The strategic value of the Port of Rotterdam for the international competitiveness of the Netherlands
A first exploration
Van Den Bosch, F.A.J.; Hollen, R.; Volberda, H.W.; Baaij, M.G.

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The strategic value of the Port of Rotterdam for the international competitiveness of the Netherlands:
A FIRST EXPLORATION

RESEARCH REPORT FOR THE PORT OF ROTTERDAM AUTHORITY

Prof. dr Frans A.J. Van Den Bosch
Rick Hollen MScBA
Prof. dr Henk W. Volberda
Dr Marc G. Baaij
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\textsuperscript{a} The end notes contain the sources of the Boxes and Figures included in this report as well as further comments and clarifications on particular parts of the main text.

This report is also available in a Dutch version with the title ‘De strategische waarde van het Haven- en Industriecomplex Rotterdam voor het internationale concurrentievermogen van Nederland: een eerste verkenning’ (ISBN-number 978-90-817220-1-8).
PREFACE

In August 2010, the Port of Rotterdam Authority approached the Department of Strategic Management and Business Environment of the Rotterdam School of Management, Erasmus University, with two questions. The first question being: what is the strategic value of the Port of Rotterdam for the Netherlands? The second question is related to the development of a ‘strategic balance’ as a tool for the long-term decision-making: how can the strategic value of the Port of Rotterdam for the Netherlands be increased by the Port of Rotterdam Authority by means of such a strategic balance? As strategy scientists, we are not regularly confronted with this type of ‘broad’ questions. Therefore, it seemed to be a challenge to put our knowledge into practice for our ‘neighbour’: the Port of Rotterdam. We hope this report will contribute to the understanding of the strategic value of the Port of Rotterdam for the Netherlands. In addition, we hope that the strategic balance as introduced in the report contributes to a further increase of that strategic value in the years to come.

We would like to thank the persons with whom we exchanged interesting insights. Those conversations were stimulating; an overview of the interviewees can be found in the appendices of this report. Moreover, we are grateful to the Port of Rotterdam Authority for having provided us this interesting assignment in the scope of ‘Smart Port’, an ambitious cooperation aiming to provide companies in the Port of Rotterdam with applicable knowledge from within the Erasmus University Rotterdam.

On behalf of the research team,
Prof. dr Frans A.J. Van Den Bosch (project leader)

EXECUTIVE SUMMARY

The value of the Port of Rotterdam for the Netherlands is usually being quantitatively examined by assessing its economic importance. The combined (direct and indirect) value added amount to around 22 billion euro, which is roughly 3.7% of the Gross Domestic Product of the Netherlands. It provides direct and indirect employment to 90,000 respectively 55,000 persons, totalling an impressive 145,000 persons. The expected volume of investments in the coming years is around 10 billion euro.

Impressive figures, but the importance for the Netherlands is considerably higher by taking into account the strategic importance of the Port of Rotterdam. For the Netherlands, being a high income country, a strategic contribution through innovation and more advanced business networks and management is the most important source for maintaining and improving its international competitiveness. Researchers at the Erasmus University Rotterdam under guidance of professor Frans A.J. Van Den Bosch have carried out a study on the strategic value of the Port of Rotterdam for the Netherlands. The research employs Michael Porter’s widely used Diamond Framework as the main theoretical foundation, and arrives at the following conclusions:

The Port of Rotterdam provides a substantial contribution to the international competitiveness of firms in the Netherlands. This is especially true for firms involved in import and export. That strategic contribution is provided in three ways:

First, the Port of Rotterdam – one of the most important junctions of good flows in the world and by far Europe’s largest seaport – offers a unique physical and knowledge infrastructure.

- Continuous renewal is taking place in the Port of Rotterdam by improving existing activities and carrying through innovations. This yields a unique and irreplaceable basis for the international competitiveness of the Netherlands, providing firms and consumers optimal access to world markets.
- Large multinational firms in the Port of Rotterdam are catalysts of innovations in infrastructure, clusters and knowledge development in the Netherlands.
- Clusters of related and supporting industries in the Port of Rotterdam are encouraged by ‘leader firms’ to come up with innovative performances, from which, in turn, also other companies in the Netherlands benefit.
- The Port of Rotterdam as a whole offers a context that stimulates business sophistication, innovation, productivity enhancements and strategic cooperation as well as competition between companies.
Second, by means of cooperation with ports and other logistic hubs in the Netherlands aimed at specialization, innovation and productivity improvements.

- Through this, innovative products and services such as container transfers and inland terminals arise. This, in turn, leads to strengthening of the logistic chain, new innovative logistic concepts and local spin-offs producing value added and employment.
- The roll-out of an ICT system as Portbase to a national standard reinforces the Dutch logistic system as a whole and, with that, the international competitiveness.

Third, through cooperation with foreign ports and other logistic hubs abroad, especially when the Port of Rotterdam Authority is involved in the strategic management and supervision of those logistic hubs.

- The international strategic connectivity of the Port of Rotterdam with for instance the Port of Sohar in Oman reinforces the chain management of the Port of Rotterdam and the expansion of the international competitiveness.
- Besides knowledge gathering and the strengthening of typical ‘Dutch’ competencies in the areas of port design, port construction and port management, the Sohar-connection also brings in concrete orders for the Dutch trade and industry, reinforcing the international competitiveness.
- Such foreign activities extend the largely saturated European domestic market for high-quality port-related R&D, keeping the Dutch expertise internationally competitive.
- Also closer to home a lot can be gained from international cooperation, for example through strategic connectivity with the Ports of Duisburg and Antwerp.

A first estimate of these three strategic contributions together adds up to at least 6 billion euro of value added. This means that the strategic value of the Port of Rotterdam is now already about 30% larger than the so-far reported economic importance!

This strategic value could further increase. On the one hand, by realizing more competitive dynamics and innovation in the Port of Rotterdam, and on the other hand by increasing the strategic connectivity between the Port of Rotterdam and other Dutch and foreign ports and other logistic hubs. The researchers conclude the following:

- Competition in the Port of Rotterdam stimulates innovation and productivity, which is important for firms to be successful in the long term as well.
- Innovations require network relations: contacts and cooperative relations between companies, knowledge institutes and governments. Technological innovations determine around 25% of the total innovation success, while social innovation counts for the other 75%. New ways of management and organizing and really investing in human talent, as well as flexibility and cooperation, are therefore of vital importance.
- The international competitive position of the Port of Rotterdam and firms becomes better by entering into strategic cooperations with logistic hubs in the hinterland, other North Sea ports and ports elsewhere in the world.

