Blue Ports

The economic impact of Dutch Inland Ports

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Master Thesis

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Jelle van der Enden

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Author: J.A. (Jelle) van der Enden
Student number: 321354
Email: j.van.der.enden@binnenvaart.nl

First Supervisor: Dr. Bart Kuipers

Erasmus University Rotterdam, Erasmus School of Economics, Urban,- Port,- and Transport Economics

Second Supervisor: Lijdia Pater – de Groot

Nederlandse Vereniging van Binnenhavens (NVB)

External Supervisor: Drs. Arwen Korteweg

Port Authority Rotterdam, Port development Division

Second Reader: Dr. Michiel Nijdam

Erasmus University Rotterdam, Erasmus School of Economics, Urban,- Port,- and Transport Economics

Commissioned by: Nederlandse Vereniging van Binnenhavens (NVB)

Vasteland 12 E, 3011 BL, Rotterdam

Phone: 010-7989840
Email: nvb@binnenvaart.nl

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ERASMUS UNIVERSITEIT ROTTERDAM

Nederlandse Vereniging van Binnenhavens
Fédération Néerlandaise des Ports Intérieurs
Niederländischer Verband der Binnenhäfen

Inland barging has a rich history in the Netherlands. In this photo my great-grandfather sets sail towards Germany on his barge the *Cornelia.* Location: the river Lek. Remarkable detail: inland barging used to be "greener" back in the day; propulsion mainly provided by wind instead of fossil fuels. A hint for green policy makers nowadays? Source: Katholieke Illustratie (1933)

Preface

I gladly present you my thesis report. The thesis report is the final project to complete the master program Urban,- Port,- and Transport Economics. A master program at the Erasmus School of Economics. Besides that performing this research was very interesting, it was a very enjoyable experience. The Nederlandse Vereniging van Binnenhavens (NVB) gave me the opportunity to research the economic impact of Dutch inland ports and gave me full support in completing this report. By combining desk research with field research the process of making the thesis was never a boring one. Besides thanking all the colleagues at CBRB/NVB for their support I would like to thank the following persons who were of great help.

Dr. Bart Kuipers. As my supervisor he gave me the right tools to work with: guidelines, contacts, and literature. During our meetings he was straightforward and critical but always remained positive and an enjoyable person to work with.

Lijdia Pater – de Groot. As my second supervisor she gave me the support I needed from the NVB. Always willing to share useful information and news and gave me full confidence during the research.

Arwen Korteweg. Helped me with his great expertise on inland ports. Although very busy he was always willing to help out. His feedback was very useful and he shared some very useful contacts.

Thomas Wermer. One of my colleagues at CBRB/NVB. Besides giving me support on IT related subjects, Thomas is a great person to share an office space with.

Last but not least I would like to thank my parents who always supported me during my study.

I hope you enjoy reading the thesis report and find it interesting and useful.

Jelle van der Enden

Rotterdam, December, 2012

Executive Summary

The Dutch Inland Ports Association (NVB) commissioned a graduation assignment to research the economic importance of Dutch inland ports. This report regards the full English version of Blue Ports "The economic impact of Dutch inland ports" (2012). A Dutch summary Blue Ports: "De onmisbare schakels" is also available on the site of the NVB. Objective of this report is to determine the economic indicators describing the relevance of inland ports. Thereby making a comparison with the results for the year 2003 in which the first Blue Ports research was performed. This research determined whether changes in macro-economic indicators and developments such as quick win subsidies and containerisation of transport flows have affected inland ports over time. Based on a bottom-up research of 16 case studies of inland ports and a literature review of economic indicators the following main results were found:

Dutch inland ports; main economic effects (2003-2011)

- 66.700 employed persons (66.400 in 2003)
- 8.2 billion Euro direct added value (5.7 billion Euro in 2003)
- 13.2 billion Euro direct en indirect added value (8.9 billion Euro in 2003)
- Growth total added value (in absolute and relative terms)
- Growth direct employment (absolute)
- Decline direct employment (relative)
- Chemical sector provides largest growth in added value
- Importance construction sector declined
- Growth importance wholesale trade partly due to increasing containerisation
- Growth economic importance concentrated to few sectors
- Increased transhipment of break bulk goods (+15% to 344.000 thousand ton)
- Growth economic performance inland ports slightly behind growth seaports

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Economic impact Dutch inland ports 2003

- 66.400 employed persons
- 5.7 billion Euro direct added value
- 8.9 billion Euro direct and indirect added value
- Seaports: 58.000 employed persons and 7 billion Euro direct added value (Louter, 2003)

Figure 1: Economic impact Dutch inland ports 2003

1 Introduction

1.1 Background

The Netherlands is considered to be one of Europe's most important logistic hotspots. Through large mainports, such as the Port of Rotterdam and Schiphol Airport, millions of people and tons of goods are transported on a yearly basis. The highways, waterways, airspace, and rail network ensure the continuity of throughput serving the mainports and their hinterlands. Various forms of infrastructure enable the use of multimodal transport. Different transport modalities are often used in combinations in supply chains. Consistency is a keyword in supply chains to increase efficiency. To improve cooperation between the various infrastructures and transport models, keeping track of performance indicators is necessary to make analyses. The most commonly used indicators are throughput statistics like bulk tonnage, containers (TEU's), passengers, vehicles, ships, trains, etc. In addition it is common to nodes like mainports to determine the economic impact to its region or country. By capturing all similar nodes of a certain infrastructure the national impact can be expressed. One example is the annually published *havenmonitor* that determines the national economic impact of all Dutch seaports combined.

Economic impact studies are often limited to forms of infrastructure from which one or more nodes have a large economic effect such as the aforementioned Port of Rotterdam and Schiphol Airport. National economic impact studies on inland ports are limited to one research namely Blue Ports: "knooppunten voor de regionale economie "(TNO, 2004). Although numerous individual reports and studies exist on inland ports an up to date overview on national level is missing, yet research is relevant. TNO estimated an economic impact (66,400 employees, 6 billion Euro added value) of a similar magnitude of the Dutch seaports (58,000 employees, 7 Billion Euro added value) (Louter, 2003). The research commissioned by the NVB is so far the only research performed on national level. The NVB is an association that represents the interests of the Dutch inland ports. Members are municipalities, provinces, port authorities, shipping organizations, the chamber of commerce (KVK), and regional development agencies.

Quick wins

- Subsidy for inland ports
- Three terms quick wins (2008, 2009, 2012)
- Improving accessibility and quality inland ports
- Investments made in 70 projects
- 100 million Euro national government
- 100 million Euro municipal and provincial governments

Figure 2: Quick wins

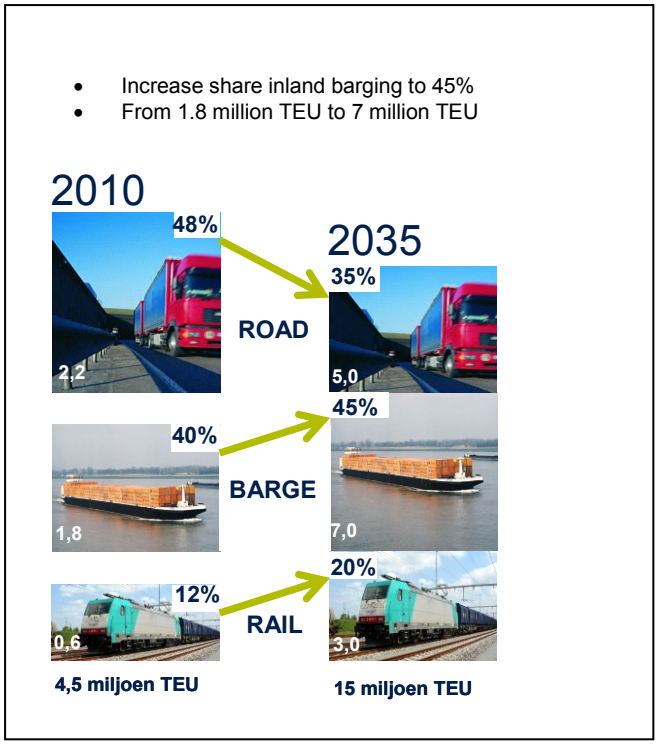
Blue Ports report (2004) was initiated due to an insufficient substantiated view of the economic importance of Dutch inland ports. A lack of data and clear structure obstructed an overview of all Dutch inland ports. The economic importance of inland ports was unclear and difficult to compare with other forms of infrastructure. Therefore attention towards inland ports was limited. Government policies were concentrated to seaports and overlooked the importance of inland ports. After Blue Ports (2004) the economic importance of inland ports was recognised. Inland ports were taken into account by policy makers in their spatial policy at national, provincial and municipal level.

The situation with regard to economic research has not much changed in eight years. Results from Blue Ports report (TNO, 2004) are still quoted in advisory reports on individual or groups of inland ports. However in the meantime no updates were performed on any economic indicators. For this reason the NVB commissioned a new research on the economic importance of Dutch inland ports.

Furthermore, a number of changes occurred with respect to inland ports since 2004. An important one is the introduction of 'quick win' projects introduced by the national government which started in 2008. Quick win is a joint subsidy from both the national government and local governments to contribute to inland ports. Since 2008 100 million Euro has been invested in improving inland ports: for all the projects local governments (municipalities and provinces) invested another 100 million Euro. The aim of quick win projects is to improve accessibility and quality of inland ports to ultimately promote the use of inland barging as a transport mode. 70 projects are initiated from which activities like dredging waterways, upgrading and expanding quays, and port area redevelopments were covered by quick win projects so far.

Another development of importance effecting inland ports is the growth in container throughput via water and the policy of the Port of Rotterdam supporting the growth in container flows.

Figure 3: Model split container transhipment Maasvlakte Rotterdam



The port authority of Rotterdam is expecting a total growth of goods throughput from 430 million tons in 2010 towards 650-750 million tons in 2030 (Havenvisie 2030). It is expected that container throughput will grow fastest. In 2010 container throughput in the port of Rotterdam was equivalent to 11 million TEU. From 2030 on an expected 30 million TEU will pass through the port. To facilitate the growth it is crucial that roads, waterways, and rail can support the growing flow of containers between the port and its hinterland. A change in modal split (increase the share of transport via water and rail and decrease the share via roads) will be necessary to avoid congestions and support further growth. The aim is to reach a maximum share of 35% of all container transport by road from and towards Maasvlakte Rotterdam in 2035; currently the share by road is 48%. The aim is to increase the share by water and rail to ease pressure on the roads which are coping with bottlenecks due to heavy traffic. The objective is to increase inland barging via waterways from 40% to 45% and increase the usage of railway from 12% to 20% in 2035 for all container transport from and towards Maasvlakte. Consequence is that the nominal usage of waterways from and towards inland ports will more than double. Interesting is to observe whether inland ports can handle the expected growth.

Growth is expected in terms of volume. However due to the global financial crisis in 2008 world trade experienced a dip. The crisis also effected the real estate sector. Property values dropped, investments in construction projects are postponed or cancelled. Traditionally inland barging and inland ports tranship large amounts of sand and gravel for the construction sector. Due to economic developments it is expected that Dutch inland ports are effected by the crisis and that the economic importance has shrunk since 2003. But also structural changes like de-industrialisation and global shift of industrial activities may have effected the economic importance of inland ports.

Main research question:

- What is the economic impact of Dutch inland ports?

Sub-questions:

- Which indicators can express the economic importance of Dutch inland ports ?
- What activities and which organisations are bonded to inland ports?
- Which ports can be considered as inland ports?
- What type of inland ports exists in the Netherlands?

Expectation

- The economic importance of Dutch inland ports has declined since 2003

1.2 Research objective

Objective of this research is to determine the economic impact of Dutch Inland ports by the use of up-to-date data sources. Furthermore, a comparison should be made with the results of the Blue Ports report (TNO, 2004). A comparison may illustrate any trends and significant changes that inland ports have experienced in the period 2003-2011.

With up to date knowledge inland ports can again be included in a full matter with future economic decision-making processes on infrastructural projects. An economic study on Dutch inland ports will give results that can be useful not only for the ports (areas) themselves but are also useful for policy makers, developers and researchers.

1.3 Problem analysis

To measure the economic importance of inland ports no standard indicators or databases exist. However, the Central Bureau of Statistics (CBS) provides throughput data on inland barging on a national level divided into different types of transhipment goods. Employment figures for inland navigation related activities are limited available.

In addition to the research it is relevant to determine which ports can be counted as inland ports and what economic activities are bonded to inland ports. Finally, the question raises whether different port-related activities and different kind of inland ports exist? These questions and problem statements can be translated into research questions and a research outcome expectation.

1.4 Outline thesis

Name Chapter	Description
Literature review	Problem analysis, research objective and background are linked to existing literature relevant for inland ports and port economics. The possibilities of measuring port performance and economic effects are being explored and discussed. Further a definition of inland ports will be researched and given. In the end the literature review will form the basis for the methodology of research.
Methodology	Considering the outcome of literature review, methods of measuring the economic performance of Dutch inland ports are chosen. Outcome is that no single method can describe the economic importance for all Dutch inland ports and therefore multiple indicators will be used. The scope of research will be formed and so will sources for data.
Added value inland ports	One of the relevant indicators selected to use is added value created by inland ports. Added value can be divided into direct and indirect added value which are based on direct employment figures created in inland ports. A division is made in different sectors that are active in inland ports. Outcomes will be compared to the added value created in seaports and national macro-economic figures. Results are compared over multiple years.
Transhipment	The other major indicator selected is transhipment of goods through inland ports. The development of transhipment is analysed over time and a division is made in categories goods. By categorising transhipped goods a link can be made with different sectors active in inland ports.
Conclusions	Research results are linked to the problem analyses and a summary of all outcomes are given. Recommendations are given for further research.
Appendices	An overview of all contacts, references, sources and the 16 case studies of inland ports

2 Literature review

2.1 Introduction

A port's primary function is to function as a gateway whereby goods and passengers are being transferred between ship and shore (Goss, 1990).

Aim of this chapter is to provide an overview of literature and reports which exist in the area of port economics. By better understanding this area of interest, basic knowledge can be formed which eventually can be applied to research on the previous formed problem statements. Descriptions of economic functions of ports and related economic effects will contribute to the research on inland ports. Developments in ports like technological changes such as larger vessels, faster loading and unloading procedures and upgraded facilities are often described in reports. However the economic effects on a port's region which occurred due to these changes are rarely described or measured. By adding the definition of port performance indicators a complete research can be conducted. It would appear that much literature is focused on seaports which in a great deal can be applied to inland ports.

2.2 Port products

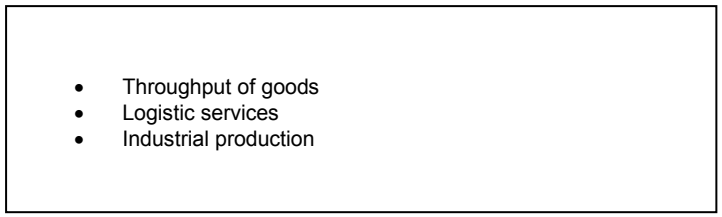
2.2.1 Port functions

Disregarding its location nor physical characteristics; a port can only be economically feasible if a minimum level of demand and supply is met (Goss, 1990).

In general seaports function as a gateway whereby goods and passengers are being transferred between ship and shore (Goss, 1990).

For a seaport of any economic significance there has to be a demand for the services that it can offer, supply of services alone is not enough. For a port with a favourable natural formed location it is not necessarily a successful port if there is insufficient demand. The same accounts for human made ports. In other words by simply creating a port, there is no guaranteed throughput. On the other hand ports do not necessarily need to be located near a large demand and supply market like a major city to be economically viable. This is partly due to recent technological developments which increased transport efficiency allowing more remote locations to be profitable as well. By reducing transport costs ports have better connections and extend their hinterland range. Technical applications include container gantry cranes, large sand / gravel conveyors belts, and other

Figure 4: Port products



Source: De Langen, 2004

high-tech loading and unloading systems which require fewer workers but workers with more specialised skills compared to traditional dockworkers. The reasoning by Goss might be applied to Dutch inland ports. Most inland ports are located in less populated regions but have a substantial throughput of goods. On the other hand large inland ports like Dordrecht, Utrecht, Zaanstad are located in urban areas

Ports cover more than just the primary function of transferring goods between ship and shore. Secondary activities like shipbuilding, metal industry, chemical industry, oil industry, and transportation services are all connected and benefit from the primary function of ports. In return it is attractive for companies to settle in port areas which create economies of scale and excess surplus for producers and consumers. Goss states the following:

> *"The economic definition of gaining port efficiency is increasing surplus of producers that export and increasing surplus of consumer that import via the port. Efficiency can be measured by summing the total transhipment costs from goods passing through a port."*

When linking this statement to the above mentioned developments of increasing transport efficiency in ports, ports require less manual labour and therefore create less added value. On the other hand increasing consumer surplus must be related to consumer income and therefore employment / added value.

Ports cannot be considered as isolated entities anymore. A port is a cluster of economic activity where a large number of companies provide products and services from which so called *port products* emerge (De Langen, 2004).

Main port performance indicators (PPI's)

- Throughput goods
- Added value

Main function PPI's (de Langen, 2007)

- Providing relevant information to organisations for management purposes
- Comparing performance between ports, regions or countries
- Communication means relevant for port related stakeholders

Figure 5: Port performance indicators (PPI)

2.2.2 Port performance indicators

Improvement of ports can best be achieved by reducing transport costs, delays, risks of damage and loss, and other bottlenecks associated with transhipment. In order to implement improvements, measurements are required to observe and analyse any progress. In most cases, seaports keep track of performance indicators.

By further professionalisation and privatisation of ports and port authorities, an increasing interest is observed in port performance indicators (PPI's). PPI's are not only relevant for port authorities but also for other stakeholders such as port users, port shareholders, governments and researchers.

Goods *throughput* is the most common form of measurement used as a PPI. Throughput figures are frequently reported by local authorities such as municipalities, port service providers, port authorities, locks and bridge men. At the mentioned sources data availability and accuracy is generally good. Although often used, throughput figures alone say little about the economic impact port related activities have on a port region. The use of throughput figures alone as a PPI has some restrictions. By summing different throughput goods into a total figure (tonnage) comparisons between different ports become less valuable. For instance one unit sand has a different value compared to one unit of oil. The growth of throughput figures are often explained by (inter) national trade flows and not solely from the (throughput) performance of a port alone.

The next commonly used PPI is *added value* created by a port. Often based on employment figures in a port this PPI is relevant for determining the economic value of a port but in return say little about the efficiency of a port. Further in this chapter it will be explained why substitution effects can give a disrupted view when solely using economic added value as a PPI.

