terminal Poznań-Franowo	0700 to 1900 hrs Mon to Sat
CLIP Container terminal Swarzędz	Sun 2200 to Sat 1400 hrs
Spedcont container terminal Łódź	Sunday 22:00 Saturday 14:00
Metrans Intermodal terminal Pruszków	Mon to Fri 0700 to 2100 hrs, Sat 0800 to 1600 hrs
Vilnius intermodal terminal	24 h
Kaunas intermodal terminal	Mon to Thu 0700 to 1600, Fri from 0700 to 1445 hrs
Klaipeda container terminal	24 h
Kuovola rail-road terminal	Mon-Fri 7.00-23.00; Warehouse 7.00-17.00

3.3 Utilisation rate

The utilization rate percentage is calculated by the terminal utilization in LU in relation to the capacity.

“The terminal utilization measured by the absolute number of LU, is on average 75,000 LU in the European freight villages. Taking also into consideration the utilization of the sites, Quadrante Europa (Italy) with 700,000 LU leads in Europe.”[18]

[17] DSLV Deutscher Speditions- und Logistikverband e.V. (2013), p. 56.
[18] DGG Deutsche GVZ-Gesellschaft mbH (2016), p. 101.

According to DGG the utilization rate of European freight villages is on average a little more than 50 % only. However there are also terminals having reached an utilization level of approx. 100 % (e.g. CLIP Container terminal Swarzędz).

Table 9: Intermodal Terminals – utilisation rate

Intermodal Terminal	Utilisation rate
DUSS-terminal Hamburg Billwerder	75 %
DUSS-terminal Großbeeren	50 %
Metrans HUB terminal Poznań	90 %
PKP Cargo terminal Poznań-Franowo	n/a
CLIP Container terminal Swarzędz	n/a
Spedcont container terminal Łódź	n/a
Metrans Intermodal terminal Pruszków	94 % (figure relates to area in 2017 i.e. 10 ha, today it is 14,6 ha)
Vilnius intermodal terminal	60-70 %
Kaunas intermodal terminal	20 %
Klaipeda container terminal	n/a
Kuovola rail-road terminal	n/a

3.4 Terminal capacity

The terminal capacity is indicated in LU. This includes e.g. containers, swap bodies as well as semitrailers. According to an analysis of DGG the average terminal capacity is in Europe is about 150,000 LU. Outstanding is the capacity of Interporto Quadrante Europa Verona in Italy having a capacity of 1,400,000 LU.[19]

Table 10: Intermodal Terminals – terminal capacity

Intermodal Terminal	Handling capacity (loading units p.a.)
DUSS-terminal Hamburg Billwerder	370,000
DUSS-terminal Großbeeren	75,000
Metrans HUB terminal Poznań	385,400
PKP Cargo terminal Poznań-Franowo	117,000
CLIP Container terminal Swarzędz	75,000
Spedcont container terminal Łódź	80,000
Metrans Intermodal terminal Pruszków	96,000
Vilnius intermodal terminal	100,000
Kaunas intermodal terminal	55,000
Klaipeda container terminal	450,000
Kuovola rail-road terminal	55,000 TEU, 250,000 TEU after 2020

[19] DGG Deutsche GVZ Gesellschaft (2016), p. 101.

3.5 Service Frequency and production system

DUSS-terminal Hamburg Billwerder is having 154 train departures per week, whereof 20 direct trains daily.

The terminal is further benefitting of the Port of Hamburg and the seaport's international links and of its railway network. Up to 220 freight trains with up to 5,900 railcars run to and from the Port of Hamburg daily. Around 11 % of German rail traffic begins or ends in the Port of Hamburg. The 2000 offered services per week runs to the DACH-region and to major parts to Eastern Europe, but also to China.[20]

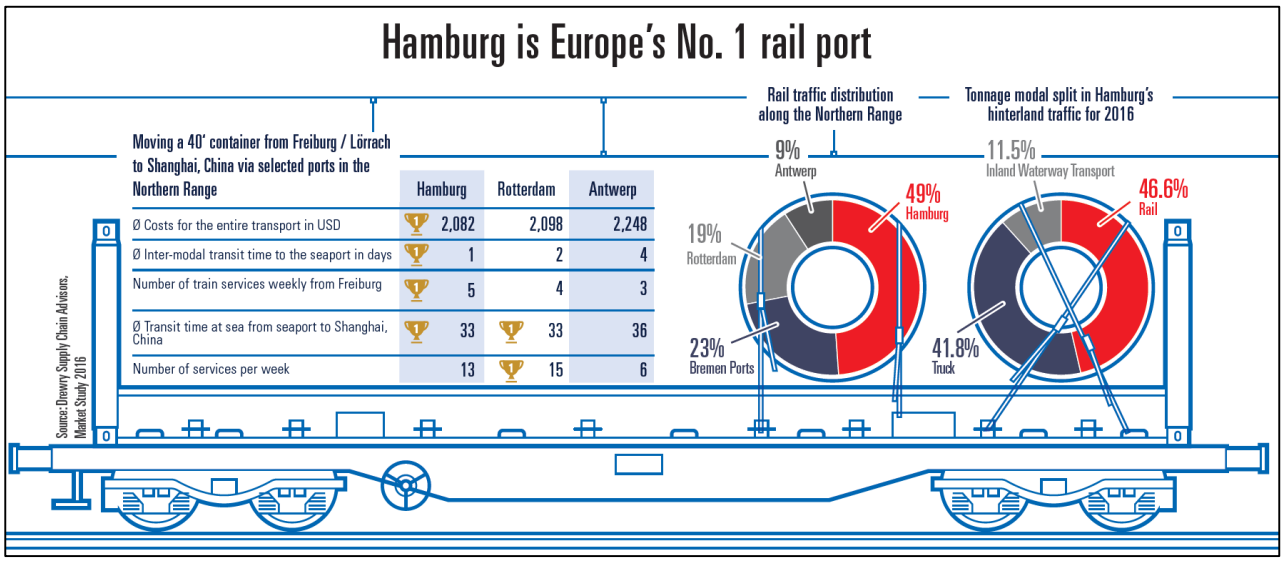

Figure 6: Rail port Hamburg accessibility

Source: Port of Hamburg Marketing, Rail it via Hamburg, March 2017

[20] Port of Hamburg Marketing (2017)

The following table gives an overview about the train departures per week of selected intermodal terminals.