Further cooperation on these three levels will create even more strategic value for the Netherlands. Consecutive governments have continually emphasized the necessity of a global top 10 position of the Netherlands in terms of innovation-driven international competitiveness. The report shows how the Port of Rotterdam can continue to contribute considerably to this important goal.

The strategic balance developed in the report might be beneficial in this respect. The Port of Rotterdam Authority could use this instrument for weighing or evaluating alternative options for the Netherlands in its long-term decision-making. The strategic balance evaluates these options based on their strategic value for the Netherlands, taking into account their expected use of scarce resources such as the natural environment, transport capacity and space. By complementing the economic balance with a strategic balance, the Authority can extend the strategic value of the Port of Rotterdam for the Netherlands. By doing so, it contributes not only to strategic renewal and innovation but also to maintaining the ‘license’ of the Port of Rotterdam to operate and grow. Over time this will help to attain a strategic positioning towards a more strategically connected (nationally and internationally integrated), ambidextrous (focusing on both exploitation and innovation), green and innovation-driven Port of Rotterdam that also improves and maintains the international competitiveness of the Netherlands.
1 INTRODUCTION

1.1 – Two choices

What is the value of the port and industrial complex Rotterdam (hereafter referred to as the Port of Rotterdam) for the Netherlands? In order to answer this question, at least two choices have to be made. First, from which lens or perspective to assess this ‘value’: the presently used ‘economic perspective’? Or is another perspective more appropriate? While keeping in mind the economic value, this report’s main focus is on a new perspective; the strategic perspective. In adopting this perspective, known economic, quantitative indicators of value of the Port of Rotterdam – such as value added and employment figures – are complemented by more qualitative indicators. The latter are certainly not less important; as will become clear from the report at present, the strategic value of these indicators for the Netherlands is substantial and could be further increased.

The second choice to be made is: whose perspective, or which stakeholder, is selected to determine the (strategic) value? The Port of Rotterdam, after all, has multiple different stakeholders. Employees of port-related companies, for example, will be interested in personal and professional development opportunities, while the management might be interested more in the contribution of the firm’s geographical position to its business results. Other examples of stakeholders, usually with an alternative perspective, are the municipality of Rotterdam, the province of South Holland, the central government, and employees’ and employers’ organizations. This report focuses on the Netherlands as stakeholder, which represents and integrates various stakeholders. The central question in this report hence pertains to the strategic value of the Port of Rotterdam for the Netherlands.

The Port of Rotterdam is dependent on the government’s legal and regulatory requirements for maintaining its license to operate and grow. Also for realizing large infrastructure projects such as the Betuweroute, the A15 highway and Maasvlakte 2 – needed to guarantee future growth – government support in the form of investments is indispensable. From this dependency on the government arises the need to clarify the contribution of the Port of Rotterdam to the Netherlands. This is also important for strategic investment decisions and the creation of future visions by the Port of Rotterdam Authority.

1.2 – The Port of Rotterdam

Worldwide there are a number of port/harbour ‘business models’: from only water with a quay to – as is the case with the Port of Rotterdam – an extensive ‘port and industrial complex’ in which various, generally interconnected, production and service providing activities are taking place. Box 1.1 shows some illustrative data of the Port of Rotterdam (the sources of the Boxes and Figures in this report can be found in the end notes section in the appendices). The Port of Rotterdam is one of the most important junctions of good flows in the world and by far Europe’s largest seaport. The Port of Rotterdam Authority is, among others, responsible for the infrastructure, long-term planning and development, safety and long-term strategic development.

Box 1.1 – An illustrative overview of the Port of Rotterdam

- Worldwide and European ranking: worldwide the 4th port and the number one in Europe
- Total direct and indirect seaport-related value added and employment: ± 15.5 billion euro respectively ± 6.7 billion euro; ± 90.000 employees resp. ± 55.000 employees
- Role of the Port of Rotterdam Authority: responsible for infrastructure, long-term planning and development, safety
- Total surface area and quay length: 10.570 ha. (excl. the ± 1.000 ha. of Maasvlakte 2) resp. ± 90 km ± 1.315
- Tank storage capacity and pipeline length: ± 30 million m³ resp. ± 1.500 km of pipelines
- Number of terminals: 50 (for containers, break bulk cargo, dry bulk cargo)
- Number of petroleum and chemical companies: ± 130 (incl. the largest refinery of Europe)
- Number of logistic companies in the logistic sector: ± 1220 (incl. transport and transhipment/storage/transfer services)
- Number of wholesale companies resp. (commercial and non-commercial) service companies: ± 650 resp. ± 270

The end notes on pages 39-43 contain the sources of the Boxes and Figures included in this report as well as further comments and clarifications on particular parts of the main text.
The economic importance of the Port of Rotterdam becomes apparent from quantitative indicators such as the direct and indirect value added and employment. Its industrial character is reflected by the number and range of industries located in the Port of Rotterdam related to logistics (transport, storage and distribution), production (such as maritime and transport equipment, petroleum, chemicals and food) and (commercial) services. All these activities are taking place in a relatively limited area, see Figure 1.1.

Figure 1.1 – Map of the Port of Rotterdam

### 1.3 – The strategic value of the Port of Rotterdam for the Netherlands

The **first question** central in this report is: what is the strategic value of the Port of Rotterdam for the Netherlands? This strategic value, to be determined in addition to the economic value, is manifested – as will be further clarified – by the contribution to the international innovation-driven competitiveness, or competitive advantage, of the Netherlands. Competitive advantage is in particular defined by four determinants that, individually and as a system, shape the environment in which Dutch firms are born and compete. Simply put, the key question is how the Port of Rotterdam contributes to each of these determinants. A port’s connectivity with other logistic hubs (or ‘logistic hot spots’) can be strategically important in this respect. Strategic connectivity of the Port of Rotterdam, for example through cooperation with inland container terminals, contributes additionally to the strategic value for the Netherlands; it stimulates specialization, innovation and the utilization of determinants of innovation-driven competitiveness that are present elsewhere. Examples are the utilization of high-quality knowledge, supplier and customer networks. Strategic connectivity increases the access to and ability to tap into those (national and international) networks. This, in turn, will positively affect the international innovation-driven competitive advantage of the Netherlands. The strategic value of the connectivity of the Port of Rotterdam with ports and other logistic hubs, nationwide as well as worldwide, is therefore considered in this research as well.