Logistic services

- Production indicators: total square meter of storage facilities, time of transfer to destination (Antwerp, Rotterdam, New Orleans)

Throughput of goods

- Production indicators: throughput, added value, investments, share in hinterland transport (Almost all major ports: Rotterdam, Antwerp, Long Beach)
- New indicators: number of ship calls and dockings, value of goods transhipped (U.S. ports and Antwerp)
- Port operation license indicators: minimum share of transport modality, Port demurrage revenue, customs revenue (Rotterdam, Dampier, Long Beach)

Industrial production

- Production indicators: added value of port-related industrial production (Dutch and Belgian ports)
- New indicators: number of available chemicals (Antwerp)
- Port operation license indicators: emission output and other environmental indicators (Rotterdam)

New PPI's that have been implemented during the last 10 years by the port of Rotterdam are: employment, turnover and profitability from port users, and number of new business establishments. The article *New indicators to measure port performance* (de Langen, 2007) gives an overview of PPI's used by the largest ports worldwide. More recently the PPRISM (Port PeRformance Indicators: Selection and measurement, 2010) project which is funded by the EU added some indicators based on research among European seaports. New indicators concluded from this report are mainly managerial and environmental. Although many similar PPI's are being used, making comparisons can be difficult due to the use of different measuring methods among ports. The following overview lists different PPI's based on the three port products

PPRISM

- Carbon footprint
- Total water consumption
- Amount of waste
- Environmental management
- Maritime / intermodal connectivity
- Quality of custom procedures
- Integration of port clusters
- Reporting corporate and social responsibility
- Autonomous management

New indicators as described are often additional. Throughput and economic added value form the basis for most port performance analysis.

By measuring indicators annually it will become clear how ports develop over time. The *Havenmonitor* (Erasmus University, 2010) is an example of an annual review on the economic added value of Dutch seaports. By measuring on an annual basis policies regarding ports can be tuned to desired developments. As mentioned before an annual review does not exist for Dutch inland ports

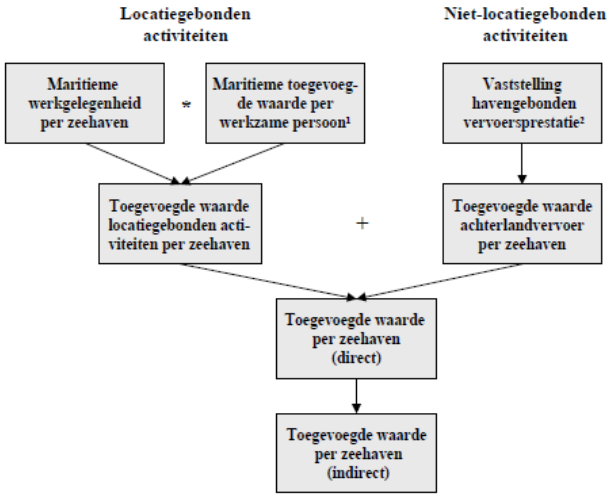
The *Havenmonitor* has shown the following results by measuring over time:

- Certain sectors are cyclical in economic developments. Given their size certain sectors play a major role in developments of ports
- Employment rates are declining, but increasing value added figures are being observed meaning that Dutch seaports are becoming increasingly efficient
- Certain sectors are dominant and take the lead in developments within a port area

The *Havenmonitor* considers to have two limitations:

- A complete definition of the seaport area is lacking. It is impossible for every company located in a port area to determine whether its seaport related or not. Perhaps a more stringent definition is desirable, but requires a lot of research.
- Forward indirect effects are not taken into account. In other words, other economic effects which are being created by seaport related activities. Spending effects by port-related employees is an example. Obtaining all forward indirect effects is difficult and requires extensive research.

Figure 6: Methodology added value Havenmonitor



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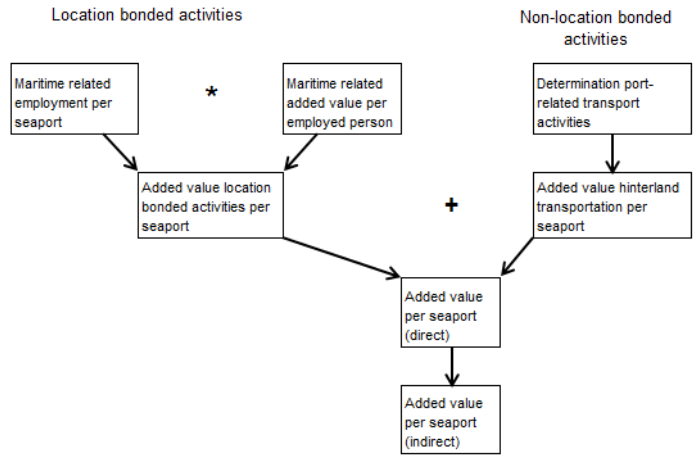


Methodology Havenmonitor

The following overview shows schematically how the *Havenmonitor* determines the added value of seaports.

To determine the direct added value, port-related employment is divided into location and non-location. Next the added value created by one employed person (AV/EP) is multiplied by the total port-related employment. By using a multiplier the indirect employment and added value is derived from the direct added value and employment.

Geographical and sectorial framework Havenmonitor

Maritime related activities are basically the direct effects that are desired to be measured. Maritime activities are defined as economic activities from companies that need a seaport enable to operate. In practice it has been found difficult whether an (industrial) site in the proximity of a port is considered to be maritime dependable. The *havenmonitor* uses a top-down approach to determine whether an (industrial) area is maritime related. Employment figures are obtained from the *Landelijk Informatiesysteem van Arbeidsplaatsen en Vestigingen* (LISA) database in combination with (seaport) municipal data of companies. Criteria is that a company is added when more than 50% of its activities is maritime related.

Location bonded maritime added value is specified in the following manner:

Based on production statistics and the National Accounts of the Central Bureau of Statistics (CBS) the added value per employed person (AV/EP) per maritime activity is calculated.

Non Location bonded maritime added value:

Most of these employment figures are related to hinterland transport activities using rail, road, pipeline and barge. Again figures are available from CBS databases. The next step is to determine the number of jobs which is more difficult since they are not bonded to a location. Partly these numbers are based on estimations from regional databases (Provincial Accounts). Further corrections are applied to the size of individual firms and regional differences.

Table 1: Four methods determination port related employment & direct added value

	Arbeidsplaatsen (* 1000)		Toegevoegde Waarde (* € mln.)	
	1996	2001	1996	2001
Zeehaventerrein				
1 Chemie en basismetaal	35.5	31.2	5953.8	4823.6
2 Overige industrie	26.0	25.8	1359.5	1472.8
3 Groothandel	12.0	14.5	665.5	954.7
4 Transport	31.6	33.0	1857.5	2113.4
5 Overig	54.3	65.3	3446.8	4048.8
Totaal	**159.5**	**169.8**	**13283.0**	**13413.3**
Strenge indeling				
1 Chemie en basismetaal	29.3	26.0	5230.3	4178.4
2 Overige industrie	7.7	6.3	280.9	230.8
3 Groothandel	0	0	0.0	0.0
4 Transport	21.9	20.9	1868.8	2208.1
5 Overig	3.7	4.3	294.0	344.3
Totaal	**62.6**	**57.5**	**7674.0**	**6961.6**
Ruime indeling				
1 Chemie en basismetaal	35.0	31.4	5844.0	4842.0
2 Overige industrie	13.7	12.3	760.9	765.4
3 Groothandel	5.7	6.0	308.6	390.6
4 Transport	40.0	42.4	2822.0	3341.1
5 Overig	15.1	16.9	1193.0	1473.9
Totaal	**109.5**	**109.1**	**10928.4**	**10813.0**
Havenmonitorindeling				
1 Chemie en basismetaal	37.4	32.9	6077.5	4982.2
2 Overige industrie	23.0	20.5	1147.6	1088.4
3 Groothandel	13.1	13.6	711.2	877.5
4 Transport	34.7	37.5	2527.8	3059.5
5 Overig	9.3	10.0	743.8	862.4
Totaal	**117.4**	**114.5**	**11207.8**	**10870.0**

Source: Louter, 2003

The table above demonstrates the different outcomes of the four methods for determining port related employment and added value. Outcomes vary significantly. The top-down (*Havenmonitorindeling*) approach is almost similar in outcome compared to the broad classification. When using the strict classification (*Strenge indeling*) half of the values are obtained compared to the top-down approach and broad classification (*Ruime indeling*). When taking an entire seaport industrial area into account it is obvious the highest values are obtained (*Zeehaventerrein*).

2.2.3 Direct effects

Economic effects are determined by both direct and indirect port-related activities. The indirect effects depend on the direct port-related activities and therefore it is necessary to first define direct effects and related activities. Again (sea) port related activities, sites, and companies need to be defined. According to literature from Louter (2003) there are roughly four methods to determine the economic region that has a direct relation to (sea) ports. Interesting is to compare these methods, since large differences in outcomes are observed. Besides a top-down approach as used in the *Havenmonitor*, Louter gives the following three methods:

Based on activities (**function**)

- strict classification (*Strenge indeling)*
- broad classification (*Ruime indeling)*

Based on physical approach (**location**)

- All companies active on a seaport (industrial) site (*Zeehaventerrein)*

Interpretation according the strict classification is that a company's main activity must depend on throughput via water. This could account both for logistic or production activities, as long as a strong dependency of throughput via water is observed. This means that forwarding companies located outside a seaport site could be included as long as a strong dependency is observed. In order to carry out measurements, Louter determined that more than 50% of companies located on a seaport site must be dependable in order for a seaport site to be accounted to the strict classification. The broad classification differs in the sense that more than 10% of companies on a seaport site depend on throughput via water. As the name indicates this is a very broad approach, such a site would not fully rely on port-related activities.

Bottom-up method

The opposite method of top-down (*Havenmonitorindeling*) is *bottom-up* determination of direct effects. Bottom-up method is used by the first Blue ports report(2004) and the *National Bank of Belgium* (NBB) to determine the economic impact of Belgium ports. This method requires field research in ports. Each individual company/organisation is examined, eventually all companies and organisations are added to form a total The method is accurate but requires most research.

Reason for companies to settle in a seaport site, even if they are not dependable on maritime activities, is due to physical characteristics. Seaport sites are relatively inexpensive, large, far located from residential areas so that noise and environmental regulations are more tolerant. Seaport sites offer many options when it comes to logistic services by road, rail, and of course water which in return improves accessibility. Besides Seaports create agglomeration effects, also known as cluster effects (De Langen, 2004)

According to Louter's physical approach (*Zeehaventerrein*), all companies / organisations / activities are included located on a seaport site no matter to what extent they are bonded to maritime activities. In the IBIS database (registration base of industrial estates) it states whether an industrial site is a *seaport site*. Criteria whether the site is a seaport site is determined by local municipal officials. This method is easy to apply for research but not refined. It is possible that only 5% of all activities are direct port related on such a site. Based on the *Havenmonitor* 1996, 2001, Louter illustrates the different outcomes in employment and added value when the different methods are applied. The table blow reflects Table 1 using index rates. The havenmonitor is used as a benchmark starting with 100 for both employed persons and added value. The overview gives a further insight in the different methods of determining direct effects.

	Employed Persons (EP) 2001	Added Value (AV) 2001
All activities on a seaport site	148	123
Strict classification	50	64
Broad classification	95	99
Zeehavenmonitor	100	100

The following three tables summarise the pros and cons of the discussed methods.

Bottom-up method (Blue Ports / NBB)

Pros

- Accurate determination of port related activities
- Selection procedure is straightforward

Cons

- Time consuming to complete the list of all port-related organisations
- Lack of geographical scope (NBB)
- Keeping track of all changes requires a large organisational effort
- Outcomes partly based on bottom-up research and partly based on estimation (Blue Ports)

Louter classifications

Pros

- Clear geographical scope (seaport industrial sites)
- Straightforward selection procedure (10%, 50% and 100% rule)
- Suitable method for annual updates

Cons

- Outcomes are less accurate
- Not tested in practice (annual reports)

Top-down method (Havenmonitor)

Pros

- Selection based on port related activities
- Proven method, all Dutch seaports participate

Cons

- No clear geographical scope
- Outcomes are less accurate due to broad definition of maritime related activities (50% rule)

2.2.4 Indirect effects

Indirect effects can be divided into backward and forward effects. Indirect backward effects concern the procurement of goods and services by companies that are directly bonded to the port. An example is that a forwarding company hires the services of a logistics company that uses its trucks to transports goods from the port to the hinterland. Indirectly the trucking company and its employees are port bonded in its activities. A clear causality can be found in this reasoning. For indirect forward effects this applies to a lesser extent. These are spending effects created by direct port-related activities. An example is a dockworker who buys his daily needs at convenient shops. Shops benefit from the direct port related activities done by the dockworker. To get an overview of all indirect forward spending, extensive research is required. Input-output models of forward indirect effects are available but are based on rough estimations. Therefore indirect backward effects are more plausible and applied in researches. Most researches use forward indirect effects as descriptive indicators instead of statistical indicators. Meaning that a unknown part of economic effects are not quantified. *Oosterhaven et al.* (2001) used input-output tables on a bi-regional level comparing mainport areas (Rotterdam and Amsterdam) with the periphery of the Netherlands on spill over effects like forward indirect linkages. Empirical results showed that forward indirect effects in the transport sector were found significantly larger outside the mainport areas. Periphery areas where a lot of inland ports are located seem to be more economically profitable than commonly thought.

For backward indirect effects also input-output models can be used. The models use cross tables that show the inter-dependency of sectors to one another. The table generates multipliers for each sector. By multiplying the multipliers with the direct added value or employment a total economic impact is obtained. Input-output tables are available at CBS and models at TNO.

2.2.5 Relation throughput and added value

Transhipment in ports generates direct employment. Towage services, dredging services, mooring services, transhipment facilities, customs, maritime suppliers, logistics services, are few examples. Measuring direct port employment is fairly easy by analysing these activities. Transhipment of certain goods needs few or many employees depending on the physical characteristics of the good. Loading fruits on pallets takes more manual labour compared to moving containers or pumping oil out of ships. These processes are largely automated. Handling break bulk requires more labour force compared to handling other bulk products and containers. A relation between throughput and added value is observed:

High value products, more technical and/or automated transhipment, fewer high skilled employees needed, more added value created per employee

Versus

Low value products, more manual labour transhipment required, more (low skilled) employees needed, less added value created per employee

As previously demonstrated the single use of either transhipment figures or economic added value figures is limiting in describing the performance of a port. The relation between transhipment and employment must be explained to get a full analysis. Lagneaux (2004) gives an example in his article "The economic importance of the Flemish maritime ports." This article shows that in 2003 the port of Rotterdam transhipped 328 million tons of goods and the port of Antwerp 143 million tons of goods. Although the large difference in transhipment both ports were considered to have a direct added value of around 7 billion Euros. The difference lies in the fact that Rotterdam transhipps more mass goods (petroleum products, ores and coal) which requires less manual labour to handle. Antwerp processes more break bulk which is more labour intensive. Both studies conducted may vary in method used, but the comparison does demonstrate that the use of more performance indicators will give a better understanding in port performance and differences among ports.

Container transhipment, 1956 Source: World shipping

2.2.6 Port economic developments

Due to the enormous increase in world trade since the 1970s throughput boomed in major ports. The economic relations between ports and their hinterlands changed due to the increase in trade flows. An important catalyst that increased throughput was the introduction of the standardised container. The use of standardised containers allowed faster throughput in all major ports. By increasing transport efficiency, ports’ hinterlands became more accessible. After developments of increasing throughputs direct employment rates stabilised in port areas and decreased slightly over the past 20 years (Hall, 2004). Reason for the slight decrease is the transition in handling break bulk to mass goods and containers. As indicated earlier, they require less manual labour. Although direct employment rates slightly decreased in the port regions the indirect effects grew (Hall, 2004). Mainly due to the growth of hinterland ranges indirect employment rates related to ports grew. Since Dutch inland ports are considered to be part of hinterlands from ports of Rotterdam, Antwerp and Amsterdam this finding is relevant to study.

For carrying out economic impact studies, substitution effects can be taken into account. Hall (2004) illustrated that during a 10-day strike that took place in all U.S. West Coast ports, manufacturers and logistics service providers anticipated the strike and sought successfully alternative routes for transportation. By taking these substitution effects into account the economic importance in many port related studies would be lower. In cases where ports are in the close range of each other (e.g. Rotterdam and Antwerp) substitution effects are even larger. Although substitution effects are hard to measure they should be taken into account when analysing the economic impact of ports. For inland ports substitution effects would also apply. Alternatives to transporting goods are rail and road. Every modality has its advantages when it comes to the physical characteristics of individual goods. Due to economies of scale and steady reliable transport schemes inland barging has an advantage to transport sand/gravel, ores, and coal. Steady flows determine the success of transporting these goods; time is less of an issue. For semi manufactured, consumption ready goods and liquid fuels speed is more relevant and therefore competition by other modalities are greater (Policy Research Corporation, 2006).

Figure 7: Definition inland ports

- Hub-and-spoke location in logistical networks (transhipment)
- Link in production / consumption supply chains
- Location to establish production and services

Source: TNO, 2004

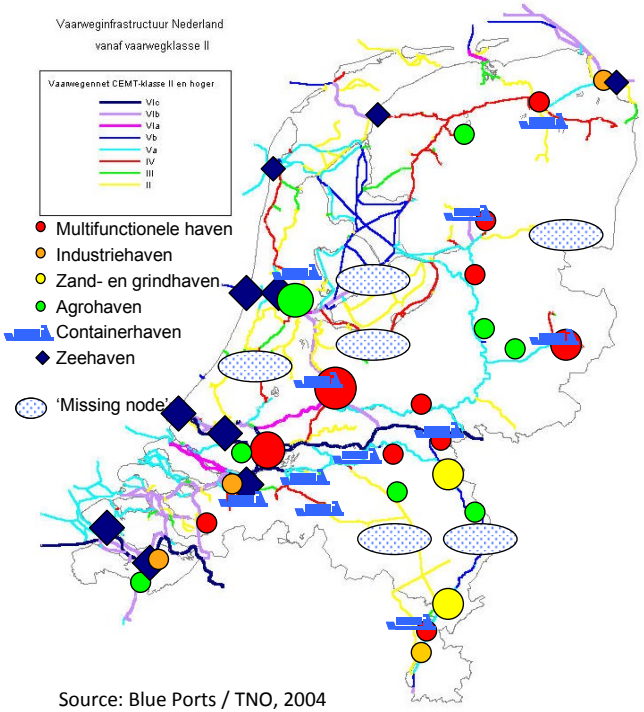
2.3 Scope inland ports

2.3.1 Definition ports

The Netherlands has a large number of inland ports. Simply put: inland ports are all Dutch ports excluding seaports. Dependency and interaction between both ports are considerable. Seaport hinterland flows partly rely on inland waterways and therefore inland ports. In return inland ports rely on the incoming goods from seaports. Both are supplementary to each other. Some inland ports are considered to be a mix of both. The ports of Drechtsteden, Zaandam and Delfzijl have a significant transhipment by both sea going ships and inland barges. An overlap will arise in some cases when determining categories of ports. In the Blue Ports report (TNO, 2004) which studies the economics effects of inland ports, ports with a clear focus on seagoing activities were excluded from the research. The ports of Rotterdam, Amsterdam, IJmuiden, Vlissingen and Terneuzen were not included. The report made the conclusion based on CBS data that 389 inland ports exists in the Netherlands. CBS concluded in 2006 that 210 municipal districts have one or more inland ports.