Table 11: Intermodal Terminals – train departures per week and production system

Intermodal Terminal	Train departures per week	Direct or shuttle trains
DUSS-terminal Hamburg Billwerder	154	direct and shuttle trains
DUSS-terminal Großbeeren	7	direct and shuttle trains
Metrans HUB terminal Poznań	14	direct and shuttle trains
PKP Cargo terminal Poznań-Franowo	5	direct and shuttle trains
CLIP Container terminal Swarzędz	6	direct and shuttle trains
Spedcont container terminal Łódź	2	direct and shuttle trains
Metrans Intermodal terminal Pruszków	13	direct and shuttle trains
Vilnius intermodal terminal	7	direct and shuttle trains
Kaunas intermodal terminal	1	direct
Klaipeda container terminal	10	direct and shuttle trains
Kuovola rail-road terminal	1-2	direct and shuttle trains

3.6 Further important KPI for terminal operation

In addition to the before mentioned KPI, there are more KPI defining the performance of terminal operation. Even though the concrete data on these parameters is not publicly available, terminals and operators should consider these when benchmarking their business. Further important KPI are:

- Transhipment volume and cost
- Turnaround times for trucks and trains

The average turnaround time for trucks is 60 to 180 minutes at Kuovola rail-road terminal, up to 60 minutes at Metrans HUB terminal Poznań and Polzug Intermodal terminal Pruszków. At DUSS-terminal Hamburg Billwerder and Spedcont container terminal Łódź it's about 30 minutes. At DUSS-terminal Großbeeren it's 15 minutes only.

The average turnaround time for trains is e.g. 600 minutes/ slot time at DUSS-terminals Hamburg Billwerder and Grossbeeren, 240 minutes at Metrans HUB terminal Poznań and about 360 minutes at Polzug Intermodal terminal Pruszków.

- Railway undertaking punctuality
- Terminal cost per ITU
- Driving / Waiting time ration (minutes).

4. BP of Intermodal Nodal Points: Logistics Services and Quality

4.1 Safety and security standard

Measures to ensure safety and security on the terminal includes physical security systems for the entire terminal area (e.g. fencing), security systems in form of entrance and exit gates, security officers, emergency plans (e.g. in case of flood) etc. Some terminals are ISPS certified. The number of damages per year is one measurable indicator for the security level.

Risks might be caused by accisdents, extreme weather events or terrorism. However freight villages rank these risks rather low.[21]

Metrans HUB terminal Poznań is protected by a fence, CCTV and security 24 h. The same standard is applied at Polzug Intermodal terminal Pruszków and CLIP Container terminal Swarzędz. At Spedcont container terminal Łódź there were no damages in 2017.

4.2 Value added services

There exist a wide range of value added services that are offered by European intermodal terminals. According to a DGG analysis, most terminals “contain catering offers, filling stations as well as a customs office. Truck repair stations and social services are also frequent. Need for expansion is in the offer of a truck wash and in the transport rental.”[22]

During their analysis, the DGG ranked the Italian Interporto di Nola as impressive regarding its number of exisiting service facilities. The terminal offers[23]:

- Storage and Logistics
    - General and temporary storage
    - General storage and storage management
        - Container storage in a dedicated yard area
        - Container emptying
        - Pallet recomposition
        - Goods loading / unloading
        - Stock management

[21] DGG (2016), p. 104f.
[22] DGG (2016), p. 95.
[23] Terminal Intermodale Nola (2018)

        - Transport documents processing
    - Container weighing
    - Container emptying, filling, loading and unloading
    - Door delivery
    - Container leasing
- Intermodal carriage