### 1.4 – How to increase the strategic value of the Port of Rotterdam: the strategic balance

The **second question** that is central in this report is: how can the strategic value of the Port of Rotterdam for the Netherlands be increased by the Port of Rotterdam Authority? Having insight in and understanding of the strategic value of the Port of Rotterdam for the Netherlands – the answer to the first question – makes it possible to positively influence this strategic value. To this end, it should be assessed which current and future activities in, or related to, the Port of Rotterdam (will) contribute more or less – or ‘add more or less weight’ – to this strategic value. This report, in pursuing a consistent, integrated and justifiable method for putting more or less weight in this respect, introduces the ‘strategic balance’ concept. The function of this strategic balance is to offer an additional instrument to be used for evaluating long-term decisions. Besides weighing the (business-)economic/financial importance of alternative options or activities by means of the presently used economic balance, the strategic balance offers the possibility to portray their strategic value.
and their use of scarce resources. The strategic balance also illuminates how the overall strategic value can be increased and the use of scarce resources be decreased (by choosing for those options).

It should be noted that a different level of analysis applies here; the strategic value of the Port of Rotterdam for the Netherlands (‘the macro question’) is determined on a national level, while the strategic value of specific activities or projects with regard to the Port of Rotterdam (the ‘micro question’) mainly centres on the activity or business level.

1.5 – Structure of the report

The following chapter elaborates on the two main questions mentioned above and clarifies choices that have been made to address these questions. In chapter 3, the methodology of determining strategic value is described. Chapter 4 subsequently gives a first empirical application of this methodology: a qualitative estimation of the strategic value of the Port of Rotterdam for the Netherlands for 2010. The strategic balance, including its methodology and policy implications, is addressed in chapter 5. The summary and conclusions as well as the recommendations are formulated in respectively chapters 6 and 7.

2 PROBLEM DEFINITION

2.1 – Introduction

This chapter will clarify the problem definition. By doing so, the concept of strategic value will be further elaborated on. Moreover, the necessity of an external or, more precisely, an international perspective will be emphasized to judge if the strategic value of the Port of Rotterdam matters for the Netherlands. The focus will be on the position of the Netherlands regarding the ranking of the most international competitive countries in the world, as stated in the yearly published Global Competitiveness Report by the World Economic Forum. At last, the approach of this research will be explained.

2.2 – Economic importance and strategic value of the Port of Rotterdam

The economic importance of the Port of Rotterdam has so far been dominating the discussions on the significance of the Port of Rotterdam for the Netherlands. Adopting an economic perspective, this led to the development of quantitative performance indicators – which are also used in cost-benefit analyses – such as value added, employments, investments, R&D expenditures and transhipment volumes. From a strategic perspective, these important indicators could be complemented by qualitative indicators. Such a strategic approach explicitly emphasizes, unlike the quantitative performance indicators, innovative and competitive dynamics. Therefore, adopting a strategic approach illuminates the strategic mechanisms that create sustainable value directed towards an international competitive advantage.

Strategic value

Accumulated knowledge and experience, location as well as specific organization and management structures are of strategic value for an organization when these resources comply with a number of criteria. For instance, these resources have to contribute to a distinctive and sustainable competitive composition. For that, they have to be scarce, hard to acquire or substitute and difficult to imitate by competitors. Also mutual ‘connectiveness’ between resources contributes to their strategic value. The Port of Rotterdam is of significant strategic value to the Netherlands only if it contributes to the country’s international competitive position. That contribution should in a way be unique in the sense that other port and industrial complexes are unable to provide the same contribution. The more the Port of Rotterdam is internally and externally connected in a strategic way, for instance with other ports in and outside the Netherlands, the harder it becomes to replace the Port of Rotterdam for an alternative and, as such, the higher the strategic value of the Port of Rotterdam for the Netherlands is.
The quantitative and qualitative part of strategic value

In order to emphasize the complementary character of the economic and strategic perspective, this report distinguishes between a quantitative and qualitative part of the strategic value of the Port of Rotterdam for the Netherlands. The quantitative part is operationalized the same way as the economic importance is determined. The qualitative part of the strategic value is conceptualized as the contribution to the determinants of the international innovation-driven competitiveness of the Netherlands.

### 2.3 – Contributions to the international competitive position of the Netherlands

From a strategic perspective, only contributing to the competitiveness of the Netherlands is not sufficient; after all, the country does not operate on a remote island. If the competitiveness of other, comparable countries improves faster and more than that of the Netherlands, this will in fact deteriorate the Dutch competitive position from an international stance. For that reason, it is the international competitive position (hereafter referred to as the international competitiveness) of the Netherlands that has been selected in this report as the external benchmark for the degree of strategic value added. The international competitiveness of a country is, depending on its stage of economic development, based on one of the three main pillars of competitiveness. In order of economic development, these pillars are: (1) the utilization of factor endowments such as unskilled labour and natural resources like minerals, oil, coal and natural gas; (2) the focus on efficiency (producing at the lowest cost possible); and (3) the focus on an innovation-driven competitive position. To facilitate understanding of these foundations of competitiveness, the World Economic Forum (WEF) uses the pyramid as shown in Figure 2.1.

**Figure 2.1 – World Economic Forum pyramid of economic development phases and the corresponding competitive focuses**

- **Innovation-driven economy; NL #8 (2010)**
  - Main pillar 3: focus on innovation and business sophistication factors

- **Efficiency-driven economy**
  - Main pillar 2: focus on efficiency enhancers

- **Factor-driven economy**
  - Main pillar 1: focus on basic requirements

The Netherlands belongs worldwide to the high income countries and finds itself at the top of the pyramid in Figure 2.1. This means that the third pillar regarding international competitiveness is key for the Netherlands. Innovation, advanced business networks and management organization (business sophistication) have to be the most important source for maintaining and improving its international competitiveness.

As shown in Figure 2.2, the international competitiveness of the Netherlands has been subject to changes over time. Although in 2000 the Netherlands could claim a comfortable third position in the WEF Global Competitiveness Index, it ended on the thirteenth place in the 2002 rankings, losing its position in the top 10 of most competitive economies in the world. In the most recent ranking of 2010, the Netherlands was ranked 8th.

**Figure 2.2 – The international competitive position of the Netherlands (2000-2010)**
Research shows that too much focus of Dutch firms and organizations on efficiency at the expense of strategic renewal and innovation negatively affects the international competitiveness of the Netherlands. In other words: efficiency-driven competitiveness is a necessary but insufficient condition to stay at the top of the pyramid; for that, knowledge-driven strategic renewal is crucial. This not only relates to the creation of new technological knowledge (R&D); from research it appears that especially new management, organization and work methods contribute to successful strategic renewal.