The study notes that an inland port can be seen as a hub-and-spoke transhipment location for goods located on a waterway. Additionally inland ports can be seen as links in production and consumption supply chains. Concluded was that besides the traditional function as a transhipment location, Dutch inland ports are considered to be an attractive place for industrial and logistic companies to establish.

Figure 8: Typology Dutch inland ports



Source: Blue Ports / TNO, 2004

2.3.2 Typology ports

Ports often tranship several types of goods from which one or two are dominant. In the seaport of Amsterdam cocoa is the most transhipped good while Rotterdam dominates in transhipment of oils and containers. This approach is also applicable for inland ports. CBS statistics show that 340 from the 389 inland ports primarily tranship sand and gravel goods (CBS,TNO, 2004-2011). This does not mean that other type of inland ports are irrelevant. During the research it shows that other type of inland ports have a relatively larger economic impact. Based on throughput figures (CBS, 1998, 2009) and the case studies performed for Blue Ports (TNO, 2004) roughly the following type of inland ports can be determined.

Multifunctional port

In these ports a variety of different goods are being transhipped in various ways. There is no clear dominance of one or two goods. Due to this diversity multifunctional inland ports tend to be larger than average and tranship more than 1.000.000 ton per year. Multifunctional inland ports play both important roles as nodes in logistic networks (national and cross border) and as a location for industries to settle. The ports are well accessible and located on main waterways with deep water (Class 5).

Example ports: Dordrecht, Utrecht, Moerdijk, and Nijmegen

Sand / gravel port

As indicated previously the majority of inland ports tranship mainly sand and gravel products. Sand / gravel ports have strong ties with the construction industry which uses sand and gravel products for making cement, tarmac and other construction products.

Example ports: Cuijk, Maasbracht

Figure 9: Overview map largest Dutch inland ports

Source: Blue Ports, 2012 / BVB, 2012

Industrial port

Industrial ports are characterised by large industrial companies located in a range of 5 kilometres from the port. They use the inland ports for loading and unloading raw materials. For instance the chemical industry makes intense use of inland ports for transhipment.

Example ports: Delfzijl, Stein, and Arnhem

Agro ports

Principally agro ports can be considered as industrial ports. However due to a strong dominance of transhipping agrarian products and feeding products a separate category is considered.

Example ports: Bergen op Zoom, Zaandam, s'-Hertogenbosch, and Sas van Gent

Container ports

Container ports are ports that facilitate container flows between seaports and hinterlands. Stand-alone container ports are not common. Often other goods are transhipped as well in the same port so most containers ports can be considered multifunctional. There is a growing interest in container ports because of expected growing container flows.

Example ports: Born, Alphen aan den Rijn, and Venlo

By categorising inland ports a comparison of economic effects per type of port can be made.

2.4 Conclusions

- Ports are economically feasible only when sufficient supply and demand exists.
- Ports create three main products: throughput of goods, logistical services, and industrial production.
- Port performance indicators (PPI’s) become more important for port stakeholders.
- Direct effects like employment and added value can be measured in different classifications. Form which outcomes in terms of figures differ significantly .
- Indirect effects can be divided into backward and forward effects. From which forward effects are difficult to measure because of the lack of causality in effects
- Economic figures and transhipment figures should be used jointly to better understand a port’s performance.
- Substitution effects can be applied on ports and transport modalities when determining its economic importance.
- Economic developments in ports indicate that direct employment growth is stabilising or even decreasing. However indirect employment related to ports is increasing. Increasing port efficiency is one of the causes.
- Inland ports can be defined as: Hub-and-spoke location in logistical networks, Link in production / consumption supply chains, and a location to establish production and services
- The following type of inland ports can be distinguished: multifunctional port, sand / gravel port, industrial port, agro port, and container ports.

3 Methodology

3.1 Introduction

Economic effects created by port related activities can be determined by various methods. The purpose of this rapport is to capture the total economic impact of Dutch inland ports. Previously literature has shown that direct related employment and throughput of goods form the basic indicators for economic measurements in ports. This chapter will extensively consider which of the different methods and indicators will be needed to the determine the economic importance of Dutch inland ports.

This chapter will give an overview of indicators which were discussed previously. The relevance of each indicator will be discussed and determined to what extend they can be applied.

3.2 Direct effects

Employment figures form together with throughput figures the most commonly used indicators to determine the economic importance of (sea) ports. Also was found that employment figures form the basis to determine the direct and indirect added value. Literature shows that determining direct port related employment can be tricky and different methods show significant different outcomes. A *bottom-up* approach which is somewhat equivalent in results to the *strict classification* (Louter, 2003) is the most realistic and conservative method and will therefore be applied for this research. Criteria in determining which organisations and its employees are port related are as follows:

The port-related organisation must:

1) Be an active port user and dependable on throughput via water

2) Be located on a “wet” industrial site (industrial site which has a port)

Bottom-up approach means that employment figures are obtained by field research. On site it will be determined whether an organisation qualifies or not. A “wet” industrial site according to local municipalities is an industrial site with a port. During research two exemptions were made on the second rule of criteria. In one case a chemical plant is located outside the *wet* industrial site but was connected with the port by pipelines. In the other case an agrarian company was located outside the port area but is fully dependable on transhipment via the public docks and therefore qualified based solely on the first rule. Employment figures are available at various sources such as municipalities, provinces, labour registration bureaus, and directly at port-related companies.

When employment figures are obtained it will be possible to determine the direct added value. Following a distinction can be made in different sectors. By doing so a more complete analysis is made. Chapter 2 shows that the direct added value is calculated by the added value created form one sector specific employed person (AV/EP) multiplied by the total port-related employment in the specified sector. By adding all the sectors a total figure is obtained.

The sector-specific added value per person employed is based on the CBS national accounts which are calculated by the following method:

Table P 11 of the national accounts gives the national added value (gross, base prices) per sector. In table A 1.1.1. total national employment per sector is given. When divided upon each other the added value of one sector specific employee is known. CBS defines an employee as a person which is employed full-time, part-time, self-employed, freelance, or via job agencies. Sectors that are considered to be relevant are chosen by findings during field research.

Table 2: Overview added value per sector, national

	AV/EP			AV/GDP		AV/EP	
	TNO 2003	CBS 2003	CBS 2011	CBS 2003	CBS 2011	Havenmonitor 2002	Havenmonitor 2010
Agriculture	45,9	37,2	38,5	2,3%	1,4%	n.a.	n.a.
Feeding industry	87,9	58,9	105,1	3,0%	2,4%	119,5	119,2
Paper/wood	66,1	52,7	65,2	0,4%	0,8%	n.a.	n.a.
Oil industry	413,1	324,9	461,0	0,5%	0,5%	405,4	186,5
Chemical industry	154,4	144,0	244,6	1,0%	2,0%	137,8	390,9
Basic metal processing industry	61,6	66,0	79,0	0,3%	0,3%	68,9	112,4
Metal production industry	45,2	42,0	60,0	1,0%	1,0%	68,9	112,4
Transport means industry	45,9	49,3	78,1	0,7%	0,5%	35,7	59,4
Other industries	41,4	38,4	43,1	1,7%	1,4%	106,2	105,4
Energy and water	179,3	218,8	241,5	1,7%	2,6%	106,2	335,6
Construction	47,2	48,6	60,4	5,3%	4,8%	n.a.	n.a.
Wholesale trade	66,4	60,2	88,0	6,6%	7,5%	74,1	94,3
Logistics (Land)	49,6	45,5	55,6	2,1%	1,9%	50,3	61,9
Logistics (Water)	47,2	80,1	51,4	0,3%	0,2%	73,6	74,0
Logistic services	66,2	64,9	72,4	1,2%	1,8%	68,2	166,5
Recreation	51,2	40,8	32,3	1,4%	0,8%	n.a.	n.a.

The following table lists the sectors that are found relevant for inland ports. The calculated added value per sectorial employee is given, overall national sectorial importance and the added value is listed used for Blue Ports (TNO, 2004), CBS 2003, CBS 2011, and the Havenmonitor (2002 and 2010).

Indirect backward multiplier	(TNO 2002)	(TNO 2008)
Agriculture	1,53	1,57
Feeding industry	1,71	1,65
Paper/wood	1,35	1,40
Oil industry	1,23	1,35
Chemical industry	1,51	1,64
Basic metal processing industry	1,34	1,38
Metal production industry	1,50	1,57
Transport means industry	1,34	1,47
Other industries	1,36	1,33
Energy and water	1,87	1,86
Construction	1,82	1,78
Wholesale trade	1,36	1,43
Logistics (Land)	1,38	1,36
Logistics (Water)	1,62	1,53
Logistic services	1,42	1,42
Recreation	1,64	1,66

Table 3: Indirect backward multipliers

3.3 Indirect effects

Literature review previously shown that ports create spill over effects. Indirect effects can be divided into backward and forward effects. Indirect backward effects concern the procurement of goods and services by companies that are directly port bonded. For indirect backward effects causalities are clear and can be determined and calculated. For forward indirect effects this is not the case. For this reason forward indirect effects will not be taken into account. Chapter 2 describes the use of multipliers to determine the backward indirect added value based on the direct added value. Blue Ports (TNO, 2004) used multipliers from TNO. These will be used again since only small deviations are observed with CBS multipliers and consistency of methodology will be contained. The newest multipliers from TNO date from 2008 which will give no problems to calculate the backward indirect added value for 2011 since multipliers change very little over time

3.4 Relative effects

When overall added value and sector related added value is calculated the results can be compared. Comparisons can be made in relation to GDP (Gross Domestic Product) and the added value of Dutch seaports. By comparing the results from 2003 with 2011 it can be concluded whether the economic importance of Dutch inland ports has increased or decreased.

Category	Number
Inland mainport (Drechtsteden)	1
Large multifunctional port	3
Multifunctional industrial port	5
Multifunctional agro port	11
Multifunctional container port	2
Industrial port	13
Agro port	12
Container port	1
Multifunctional sand / gravel port	4
Large sand / gravel port	41
Small sand / gravel port	300
Total	**393**

Table 4: Category inland ports

3.5 Geographical scope

The method to measure economic importance is clear. Next step is to determine the geographical scope of measuring. The Netherlands counts almost 400 inland ports (TNO / AVV, 2004). By applying a bottom-up research for each individual port will be take up too much time. Therefore, a similar method as the Blue Ports report (TNO, 2004) will be chosen. Shortly described: a selection of different categories inland ports spread over different regions (provincial) is studied. By adding an estimation of the remaining smaller ports an overall estimation can be calculated for all Dutch inland ports. Consequence of applying such a method is that the overall results should be seen as an estimation.

Based on inland port functions as described in the second chapter a further breakdown can be made in port functions / activities. The following table represents a selection created by TNO / A&S management (2004)

Although this selection dates from 2004 it can be considered representative and usable for new research. From 2004 on just two new inland ports emerged (ECORYS, 2010). Infrastructural entities such as ports are static and require large amounts of investments to create or break down. Therefore companies and organisations which are settled and bonded in ports invest in the long-term to benefit from amenities that ports offer them in the long run. Investments are made in terminal cranes, pipelines, port maintenance of quays and dredging of waterways and infrastructure surrounding the ports. Secondly trends in individual port throughput figures (CBS and Blue Port case studies, 2004-2011) show a stable pattern which confirms the applicability of the table.

By using the table an analysis can be made for every type of inland port. By determining the average effects for every category and multiply with the number of ports which exits for every category a total estimation can be calculated. In order to calculate the average employment for each category of inland port at least one case study will be performed.

Case study	Category inland port
Drechtsteden	Inland mainport
Hengelo (Regio Twente)	Large multifunctional port
Wageningen	Multifunctional agro port
Drachten	Multifunctional sand / gravel port
Sas van Gent	Agro port
Zaanstad	Large multifunctional agro port
Delfzijl	Multifunctional industrial port
Stein	Industrial port
Cuijk	Large sand / gravel port
Nijmegen	Large multifunctional port
Born	Multifunctional container port
Alphen aan den Rijn	Container port
Veghel	Multifunctional agro port
Venlo	multifunctional port
Bergen op Zoom (new)	Medium multifunctional port
Utrecht (new)	Large multifunctional port

Table 5: Overview case studies

The 14 case studies that were performed in the Blue Ports report (TNO, 2004) will be re-examined with an addition of two new case studies. The 14 case studies accounted for a collective direct added value of 1.4 billion Euros in 2004. A significant share of the total estimated direct added value of 5.7 billion Euro. By examining the same selection with an addition of two case studies a new overview on the economic importance of Dutch inland ports is produced. The continuity in research method is maintained and additionally an interesting comparison can be made between the years 2003 and 2011. In the appendix each case study is discussed separate.

3.6 Sea and small inland ports

Seaports are partly dependent on the functioning of inland ports. A significant share of hinterland transport is taken account by inland barging, around 40% of all containers going towards and from the port of Rotterdam. Although a part origins or end up outside the Netherlands, most of these containers are being transhipped within the Netherlands (KiM, 2012). The mutual dependency creates inland barging related employment in seaports. In other words seaports function partly as inland ports. To determine the exact employment created is a impracticable task due to dispersion of barging activities in seaports. However a good estimation can be given by using a similar method which has been used in Blue Ports (TNO, 2004). The basis is employment and added value figures that are given in the *Havenmonitor 2010* for the major seaports of Rotterdam, Amsterdam, Velsen, Terneuzen and Vlissingen.

- The indicators barging related employment and added value are taken in full account
- Next the assumption is made that 10% of all logistical activities such as logistic intermediaries, storage providers, and transport services are bonded to inland barging activities.
- Another 10% of wholesale trade and industrial activities are assumed to be inland barging related.
- The above made assumptions are also made for the indirect effects. By using the same multipliers for inland ports (TNO, 2008) the backward indirect added value is calculated

Small Inland port of Maarssen, 1one gravel transhipment firm active, 12 employees

Small sand / gravel and agro related ports

Around 300 inland ports are considerably small in size. In most cases the only throughput is sand, gravel or feeding related products. Like seaports an estimation will be made on the effects of these small inland ports. For daily operations it is assumed that around 10 employees are needed. For the transhipment of sand and gravel or operating cement mills about half of total employees are needed, 20 % of employees handle feeding related products, another 20% are dedicated to transport services and the remaining 10% is assumed to be active for local industries. By multiplying the employment figures with sector specific indicators economic effects of the smaller inland ports are obtained.

NSTR 0	Agricultural products, animals
NSTR 1	Nutrition; foods
NSTR 2	Solid fuels
NSTR 3	Oils; oil based products
NSTR 4	Ores and metal residues
NSTR 5	Metals: Metals and semi-manufactured goods
NSTR 6	Crude minerals and construction materials
NSTR 7	Fertilisers
NSTR 8	Chemical products
NSTR 9	Other goods and products

Table 6: Overview bulk goods according to NSTR classification

3.7 Transhipment

Literature review showed that transhipment figures help understand changes in sector specific employment and added value. In both directions changes can be related to each other. Transhipment figures are obtained from CBS and municipalities. CBS divides transhipment goods in categories according to NSTR norms (Nomenclature uniforme des marchandises pour les Statistiques de Transport, Revisée). This norm in dividing transported goods in categories is applied for all EU member states since 1967. Municipalities often apply the same or similar norm.

The CBS barging figures contain all goods that are transported via Dutch inland waterways (barges sailing under Dutch and foreign flag). The transhipment of NSTR categorised goods can be related to different sectors active in inland ports. CBS transhipment figures are available until 2011. For the year 2010 the total transhipped tonnage is known but not divided in NSTR categories. On request the CBS provided transhipment figures on municipal level for the years 2007, 2008, and 2009. These figures are divided according to the same NSTR norms. Additionally CBS provided the total amount of transhipped containers via inland waterways. One transhipped unit is expressed in TEU (Twenty-foot Equivalent Unit). Figures were provided unit the year 2009. For the years 2010 and 2011 individual container terminals are analysed.

3.8 Summary methodology

1. Breakdown of employment figures divided into sectors according to CBS classification for port bonded organisations for each case study
2. Determine the average added value for each employee per sector
3. Multiplying the overall employment with the national average sectorial direct added value will result in the overall direct added value categorised per sector for each case study
4. The direct added value per sector will be multiplied by an added value multiplier (TNO). By doing so the indirect backward added value is calculated. By adding the results to the direct added value the total added value is obtained
5. The economic importance of the case studies is compared to the remaining ports divided in the following categories: Multifunctional port, sand / gravel port, industrial port, agro port, and container port. Total effects are based on the average employment per category port. Total employment is estimated by the relation employment / total transhipment per category port. The figures are obtained from the case studies which cover every category port.
6. Adding the economic effects of seaports and small inland ports. By adding the results form step 5 an overview is created for all Dutch inland port related economic effects: direct employment, direct added value, indirect added value. The overall results will be related to national indicators such as GDP, and national employment figures. Comparisons are made with the performance of Dutch seaports. Development of economic indicators are analysed for the years 2003-2011
7. Final step is to analyse the transhipment in goods and containers. They will be related to the economic performance indicators obtained by the previous steps. An overtime comparison is made for the years 2003-2011

4. Added value inland ports

4.1 Introduction

In this chapter the overall added value of Dutch inland ports are obtained. Employment figures and added value are first determined based on 14 case studies which were both performed in 2004 and 2012, so a direct comparison can be made. The two new case studies are discussed separate. The figures were obtained by fields research performed on all case studies. Municipalities, local port authorities, and companies were approached to obtain direct employment figures. Secondly employment figures are divided into sectors and multiplied by CBS sector related added values. Thirdly TNO multipliers are applied to calculate the indirect effects which are added to the direct effects to obtain the total added value. To complete the analysis a price level correction based on a CBS backward multiplier is applied to the results of 2003 so comparison can be made in real terms.