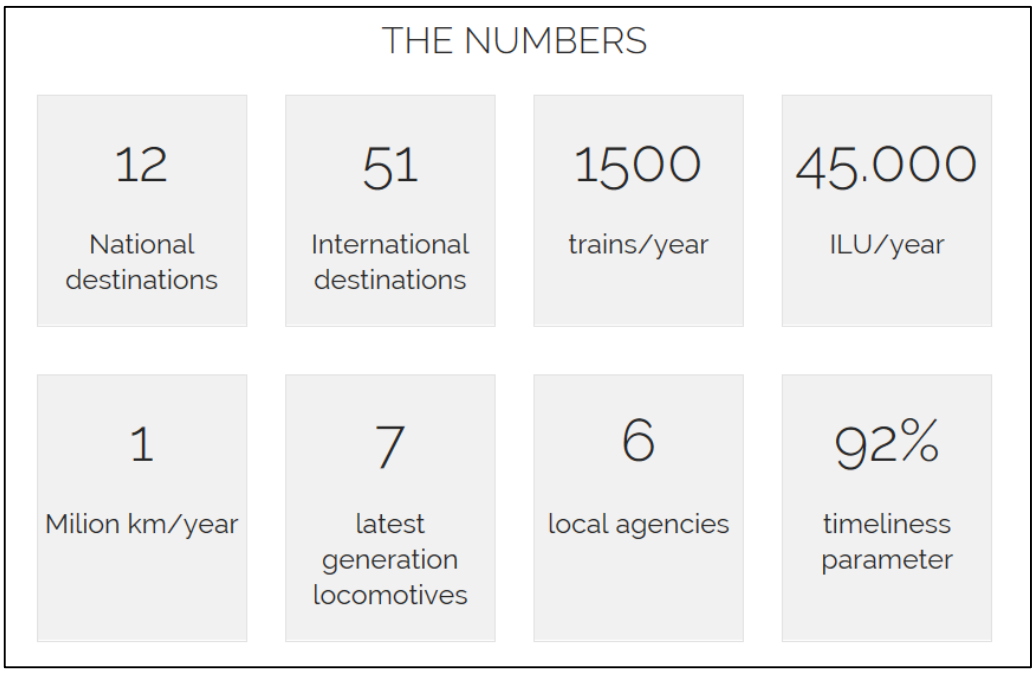

Figure 7: Intermodal carriage at Terminal Intermodale Nola in numbers

Source: Terminal Intermodale Nola, www.terminalintermodalenola.it/en/servizi/trasporti-intermodali/ (Accessed: 16 May 2018)

- Customs clearance
    - Customs inspection service
        - An Indoor yard for cargo inspection operations in any weather condition
        - Cargo X-ray screening service by Customs order, through Electronic Scanner)
    - Customs documents service
        - Coordinating with sea agents and international forwarding agents for Customs documents control and issue (T1/IM7);
        - Coordinating with Customs Authority for real-time data transmission and reception (through software system);

- Final data and documents transmission to customer

- Mainenance and repair

Regarding terminal services, DGG ranked trucking, container depot, container repair, container packaging, storage of hazardous materials and cleaning of tank containers as most important. “On average, four out of six mentioned services are offerend in European freight villages, therefore it can be inferred that a well-established terminal service is usually available in the Freight Villages.”[24]

Table 12: Intermodal Terminals – value added services

Intermodal Terminal	Value added services (selection)
DUSS-terminal Hamburg Billwerder	customs 2.5 km radius, customs
DUSS-terminal Großbeeren	Repair and storage, customs 8 km Ludwigsfelde, next to empty container storage
Metrans HUB terminal Poznań	customs, EDI, cleaning, repair,survey
PKP Cargo terminal Poznań-Franowo	warehouse, aerial trains, 'Cargo Connect' first/last mile services, storage
CLIP Container terminal Swarzędz	cleaning, repair, removal of old stickers and security elements such as hooks and nails, container forming
Spedcont container terminal Łódź	Weighing of containers, customs, warehouse
Metrans Intermodal terminal Pruszków	Customs Mon to Fri 0800 to 1600 hrs
Vilnius intermodal terminal	repair, customs, packing station
Kaunas intermodal terminal	warehousing, stuffing, repair, customs
Klaipeda container terminal	reefer inspection, stuffing, stripping, weighting, EDI, palletizing, transhipment of liquid cargo to tank containers
Kuovola rail-road terminal	Container inspection, sealing, stuffing, loading, railway bills, customs clearance

4.3 Staff qualification

Terminals can train their employees according to their quality management. There are special courses according to the requirements of e.g. ISO 9001 (quality management) and ISO 14001 (environmental management system). Terminals using these trainings are e.g. Metrans HUB terminal Poznań and Metrans Intermodal terminal Pruszków.

A best practice example for a training center ensuring high qualification of staff and trainings for a whole logistics region is the maco-maritimes competenzcentrum GmbH (short: ma-co). The shareholders are Zentralverbandes der Deutschen Seehafenbetriebe (Central Association of

[24] DGG (2016), p. 102.

German Seaport Operators), Unternehmensverband Hafen Hamburg e.V. (business association Port of Hamburg), Unternehmensverband Bremische Häfen e.V. (business association Bremen ports), ver.di Bundesverwaltung Berlin (unified services union ver.di national administration Berlin), ver.di Landesbezirk Niedersachsen – Bremen (unified services union ver.di regional office Lower Saxony – Bremen) and ver.di-Landesbezirk Hamburg (unified services union ver.di regional office Hamburg).

The training centre ma-co provides courses in port operations and cargo handling, logistics, maritime shipping, dangerous cargo, and safety, among other topics. For example, highly qualified specialist for port logistics are trained in a two-year course of instruction. Training as a ConTrucker, a specialist for container transport within the Port of Transport, is a unique offer, as is a modular course of studies as “Hansa logistics expert.” This flexible training concept can be adapted to the specific needs of a firm and also takes the trainee’s previous level of qualification into account.[25] Amongst the clients are port and handling companies, distribution centres and container packing stations, freight forwarders, shipping companies, but also shipping departments and manufacturers of medium and large companies.[26]

4.4 Further important KPI for logistics services and quality

Like for the KPI regarding terminal operation, there are also additional KPI to the before mentioned ones regarding logistics services and quality. Even though the concrete data on these parameters is not publicly available, terminals and operators should consider these when benchmarking their business. Further important KPI are:

- Quality Management (ISO9001 and ISO14001)
- Neutrality and openness of terminals for all operators and clients

[25] Port of Hamburg Marketing (2018)
[26] maco-maritimes competenzcentrum GmbH (2018)

5. Hinterland concept – Dry port

"The North Sea-Baltic Corridor consists of 5947 km of railways, 4029 km of roads, and 2186 km of inland waterways and connects the ports of the eastern shore of the Baltic Sea with ports of the North Sea."[27] One major aim of the corridor development is to overcome capacity and bottleneck challenges in port hinterland connections. The dry port concept, as one particular nodal point type, supports these efforts.