2.4 – Approach

The report is partly based on existing insights of the scientific strategy literature. Research on the strategic value of a port and industrial complex for a country and on a ‘strategic balance’, however, has not yet been taken place. In that sense, this report can be considered as the first to explore these topics. The widely used Diamond Framework – which can be used to investigate the determinants (determining factors) of the international competitiveness of industries, regions and countries – has been chosen as the main theoretical foundation. The concept of strategic connectivity illustrates the capacity of knowledge absorption in interorganizational relations and, through that, the ability to increase competitiveness.

A methodology has been developed for determining the strategic value of the Port of Rotterdam for the Netherlands. This methodology is based on the Diamond Framework complemented with the concept of strategic connectivity of the Port of Rotterdam with (the determinants of competitiveness of) locations elsewhere in the Netherlands and abroad. The aforementioned results in an Overall Fact Sheet of the strategic value. Also the methodology of the strategic balance is based on that, but takes it a bit further by actually enabling to evaluate alternative options for the Port of Rotterdam Authority regarding their strategic contribution. Examples of such options are alternative ways to improve the existing physical infrastructure of the Port of Rotterdam. In this way, the possible influence of investments in improving the road network versus investments in inland shipping infrastructure on the strategic value for the Netherlands becomes visible.

The applied research consists of a first empirical assessment of the strategic value of the Port of Rotterdam for the Netherlands in 2010. For that purpose, a large number of data sources have been analyzed. In addition, a few concise case studies have been conducted that illustrate certain aspects of the strategic value. Interviews with the top and senior management of firms and organizations including the Port of Rotterdam Authority (see the appendices for the list of interviewees) played an important role in different stages of the research. In the first stages of the research, the interviews during which the research questions were reflected upon and operationalized, for instance, appeared to be particularly valuable in the beginning of the research. In the final stages of the research, the preliminary results were discussed and complementary insights and data sources were introduced.

3  DETERMINING THE STRATEGIC VALUE OF THE PORT OF ROTTERDAM FOR THE NETHERLANDS

3.1 – Introduction

This chapter first elaborates on the Diamond Framework, which shows how four determinants influence the international competitiveness of an industry, cluster of industries, region or country. This Framework will then be applied to indicate the (qualitative part of the) strategic value of the Port of Rotterdam for the Netherlands (i.e., its contribution to the international competitive position of the Netherlands). Also the role of the government is discussed in this light. Next, the concept of strategic connectivity will be introduced. Strategic connectivity between ports and other logistic hubs, or in general between firms and organizations, contributes to innovation and renewal directed at further improvement of the international competitiveness of the Netherlands. Based on the Diamond Framework and the strategic connectivity construct, the so-called ‘Triple Strategic Value Contribution’ to the Dutch Diamond Framework will be put forward. This Triple Strategic Value Contribution Framework demonstrates how the Port of Rotterdam contributes in three complementary ways to the international competitiveness of the Netherlands. Finally, an Overall Fact Sheet will be presented,
showing both the quantitative part (the economic importance) and qualitative part (the strategic importance) of the strategic value of the Port of Rotterdam for the Netherlands.

### 3.2 – Determinants of international competitiveness

The Diamond Framework of Michael Porter (Harvard Business School, USA) analyses how four interacting determinants stimulate firms and organizations in a certain industry, cluster of industries, region or country to innovate, renew and increase their productivity and, as a consequence, improve their international competitiveness. This Framework, which also addresses the role of the government, is shown in Figure 3.1. The role of the Port of Rotterdam Authority is discussed as well in this respect, as it was assigned government roles when it became privatized in 2004. Below, a number of concrete examples of the Port of Rotterdam illustrate the determinants of the Diamond Framework.

**Figure 3.1 – Porter’s Diamond model: determinants of the international competitiveness of industries in the Netherlands**

#### (1) Determinant: factor conditions

The first determinant, factor conditions, refers on the one hand to production factors such as natural resources, the size and quality of the workforce (human resources) and capital resources. On the other hand it also refers to infrastructure in the broadest sense of the word: physical (such as the water, road, pipeline and railway infrastructure of the Port of Rotterdam), administrative, information (for example the fibreglass network and Portbase, the ICT platform of a couple of Dutch ports) and scientific infrastructure (knowledge institutions like the Erasmus University Rotterdam and the Shipping and Transport College) in the Port of Rotterdam area. As the factor conditions become more specialized, their contribution to the international competitiveness of the Port of Rotterdam and the Netherlands increases. Specialized factor conditions in the Port of Rotterdam are for example clusters of maritime activities, highly specialized employees and advanced possibilities of combining various transport modes like road, water, pipeline and railway (modal split). A good example of the latter is Keyrail, which stimulates more rail freight transport (see Box 3.1).

**Box 3.1 – Keyrail as specialized infrastructural factor of rail freight transport**

- Keyrail is the commercial operator of the ‘Betuweroute’, the double track freight railway line from, amongst others, the Port of Rotterdam and the Port of Amsterdam to the border of Germany (nearby Zevenaar). Its shareholders are Prorail, the Port of Rotterdam Authority and the Port of Amsterdam Authority.
- The Betuweroute stimulates the commercial élan of the railway sector in- and outside Rotterdam. And it offers additional railway capacity: the intention is to have 150 trains per day running in 2013.
- By using, among others, the Betuweroute, the modal split of hinterland containers has slightly changed in 2009 (inland shipping 33%; railway 11%; road 56%) compared to the period 2001-2005.

The determinant factor conditions also relates to activities that contribute to the decrease of so-called ‘factor disadvantages’. This means that shortcomings in the factor conditions are deliberately changed into advantages in an innovative way. For instance, the lack of space in the Port of Rotterdam gave rise to the construction of Maasvlakte 2 (implying an
extension of the Port of Rotterdam and the construction of supporting infrastructure on reclaimed land alongside the Dutch coast), which considerably increases the available surface area of the Port of Rotterdam (see Box 3.2).

Box 3.2 – Decrease of factor disadvantages by constructing Maasvlakte 2

- The Port of Rotterdam in its present form offers insufficient possibilities to realize the growth needed to maintain its status of ‘Gateway to Europe’ in the future.
- The construction of Maasvlakte 2, one of the largest civil engineering projects in the Netherlands, creates approx. 1.000 ha. new port and industrial ground, immediately adjacent to deep seawater and the current Maasvlakte.
- Owing to this innovative approach, a factor disadvantage (lack of space) is changed into an improvement of the factor conditions. Large, innovative companies are no longer obliged to look for another (foreign) port to locate their business operations as the Port of Rotterdam area expands. Additionally, space is created for building the port of the future.