In the second part of the chapter the economic effects of seaports on inland ports are calculated. By adding these effects together with the remaining effects of small inland ports it results in an overall estimation of economic value of Dutch inland ports. Results are compared to national economic indicators of 2003 and 2011 to determine whether the economic importance has increased or decreased over years.

4.2 Case studies

4.2.1 Employment

Table 7: Employed persons 14 case studies, per sector

	Hengelo		Drechtsteden		Wageningen		Drachten		Sas van Gent		Zaanstad		Delfzijl		Stein		Cuijk		Nijmegen		Born		Alphen aan den Rijn		Veghel		Venlo			Total	
	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011		2003	2011
Agriculture																												55	50		55	50
Feeding industry	30		120	85	170	170	30	24	450	425	1462	1987	20	4	5		20	20	90	25					1316	1252	20	20		3733	4012
Paper/wood											230	150					70	50	290	207	50	50						25		640	482
Oil industry				222									24	81																24	303
Chemical industry	600	450	550	861					150	150	434	230	837	1267	1000	900	20	20	100											3691	3878
Basic metal processing industry			100	82							3		745	651					40	72	100	90						25		988	920
Metal production industry				328			12	15			336																75	70		423	413
Transport means industry							100	115			160	57					30		70	353							10			370	525
Other industries			830	544							27	25	95	266	10				0	49	40	20								1002	904
Energy and water								75										20	190	233										190	328
Construction	30	80	3030	1842	15		507	489			44	214	50				25	60	25	11	10	15			217	179	10	20		3963	2910
Wholesale trade				797			55	54			219	232							80			100					160	160		514	1343
Logistics (Land)			200	3	15	15	20	33				93			80	100					70	20								385	264
Logistics (Water)				304							31	86	148	160	5															184	550
Logistic services	40	40	250	212	3	3					188	66	50	175	40	30	5	10	25	38	120	150	20	25	21	20	30	40		792	809
Recreation					50	50	5																							55	50
Total	**700**	**570**	**5080**	**5280**	**253**	**238**	**729**	**805**	**600**	**575**	**3134**	**3140**	**1969**	**2604**	**1140**	**1030**	**170**	**180**	**910**	**988**	**390**	**445**	**20**	**25**	**1554**	**1451**	**360**	**410**		**17009**	**17741**

- Direct employment grew slightly in 2003-2011 with 732 to17.741 employed persons
- Traditional barging sectors still deliver most jobs (feeding and chemical and construction industries)
- Wholesale trade, water related logistics and oil industry strongest growth
- Strong decline construction industry with 1.053 to 2.910 employed persons

- Strong growth chemical related employment Delfzijl + 430
- Strong decline construction related employment Drechtsteden -1188
- Other ports small to moderate changes in employment

4.2.2 Direct added value

Table 8: Direct added value 14 case studies, per sector

	Hengelo		Drechtsteden		Wageningen		Drachten		Sas van Gent		Zaanstad		Delfzijl		Stein		Cuijk		Nijmegen		Born		Alphen aan den Rijn		Veghel		Venlo			Total	
	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011		2003	2011
Agriculture																											2,5	1,9		3	2
Feeding industry	2,6		10,5	8,9	14,9	17,9	2,6	2,5	39,6	44,6	128,5	208,7	1,8	0,4	0,4		1,8	2,1	7,9	2,6					115,7	131,5	1,8	2,1		328	421
Paper/wood											15,2	9,8					4,6	3,3	19,2	13,5	3,3	3,3						1,6		42	31
Oil industry				102,3									9,9	37,3																10	140
Chemical industry	92,6	110,1	84,9	210,6					23,2	36,7	67,0	56,2	129,2	309,9	154,4	220,1	3,1	4,9	15,4											570	948
Basic metal processing industry			6,2	6,5							0,2		45,9	51,4					2,5	5,7	6,2	7,1						2,0		61	73
Metal production industry				19,7			0,5	0,9			15,2																3,4	4,2		19	25
Transport means industry							4,6	9,0			7,3	4,5					1,4		3,2	27,6							0,5			17	41
Other industries			51,1	23,4							1,1	1,1	3,9	11,5	0,6					2,1	2,5	0,9								59	39
Energy and water																		4,8	34,1	56,3										34	61
Construction	1,2	4,8	143,0	111,2	0,7		23,9	29,5			2,1	12,9	2,4				1,2	3,6	1,2	0,7	0,5	0,9			10,2	10,8	0,5	1,2		187	176
Wholesale trade				70,1			3,7	4,8			14,5	20,4							5,3		0,5	8,8					10,6	14,1		34	118
Logistics (Land)			9,9	0,2	0,7	0,8	1,0	1,8				5,2			4,0	5,6					3,5	1,1								19	15
Logistics (Water)				15,6							1,5	4,4	7,0	8,2	0,2															9	28
Logistic services	2,6	2,9	16,6	15,4	0,2	0,2					12,4	4,8	3,3	12,7	2,6	2,2	0,3	0,7	1,7	2,8	7,9	10,9	1,3	1,8	1,4	1,4	2,0	2,9		52	59
Recreation					2,6	1,6	0,3																							3	2
Direct added value	**99**	**118**	**322**	**584**	**19**	**21**	**37**	**49**	**63**	**81**	**265**	**328**	**203**	**431**	**162**	**228**	**12**	**19**	**91**	**111**	**24**	**33**	**1**	**2**	**127**	**144**	**21**	**30**		**1447**	**2178**

- Overall direct added value increased to 2178 million Euro
- Chemical industry delivers highest added value and strongest growth
- Direct added value of chemical industry grew mainly to growth national added value (table 2)
- Direct added value of the construction industry declined, mainly due to lower employment figures (table 7)
- Strong growth in national added value in the feeding, oil, and chemical industries

- Oil industry, water related logistics en wholesale trade fastest growers
- Strong growth in national added value in the feeding, oil industries and wholesale trade (table 2)

4.2.3 Total added value

Table 9: Total added value 14 case studies, per sector

	Hengelo		Drechtsteden		Wageningen		Drachten		Sas van Gent		Zaanstad		Delfzijl		Stein		Cuijk		Nijmegen		Born		Alphen aan den Rijn		Veghel		Venlo			Total	
	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011		2003	2011
Agriculture																												3,9	3,0		4	3
Feeding industry	4,5		18,0	14,7	25,5	29,5	4,5	4,2	67,8	73,7	219,7	344,4	3,1	0,7	0,8		3,1	3,5	13,5	4,3					198,2	217,0	3,0	3,5		562	695
Paper/wood											20,5	13,7					6,2	4,6	25,9	18,9	4,5	4,6						2,3		57	44
Oil industry				138,2									12,2	50,4																12	189
Chemical industry	139,9	180,5	128,2	345,3					35,0	60,2	101,2	92,2	195,1	508,2	233,1	361,0	4,7	8,0	23,3											861	1555
Basic metal processing industry			8,3	8,9							0,3		61,5	71,0					3,3	7,8	8,3	9,8						2,7		82	100
Metal production industry				30,9			0,8	1,4			22,8																5,1	6,6		29	39
Transport means industry							6,2	13,2			9,8	6,5					1,9		4,3	40,5							0,6			23	60
Other industries			68,5	31,2							1,5	1,4	5,3	15,2	0,8					2,8	3,3	1,1								79	52
Energy and water																		9,0	63,7	104,7										64	114
Construction	2,6	8,6	260,0	197,9	1,3		43,5	52,5			3,8	23,0	4,4				2,2	6,4	2,1	1,2	0,9	1,6			18,6	19,2	0,9	2,1		340	313
Wholesale trade				100,3			5,0	6,8			19,7	29,2							7,2			12,6					14,4	20,1		46	169
Logistics (Land)			13,7	0,2	1,0	1,1	1,4	2,5				7,0			5,5	7,6					4,8	1,5								26	20
Logistics (Water)				23,9							2,4	6,8	11,3	12,6	0,4															14	43
Logistic services	3,8	4,1	23,5	21,8	0,3	0,3					17,6	6,8	4,7	18,0	3,8	3,1	0,4	1,0	2,4	3,9	11,3	15,4	1,8	2,6	2,0	2,1	2,8	4,1		74	83
Recreation					4,3	2,7	0,5																							5	3
Total added value	**151**	**193**	**520**	**913**	**32**	**34**	**62**	**81**	**103**	**134**	**419**	**531**	**298**	**676**	**244**	**372**	**19**	**33**	**146**	**184**	**33**	**47**	**2**	**3**	**219**	**238**	**31**	**44**		**2278**	**3482**

- Overall added value increased to 3482 million Euro
- Changes between 2003 and 2011 are similar to direct effects (table 8) since multipliers didn't change significantly (table 3)

4.2.4 Overview

Table 10: Overview economic impact 14 case studies

	Average added value per employed person, national 2003 (CBS)(thousand Euro)	Average added value per employed person, national 2011 (CBS)(thousand Euro)	Difference		Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2003(million Euro)	Difference
Agriculture	37,2	38,5	1,3		55	50	-5		3	2	-1		4	3	-1
Feeding industry	58,9	105,1	46,2		3733	4012	279		328	421	93		562	695	134
Paper/wood	52,7	65,2	12,5		640	482	-158		42	31	-11		57	44	-13
Oil industry	324,9	461,0	136,1		24	303	279		10	140	130		12	189	176
Chemical industry	144,0	244,6	100,5		3691	3878	187		570	948	379		861	1555	695
Basic metal processing industry	66,0	79,0	13,0		988	920	-68		61	73	12		82	100	19
Metal production industry	42,0	60,0	18,0		423	413	-10		19	25	6		29	39	10
Transport means industry	49,3	78,1	28,8		370	525	155		17	41	24		23	60	37
Other industry	38,4	43,1	4,7		1002	904	-98		59	39	-20		79	52	-28
Energy and water	218,8	241,5	22,8		190	328	138		34	61	27		64	114	50
Construction	48,6	60,4	11,8		3963	2910	-1053		187	176	-11		340	313	-28
Wholesale trade	60,2	88,0	27,8		514	1343	829		34	118	84		46	169	123
Logistics (Land)	45,5	55,6	10,1		385	264	-121		19	15	-4		26	20	-6
Logistics (Water)	80,1	51,4	-28,8		184	550	366		9	28	20		14	43	29
Logistic services	64,9	72,4	7,5		792	809	17		52	59	6		74	83	9
Recreation	40,8	32,3	-8,5		55	50	-5		3	2	-1		5	3	-2
Total					**17009**	**17741**	732		**1447**	**2178**	732		**2278**	**3482**	1204

4.2.5 Added value, corrected price levels

Table 11: Direct and total added value 14 case studies, corrected price levels

	Direct added value 2003, price level 2011 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003, price level 2011 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture	3	2	-1		5	3	-2
Feeding industry	435	421	-13		744	695	-49
Paper/wood	56	31	-25		76	44	-32
Oil industry	13	140	127		16	189	172
Chemical industry	755	948	193		1140	1555	415
Basic metal processing industry	81	73	-8		108	100	-8
Metal production industry	25	25	-1		38	39	1
Transport means industry	23	41	18		30	60	30
Other industry	78	39	-40		105	52	-53
Energy and water	45	61	16		84	114	29
Construction	248	176	-72		451	313	-138
Wholesale trade	45	118	73		61	169	108
Logistics (Land)	25	15	-11		35	20	-15
Logistics (Water)	12	28	17		19	43	25
Logistic services	69	59	-11		99	83	-15
Recreation	4	2	-2		6	3	-4
Total	**1917**	**2178**	261		**3019**	**3482**	463

By correcting prices levels for the year 2003 to price levels of the year 2011 a comparison can be made on the same level. By correcting the price levels it can be determined whether sectors have grown or shrunk in real terms. One conclusion is that without the growth of the oil and chemical industry, the added value of the 14 case studies would have shrunk. It is clear that the economic importance of the construction industry has shrunk in inland ports. Both in tables with and without price level corrections, figures declined for the construction industry. The oil and chemical industry made overall growth possible. Not only due to an increase of employment but mostly due to the growth in national added value for both sectors (table 2)

4.3 Sea and small inland ports

4.3.1 Impact seaports

Table 12: Inland barging related employment seaports, per sector

	Rotterdam		Amsterdam		Velsen		Vlissingen		Terneuzen			Total	
	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011		2003	2011
Agriculture													
Feeding industry	180	225	81	27	93	11	5	8	50	43		409	314
Paper/wood													
Oil industry	313	343	28	14	13	2	37					391	360
Chemical industry	522	409	156	117	28	14	79	65	358	317		1143	921
Basic metal processing industry	169	133	31	38	1113	978	71	107	91	24		1475	1279
Transport means industry	198	108	86	22	16	4	130	80	15	14		445	227
Other industries	67	135	66	41	41	40	7	7	15	42		196	264
Energy and water	203	213	14	16	10	11	54	0,4	9	9		290	249
Construction													
Wholesale trade	473	355	211	149	70	69	27	6	29	13		810	593
Logistics (Land)													
Logistics (Water)	3966	5959	1116	699	219	135	668	211	458	121		6427	7125
Logistic services	1833	1651	336	363	48	37	99	108	81	77		2397	2237
Recreation													
Direct employment	**7924**	**9530**	**2125**	**1486**	**1651**	**1300**	**1177**	**592**	**1106**	**659**		**13983**	**13568**

- Small decrease in overall barging related employment seaports
- Decline in every seaport observed except in Rotterdam where employment grew with 1606 persons
- Only the sectors other industries and logistics over water (largely barging) grew in employment

Table 13: Inland barging related direct added value seaports, per sector

	Rotterdam		Amsterdam		Velsen		Vlissingen		Terneuzen			Total	
	2003	2011	2003	2011	2003	2011	2003	2011	2003	2011		2003	2011
Agriculture													
Feeding industry	25	27	10	3	5	1		0	7	6		47	38
Paper/wood													
Oil industry	139	63	5	2	2	0	14					160	65
Chemical industry	74	200	7	25	2	2	7	18	85	166		175	412
Basic metal processing industry	8	15	2	3	89	123	4	13	4	2		107	156
Transport means industry	8	6	10	1	1	0	6	5	1	0		26	12
Other industries	11	11	12	4	3	3	1	1	2	3		29	22
Energy and water	29	65	2	5	2	8	7	0,1	2	4		42	81
Construction													
Wholesale trade	39	37	15	16	3	6	1	0	2	1		60	60
Logistics (Land)													
Logistics (Water)	213	335	57	39	11	8	27	12	25	7		333	401
Logistic services	120	338	17	55	3	6	7	19	5	16		152	434
Recreation													
Direct added value	**666**	**1097**	**137**	**152**	**128**	**156**	**73**	**69**	**133**	**206**		**1131**	**1680**

- Compared to employment figures (table 12) overall direct added value grew strong (no price level correction applied). Only the seaport of Vlissingen experienced a small decline in direct added value
- The following sectors grew in direct added value: chemical, metal, energy and water, logistics over water and logistic services.
- Growth in barging related (logistics over water) activities and therefore growth in inland ports

Table 14: Total inland barging related added value seaports

	Direct added value		Multiplier (TNO)			Total added value	
	2003	2011	2003	2011		2003	2011
Agriculture			1,53	1,57			
Feeding industry	47	38	1,71	1,65		80	62
Paper/wood			1,35	1,40			
Oil industry	160	65	1,23	1,35		197	88
Chemical industry	175	412	1,51	1,64		264	675
Basic metal processing industry	107	156	1,42	1,48		146	229
Transport means industry	26	12	1,34	1,47		35	18
Other industries	29	22	1,36	1,33		39	29
Energy and water	42	81	1,87	1,86		79	151
Construction			1,82	1,78			
Wholesale trade	60	60	1,36	1,43		82	86
Logistics (Land)			1,38	1,36			
Logistics (Water)	333	401	1,42	1,53		473	613
Logistic services	152	434	1,64	1,42		249	616
Recreation			1,64	1,66			
Total added value	**1131**	**1680**				**1644**	**2568**

- Overall growth added value in seaport activities related to inland ports grew with 924 million Euro to total of 2568 million Euro
- The following sectors are important for the large growth: chemical, energy and water, logistics over water and logistic services.
- These outcomes reconfirm the strong ties inland ports have with seaports
- Most growth is concentrated to the seaport of Rotterdam

4.3.2 Impact small inland ports

Table 15: Economic impact small inland ports

	Share	Employed persons	AV/EP (2011)	Total direct AV 2003	Total direct AV 2011	Multiplier (TNO)	Total AV 2003	Total AV 2011
Construction	50%	1500	60,4	70,8	90,5	1,78	128,9	161,1
Feeding industry	20%	600	105,1	53,9	63,0	1,65	88,4	104,0
Logistic services	20%	600	72,4	39,7	43,5	1,42	56,4	61,7
Other industries	10%	300	43,1	12,4	12,9	1,33	16,9	17,2
Total				**177**	**210**		**291**	**344**

- Total employment 3000 persons
- Growth direct added value 33 million Euro to 210 million Euro
- Growth overall added value 53 million Euro to 344 million Euro

4.4 Overall impact Dutch inland ports

4.4.1 Overview

Table 17: Overall economic impact Dutch inland ports, 2011

Category inland port	Quantity	Average employment (thousand)	Total employment (thousand)	Added value per employee (thousand Euro)	Source added value per employee + multiplier	Direct added value per type inland port total (million Euro)	Added value multiplier	Total added value (million Euro)
Inland mainport	1	5,3	5,3	110,6	Drechtsteden	584	1,56	913
Large multifunctional port	3	2,0	6,0	112,5	Nijmegen	675	1,66	1119
Multifunctional industrial port	5	1,0	5,0	165,7	Delfzijl	828	1,57	1298
Multifunctional agro port	11	1,5	16,5	104,5	Zaanstad	1724	1,62	2791
Multifunctional container port	2	0,3	0,5	74,0	Born	37	1,42	52
Industrial port	13	0,5	6,5	221,2	Stein	1438	1,63	2345
Agro port	12	0,25	3,0	141,4	Sas van Gent	424	1,65	698
Containerport	1	0,025	0,025	72,4	Alphen aan den Rijn	2	1,42	3
Multifunctional sand / gravel port	4	0,8	3,2	60,3	Drachten	194	1,66	322
Large sand / gravel port	41	0,1	4,1	107,9	Cuijk	443	1,67	741
Total	93		50,1			6349	1,62	10282
Small inland ports	300		3		Blue ports	210	1,64	344
Seaports	5		13,6		Havenmonitor 2010	1680	1,53	2568
Total	400		66,7			8238	1,60	13194

Table 16: Economic impact related to national indicators

Year	Direct added value inland ports total (million Euro)	Total added value inland ports (million Euro)		Gross domestic product (million Euro)	Direct added value inland ports in % of GDP	Total added value inland ports in % of GDP		Total inland port related employment (thousand)	Total employment, national (thousand)	Total employment inland ports in % of national employment
2003	5738	8891		454276	1,26%	1,96%		66,4	7141	0,93%
2011	8238	13194		601973	1,37%	2,19%		66,7	8698	0,77%

Figure 10: Overview economic effects Dutch inland ports, 2011

Economic importance Dutch inland ports 2011

- 66.700 employed persons
- 8.2 billion Euro direct added value
- 13.2 billion Euro direct and indirect added value
- Added value increased (related to gross domestic product)
- Employment decreased (related to national employment)

4.4.2 Comparison seaports

Figure 12: Growth inland ports 2003-2011

Growth inland ports 2003 - 2011

- Growth total added value from 8.9 billion Euro in 2003 to 13.2 billion Euro in 2011 (+48%)
- Growth direct employment from 66.400 to 66.700 employed persons (+0.5 %)
- Transhipment of 304.479 (thousand ton) in 2003 to 344.095 (thousand ton) in 2011 (+13%)

Figure 11: Growth seaports 2002-2010

Growth seaports (havenmonitor 2002 , 2010 and CBS)

- Growth total added value form 22.5 billion Euro in 2002 to 35.1 billion Euro in 2010 (+56%)
- Growth total employment from 264.700 to 267.931 employed persons (+1.2 %)
- Transhipment of 432.103 (thousand ton) in 2002 to 568.032 (thousand ton) in 2010 (+31%)

- Total added value grew around 50% for both inland ports (48%) and seaports (56%) (no price level correction applied)
- Total employment growth stabilised for both inland ports (66.700 direct employed) and seaports (267.931 overall employed)
- Seaports managed more growth in transhipping goods (31%) compared to inland ports (+13%)

5 Transhipment

5.1 Introduction

In this chapter an analysis is made on the transhipment of goods by Dutch inland ports. The analysis is made over a time-span of 13 years (1998-2011). An overview of the top 20 largest inland ports in terms of transhipped tonnage is given. Next transhipment is divided into categorised goods. For every good an overview of the top 10 largest ports is given. Finally the chapter ends with an analysis on transhipped containers and conclusions.