Figure 8: Ports along the North Sea-Baltic corridor

Source: European Commission, DG MOVE, TENtec Interactive map viewer, 2018

[27] European Commission (2018)

5.1 Dry Port

By shifting transport flows from road to rail, the dry port concept mainly offers seaports the possibility of securing a market in the hinterland, increasing the throughput without physical expansion as well as better services to shippers and transport operators.

A dry port is a transshipment point for the transport of goods from origin to the sea port and vice versa. This transshipment can be realized close to the origin / destination as a local distribution center or as a hub in a network or as a multimodal transfer point.

A dry port can be optimized to reduce the traffic density on the link between sea-port and dry port by bundling traffic into highly utilized carrying modes. This can either be realized by shifting lorry traffic to high capacity barge or railway transport or on the other hand by assembling highly utilized sea-port-dedicated transports.

In a similar matter a dry port can reduce the traffic density in the port itself by bundling traffic into terminal dedicated transport modes. By this the need for e.g. railway shunting or drive-around to serve different terminals in the port is reduced. Also a better utilization in the sea port terminals can be reached by reducing the share of ineffective handling of low level utilized trains or barges or lorries.

A dry port can disburden the utilization of land-use in the sea terminal either by translocation of stack-functions into the hinterland or by fastening the turnaround time in the sea terminal by outsourcing of administrative or maybe even custom or security handling into the dry port.

Last but not least a dry port can support a unique selling proposition of a sea port or terminal- or transport-operator when it is convenient to hinterland markets.[28]

The following figure points up the function of dry ports in intermodal transport. It shows the transport network with and without a dry port. At the dry port loading units are transshipped between road and rail, stored for short or long time, customs are cleared and containers maintained. The function is there to meet customers' needs.

[28] TIGER project (2011)

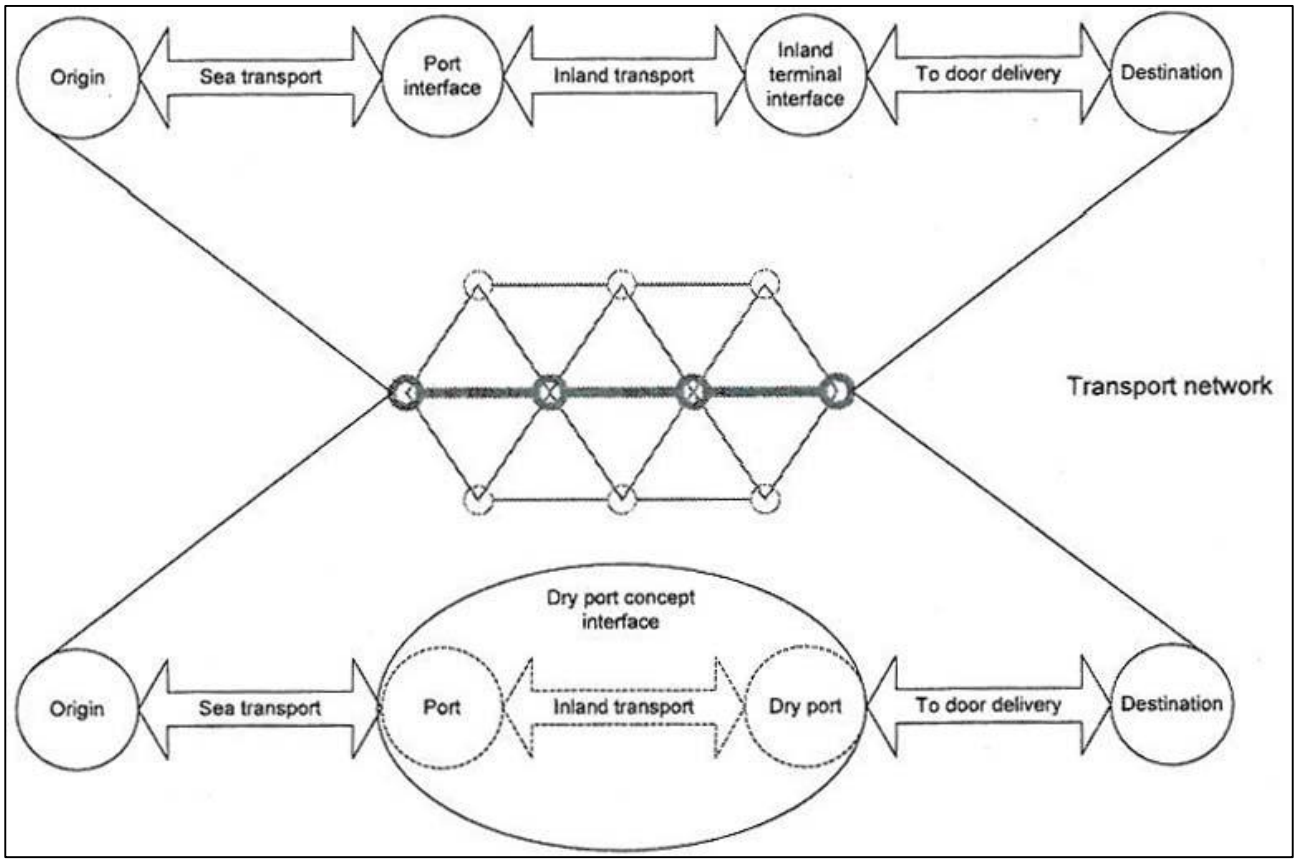

Figure 9: The dry port concept

Source: Roso, V., in: The Dry Port Concept, Department of Technology Management and Economics, Chalmers University of Technology, Göteburg, Sweden 2009, p. 57.