(2) Determinant: demand conditions

The second determinant, demand conditions, points to how the nature of customer demand in the Port of Rotterdam contributes to an increasing international competitiveness. This can be the case in numerous ways. The presence in the Port of Rotterdam of customers that are seen internationally as being very demanding, or ‘lead users’ – such as APM Terminals, Argos, Vopak and other so-called leader firms as identified in previous research (see Box 3.3) – stimulates or pressures companies in the Port of Rotterdam and elsewhere in the Netherlands to innovate and increase productivity in order to meet the lead user’s buying needs. If internationally oriented demanding customers in the Port of Rotterdam – such as BP, Exxon Mobil, Shell and Texaco, which also belong to the world top – need advanced products and services that are not yet available elsewhere, this will not only encourage innovation. It also offers opportunities for suppliers and service providers in the Port of Rotterdam to employ their accumulated knowledge internationally through export. A third aspect is that demand can arise for products and services in highly specialized market segments in the Port of Rotterdam, such as tugboat services and the (maritime) transport of heavy and/or large constructions (heavy lift). These market segments have been developed in the Port of Rotterdam (home base) and, from there, can be further developed internationally. An illustrative example of a company involved in heavy lift is Smit Internationale; firms in the Port of Rotterdam and elsewhere in the Netherlands can benefit from its competitiveness and innovations in this segment.

Box 3.3 – Leader firms and their significance for the demand conditions

- Because of their characteristics (such as size and in-house knowledge), leader firms in a cluster have influence on the competitiveness and development of the cluster. And with that, they exert influence on other firms in that cluster.
- Examples of leader firms in the Port of Rotterdam as identified in previous research:
  - APM Terminals Rotterdam
  - Argos Group
  - Broekman Group
  - Ertsoverslagbedrijf Europoort (EECV)
  - Europe Container Terminals (ECT)
  - Europees Massagoed Overslagbedrijf (EMO)
  - Huisman Itrec
  - IHC Merwede
  - Imtech
  - Interforest
  - Kuehne & Nagel
  - Maersk Lines
  - Mammoet Netherlands
  - Odjfell Terminals
  - Royal Boskalis Westminster
  - Royal Vopak
  - Smit Internationale
  - Van Oord

Another example of how demand conditions contribute to specialization, innovation and, subsequently, internationalization, is the maritime sector and within this sector offshore companies like SBM Offshore and ‘leader firm’ Huisman Itrec. In the area of the design and production of drilling, lift, pipelay and transport equipment, the Netherlands belongs to the world top players. Highly demanding lead users in the Port of Rotterdam have certainly contributed to this achievement.

(3) Determinant: related and supporting industries

The third determinant, related and supporting industries, refers to the contribution of (mainly) suppliers to the international competitiveness. The more those suppliers possess a strong international competitive advantage themselves and the more they are connected through networks with buyers such as leader firms in the Port of Rotterdam and companies elsewhere, the higher the contribution of this determinant. Suppliers in the Port of Rotterdam with a presence in multiple countries are usually internationally competitive and remain keen to be productive and innovative in order to stay competitive. Their presence in the Port of Rotterdam is therefore increasing the contribution of this determinant to the international competitiveness of the Netherlands. Examples of internationally oriented suppliers of several leader firms
are ABB, GTI and Wärtsilä. Suppliers are stimulated and challenged by leader firms to increase quality and performance, rendering these suppliers with a head start on the (international) competition when delivering to other clients. Hence, a supplier that delivers to a lead user in fact leads the way. By making the ‘best of the best’ for a demanding buyer, also other customers in the Netherlands will benefit.

(4) Determinant: context for firm strategy, structure and rivalry

The fourth determinant, ‘context for firm strategy, structure and rivalry’, emphasizes two aspects. First, how companies form strategies and deal with external stakeholders such as client relations and trade union associations. Second, this determinant relates to the intensity of competition (rivalry) in the Port of Rotterdam. The first aspect can generally be described as the way in which companies are managed and organized. If, for example, the international competitive advantage of firms in industries or regions increases by an increase in flexibility, this will affect the strategic renewal of management practices and organizational structures in the established firms. But if that strategic renewal stays behind, the international competitive advantage decreases. In that sense, firms in the Port of Rotterdam are not only required to demonstrate operational flexibility, but more and more also ‘higher forms’ like organizational and strategic flexibility. When companies in the Port of Rotterdam are more keen on tackling these challenges than elsewhere in the world, the contribution to the international competitiveness of the Netherlands will increase.

Another example is that many companies in the Netherlands are managed and organized with a focus on exploitation: selling existing products and services and trying to improve them based on the already available knowledge. In a dynamic environment, however, this stance may get problematic as companies risk losing the link to new knowledge, products and services. Prior scientific research has pointed out that, in order to prevent this situation, companies should be managed and organized in such a way that, besides a focus on exploitation, there is also attention for exploration (innovation). A focus on exploration means deliberately be involved in the development of new knowledge about organizing, producing and marketing, aimed at the successful launch of new products and services. Prior research also indicates that companies that demonstrate both an explorative and exploitative mindset performed better in a dynamic environment; such companies are called ‘ambidextrous organizations’.

World ports such as the Port of Rotterdam and companies that are connected with these world ports compete, to a large extent, on efficiency, realized through continuous increases in scale, standardization efforts and a strict focus on costs. These activities and the underlying corporate governance and management principles are translated into the way those companies are being managed and organized: a focus on exploitation and the creation of shareholder value are key. In a dynamic environment, therefore, it is a strategic challenge to manage and organize a company in such a way that over time also renewal takes place. In other words, to become an ambidextrous organization; see also Box 3.4.

Box 3.4 – Cultivating a context for innovation and renewal: towards an Ambidextrous Port

- Companies in the Port of Rotterdam are mainly focused on efficiency (exploitation focus).
- In a dynamic environment, companies need to renew in order to survive and to develop new organizational and management structures, products and services in time (exploration focus).
- Companies that focus on both exploitation and exploration (ambidextrous firms) usually demonstrate the best performance.
- Port and industrial complexes with ambidextrous organizations are efficient, flexible and innovative (‘Ambidextrous Ports’) and have a strong Diamond, which results in a strong international, innovation-driven competitive position.