5.2 Bulk products

Table 19: Transhipment per good 2003, 2011, total Netherlands

Bulk goods (thousand ton)	NSTR	2003	2011	2003-2011	2003-2011
Agricultural products	0	9527	11062	1535	16%
Nutrition; foods	1	17737	18086	349	2%
Solid fuels	2	26570	25436	-1134	-4%
Oils; oil based products	3	50953	58533	7580	15%
Ores and metal residues	4	36807	33295	-3512	-10%
Semi-manufactured goods (Metal)	5	9525	12066	2541	27%
Crude minerals and construction materials	6	85115	84637	-478	-1%
Fertilisers	7	6523	7027	504	8%
Chemical products	8	24328	35984	11656	48%
Other goods and products	9	37394	57969	20575	55%
Total		**304479**	**344095**	39616	**13%**

Table 18: Transhipment per good 2007, 2011, total Netherlands

Bulk goods (thousand ton)	NSTR	2007	2011	2007-2011	2007-2011
Agricultural products	0	9825	11062	1237	13%
Nutrition; foods	1	17218	18086	868	5%
Solid fuels	2	30599	25436	-5163	-17%
Oils; oil based products	3	52946	58533	5587	11%
Ores and metal residues	4	36154	33295	-2859	-8%
Semi-manufactured goods (Metal)	5	13685	12066	-1619	-12%
Crude minerals and construction materials	6	83338	84637	1299	2%
Fertilisers	7	6787	7027	240	4%
Chemical products	8	50172	35984	-14188	-28%
Other goods and products	9	40621	57969	17348	43%
Total		**341345**	**344095**	2750	**1%**

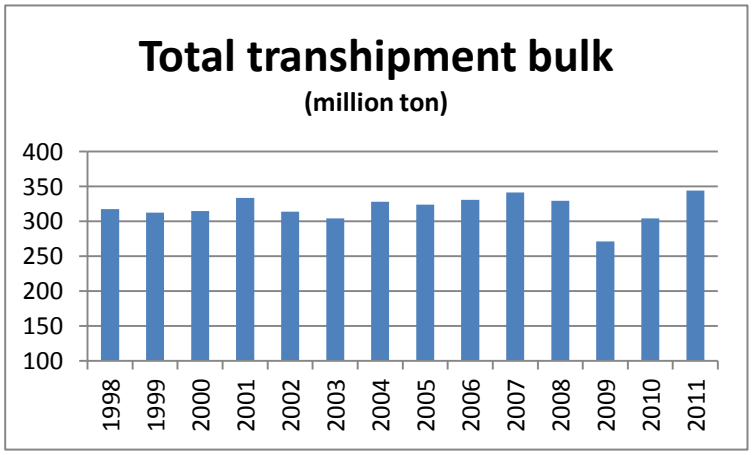


Figure 13: Transhipment bulk, 1998-2011, total Netherlands

- Growth inland barging 2003-2011 from 300 million to 350 million ton (+13%)
- Collapse of world trade and financial crisis in 2009 had a negative effect on transhipment inland barging
- The years 2010 and 2011 shown recovery in transhipment of bulk goods

Table 20: Overview top 20 largest inland ports

	2009	million ton		2008	million ton		2007	million ton		1998	million ton
1.	Utrecht	6,5	1.	Cuijk	8,4	1.	Cuijk	8,9	1.	Utrecht	5,3
2.	Cuijk	5,2	2.	Utrecht	5,2	2.	Utrecht	4,6	2.	Cuijk	5,2
3.	Hengelo	3,4	3.	Hengelo	3,8	3.	Delfzijl	4,0	3.	Maasbracht	4,6
4.	Oss	3,2	4.	Oss	3,6	4.	Hertogenbosch, 's-	4,0	4.	Zaanstad	3,6
5.	Gennep	3,1	5.	Lelystad	3,5	5.	Dordrecht	3,5	5.	Dordrecht	3,6
6.	Delfzijl	3,0	6.	Dordrecht	3,5	6.	Hengelo	2,5	6.	Geertruidenberg	3,2
7.	Maastricht	2,9	7.	Delfzijl	3,4	7.	Groningen	3,4	7.	Hertogenbosch, 's-	3,1
8.	Stein	2,8	8.	Gennep	3,4	8.	Oss	3,3	8.	Roermond	3,1
9.	Hertogenbosch, 's-	2,8	9.	Hertogenbosch, 's-	3,1	9.	Gennep	3,3	9.	Hengelo	2,9
10.	Geertruidenberg	2,6	10.	Stein	3,1	10.	Nijmegen	3,0	10.	Maastricht	2,8
11.	Dordrecht	2,6	11.	Nijmegen	2,9	11.	Maastricht	2,9	11.	Stein	2,4
12.	Zaanstad	2,4	12.	Zaanstad	2,7	12.	Zaanstad	2,8	12.	Delfzijl	2,4
13.	Zwolle	2,4	13.	Maastricht	2,6	13.	Stein	2,8	13.	Bergen	2,3
14.	Lelystad	2,3	14.	Geertruidenberg	2,5	14.	Born	2,7	14.	West Maas en Waal	2,3
15.	Nijmegen	2,3	15.	Zwolle	2,5	15.	Geertruidenberg	2,7	15.	Bergen op Zoom	2,2
16.	Arnhem	2,2	16.	Born	2,3	16.	Loenen	2,7	16.	Kampen	2,1
17.	Roermond	2,1	17.	Arnhem	2,3	17.	Lelystad	2,6	17.	Oosterhout	2,1
18.	Bergen op Zoom	2,0	18.	Roermond	2,3	18.	Bergen op Zoom	2,6	18.	Zwijndrecht	1,9
19.	Groningen	1,8	19.	Bergen op Zoom	2,1	19.	Roermond	2,5	19.	Angerlo	1,8
20.	Meppel	1,7	20.	Tiel	2,0	20.	Zwolle	2,5	20.	Heel	1,8

Source: CBS, TNO

Table 20 gives an overview of the largest inland ports in the Netherlands according to transhipment figures. In some ports transhipment might be large but this doesn't mean that economic impact is high. In this report the total added value for the sand / gravel inland port of Cuijk is estimated at 32.5 million Euro. The port of Nijmegen which has far less transhipment has an estimated total added value of 184.2 million Euro. This is due to the diversity of sectors and activities which take place in the port of Nijmegen that create more added value than solely the transhipment of sand and gravel in Cuijk.

Agricultural products

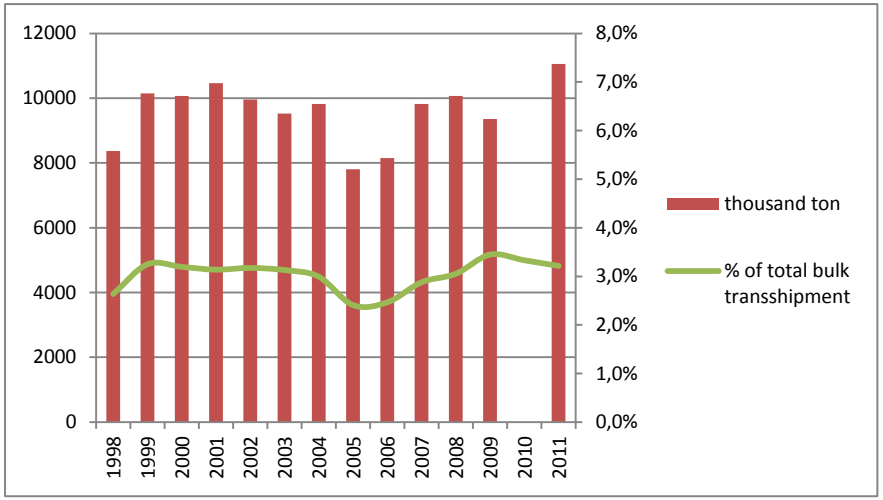


Figure 14: Transhipment agricultural products 1998-2011, total Netherlands

Agricultural products being transhipped by inland barging are mainly:

- Grain
- Wood products
- Livestock products

Stable development of transhipment over the years with an overall share of around 3% of total transhipment

	2007	thousand ton		**2008**	thousand ton		**2009**	thousand ton
1.	Bergen op Zoom	688	1.	Zaanstad	562	1.	Zaanstad	577
2.	Zaanstad	620	2.	Bergen op Zoom	561	2.	Bergen op Zoom	473
3.	Lochem	477	3.	Lochem	488	3.	Lochem	471
4.	Oss	452	4.	Oss	486	4.	Veghel	453
5.	Wageningen	329	5.	Wageningen	348	5.	Oss	407
6.	Meppel	282	6.	Veghel	342	6.	Meppel	349
7.	Veghel	251	7.	Meppel	324	7.	Wageningen	315
8.	Gennep	216	8.	Gennep	227	8.	Gennep	286
9.	Zwolle	195	9.	Zwolle	204	9.	Nijkerk	216
10.	Geertruidenberg	176	10.	Deventer	185	10.	Zwolle	196

Table 21: Top 10 inland ports transhipping agricultural products, 2007-2009

Nutrition; foods

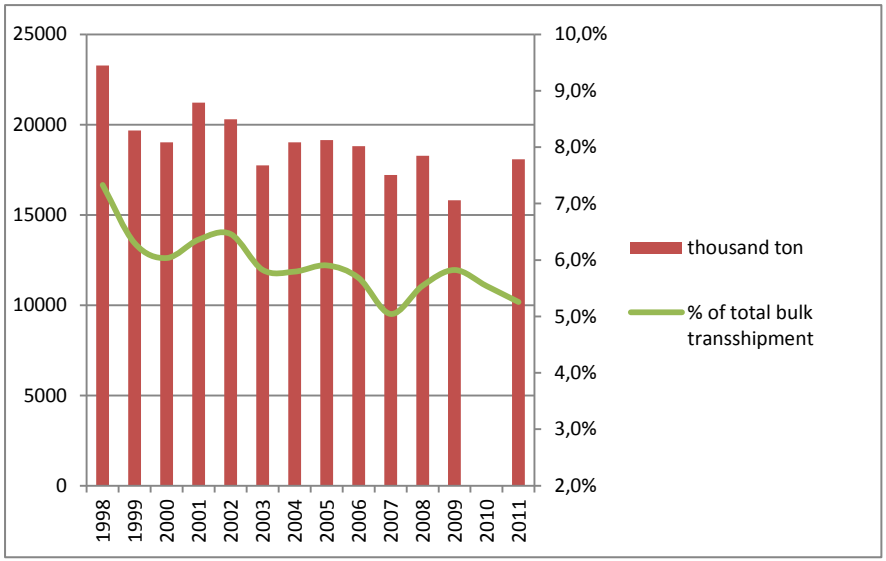


Figure 15: Transhipment feeding products 1998-2011, total Netherlands

Food products being transhipped by inland barging are mainly:

- Livestock feeding

A gradual decline in share from 7% (1998) to 5% (2011) in overall transhipment

	2007	thousand ton		2008	thousand ton		2009	thousand ton
1.	Oss	712	1.	Oss	695	1.	Oss	675
2.	Veghel	533	2.	Lochem	509	2.	Veghel	450
3.	Lochem	417	3.	Veghel	508	3.	Zaanstad	475
4.	Zaanstad	410	4.	Utrecht	413	4.	Hertogenbosch, 's-	445
5.	Zwolle	400	5.	Zwolle	409	5.	Lochem	404
6.	Hertogenbosch, 's-	386	6.	Zwijndrecht	408	6.	Utrecht	400
7.	Utrecht	374	7.	Meppel	385	7.	Nijmegen	376
8.	Zwijndrecht	360	8.	Hertogenbosch, 's-	379	8.	Wageningen	376
9.	Meppel	284	9.	Nijmegen	366	9.	Meppel	353
10.	Deventer	280	10.	Deventer	338	10.	Zwolle	324

Table 22: Top 10 inland ports transhipping feeding products, 2007-2009

Solid fuels

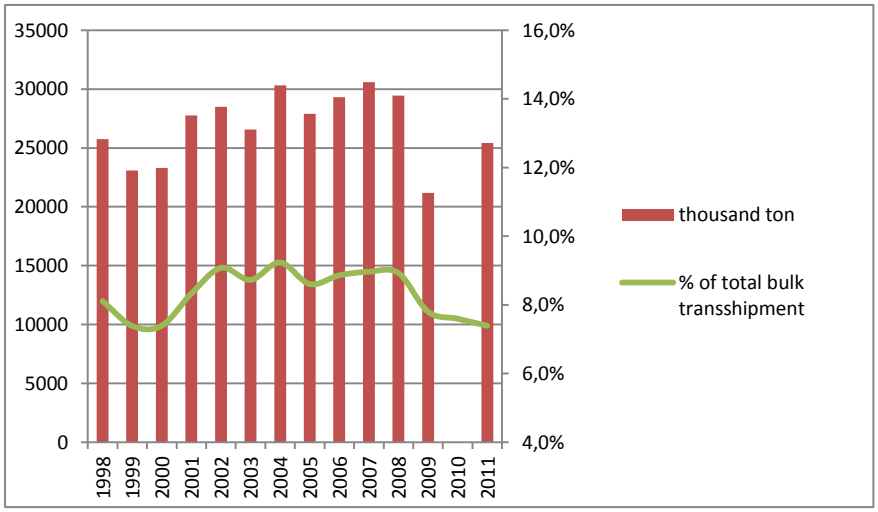


Figure 16: Transhipment solid fuels 1998-2011, total Netherlands

Solid fuels being transhipped by inland barging are mainly:

- Coal used for energy production

Most ports listed in table 23 have a power plant nearby using coal as fossil fuel. The overall share of coal transhipment is stable between 7% and 9%

	2007	thousand ton		2008	thousand ton		2009	thousand ton
1.	Geertruidenberg	1118	1.	Born	934	1.	Geertruidenberg	853
2.	Nijmegen	1033	2.	Nijmegen	915	2.	Nijmegen	623
3.	Born	891	3.	Geertruidenberg	736	3.	Born	489
4.	Dordrecht	261	4.	Dordrecht	335	4.	Dordrecht	324
5.	Tiel	102	5.	Venlo	81	5.	Venlo	83
6.	Venlo	98	6.	Delfzijl	74	6.	Meerlo-Wanssum	66
7.	Delfzijl	53	7.	Meerlo-Wanssum	61	7.	Maastricht	34
8.	Meerlo-Wanssum	51	8.	Stein	53	8.	Tiel	27
9.	Stein	44	9.	Tiel	32	9.	Gennep	24
10.	Werkendam	30	10.	Maastricht	29	10.	Stein	21

Table 23: Top 10 inland ports transhipping solid fuels, 2007-2009

Oils; oil based products

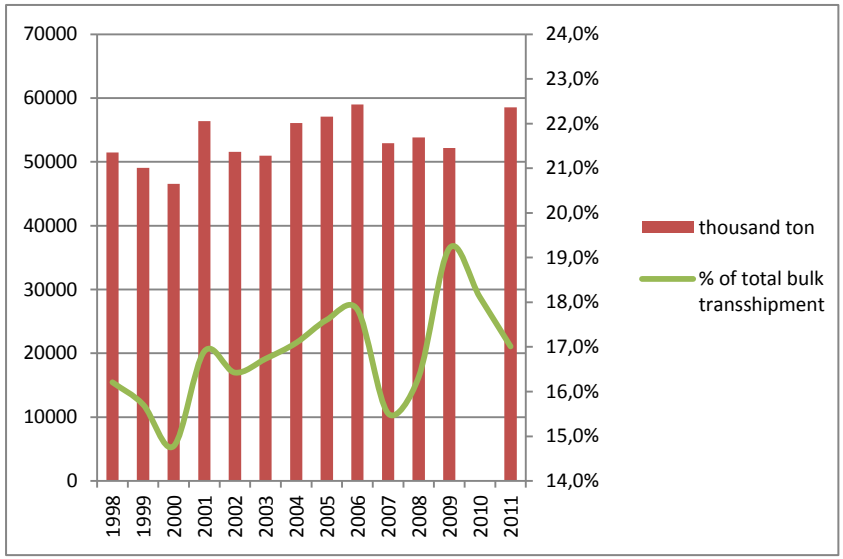


Figure 17: Transhipment oils 1998-2011, total Netherlands

Oil products being transhipped by inland barging are mainly:

- Raw oil products
- Liquid fuels based on oil
- Livestock and livestock products

Volatile growth development of transhipment over the years but with an high average 17 % in total transhipment share

	2007	thousand ton		**2008**	thousand ton		**2009**	thousand ton
1.	Arnhem	1407	1.	Arnhem	1609	1.	Arnhem	1270
2.	Zwolle	1388	2.	Zwolle	1252	2.	Zwolle	1225
3.	Roermond	837	3.	Geertruidenberg	936	3.	Geertruidenberg	926
4.	Loenen	819	4.	Roermond	884	4.	Loenen	920
5.	Geertruidenberg	658	5.	Loenen	810	5.	Roermond	821
6.	Hengelo	481	6.	Hengelo	470	6.	Hengelo	498
7.	Delfzijl	453	7.	Dordrecht	461	7.	Utrecht	387
8.	Nieuwegein	439	8.	Nieuwegein	415	8.	Delfzijl	375
9.	Groningen	397	9.	Groningen	412	9.	Rijnwaarden	329
10.	Wageningen	381	10.	Rijnwaarden	388	10.	Dordrecht	314

Table 24: Top 10 inland ports transhipping oils, 2007-2009

Ores and metal residues

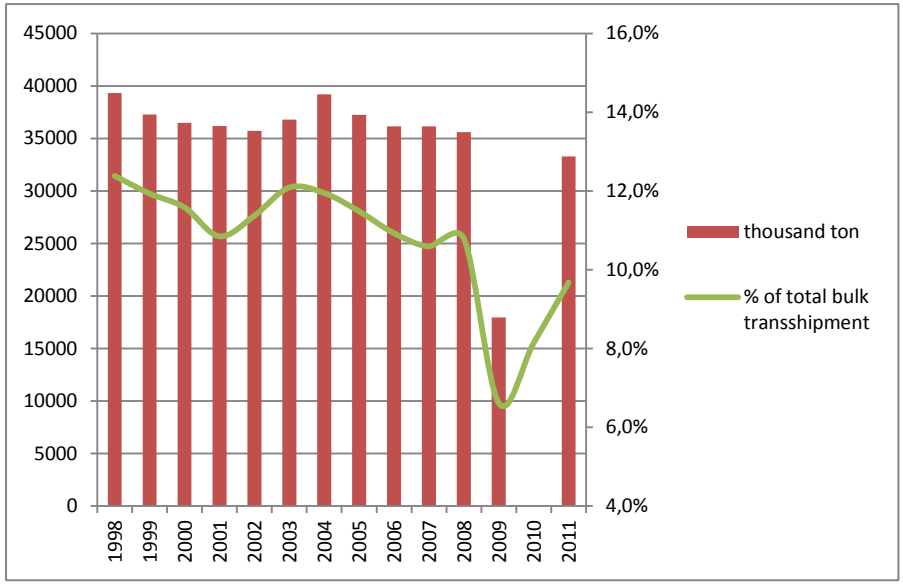


Figure 18: Transhipment ores and metal residues 1998-2011, total Netherlands

Ores and metal residues transhipped by inland barging are mainly:

- Iron ore
- Metal scrap and waste products

Strong decline of transhipment during 2009. Recovery in 2010 and 2011.

	2007	thousand ton		2008	thousand ton		2009	thousand ton
1.	Hertogenbosch, 's-	438	1.	Dordrecht	221	1.	Dordrecht	144
2.	Bergen op Zoom	242	2.	Nijmegen	179	2.	Nijmegen	130
3.	Dordrecht	257	3.	Oss	153	3.	Hertogenbosch, 's-	87
4.	Born	112	4.	Hertogenbosch, 's-	130	4.	Harderwijk	77
5.	Hengelo	80	5.	Born	128	5.	Almelo	73
6.	Venlo	73	6.	Groningen	127	6.	Born	70
7.	Amersfoort	67	7.	Hengelo	78	7.	Hengelo	58
8.	Almelo	62	8.	Almelo	73	8.	Groningen	56
9.	Groningen	61	9.	Tiel	62	9.	Westervoort	48
10.	Zaanstad	56	10.	Alkmaar	61	10.	Venlo	43

Table 25: Top 10 inland ports transhipping ores and metal residues, 2007-2009

Semi-manufactured goods

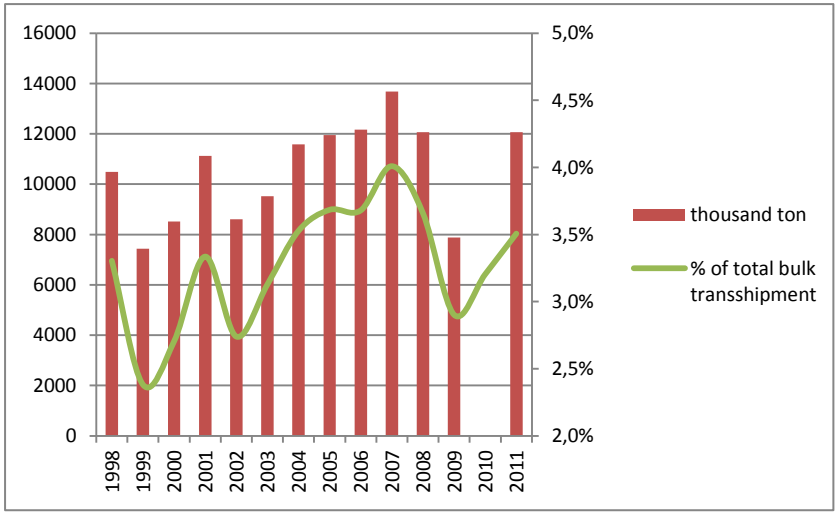


Figure 19: Transhipment semi-manufactured goods 1998-2011, total Netherlands

Semi-manufactured goods transhipped by inland barging are mainly:

- Semi-manufactured steel constructions
- Metal plates
- Metal thread
- Metal pipes
- Other steel devices

Unstable development of transhipment over the years with an average share of around 3% of total transhipment

	2007	thousand ton		2008	thousand ton		2009	thousand ton
1.	Maastricht	569	1.	Maastricht	607	1.	Almelo	332
2.	Almelo	412	2.	Almelo	351	2.	Maastricht	313
3.	Oosterhout	204	3.	Oosterhout	194	3.	Roermond	196
4.	Roermond	192	4.	Zwijndrecht	143	4.	Oosterhout	129
5.	Dordrecht	156	5.	Roermond	132	5.	Zwijndrecht	137
6.	Zwijndrecht	156	6.	Dordrecht	108	6.	Dordrecht	96
7.	Delfzijl	93	7.	Delfzijl	73	7.	Venlo	41
8.	Venlo	51	8.	Meerlo-Wanssum	60	8.	Noord-Beveland	37
9.	Steenbergen	35	9.	Venlo	44	9.	Leeuwarden	31
10.	Born	29	10.	Leeuwarden	30	10.	Harderwijk	31

Table 26: Top 10 inland ports transhipping semi-manufactured goods, 2007-2009

Construction materials

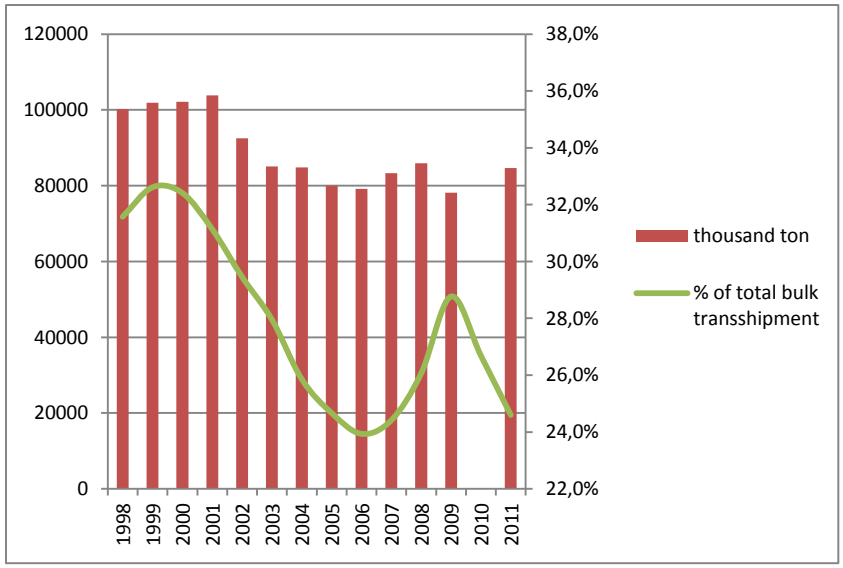


Figure 20: Transhipment construction materials 1998-2011, total Netherlands

Construction materials transhipped by inland barging are mainly:

- Sand / gravel
- Clay
- Cement
- limes

By far construction materials are the most transhipped good by inland ports. Declining share and overall transhipment figures (33% → 24%, 100.000 ton → 80.000 ton)

	2007	thousand ton		**2008**	thousand ton		**2009**	thousand ton
1.	Cuijk	8507	1.	Cuijk	7962	1.	Cuijk	4773
2.	Gennep	2803	2.	Lelystad	3317	2.	Utrecht	4345
3.	Utrecht	2603	3.	Utrecht	3280	3.	Gennep	2541
4.	Lelystad	2480	4.	Gennep	2952	4.	Maastricht	2068
5.	Delfzijl	2229	5.	Hengelo	2391	5.	Hengelo	1970
6.	Hengelo	2120	6.	Delfzijl	1844	6.	Lelystad	1718
7.	Maasdriel	1992	7.	Tiel	1750	7.	Oss	1598
8.	Maastricht	1806	8.	Oss	1579	8.	Delfzijl	1545
9.	Reimerswaal	1748	9.	Maastricht	1449	9.	Reimerswaal	1365
10.	Oss	1610	10.	Reimerswaal	1444	10.	Harlingen	1022

Table 27: Top 10 inland ports transhipping construction materials, 2007-2009

Fertilisers

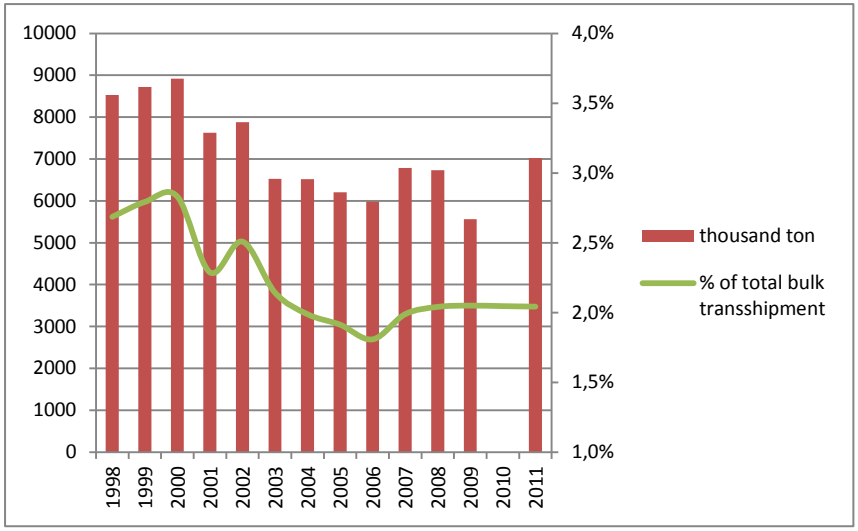


Figure 21: Transhipment fertilisers 1998-2011, total Netherlands

Fertilisers being transhipped by inland barging are organic and inorganic fertilisers.

There is a steady decline in transhipment volumes over the years 1998-2009. The past 4 years a stable transhipment share of 2%

	2007	thousand ton		2008	thousand ton		2009	thousand ton
1.	Stein	983	1.	Stein	994	1.	Stein	981
2.	Utrecht	197	2.	Utrecht	168	2.	Utrecht	127
3.	Dordrecht	168	3.	Dordrecht	140	3.	Meerlo-Wanssum	124
4.	Zwijndrecht	102	4.	Meerlo-Wanssum	118	4.	Veendam	87
5.	Breda	97	5.	Veendam	103	5.	Breda	82
6.	Meerlo-Wanssum	76	6.	Breda	96	6.	Zwijndrecht	61
7.	Zwolle	57	7.	Zwijndrecht	66	7.	Delfzijl	56
8.	Veendam	48	8.	Kampen	55	8.	Zwolle	50
9.	Doetinchem	46	9.	Zwolle	54	9.	Wieringermeer	46
10.	Lochem	42	10.	Etten-Leur	52	10.	Kampen	45

Table 28: Top 10 inland ports transhipping fertilisers, 2007-2009

Chemical products

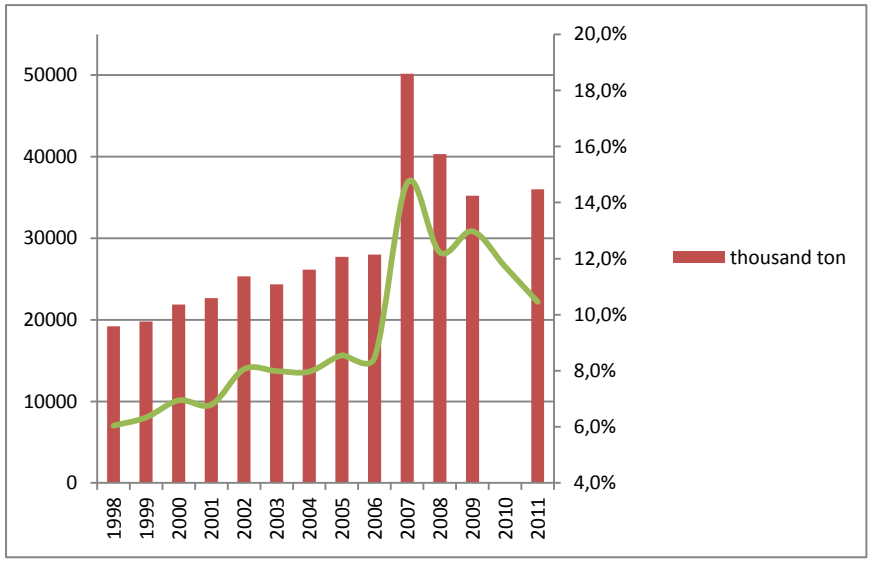


Figure 22: Transhipment chemical products 1998-2011, total Netherlands

Chemicals being transhipped by inland barging are mainly:

- Aluminium oxides and hydroxides
- Coal rest products
- Petrochemical products

Increasing share in overall transhipment from 6% (1998) to 10% (2011) with an exceptional year in 2007(50.000 ton, 18% share)

	2007	thousand ton		**2008**	thousand ton		**2009**	thousand ton
1.	Loenen	1700	1.	Zaanstad	1071	1.	Stein	890
2.	Stein	1071	2.	Stein	972	2.	Zaanstad	500
3.	Zaanstad	913	3.	Dordrecht	509	3.	Delfzijl	454
4.	Delfzijl	593	4.	Alkmaar	500	4.	Lelystad	450
5.	Alkmaar	626	5.	Loenen	389	5.	Dongeradeel	400
6.	Dordrecht	473	6.	Dongeradeel	384	6.	Dordrecht	351
7.	Oirschot	420	7.	Delfzijl	380	7.	Alkmaar	306
8.	Dongeradeel	407	8.	Bergen op Zoom	363	8.	Bergen op Zoom	287
9.	Bergen op Zoom	374	9.	Nijmegen	274	9.	Leeuwarden	240
10.	Kampen	333	10.	Leeuwarden	247	10.	Nijmegen	196

Table 29: Top 10 inland ports transhipping chemical products, 2007-2009

Other goods and products

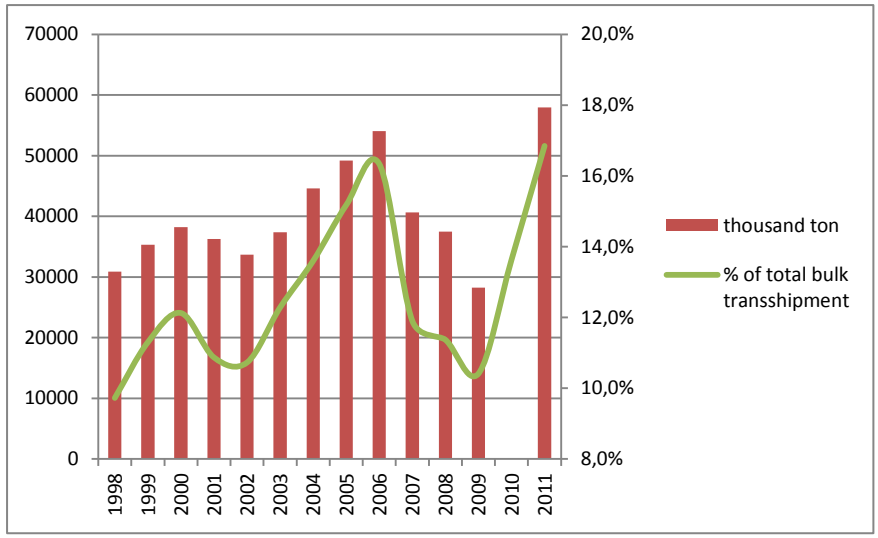


Figure 23: Transhipment other goods and products 1998-2011, total Netherlands

Other goods and products transhipped by inland barging are mainly:

- Vehicle and vehicle parts
- Engine, machines and other devices
- Parcel loads

A large share of these products is transhipped in containers. Trends are therefor similar to (inter)national container flows. Strong growth in transhipment share from 10% to 16% (1998-2011) from which 2007-2009 a strong decline is observed .