5.2 Effects of dry ports

In the following the traffic density, economic as well as ecological effects are described. The major description of the effects is taken from the TIGER project report.[29]

5.2.1 Traffic density effects

One can observe effects on traffic density on the link between seaport and dry port terminal as well as effects on traffic density in the seaport.

By concentrating containers in high-utilised trains, a dry port can help to reduce the congestion on the hinterland links. With hub shuttle trains bundling volume flows for a catchment area that covers

[29] TIGER project (2011)

a bigger region or even a country, a higher fill rate can be reached. However not all of the railway container are suitable for a hub concept as they are already running in well utilised direct trains between the port and hinterland agglomerations.

It has to be stated that a location of a dry port directly linked to a transport corridor can lead to a higher traffic density on this corridor. This is due to the effect that the hub can “attract” traffic that normally would be routed on other links. Nevertheless, this also implies that additional capacity is won on alternative routes. The influence of the hub location increases reciprocally with the distance between hub and port. The higher the distance, the more alternative routes are available. For a close-by hub location there are no or little alternative routes, so the effects on traffic density are limited to a dedicated link.

With a focus on railway traffic within the seaport, a lot of traffic burden is caused by train-coupling and -sharing operations for sorting a train that contains several groups of wagons for different terminals. This also causes a low performance in the railway terminals which are optimised and equipped with cranes for 700 m long trains. A hub concept that has a transhipment function for bundling terminal dedicated 700 m long trains in the export direction leads to a better utilisation of port infrastructure and superstructure. In import direction the port terminals can load 700 m long trains with mixed containers for every direction. In the transhipment hub they are sorted to their final destination.

However, it has to be kept in mind that a lot of different railway operators offer their services in the ports. If containers from different operators are mixed on a shuttle service between the port and the hub terminal, additional effort for administrative and logistic controlling will be evoked.

Another important aspect is that a hub can help to reduce the dwell time of trains in the port. In case of composing terminal dedicated trains, the time for shunting and sorting can be minimised. Furthermore, train delays can be reduced, especially if the shuttle trains operate in a high frequency in an industrialised matter. This fits the aim of the seaports to standardise the railway operation in the ports in order to improve the performance.

5.2.2 Economic effects

On the one hand, a successful hub concept allows a high traffic volume between the seaport and the hub and a high frequency of shuttle services. The bundling of transport flows on a hub for a region or even a whole country allows very effective transport concepts. This is very attractive to the customer as a high shuttle frequency implements a high service level, short transport times due to

reduced dwell times and high flexibility. This generates economic benefit for the forwarder/logistic operator who offers this service as he offers a better performance to his customers which may bring him in a unique selling proposition. Unit costs on the run between seaport and hub are reduced due to high utilised trains which operate in effective shuttle services.

On the other hand, a hub implies additional costs fort he transhipment. These extra costs per TEU depend simpliefied mostly on the total amount of containers that are handled in a hub. A high and regular amount of traffic allows the most effective operation and at low costs. The following figure shows the schematic interrelation between costs, distance between port and hub and the amount of containers via a hub. It becomes clear that for a cost effective operation of a hub, the distance and the amount of containers are factors of high influence: A location nearby to the port cannot benefit that much from sinking transport cost due tot he bundling of containers. There must be a higher amount of containers in this case for profiting from a hub than compared to a long distance hub.

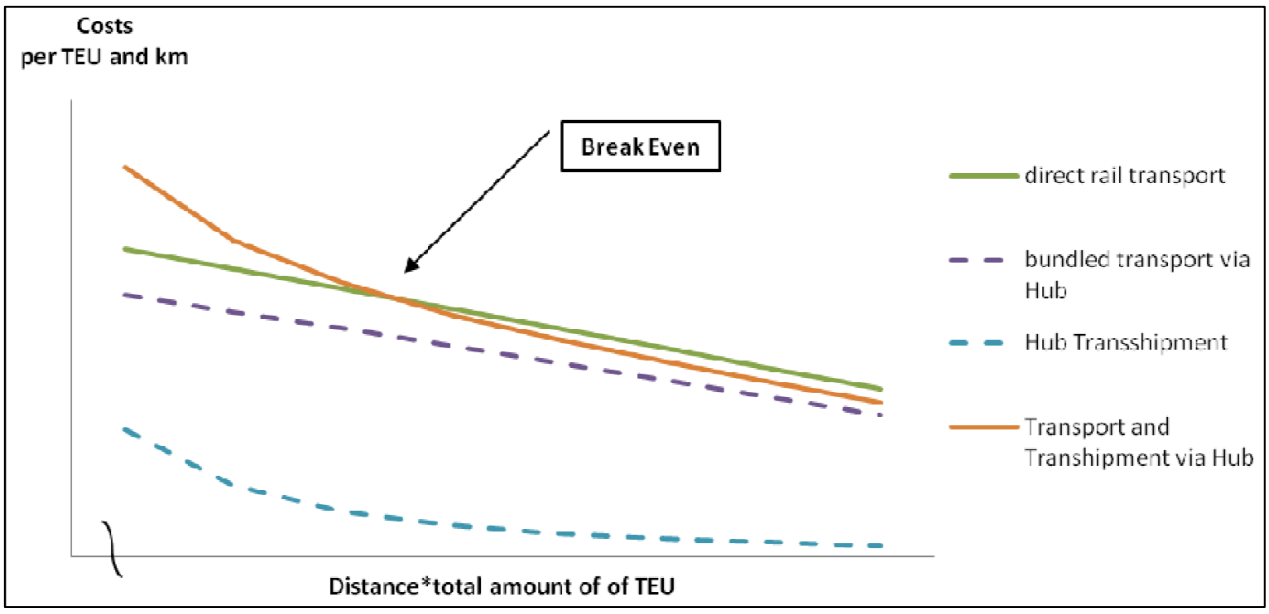

Figure 10: Interrelation between costs, distance and amount of containers for hub and direct transport (schematic)