The strategic renewal of companies in which there is room for flexibility and ambidextrous organizing is mainly driven by the second aspect of the determinant ‘context for strategy, structure and rivalry’: (internal) rivalry. This aspect comprises the intensity of competition in the Port of Rotterdam. In the Diamond Framework, competition is the most important part that contributes to renewal and the international competitiveness. This is especially the case when this competitiveness is innovation-driven; competition then is related more to value creation for customers through new product characteristics, services and the use of alternative technologies, and less related to the cost price level. A first indication of the level of competitive rivalry is provided by the number of firms in the Port of Rotterdam in a certain market segment, such as the (petro)chemical cluster.
The role of the government and the Port of Rotterdam Authority

The crucial role of the government in the Diamond Framework is to shape the legal and institutional context in which companies can be internationally competitive. In this connection, Michael Porter describes the government’s role as catalyst and challenger, stimulating companies to reach higher levels of competitiveness, innovation and strategic renewal.

The government can influence each determinant both negatively and positively. When the determinants are influenced in such a way that the pressure to innovate and renew decreases, for instance due to inadequate regulations, its influence is negative. A positive influence, on the other hand, implies that each of the determinants as well as their interactions do contribute to the international competitiveness. The latter could be realized by, for instance, investments in public physical and knowledge infrastructure (factor conditions), purchases of products and services that are innovative and based on future demand (demand conditions), rules and regulations directed to fulfilling environmental requirements (related and supporting industries), and efforts to increase competitive rivalry as well as a long-term focus on legislation, such as tax legislation (context for firm strategy, structure and rivalry).

With the creation of an independent Port of Rotterdam Authority in 2004, several governmental agencies transferred some of their tasks to this Port Authority, including the caretaking of the safety of shipping traffic and the development, construction, administration and exploitation of the Port of Rotterdam. The Port of Rotterdam Authority cannot create international competitive industries just by itself. It can, however, positively influence the three earlier discussed determinants. And, above all, the Port of Rotterdam Authority can create and positively influence the context in which firms can become more innovative and internationally competitive. The latter relates to its influence on the fourth determinant, context for firm strategy, structure and rivalry, which includes the care for proper competitive dynamics within market segments focused on renewal and innovation. With that, a more ‘Ambidextrous Port’ comes into the picture.

Another example of how the Port of Rotterdam Authority can positively influence the Port of Rotterdam Diamond, is through an innovative fulfillment of its function as ‘landlord’ of the port infrastructure (part of the factor conditions). In this function, the Port of Rotterdam Authority is, for instance, (co-)responsible for the development of a smart grid and shore power provisions. By having initiated a knowledge and innovation alliance with General Electric (ranked 13th in the Fortune Global 500 in 2010), the Port of Rotterdam Authority – through a combination of mutual knowledge and expertise – will be capable of accelerating these developments; see also Box 3.5. This alliance, by the way, is an example of strategic connectivity (a concept that will be explained next) of the Port of Rotterdam Authority with a Fortune Global 500 firm.

Box 3.5 – Influencing the fourth determinant by the Port of Rotterdam Authority: knowledge alliance with General Electric

- Knowledge has three dimensions: content, context and process; (new) combinations of these dimensions lead to innovation.
- The Port of Rotterdam Authority has context knowledge of an internationally oriented port (i.e., knowledge about what a world port needs to stay on top).
- General Electric possesses international content knowledge of new technologies (e.g. infrastructure, smart grid, transport) and knowledge of the implementation process (e.g. business cases, financing models).
- The combining of different knowledge dimensions (content, context, process) from different national and industry ‘Diamonds’ increases the chance of successful innovations in the Port of Rotterdam.
- The Port of Rotterdam Authority increases its own organizational knowledge absorptive capacity through an alliance with Fortune 500 company General Electric, through which innovative services can be more rapidly developed for the Port of Rotterdam.
- These innovative services could be implemented in ports and other logistic hubs elsewhere in the Netherlands and, through strategic connectivity, be implemented with foreign partners. This provides a strategic contribution to the international innovation-driven competitiveness of the Netherlands.

The current distribution of tasks between the government and the Port of Rotterdam Authority makes it complex for the latter to (proactively) anticipate new developments, for example in the transportation and storage of liquefied natural gas (LNG). The Port of Rotterdam Authority operates in a strongly regulated context in which rules and legislation on various levels (communal, provincial, national and European) make the implementation of strategic renewal activities more difficult. Institutional entrepreneurship, the ability to achieve changes in institutional fields, rules and regulations, will be helpful in that context. Institutional entrepreneurship requires a vision and a concern for renewing institutions, rules and regulations as well as the resources that can be leveraged to realize these changes and hence transform the institutional
field. For the Port of Rotterdam Authority, the role of institutional entrepreneur is of great importance for increasing the strategic value of the Port of Rotterdam for the Netherlands. It has already obtained experience in this area over time due to, for example, the involvement in the decision-making process regarding Maasvlakte 2; see also Box 3.6.

**Box 3.6 – The distribution of the roles between government and Port of Rotterdam Authority leads to fairly complex decision-making processes regarding renewal in the Port of Rotterdam**

- The Port of Rotterdam has to deal with the government on multiple levels, such as the municipality of Rotterdam, the province of South Holland, the state government and European government institutions.
- Regarding the Port of Rotterdam, the main task of the government is to look after public interests with regard to safety, natural environment, the public physical and knowledge infrastructure and spatial planning.
- The government assigned various tasks to the Port of Rotterdam Authority (since its privatization in 2004), including the safeguarding and the functioning as a landlord of the infrastructure.
- The Port of Rotterdam Authority is *not* in charge to take care of the environment (e.g. through umbrella licenses) and spatial planning in the Port of Rotterdam; this makes it complex and time-consuming for the Port of Rotterdam Authority to proactively anticipate renewals and associated opportunities that are necessary in order to stay ahead of the international competition.
- In order to timely anticipate new developments, the role of the Port of Rotterdam Authority as institutional entrepreneur is important, demonstrating the ability to achieve changes in institutional fields, rules and regulations whenever necessary.

### 3.3 – Diamond Framework and strategic connectivity

The Diamond Framework presumes that interactions between the four determinants, which as a system contributes to innovation and renewal dynamics of the involved firms, are incited by competitive dynamics. The interactions give rise to a further increase of the international competitiveness. Informal and formal relationships between firms play an important role in these interactions. These include strategic alliances and networks of organizations in which information and knowledge as well as insights about, for example, market developments are exchanged. So the interaction between the determinants ‘demand conditions’ and ‘related and supporting industries’, for instance, is stronger if the relations between suppliers and demanding clients become less characterized by mere market transactions. If network relations are created – in which knowledge is exchanged and suppliers are getting innovative assignments – with a focus on continuous improvement of products and services, the likelihood of successful innovations increases.