	2007	thousand ton
1.	Born	1123
2.	Utrecht	1069
3.	Hertogenbosch, 's-	921
4.	Meerlo-Wanssum	647
5.	Meppel	575
6.	Hengelo	568
7.	Oss	436
8.	Zaanstad	410
9.	Tilburg	353
10.	Nijmegen	337

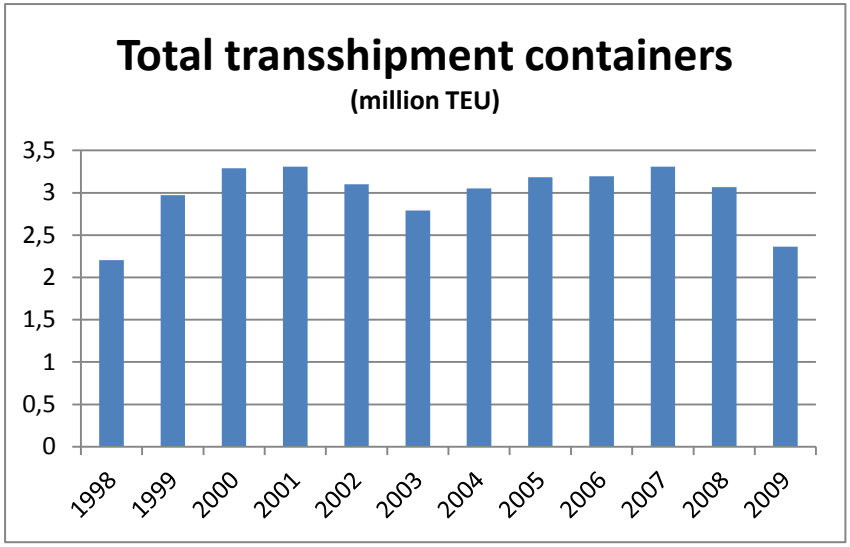
	2008	thousand ton
1.	Born	1002
2.	Utrecht	952
3.	Hertogenbosch, 's-	931
4.	Meerlo-Wanssum	618
5.	Hengelo	580
6.	Oss	525
7.	Meppel	516
8.	Nijmegen	425
9.	Zaanstad	416
10.	Tilburg	358

	2009	thousand ton
1.	Utrecht	1012
2.	Hertogenbosch, 's-	983
3.	Born	757
4.	Hengelo	601
5.	Meppel	572
6.	Zaanstad	541
7.	Oss	399
8.	Meerlo-Wanssum	382
9.	Tilburg	337
10.	Nijmegen	316

Table 30: Top 10 inland ports transhipping other goods and products, 2007-2009

5.3 Containers

Figure 24: Total transhipment containers, TEU, 1998-20009



Source: CBS

Table 31: Transhipment six container terminals, 2002, 2006, 2011

Containeroverslag (TEU)	2002	2006	2011
's-Hertogenbosch	66.000	105.000	120.000
Oosterhout	0	95.000	160.000
Born	57.000	80.000	125.000
Nijmegen	31.000	80.000	85.000
Zaanstad	0	70.000	45.000
Venray (Wanssum)	0	65.000	95.000
Utrecht	47.000	65.000	70.000
Hengelo	0	50.000	90.000
Meppel	21.500	45.000	37.000
Totaal		**655.000**	**827.000**

Source: TNO, Ecorys, BCTN

- There is a growing trend in using inland barging for container transhipment. In the period 1998-2007 transhipment grew from 2.2 million TEU to 3.3 million TEU (+50%)
- Collapse of world trade and financial crisis in 2009 had a negative effect on transhipment
- However Table 31 which includes the largest inland container terminals and figure 23 indicate that transhipment has recovered in 2010 and 2011

5.4 Conclusions

The following conclusions regarding transhipment can be summarised:

- Growth transhipment inland barging 2003-2011, from 300 million to 350 million ton (+13%)
- Large amounts of transhipment does not mean necessary high amounts of added value created in a port
- There is a growing trend in using inland barging for container transhipment
- Collapse of world trade and financial crisis in 2009 had a negative effect on transhipment
- The years 2010 and 2011 shown recovery in transhipment
- Strong growth transhipment chemical goods
- Growth transhipment agricultural products
- Growth transhipment oil-based products
- Decline in transhipment ores and metal residues
- Stable transhipment figures for food products, solid fuels, and fertilisers

Development economic impact Dutch inland ports

- Total added value increased in real terms, 2.19% from GDP (1.96% in 2003)
- Direct added value increased in real terms, 1,37% from GDP (1,26% in 2003)
- Growth total added value inland ports (2003-2011, +48%) behind growth seaports (2003-2011, +56%)
- Sectors which delivered main growth in added value: chemical, oil, and wholesale trade

- Decline importance construction sector (added value, employment, and transhipment)

- Decline in employment related to overall national employment (2003: 0,93%, 2011: 0,77%)

- Growth in overall transhipment with 15% to 344 million ton in 2011 (2003: 300 million ton)
- Dip in transhipment figures for 2009
- Strong growth transhipment other goods and products (2003-2011 ,+55%), related to wholesale trade and container transhipment
- Strong growth transhipment chemical products (2003-2011 ,+48%)
- Growth in container transhipment expected (Table 31)

6 Conclusions

6.1 Research conclusions

The economic importance of Dutch inland ports is determined by using a similar method as used in Blue Ports (TNO, 2004). By doing so an overview is created on the economic situation of the Dutch inland ports for the year 2011. Furthermore a comparison with the situation in the year 2003 is made. Main results:

- Direct employment: 66,700 persons (66,400 persons in 2003)

- Direct added value: 8.2 billion Euro (5.7 billion Euro in 2003)

- Direct and indirect added value: 13.2 billion Euro (8.9 billion Euro in 2003)

The chemical industry provides the largest contribution to the growth of the economic importance of Dutch inland ports. Without the growth of the chemical sector overall growth would not be possible (after price level correction). The growth of national added value in the chemical sector largely explains the increasing importance of this sector for Dutch inland ports. Besides a growing throughput of chemical products, a growth in employment supports the growing importance of the chemical sector for inland ports. The economic importance of the construction industry that makes use of inland ports has declined. A strong decline in employment and added value is observed. Also transhipment in construction materials have decreased over years.

A clear growth in transhipment of semi-manufactured goods, machinery, vehicles, and other goods via inland ports is observed. The related wholesale sector also increased in added value. A large share of the above mentioned goods are transported in containers. With regard to the inland terminals where containers are being transhipped relatively few direct employment is created. However indirect (forward) effects are much larger but difficult to measure. Container terminals are essential links in export and import flows in (inter)national supply chains. Given the forecast growth in container throughput in the port of Rotterdam it is expected that the importance of inland container terminals (and ports) to further increase. Compared to Dutch seaports Dutch inland ports developed slightly slower according to economic indicators such as employment, added value and throughput figures for the period 2002-2011.

6.2 Recommendations for further research

First recommendation is to research the economic importance of Dutch inland ports annually. When research is performed on a yearly basis trends can be detected and policies regarding inland ports can be optimised. To realise this the NVB can set up a standardised database including indicators which can be updated by the involved parties like municipalities, port authorities and companies active in inland ports. Secondly the methodology can be optimised for further research. Although 16 case studies were performed an estimation of the remaining inland ports was made. By increasing the amount of case studies a more accurate estimation can be made. Ultimately all major inland ports should participate in the research. The NVB and its partners can set up an online database with fields that can be updated by the users, this principal is similar to the information “dashboard” used in the PPRISM project to monitor European seaports. Finally measuring forward indirect effects should be considered. Although neglected in all port economic studies (including this one) it would be useful to understand the forward indirect effects of e.g. container terminals. The direct and indirect backwards effects are small but it seems that indirect forward effects have high values since container terminals form nodes in large (inter)national transport chains.

7 Appendices

7.1 References

7.1.1 Contacts

Centraal Bureau voor de Statistiek (CBS)

R. Willems

TNO

W. Manshanden

Expertise- en Innovatie Centrum Binnenvaart (EICB)

A. de Vries

B. Kelderman

Bureau Voorlichting Binnenvaart (BVB)

M. Rook

Port of Rotterdam

A. Korteweg

Regionale Economie, Haven- en Vervoerseconomie (RHV) B.V.

M. Nijdam

L. van der Lugt

Case studies

Twente Region:

M. Roelofs, Gemeente Hengelo

A. Timmerhuis, Regio Twente

H. Haaksema, Regio Twente

F. Taks, Gemeente Almelo

Drechtsteden:

R. Scheelbeek, Gemeente Dordrecht

F. Winterwerp, Onderzoekcentrum Drechtsteden

Wageningen:

M. van der Bilt, Gemeente Wageningen

Drachten:

M. Tefi-Dontje, Gemeente Smallingerland

J. Hoeksema, Gemeente Smallingerland

Sas van Gent:

M. Buuron, Provincie Zeeland

C. Kempen, Provincie Zeeland

R. Lucas, KvK

Zaanstad:

M. Schuit, Gemeente Zaanstad

J. Nijman, Gemeente Zaanstad

J. van Rooijen, Gemeente Zaanstad

Stein, Born and Venlo:

R. Creemers, Provincie Limburg

N. ter Huurne, Gemeente Sittard-Geleen

R. Vaessens, Etil

J. Radovanovic, Etil

J. Mulders, Gemeente Venlo

P. Wennekers, gemeente Venlo

Delfzijl:

A.Bruijn, Groningen Seaports

M. Zwerver, Groningen Seaports

Cuijk:

J. Hoeijmakers, Gemeente Cuijk

J. Tienkamp, Gemeente Cuijk

Nijmegen:

J.Jansen, Gemeente Nijmegen

W. den Breejen, Havendienst Nijmegen

G. Hendriks, Havendienst Nijmegen

Alphen aan den Rijn:

M. Vos, Van Uden

Veghel:

P. Maassen, Gemeente Veghel

Bergen op Zoom:

R. Scheffer, Gemeente Bergen op Zoom

J. Breker, Havendienst Bergen op Zoom

Utrecht:

J. de Jong, Havendienst Utrecht

A. Teuns, Havendienst Utrecht

T. van Oijen, Industrievereniging Lage Weide

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	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	120	85	-35		10,5	8,9	-1,6		18	14,7	-3,3
Paper/wood											
Oil industry		222	222			102,3	102,3			138,2	138,2
Chemical industry	550	861	311		84,9	210,6	125,7		128,2	345,3	217,1
Basic metal processing industry	100	82	-18		6,2	6,5	0,3		8,3	8,9	0,6
Metal production industry		328	328			19,7	19,7			30,9	30,9
Transport means industry											
Other industries	830	544	-286		51,1	23,4	-27,7		68.5	31.2	-37.3
Energy and water											
Construction	3030	1842	-1188		143	111,2	-31,8		260	197,9	-62,1
Wholesale trade		797	797			70,1	70,1			100,3	100,3
Logistics (Land)	200	3	-197		9,9	0,2	-9,7		13,7	0,2	-13,5
Logistics (Water)		304	304			15,6	15,6			23,9	23,9
Logistic services	250	212	-38		16,6	15,4	-1,2		23,5	21,8	-1,7
Recreation											
Total	**5080**	**5280**	200		**322,2**	**583,8**	261,6		**520,5**	**913,3**	393,1

Source: Onderzoekcentrum Drechtsteden (OCD)

Transhipment seaport (Source: municipality Dordrecht)

Merwedehaven (Source: DuPont Dordrecht)

7.2 Case studies

7.2.1 Drechtsteden (Dordrecht, Zwijndrecht, Papendrecht)

- Inland mainport, multimodal node in transport chains (water, rail, road)
- Port management controlled by Port of Rotterdam
- Transhipment between inland barging and maritime shipping
- Large variety in transhipment goods (from sand / gravel to constructions / heavy lift)
- Direct port bonded employment of 5280 persons
- Total economic added value of 913 million Euro
- Conflict transhipment chemicals and public opinion

Bulk goods (thousand ton)	NSTR	2009
Agricultural products	0	153
Nutrition; foods	1	315
Solid fuels	2	325
Oils; oil based products	3	366
Ores and metal residues	4	432
Semi-manufactured goods (Metal)	5	233
Crude minerals and construction materials	6	1319
Fertilisers	7	105
Chemical products	8	449
Other goods and products	9	239
Total		**3935**

Transhipment inland barging Dordrecht, Zwijndrecht, Papendrecht 2009 (Source: CBS)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	30		-30		2,6	0	-2,6		4,5	0	-4,5
Paper/wood											
Oil industry											
Chemical industry	600	450	-150		92,6	110,1	17,5		139,9	180,5	40,6
Basic metal processing industry											
Metal production industry											
Transport means industry											
Other industries											
Energy and water											
Construction	30	80	50		1,2	4,8	3,6		2,6	8,6	6,0
Wholesale trade											
Logistics (Land)											
Logistics (Water)											
Logistic services	40	40			2,6	2,9	0,3		3,8	4,1	0,3
Recreation											
Total	**700**	**570**	-130		**99,3**	**118**	18,8		**150,7**	**193,2**	42,4

Source: municipality Hengelo

Port of Hengelo (Source: Microsoft)

7.2.3 Hengelo / Twente Region

- Multifunctional inland port
- Accessible via Twentekanaal, Class 4 waterway
- Node in national and European logistic networks
- Active cooperation with other ports in the region Twente to support common interests
- Port directly supports local chemical, construction en feeding industries
- Combi Terminal Twente transhipped 90.000 TEU in 2011 (50.000 TEU in 2006)
- Direct port bonded employment of 570 persons
- Total economic added value of 193 million Euro
- The waterway Ijssel requires dredging to support further growth in larger ships

Container terminal C.T.T.
(Source: municipality Hengelo)

Bulk goods (thousand ton)	NSTR	2009
Agricultural products	0	3
Nutrition; foods	1	292
Solid fuels	2	0
Oils; oil based products	3	498
Ores and metal residues	4	58
Semi-manufactured goods (Metal)	5	2
Crude minerals and construction materials	6	1970
Fertilisers	7	1
Chemical products	8	11
Other goods and products	9	601
Total		**3436**

Transhipment inland barging Hengelo 2009
(Source: CBS)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	170	170	0		14,9	17,9	3,0		25,5	29,5	4,0
Paper/wood											
Oil industry											
Chemical industry											
Basic metal processing industry											
Metal production industry											
Transport means industry											
Other industries											
Energy and water											
Construction	15		-15		0,7		-0,7		1,3		-1,3
Wholesale trade											
Logistics (Land)	15	15	0		0,7	0,8	0,1		1	1,1	0,1
Logistics (Water)											
Logistic services	3	3	0		0,2	0,2	0,0		0,3	0,3	0,0
Recreation	50	50	0		2,6	1,6	-1,0		4,3	2,7	-1,6
Total	**253**	**238**			**19,1**	**20,5**	1,4		**32,4**	**33,6**	1,2

Source: municipality Wageningen

Aerial photo Rijnhaven (Source: municipality Wageningen)

Rijnhaven (Source: municipality Wageningen)

7.2.4 Wageningen

- Multifunctional agro port
- Good accessibility, located along the Neder-Rijn, class 5a waterway
- Transit function for the livestock sector in mid-Netherlands
- Capacity expansion is considered by the municipality of Wageningen
- Shore power is being applied for inland barges
- Direct port bonded employment of 238 persons
- Total economic added value of 34 million Euro
- Important asphalt producer left in 2010, causing downturn in transhipment and added value

Bulk goods (ton)	2011	2007
Mineral oils	346.895	355.557
Feeding goods	695.796	610.136
Sand products	191.705	265.487
Gravel	168.974	259.096
Limestone	72.910	65.285
Cement	22.066	18.920
Split / lava	9.406	2.297
Other goods	23.255	44.093
Total	**1.531.007**	**1.620.871**

Transhipment inland barging Rijnhaven 2011-2007 (Source: municipality Wageningen)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	30	24	-6		2,6	2,5	-0,1		4,5	4,2	-0,3
Paper/wood											
Oil industry											
Chemical industry											
Basic metal processing industry											
Metal production industry	12	15	3		0,5	0,9	0,4		0,8	1,4	0,6
Transport means industry	100	115	15		4,6	9,0	4,4		6,2	13,2	7,0
Other industries											
Energy and water		75	75								
Construction	507	489	-18		23,9	29,5	5,6		43,5	52,5	9,0
Wholesale trade	55	54	-1		3,7	4,8	1,1		5	6,8	1,8
Logistics (Land)	20	33	13		1	1,8	0,8		1,4	2,5	1,1
Logistics (Water)											
Logistic services											
Recreation	5		-5		0,3				0,5		-0,5
Total	**729**	**805**	76		**36,5**	**48,5**	12,2		**61,9**	**80,6**	18,7

Source: municipality Smallingerland

Industrial area "De Haven" (Source: municipality Smallingerland)

7.2.5 Drachten

- Multifunctional sand / gravel port
- Accessible via Drachtstervaart, class 4 waterway
- Part of industrial area "De Haven"
- With companies like Heineken en Philips in proximity a container terminal might be considered
- First northerly port with shore power availability
- Direct port bonded employment of 805 persons
- Total economic added value of 81 million Euro
- Waterway Prinses Margrietkanaal requires upgrading

Bulk goods (thousand ton)	NSTR	2010
Agricultural products	0	61
Nutrition; foods	1	217
Solid fuels	2	
Oils; oil based products	3	
Ores and metal residues	4	51
Semi-manufactured goods (Metal)	5	14
Crude minerals and construction materials	6	343
Fertilisers	7	
Chemical products	8	3
Other goods and products	9	11
Total		**699**

Transhipment inland barging Drachten 2010 (Source: municipality Smallingerland)

Port of Drachten (Source: municipality Smallingerland)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	450	425	-25		39,6	44,6	5,0		67,8	73,7	5,9
Paper/wood											
Oil industry											
Chemical industry	150	150	0		23,2	36,7	13,5		35	60,2	25,2
Basic metal processing industry											
Metal production industry											
Transport means industry											
Other industries											
Energy and water											
Construction											
Wholesale trade											
Logistics (Land)											
Logistics (Water)											
Logistic services											
Recreation											
Total	**600**	**575**	-25		**62,8**	**81,3**	18,5		**102,8**	**133,8**	31,0

Source: Kamer van Koophandel

Port Sas van Gent (Source: Microsoft)

7.2.6 Sas van Gent

- Agro port
- Port managed by Zeeland Seaports port authority
- Accessible via Canal Gent-Terneuzen, class 6b waterway
- Direct connection canal Gent-Terneuzen with provincial road (N252)
- Rosier (Zuid Chemie), fertiliser producer – 150 employees
- Cargill, starch producer – 425 employees
- Direct port bonded employment of 575 persons
- Total economic added value of 134 million Euro

Transhipment Rosier, Sas van Gent (Source: Author)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	1462	1987	525		128,5	208,7	80,2		219,7	344,4	124,7
Paper/wood	230	150	-80		15,2	9,8	-5,4		20,5	13,7	-6,8
Oil industry											
Chemical industry	434	230	-204		67	56,2	-10,8		101,2	92,2	-9,0
Basic metal processing industry	3		-3		0,2		-0,2		0,3		-0,3
Metal production industry	336		-336		15,2		-15,2		22,8		-22,8
Transport means industry	160	57	-103		7,3	4,5	-2,8		9,8	6,5	-3,3
Other industries	27	25	-2		1,1	1,1	0,0		1,5	1,4	-0,1
Energy and water											
Construction	44	214	170		2,1	12,9	10,8		3,8	23,0	19,2
Wholesale trade	219	232	13		14,5	20,4	5,9		19,7	29,2	9,5
Logistics (Land)		93	93			5,2	5,2			7,0	7,0
Logistics (Water)	31	86	55		1,5	4,4	2,9		2,4	6,8	4,4
Logistic services	188	66	-122		12,4	4,8	-7,6		17,6	6,8	-10,8
Recreation											
Total	**3134**	**3140**	6		**265**	**328**	63		**419,3**	**531,1**	111,8