Source: TIGER project (HPA, Sven Heidmeier), 2011, p. 26

Of course there are many other factors that influence the economy of a hub concept e.g. lower storage costs or decongestion in the port, but it can be assumed that there always is this strong dependency between distance and container amount.

5.2.3 Ecological effects

For historical reasons, most ports in Europe are located in urban agglomerations demanding effective and safe carriage of goods with a minimum environmental strain. At the same time, the ports of Europe need space and facilities for loading, unloading, storage, terminals, etc. in order to ensure high service quality and expansion capability in view of the expected traffic and cargo volume growth. Traditionally, the port areas were extended by filling docks and dams, today new sea areas solve the space problem, wherever this procedure is applicable.

However, filling the sea area is increasingly problematic in view of environmental protection of coastal sea land. The augmenting problem of transporting goods to and from the port through the city, together with the expensive costs of establishing new docks, have created preconditions to establish dry ports in the seaports' hinterland, which can handle almost all port related activities. The development of dry ports is therefore an essential tool to promote sustainability and effectiveness of freight. Avoiding traffic bottlenecks in port areas is mentioned as the most important environmental advantage of the dry ports by transport operators.[30]

The development of intermodal hinterland transport (rail and barge), enabling largescale transport services, is gaining importance to keep the port accessible by shifting cargo away from the congested roads to the rail- and waterways. In this context, it has to be kept in mind that a nameable share of road transport is unlikely to be shifted to road and rail due to structural or logistic reasons (e.g. loco transport). For this reason, road transport is still the major hinterland transport system of most seaports. However, further accommodating the container growth by road transport is not a real option: Road infrastructure in and to the seaports reaches its capacity limits and heavy congestion not only occurs on the roads, but also at terminals. In addition, the environmental and social impacts of road transport are subject of a strong debate about the future role of road transport. Barge transport can be an attractive alternative, but most ports are not connected to a well-developed waterway network. These so called external effects, which are largely nonmonetary, are gaining importance in project evaluations and particularly in investment projects where governments have to participate financially.[31]

The substitution of road transport by rail reduces the environmental impact of industrial and traffic production. Additionally, environmentally conscious shippers generate economic benefits and

[30] Jaržemskis (2007)
[31] Visser et al. (2007)

competition advantages by taking the reduction of the “carbon footprint” as a measure of product marketing. The seaport city benefits from the decrease of road traffic, which leads to enhanced quality of life for the citizens. Less traffic might also leave valuable area around the city centre for other purposes than traffic.[32]

These elaborations clearly show that the assessment of ecological effects of a dry ports is not as easy as it seems. It will not be sufficient to compare emissions of rail and road within a defined corridor. In fact, additional ecological effects have to be considered:

- Measures during the construction of the dry port as well as the connection to the seaport (e.g. noise)
- External costs during the operation
- Different kinds of emissions like CO2, SO2, NOX, Volatile Organic Compounds, Particulate Matter etc.

5.3 Market Requirements

Market requirements on dry ports concepts differ amongst the key stakeholders. These are port authorities, logistics operators and customers. In the following a summary of their points of view is given, based on the outcomes of the TIGER project.[33]

The key requirements on a dry port from a port authority’s point of view can be described as follows:

- Bundling of container volumes on dedicated trains between the single sea terminals and the hinterland terminal to reduce the number of trains and shunting operations on the hinterland links and in the port,
- Improve the attractiveness of the port by a high number of rail or barge services,
- Improve the punctuality of services by interconnecting disposition in the hinterland terminals and in the port.

The main requirements of the market from a logistics operator’s point of view are summarised as follows:

- Sufficient storage area for loading units under the crane,
- Consideration of the requirements of hub & spoke rail production systems in the terminal layout,
- Storage area for IMO containers (> 24 hours) and reefers,

[32] Roso et al. (2006)
[33] TIGER project (2011), p. 42 ff.

- Parking area for trucks and/or chassis,
- Additional services as empty container depot, long-standing depot, container repair,
- Handling tracks with sufficient length for block trains (700 m),
- Both-way rail connection and electrification of the terminal,
- Sufficient holding sidings for block trains,
- Tracks for damaged wagons,
- Camera identification at the in- and out-gates for container number identification and documentation of the actual condition of the containers,
- Hardware and software for the data exchange,
- Investments for the compliance with ISPS,
- Technologies for the handling of loading units between different terminal modules (if applicable).

The main requirements of the market from a customers' point of view are summarised as follows:

- Sufficiently covered intermodal landscape
- Direct access of the dry port to rail and preferably also inland waterway is an indispensible condition.
- Positioning of hinterland terminals within a large-scale transport corridor as well as close to regional markets and customers were stated as the most relevant factors for the detailed location finding.
- One overnight rail connection per day is regarded as a "must", preferably supplemented by one or more additional overnight services
- "Regional player" as operator of the dry port, who stands for excellent knowledge in the respective regional transport market as well as for a neutral instance.
- Variety of value-added services, mainly container depor, data exchange with seaport system, 24/7 sercie, but also dangerous goods handling, service-security level (ISPS), customs services, stuffing and stripping, container security / scanning, container fumigation.