In this report, the Diamond Framework is extended with the concept of strategic connectivity. This concept is especially significant in the context of ports and other logistic hubs when depicting the strategic value of connections with (the determinants of) competitiveness and competitiveness of) locations elsewhere. **Strategic connectivity** here is defined as the (organizational) access to and utilization of determinants of competitiveness that are present elsewhere. These organizational relations imply more than only market transactions; they comprise all kinds of interorganizational cooperations (formalized ones, such as strategic alliances and joint ventures, as well as more informal forms of cooperation, such as knowledge networks) focused on specialization, innovation and renewal in the broadest sense of the word.

Connectivity is important for the Port of Rotterdam. For instance, various companies in the (petro)chemical cluster are connected with each other by pipelines. This can be seen as physical connectivity. Moreover, the Port of Rotterdam is connected with locations elsewhere in the Netherlands (such as Moerdijk) and abroad (like the petrochemical industrial complex in the Port of Antwerp). Connectivity is particularly important in transport networks. The number and structure of the connections (including frequency and capacity) within these networks, for instance between location A and B, are relevant in this regard. To highlight this structural dimension of connectivity – in which concepts as centrality, hub and broker functions in networks take centre stage – Box 3.7 provides some information on container shipping lines in the so-called Le Havre-Hamburg range. The structural dimension represents the first dimension of strategic connectivity.

**Box 3.7 – Connectivity: containerized liner shipping services in the Le Havre-Hamburg range (2010)**

- Rotterdam has the most liner shipping services (50), followed by Antwerp (39), Hamburg (39) and Le Havre (33).
- The Port of Rotterdam is the most important port to call at the Far East, followed by the Port of Hamburg.
- The Port of Antwerp is the most important port to call at North America, followed by the Port of Bremerhaven.
- All large shipping companies call at the Port of Rotterdam.
- The choice of containerized shipping companies to call at ports is based on e.g. cargo packages, costs and customers’ preferences.
Besides the structural dimension of strategic connectivity, this report focuses in particular on the strategic dimension that is aimed at specialization, innovation and renewal. The latter dimension points explicitly to the strategic value of the connections, focused on innovation and renewal of the organizations involved in the network. It turns out that the choice of container shipping companies for certain ports not only depends on the costs and the structural dimension of the existing connections. Above all, the preferences of the shipping companies’ customers seem to be very important; for example with regard to competitive storage possibilities or transit modalities (e.g. pipelines, inland shipping and railway transport) to the hinterland. Strategic connectivity increases as ports become more sensitive for and – through specialization and innovation – anticipatory of the preferences of the ‘customer of the customer’; see also Box 3.8.

**Box 3.8 – Strategic connectivity: quantitative and qualitative dimension**

- **Strategic connectivity** comprises of the (logistic) connections and/or organizational relations (between, for instance, companies and ports) that contribute to an increasing access to and utilization of determinants of competitiveness that are present elsewhere, resulting in specialization, innovation and renewal.
- **Strategic connectivity consists of two dimensions:**
  - The *structural or quantitative dimension* focuses on the number and structure (structural dimension) of the connections (e.g. centrality and influence in the network; whether a port or company fulfills a hub or broker function in a transport network).
  - The *strategic or qualitative dimension* focuses on the quality (relational and cognitive dimension) of connections and organizational relations (e.g. based on trust and knowledge absorption), aimed at innovation and renewal in companies and in their respective networks.
- **Interorganizational cooperation between partners aimed at strategic connectivity presupposes complementarity regarding, among others, market and knowledge.**
- **Strategic connectivity contributes to gaining and maintaining a more difficult-to-copy (more sustainable) competitive advantage.**

The development and expansion of strategic connectivity requires time and advanced management and organizing skills. Besides, it is context-dependent. Strategic connectivity therefore contributes to a more sustainable competitive position, meaning that it is better defendable in the long run.

**3.4 – Three times strategic value of the Port of Rotterdam: Triple Strategic Value Contribution Framework**

The qualitative part of the strategic value of the Port of Rotterdam Diamond for the Netherlands consists of the contribution to the reinforcement of the Dutch Diamond’s four determinants and their interactions. For example, the determinant factor conditions of the Port of Rotterdam Diamond contributes significantly to the determinant factor conditions of the Dutch Diamond. Therefore, firms located elsewhere in the Netherlands have, among others, a highly advanced multimodal transport, knowledge and energy infrastructure at their disposal, rendering them more competitive. Apart from this direct effect, the international innovation-driven competitiveness of the Netherlands increases even more as the strategic connectivity of the Port of Rotterdam Diamond with industries and regions in the Netherlands and beyond increases. In empirical research, such a broad approach to strategic connectivity is not feasible. For that reason, this research focuses on *strategically connectivity of ports (and industrial complexes) and other logistic hubs*. Based on that, two additional strategic contributions are elaborated upon: resulting from the strategic connectivity with ports and other logistic hubs both in the Netherlands and abroad.

Hence in the selected approach, the qualitative part of the strategic value of the Port of Rotterdam for (the international competitiveness of) the Netherlands consists of three parts. The first part pertains to the strategic value created by the Port of Rotterdam Diamond for the determinants of the Dutch Diamond. The second and third part result from the strategic connectivity of the Port of Rotterdam with other ports and logistic hubs in, respectively, the Netherlands and other countries; see Figure 3.2.
The strategic value of the Port of Rotterdam Diamond for the determinants of the Dutch Diamond

The first part of the strategic value is marked as arrow (1) in Figure 3.2. This part refers to the strategic value of the determinants of the Port of Rotterdam Diamond for the determinants of the international, innovation-driven competitiveness of firms (and organizations) in the Netherlands. Not only of firms of typical Port of Rotterdam industries (such as food, chemicals and transport), but also of firms in other industries (like the electrotechnical and agricultural industry). The processing and (petro)chemical industry outside the Port of Rotterdam, for instance, benefits from the fact that the Port of Rotterdam accommodates one of the largest (petro)chemical clusters in the world, bringing about strong determinants such as factor conditions (including one of the best knowledge infrastructures and process operator training in the world) and advanced related and supporting industries. Large international companies in the Netherlands that are not situated in the Port of Rotterdam benefit from the advanced transport, handling, storage and distribution options of the Port of Rotterdam to sell their products worldwide. Heineken, for example, relies to a large extent on the Port of Rotterdam for its beer export to the USA. And DSM is connected with the Port of Rotterdam by pipeline for the supply of raw materials.