Source: municipality Zaanstad

Zaanse Kanaalzone (Source: municipality Zaanstad)

7.2.7 Zaanstad

- Large multifunctional Agro port
- Located along the Zaan, good accessibility, waterway class 5a
- Port and inland barging activities dominated by the feeding industry
- The Westzanerpolder will be transferred to a (sea)port
- CTV Zaandam transhipps 45.000 TEU (2011)
- Direct port bonded employment of 3140 employed persons
- Total economic added value of 531 million Euro

Bulk goods (thousand ton)	NSTR	2009
Agricultural products	0	577
Nutrition; foods	1	475
Solid fuels	2	0
Oils; oil based products	3	4
Ores and metal residues	4	38
Semi-manufactured goods (Metal)	5	0
Crude minerals and construction materials	6	311
Fertilisers	7	1
Chemical products	8	500
Other goods and products	9	541
Total		**2447**

Transhipment inland barging Zaanstad 2009 (Source: CBS)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	20	4	-16		1,8	0,4	-1,4		3,1	0,7	-2,4
Paper/wood											
Oil industry	24	81	57		9,9	37,3	27,4		12,2	50,4	38,2
Chemical industry	837	1267	430		129,2	309,9	180,7		195,1	508,2	313,1
Basic metal processing industry	745	651	-94		45,9	51,4	5,5		61,5	71,0	9,5
Metal production industry											
Transport means industry											
Other industries	95	266	171		3,9	11,5	7,6		5,3	15,2	9,9
Energy and water											
Construction	50		-50		2,4		-2,4		4,4		-4,4
Wholesale trade											
Logistics (Land)											
Logistics (Water)	148	160	12		7,0	8,2	1,2		11,3	12,6	1,3
Logistic services	50	175	125		3,3	12,7	9,4		4,7	18,0	13,3
Recreation											
Total	**1969**	**2604**	635		**203,4**	**431**	228		**297,6**	**676,1**	378,5

Source: Groningen Seaports

Oosterhornhaven (Source: Groningen Seaports)

Industrial area Oosterhorn (Source: Groningen Seaports)

7.2.8 Delfzijl

- Multifunctional industrial port
- Both seaport and inland port
- Port authority Groningen seaports controls port
- Transport node, connected to waterways Lemmer-Delfzijl and Eems
- Strong growth transhipment share inland barging (1996-2011)
- Strong growth chemical industry (2003-2011)
- Direct port bonded employment of 2604 persons
- Total economic added value of 676 million Euro

Transhipment (thousand ton)	Maritime	Inland
1996	3268	1741
1997	3293	2522
1998	3139	2397
1999	2970	2827
2000	3389	2879
2001	3585	3295
2002	3463	3188
2003	3077	3483
2004	2841	3767
2005	2998	4103
2006	2930	4792
2007	3133	4672
2008	3310	4673
2009	2913	3986
2010	3380	4240
2011	3134	4918

Transhipment Delfzijl 1996-2011
(Source: Groningen Seaports)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	5		-5		0,4		-0,4		0,8		-0,8
Paper/wood			0								
Oil industry			0								
Chemical industry	1000	900	-100		154,4	220,1	65,7		233,1	361,0	127,9
Basic metal processing industry			0								
Metal production industry			0								
Transport means industry			0								
Other industries	10		-10		0,6		-0,6		0,8		-0,8
Energy and water			0								
Construction			0								
Wholesale trade			0								
Logistics (Land)	80	100	20		4,0	5,6	1,6		5,5	7,6	2,1
Logistics (Water)	5		-5		0,2		-0,2		0,4		-0,4
Logistic services	40	30	-10		2,6	2,2	-0,4		3,8	3,1	-0,7
Recreation			0								
Total	**1140**	**1030**	-110		**162,3**	**228**	66		**244,3**	**371,6**	127,2

Source: ETIL

Port Stein (Source: Microsoft)

Container transhipment (source: Wessem)

7.2.9 Stein

- Industrial port
- The port of Stein is a multimodal node connected to road, water, rail and pipeline
- Located along the Julianakanaal, waterway class 5a
- Active cooperation between ports in the province of Limburg to support common interests
- Port of great importance for nearby chemical and feeding industry (Chemelot terrein)
- Container Terminal Stein transhipments 40.000 TEU (2011)
- Direct port bonded employment of 1030 persons
- Total economic added value of 372 million Euro

Bulk goods (thousand ton)	NSTR	2009
Agricultural products	0	4
Nutrition; foods	1	0
Solid fuels	2	21
Oils; oil based products	3	5
Ores and metal residues	4	1
Semi-manufactured goods (Metal)	5	2
Crude minerals and construction materials	6	848
Fertilisers	7	981
Chemical products	8	890
Other goods and products	9	71
Total		**2824**

Transhipment inland barging Stein 2009 (Source: CBS)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	20	20	0		1,8	2,1	0,3		3,1	3,5	0,4
Paper/wood	70	50	-20		4,6	3,3	-1,3		6,2	4,6	-1,6
Oil industry			0								
Chemical industry	20	20	0		3,1	4,9	1,8		4,7	8,0	3,3
Basic metal processing industry			0								
Metal production industry			0								
Transport means industry	30	0	-30		1,4		-1,4		1,9		-1,9
Other industries			0								
Energy and water		20	20			4,8	4,8			9,0	9,0
Construction	25	60	35		1,2	3,6	2,4		2,2	6,4	4,2
Wholesale trade			0								
Logistics (Land)			0								
Logistics (Water)			0								
Logistic services	5	10	5		0,3	0,7	0,4		0,4	1,0	0,6
Recreation			0								
Total	**170**	**180**	10		**12,4**	**19**	7		**18,5**	**32,5**	14,0

Source: municipality Cuijk

Port of Cuijk (Source: Auteur)

Port of Cuijk (Source: Microsoft)

7.2.10 Cuijk

- Large sand / gravel port
- Centre of activities in industrial area 'De Haven Cuijk'
- Accessible via water (Maas) and road (A73)
- Top 3 inland ports of the Netherlands (transhipment)
- Large amount of transhipment and processing of sand and gravel products
- Consideration of container terminal on public quay
- Direct port bonded employment of 180 persons
- Total economic added value of 33 million Euro
- Nearby gravel pits are closing down

Bulk goods (thousand ton)	NSTR	2009
Agricultural products	0	5
Nutrition; foods	1	30
Solid fuels	2	18
Oils; oil based products	3	145
Ores and metal residues	4	1
Semi-manufactured goods (Metal)	5	0
Crude minerals and construction materials	6	4773
Fertilisers	7	11
Chemical products	8	16
Other goods and products	9	171
Total		**5168**

Transhipment inland barging Cuijk 2009 (Source: CBS)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	90	25	-65		7,9	2,6	-5,3		13,5	4,3	-9,2
Paper/wood	290	207	-83		19,2	13,5	-5,7		25,9	18,9	-7,0
Oil industry			0								
Chemical industry	100		-100		15,4		-15,4		23,3		-23,3
Basic metal processing industry	40	72	32		2,5	5,7	3,2		3,3	7,8	4,5
Metal production industry			0								
Transport means industry	70	353	283		3,2	27,6	24,4		4,3	40,5	36,2
Other industries		49	49			2,1	2,1			2,8	2,8
Energy and water	190	233	43		34,1	56,3	22,2		63,7	104,7	41,0
Construction	25	11	-14		1,2	0,7	-0,5		2,1	1,2	-0,9
Wholesale trade	80		-80		5,3		-5,3		7,2		-7,2
Logistics (Land)			0								
Logistics (Water)			0								
Logistic services	25	38	13		1,7	2,8	1,1		2,4	3,9	1,5
Recreation			0								
Total	**910**	**988**	78		**90,4**	**111**	21		**145,8**	**184,2**	38,5

Source: municipality Nijmegen

Port of Nijmegen (Source: municipality Nijmegen)

7.2.11 Nijmegen

- Large multifunctional port
- Industrial and logistical function
- Multiple (port related) activities: production (paper, feeding, cement, asphalt, vehicles, energy), recycling, and logistics
- Container Terminal Nijmegen tranships 85.000 TEU (2011)
- Direct port bonded employment of 988 persons
- Total economic added value of 184 million Euro
- Preparations are made to allow sea going ships to enter

Bulk goods (thousand ton)	NSTR	2009
Agricultural products	0	8
Nutrition; foods	1	376
Solid fuels	2	623
Oils; oil based products	3	34
Ores and metal residues	4	130
Semi-manufactured goods (Metal)	5	7
Crude minerals and construction materials	6	564
Fertilisers	7	11
Chemical products	8	196
Other goods and products	9	316
Total		**2265**

Transhipment inland barging Nijmegen 2009 (Bron: CBS)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry											
Paper/wood	50	50	0		3,3	3,3	0,0		4,5	4,6	0,1
Oil industry											
Chemical industry											
Basic metal processing industry	100	90	-10		6,2	7,1	0,9		8,3	9,8	1,5
Metal production industry											
Transport means industry											
Other industries	40	20	-20		2,5	0,9	-1,6		3,3	1,1	-2,2
Energy and water											
Construction	10	15	5		0,5	0,9	0,4		0,9	1,6	0,7
Wholesale trade		100	100			8,8	8,8			12,6	12,6
Logistics (Land)	70	20	-50		3,5	1,1	-2,4		4,8	1,5	-3,3
Logistics (Water)											
Logistic services	120	150	30		7,9	10,9	3,0		11,3	15,4	4,1
Recreation											
Total	**390**	**445**	55		**23,9**	**33**	9		**33,1**	**46,7**	13,6

Source: ETIL

Opening new terminal Holtum-Noord 3 (Source: Schuttevaer)

7.2.12 Born

- Multifunctional container port
- Node in national and European transport chains
- Active cooperation between ports in the province of Limburg to support common interests
- Largest Dutch inland container terminal (based on the maximum capacity of 300.000 TEU)
- Barge Terminal Born tranships 125.000 TEU in 2011 (80.000 TEU in 2006)
- Direct port bonded employment of 445 persons
- Total economic added value of 47 million Euro
- Risk of over-capacity container terminal

Port of Born (Source: Microsoft)

Bulk goods (thousand ton)	NSTR	2009
Agricultural products	0	29
Nutrition; foods	1	1
Solid fuels	2	489
Oils; oil based products	3	1
Ores and metal residues	4	70
Semi-manufactured goods (Metal)	5	11
Crude minerals and construction materials	6	135
Fertilisers	7	0
Chemical products	8	11
Other goods and products	9	757
Total		**1504**

Transhipment inland barging Born 2009 (Source: CBS)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry											
Paper/wood											
Oil industry											
Chemical industry											
Basic metal processing industry											
Metal production industry											
Transport means industry											
Other industries											
Energy and water											
Construction											
Wholesale trade											
Logistics (Land)											
Logistics (Water)											
Logistic services	20	25	5		1,3	1,8	0,5		1,8	2,6	0,8
Recreation											
Total	**20**	**25**	5		**1,3**	**2**	1		**1,8**	**2,6**	0,8

Source: van Uden

Transhipment Alpherium (Source: van Uden)

7.2.13 Alphen aan den Rijn

- Fully dedicated container port called 'Alpherium'
- Operational since October 2010
- Newly developed in the area Steekterpoort aan de Gouwe
- Transhipps great deal of production Heineken
- Example of 'modal shift' of transportation from road to water
- Container terminal Alpherium transhipped 35.000 TEU (2011)
- Direct port bonded employment of 25 persons
- Total economic added value of 2.6 million Euro
- Local infrastructure like bridges limit the growth of the terminal

Layout Alpherium (Source: van Uden)

	Direct employment 2003	Direct employment 2011	Difference		Direct added value 2003 (million Euro)	Direct added value 2011 (million Euro)	Difference		Total added value 2003 (million Euro)	Total added value 2011 (million Euro)	Difference
Agriculture											
Feeding industry	1316	1252	-64		115,7	131,5	15,8		198,2	217,0	18,8
Paper/wood											
Oil industry											
Chemical industry											
Basic metal processing industry											
Metal production industry											
Transport means industry											
Other industries											
Energy and water											
Construction	217	179	-38		10,2	10,8	0,6		18,6	19,2	0,6
Wholesale trade											
Logistics (Land)											
Logistics (Water)											
Logistic services	21	20	-1		1,4	1,4	0,0		2,0	2,1	0,1
Recreation											
Total	**1554**	**1451**	-103		**127,3**	**144**	16		**218,8**	**238,3**	19,5

Source: municipality Veghel

Zuid-Willemsvaart (Source: municipality Veghel)

Port of Veghel (Source: Microsoft)

7.2.14 Veghel

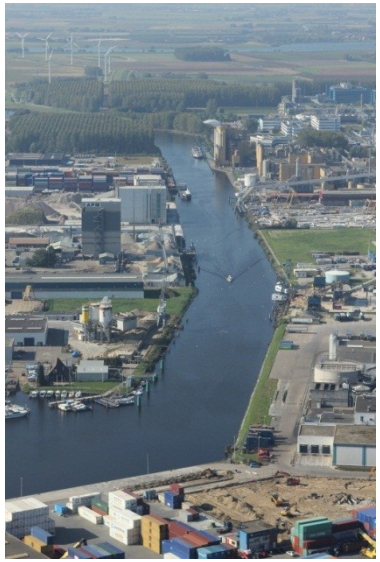
- Multifunctional Agro port
- Located along the Zuid-Willemsvaart, waterway class 2
- The Zuid-Willemsvaart will be upgraded to a waterway class 4 to ensure further growth
- Inland Terminal Veghel tranships 50.000 TEU (2011)
- Important transhipment node for feeding and construction products
- Direct port bonded employment of 1451 persons
- Total economic added value of 238 million Euro

Bulk goods (thousand ton)	NSTR	2009
Agricultural products	0	453
Nutrition; foods	1	450
Solid fuels	2	0
Oils; oil based products	3	0
Ores and metal residues	4	0
Semi-manufactured goods (Metal)	5	1
Crude minerals and construction materials	6	399
Fertilisers	7	2
Chemical products	8	11
Other goods and products	9	205
Total		**1521**

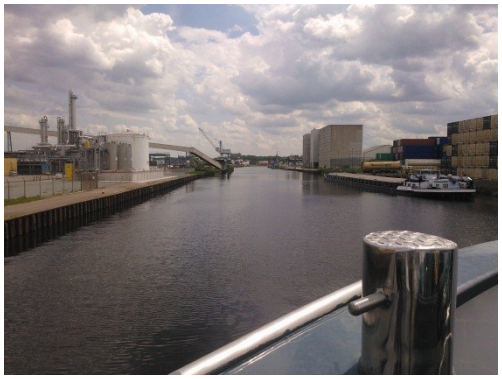
Transhipment inland barging Veghel 2009 (Source: CBS)

	Direct employment 2011		Direct added value 2011 (million Euro)		Total added value 2011 (million Euro)
Agriculture					
Feeding industry	271		28,5		47,0
Paper/wood					
Oil industry					
Chemical industry	1455		355,8		583,6
Basic metal processing industry					
Metal production industry					
Transport means industry					
Other industries					
Energy and water					
Construction	245		14,8		26,3
Wholesale trade					
Logistics (Land)	15		0,8		1,1
Logistics (Water)					
Logistic services	19		1,4		
Recreation					0,0
Total	**2005**		**401,3**		**658,0**

Source: Municipality Bergen op Zoom



Aerial photo Theodorushaven (Source: Municipality Bergen op Zoom)



Theodorushaven (Source: author)

7.2.15 Bergen op Zoom

- Multifunctional inland port
- Strategic location along the Schelde-Rijnkanaal (inland waterway Rotterdam-Antwerpen)
- Sabic (before GE plastics) transhipps chemicals outside the Theodorus port via pipelines
- Markizaat container terminal transhipps 70.000 TEU in 2011
- Possible expansion container terminal outside the Theodorus port
- Direct port bonded employment of 2005 persons (including Sabic)
- Total economic added value of 658 million Euro

Bulk goods (thousand ton)	NSTR	2009
Agricultural products	0	473
Nutrition; foods	1	103
Solid fuels	2	6
Oils; oil based products	3	32
Ores and metal residues	4	11
Semi-manufactured goods (Metal)	5	3
Crude minerals and construction materials	6	839
Fertilisers	7	1
Chemical products	8	287
Other goods and products	9	213
Total		**1968**

Transhipment inland barging 2009 (Source: CBS)

	Direct employment 2011		Direct added value 2011 (million Euro)		Total added value 2011 (million Euro)
Agriculture					
Feeding industry	160		16,8		27,7
Paper/wood					
Oil industry					
Chemical industry					
Basic metal processing industry					
Metal production industry					
Transport means industry					
Other industries					
Energy and water	280		67,6		125,8
Construction	320		19,3		34,4
Wholesale trade					
Logistics (Land)					
Logistics (Water)					
Logistic services	40		2,9		4,1
Recreation					
Total	**800**		**106,6**		**192,0**

Source: Industrievereniging Lage Weide and KVK

Port of Utrecht (Source: Industrievereniging Lage Weide)

7.2.16 Utrecht

- Large multifunctional inland port
- Good accessibility, class 5a waterway, sufficient draft (4m)
- Largest ice-free port in Northern-Europa, 24 hours per day open
- Strategic location along the Amsterdam Rijnkanaal
- Container transhipment of 70.000 TEU in 2011 (65.000 TEU in 2006)
- Direct port bonded employment of 800 persons
- Total economic added value of 192 million Euro
- Possible entry for sea going ships, but no permit granted

Aerial photo port of Utrecht (Source: Industrievereniging Lage Weide)

	Transhipment 2003 (thousand ton)	Transhipment 2011 (thousand ton)	Difference
Cement, lime, chalk	33	63	30
Other	7	1	-5
Glass		19	19
Gravel	256	335	80
Ground, bagger	360	541	181
Wood;, trees		25	25
Wood; construction, scrap		97	97
Fertiliser	178	170	-7
Metals	18	9	-9
Solid fuels	5		-5
Liquid fuels	7		-7
Scrap	952	536	-416
Silt		283	283
Stone	5	5	-1
feeding	651	923	272
Waste	305	202	-103
Salts	60	237	177
Sands	1078	1443	365
Total	**3914**	**4889**	**975**

Transhipment 2003-2011 (Source: Municipality Utrecht)