5.4 Key success factors of a dry port concept

In the TIGER project a survey was carried out to find out about key success factors of dry ports. Based on the market requirements of different stakeholders (ref. chapter 5.3), the following summary of key success factors can be formulated[34]:

- Dry ports have a high potential for strengthening seaports' hinterland traffic, especially for the efficient and environmental friendly rail and barge transport. They help to secure the development of hinterland markets under terms limited transport capacities.
- A dry port should be located close to the customers markets as well as close to main railway lines and motorways. These logistic-attractive locations implement a rather high price for land use, especially in a dense populated country like Germany. Sufficient space is needed for transhipment, storage and additional logistic activities. High investment is needed, particularly due to the huge amount of area in an attractive site and high investments in railway infrastructure and transhipment equipment.
- The amount of hinterland traffic may fluctuate at a high level as the last economic crisis has shown. This may lead to insufficient utilisation of a cost expensive dry port. The dry port owner/operator depends on the production concept of the railway and barge operators. This means that one has to deal with the risk of a high variability of utilisation if an operator decides not to use the dry port anymore.
- A dry port should be based on a sustainable business model that respects these risks. A possible risk reduction may base on a multi-purpose terminal and a product diversification (hub, value added services, depot, etc) to compensate or a shareholders alliance to minimize fluctuation.
- Taking the commercial risks into account, a dry port should be funded on national and international level to secure and strengthen the environmental friendly railway and barge hinterland traffic and enhance the modal shift from road to rail and barge.

[34] TIGER (2011), p. 59.

6. Recommendations for logistics centres

From 2011 to 2014 the Interreg BSR project Amber Coast Logistics supported the development of multimodal logistics centres and thus promotes the connection of remote areas in the southern and eastern Baltic Sea region.

In its report “Strengthening the logistics sector in the Baltic Sea Region” they define recommendations for logistics centres. A logistics center is a „logistics center is a center in a defined area within which all activities relating to transport, logistics and the distribution of goods - both for national and international transit, are carried out by various operators on a commercial basis. The operators can either be owners or tenants of buildings and facilities (warehouses, distribution centres, storage areas, offices, truck services, etc.), which have been built here.

In order to comply with free competition rules, a logistics center must be open to allow access to all companies involved in the activities set out above. A logistics center must also be equipped with all facilities to carry out the mentioned operations. If possible, it should include public services for the staff and equipment for the users.

In order to encourage intermodal transport for the handling of goods, a logistics center should preferably be served by a multiplicity of transport modes (road, rail, sea, inland waterway, air). To ensure synergy and commercial cooperation, it is important that a logistics center is managed in a single and neutral legal body (preferably by a public-private-partnership). Finally, a logistics center must comply with European standards and quality performance to provide the framework for commercial and sustainable transport solutions.“[35]

Thus several logistics centers can be part of freight villages. However when developing logistics centres the approach is comparable, regarding design, optimum location and services needed. In the following the recommendations worked out by the Amber Coast Logistics project are described.[36] They are based on the analysis of four case studies and represent best practices of the results. The case studies relate to Logistics Centre Frankfurt (Oder) in Germany, Prilesie and Beltamozhservice 2 in Belarus as well as Logistics Centre Køge in Denmark.

[35] EUROPLATFORMS EEIG (no date)
[36] Amber Coast Logistics (2014), p. 9ff.

Figure 11: Location of Prilesie logistics centre and connection with the main transport corridors

Source: Prilesie 2013

Physical planning, development process, infrastructure

When developing a logistics centre it is important to integrate all transport and logistics-related activities. An environment in which the transport sector can develop should be envisaged. In order to minimise the financial risk the provision of infrastructure in an area with development potential can proceed on a step-by-step basis with due attention being paid to the needs of users and investors.

Neutrality in terms of competition

Logistics centres should be open to all new companies interested in establishing a commercial presence. This applies to private and public transport as well as to companies and enterprises.

General planning

With a view to the (further) development of a logistics centre in line with market requirements attention should be paid to the availability of sufficient space for extending the centre to which no

planning restrictions apply. Three out of four logistics centres analysed in the project have free space available and are thus prepared for the future. Generally an logistics centre should be located on a site covering a minimum 100 to 150 ha. Depending on the activities, between 400 and 500 ha might be needed.

Sufficient local demand

Although not absolutely necessary, it is nonetheless important that there should be sufficient local demand to permit minimum or basic utilization of the logistics centre. Local demand provides an economic basis for supra-regional activities. The analysis of the Frankfurt (Oder) centre showed that the lack of local demand makes it much harder to achieve profitability there. In Prilesie, for example, a sound basis has been provided by the rapid extension of fast-moving consumer goods networks to Belarusian regions (a notable instance of which is Evroopt, the biggest supermarket chain in Belarus). Hence the focus in Belarus at the moment is on distribution not international logistics.

Organisation

The existence of a legal body capable of acting on behalf of the transport centre and of securing the common interests of the companies located in logistics centres is a factor for success. Public-private-partnership models appear to be the most successful organisational forms.

Common facilities

Freight handling facilities which can be used on a cost-sharing basis or are generally available in logistics centres represent a benefit for companies on the ground.

Proximity to industrial and/or core agglomeration areas

This recommendation goes hand in hand with the previous one. If there is sufficient local demand, the ideal location in most cases is close to industrial areas or agglomerations. This does not mean that a logistics centre cannot be established in rural areas. Here, however, a corresponding “centre” should be selected.

Macro-infrastructure perspective

Irrespective of the micro-location and the infrastructure, the right position with respect to international transport corridors and the proximity of major railways and highways is crucial. This is important to attract supra-regional customers as well for the transport of regional products to them and vice versa. A successful logistics centre needs access to at least two transport modes (road and rail) and if

possible three (sea or inland waterway). A combined transport terminal is essential for success in logistics. The Prilesie complex demonstrates the importance of national and international experience as well as the need for the involvement of foreign experts in setting up modern logistics centres. Here Belarus can benefit substantially from cooperation with experts and logistics centres in Poland, Lithuania, Latvia and Germany.

Cooperation

The envisaged cooperation between Frankfurt (Oder) and Prilesie is a good example of the benefits of working together. Internal co-operation and collaboration with other logistics centres can generate economies of scale and help produce efficient transport chains and network solutions for optimal cargo flow and distribution.

Local characteristics

Local characteristics need to be considered. Depending on the location, various niche strategies should be considered when planning a new logistics centre. A good example is Belarus. Among the biggest exports to Russia from Belarus are foodstuffs (amounting to US$4-5 billion annually and expected to grow), most of which are currently distributed though logistics centres in Russia. This holds out the prospect of nearby logistics centres being able to benefit from these trade flows.

Multi-modal transport connections

A successful logistics centre needs access to at least two transport modes (road and rail) and if possible three (sea or inland waterway). A combined transport terminal is essential for success in logistics.

Professional planning is a prerequisite for success

The Prilesie complex demonstrates the importance of national and international experience as well as the need for the involvement of foreign experts in setting up modern logistics centres. Here Belarus can benefit substantially from cooperation with experts and logistics centres in Poland, Lithuania, Latvia and Germany.

Level of services

Generally a logistics centre is most competitive if a full range of logistics services can be provided for transport companies in accordance with international standards and the centre is open to freight forwarding companies and others.

Modern IT solutions

logistics centres should be equipped with the most advanced IT infrastructure and offer technical solutions that eliminate barriers to individual companies.

Pricing

Careful attention should be paid to the pricing policy and rental rates. Clearly, they have to be attractive to customers and competitive in the region. This might prove a benefit for logistics centres in the Eastern part of Europe and pose a challenge for logistics centres in Western Europe.

7. Summary and Outlook

Intermodal nodal points play a key role in the organization and functioning of the North Sea-Baltic TEN-T Core Network Corridor. Intermodal terminals are the interface between the different modes and thus are key to access intermodal services to ensure efficient and road-competitive intermodal supply chains throughout Europe.

Major key performance indicators for intermodal terminals can be clustered in infrastructure and equipment, operation and logistics services as well as quality. Looking at the best practices regarding these indicators, the aim is to learn from the best practice, to compare it to one's own business and to make sound decisions for one's own business.

In the paper on hand several KPI were illustrated regarding intermodal terminals' performance. Depending of the geographical location and handling volumes, the required terminal size and equipment differs. Some overall conclusions what makes an intermodal terminal succesful can be drawn anyway. They are listed in the following figure.

Illustration Q SWOT analysis TOP 20 FV - selection

criterion "strengths"
- location at the intersection of supra-regional transport axes
- sufficient expansion options
- high performance Intermodal Terminal
- strategic, geo-central location (TEN-T)
- international networking
- private Train Network
- broad range of logistics companies
- trimodal terminal: rail, inland waterways and roads
- settlement in an economically advanced region

criterion "weaknesses"
- not completed transport infrastructure
- limited availability of land plots, low provision of logistics space and property in the region
- low level of decision making structures of local stakeholders
- spatial proximity to residential areas
- insufficient road-rail transportation
- economic "underdevelopment" of FV region
- no networking/participation in networks

criterion "opportunities"
- improvement of infrastructure
- opportunities to extend the FV
- connection to "hinterland transport" of seaports (function as hinterland seaport hub)
- development of "Green Logistics"
- quality management standard ISO 2001
- logistics cluster (transport, mobility, logistics)
- development of new technologies (terminals)

criterion "threats"
- increasing shortage in public road and rail network
- traffic (congestion) problems
- political and environmental restrictions
- regional competition due to resettlement in the area of FV
- aging of logistic real estate
- strong political support of road transportation
- delay of development by administrative regulations

Figure 12: SWOT of Top 20 Freight Villages

Source: DGG Deutsche GVZ-Gesellschaft mbH, 2013, p. 107

The concrete rating of a best practice is relative, not absolute. It depends on the region, context and time. Thus even though terminals along the North Sea-Baltic corridor rank comparatively small and specialised, they serve the region well, providing even free capacity and extension possibilities for future increasing volumes. They are located in close distance to sea ports and/or capital regions. They further have good train connections not only between the North Range ports and the Baltics, but also to the Silk Road to China. While this will offer opportunities in the future, terminals have to make sure to be up to date regarding terminal infrastructure, technology and equipment. Here benchmarking with other terminals might reveal untapped potential. Besides the SWOT analysis (fig. 11), also the dry port concept as well as recommendations derived from several EU projects might give valuable impulses.

Looking at the intermodal map, it further becomes clear that the density of terminals is way higher in Western Europe than in the Baltic Sea region. A further development of the network as well as the terminals might support a higher share of intermodal transport in the latter one. This would contribute to a greening and implementation of a sustainable transport corridor system in the EU and beyond.

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