The strategic value of strategic connectivity of the Port of Rotterdam with other Dutch ports and logistic hubs

Arrow (2) in Figure 3.2 represents the second part of the strategic value, focusing on the strategic connectivity of the Port of Rotterdam with other ports and logistic hubs in the Netherlands. The strategic value of this part would be limited if the Port of Rotterdam would operate totally on its own. That is to say, without any form of cooperation with other ports and logistic hubs in the Netherlands aimed at accessing and utilizing determinants of competitiveness that are present elsewhere and resulting in specialization, innovation and renewal. Value added for Dutch (and foreign) customers is being created by means of this type of cooperation. Owing to such strategic connectivity, the strategic value of the Port of Rotterdam (as well as the strategic value of the other logistic hubs that are involved) for the Netherlands increases.

The strategic connectivity between the Port of Rotterdam and the Port of Amsterdam regarding, amongst others, infrastructure (by means of Keyrail and Portbase) does by itself not necessarily imply less competition between the two. On the other hand, it does lead to an increase in international competitiveness by providing firms the opportunity to benefit from the increasing existence of one ‘Dutch Mainport Network’. Such an encompassing network would imply that the
ports and other logistic hubs in the Netherlands are connected with each other in one network and continuously looking for ways to improve the international competitiveness of the Netherlands as a logistic hub of Europe. Illustrative of this idea is the recent decision to strategically connect the Port of Dordrecht with the Port of Rotterdam. The Port of Rotterdam Authority will take charge of the port management and port development. Thanks to this initiative, specialization can be increased and new opportunities are being created for (international) customers to enhance their value added.

**The strategic value of international strategic connectivity of the Port of Rotterdam**

Through strategic connectivity of the Port of Rotterdam with foreign ports and other logistic hubs abroad, the third part of strategic value is created; see Figure 3.2, arrow (3). If companies in the Port of Rotterdam are strategically connected with internationally competitive companies outside the Netherlands, this will contribute to the strengthening of the Port of Rotterdam Diamond and, with that, of the international competitiveness of the Netherlands. The strategic value of the Port of Rotterdam for the Netherlands also increases as the number of internationally operating companies that are located in the Port of Rotterdam gets larger. Examples of such companies are General Electric, Shell and Vopak, which belong to the top of the world in their industry and have many subsidiaries worldwide. These type of companies in fact benefit from several Diamonds; not only from the Port of Rotterdam Diamond but also from the Diamonds of locations elsewhere to which these companies are strategically connected. The R&D efforts of Shell in the USA, for example, are also available to the Shell complex in the Port of Rotterdam. And the innovations of Hutchison Port Holdings – the world’s largest port operator – also become available to its subsidiary ECT in the Port of Rotterdam. This can certainly strengthen innovation in the Port of Rotterdam and, over time, its knowledge infrastructure. In this report, arrow (3) in Figure 3.2 is limited to strategic connectivity between the Port of Rotterdam and foreign ports.

**The importance of strategic connectivity of the Port of Rotterdam with foreign ports: a further clarification**

To continuously strengthen the international competitive position of the Port of Rotterdam and the Netherlands, the strategic connectivity of the Port of Rotterdam with foreign ports plays a very important role. This is because this position is threatened by the increasing globalization and increases in scale as well as by the chain management of both container shipping companies and container terminal operators. These two parties determine to a large extent which ports are being called at. Box 3.9 shows the relative position of the Port of Rotterdam with regard to the world’s four largest container terminal operators. APM Terminals, for instance, generated in 2009 a worldwide container turnover of 31 million TEU (i.e., twenty-foot equivalent unit), of which only 5,5% was transferred in the Port of Rotterdam. On the other hand, APM Terminals handles approximately 17,5% of the Port of Rotterdam’s total container throughput in 2009. This example illustrates that the bargaining power and international chain management is (becoming) restricted for the Port of Rotterdam, posing an important challenge for the Port of Rotterdam Authority.

**Box 3.9 – The largest container terminal operators and the relative position of the Port of Rotterdam (2009)**

<table>
<thead>
<tr>
<th>(1) Worldwide container turnover (mln TEU)</th>
<th>(2) Turnover in Port of Rotterdam (mln TEU)</th>
<th>Share in container turnover in the Port of Rotterdam (total 2009: 9,7 mln TEU)</th>
<th>Share (2)/(1)x100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>APM Terminals 31,0</td>
<td>1,7</td>
<td>17,5%</td>
<td>5,5%</td>
</tr>
<tr>
<td>Hutchison Port Holdings/ECT 32,2</td>
<td>6,1</td>
<td>62,9%</td>
<td>18,9%</td>
</tr>
<tr>
<td>PSA International 45,0</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>DP World (active at Maasvlakte 2 from 2013 onwards) 31,5</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

**Internationalization strategies of ‘world ports’**

The above mentioned challenge is also illustrated by a comparison of the internationalization strategy of the Port of Rotterdam with that of other world ports. To that end, Box 3.10 compares the Port of Rotterdam to the Ports of both Singapore and Hong Kong. All three ports belong to the Top 10 ports worldwide regarding containerized transport. However, the Ports of both Singapore and Hong Kong have, unlike the Port of Rotterdam, a private international port operator; PSA International and Hutchison Port Holdings, respectively. The internationalization, or international strategic
connectivity, of the Port of Hong Kong started already in 1991 by obtaining a stake in the Port of Felixstowe, while the Port of Singapore started in 1996. The Port of Rotterdam Authority began its internationalization efforts not until the year 2002, when it decided to take a participation in the development and management of the Port of Sohar in Oman. Nowadays, the Ports of Singapore and Hong Kong already have taken stakes in ports in, respectively, 16 and 26 countries. The international strategic connectivity of the Port of Rotterdam is – although of a different nature than that of the Ports of both Singapore and Hong Kong due to the exclusive focus of the Port of Rotterdam Authority on ‘port management’ – still rather limited in comparison with these two competing ports.

In March 2011 it was announced that the Port of Rotterdam Authority signed an agreement with the Port of Nangang in China. The agreement covers, among others, the utilization of expertise and experience of the Port of Rotterdam Authority to develop a greenfield port and industrial complex (the largest in northern China) located 165 km from Beijing – making it the first foreign port authority to be active in a Chinese port. That same month also witnessed an agreement signed by the Port of Rotterdam Authority and Qatar Petroleum (QP) – Ras Laffan Industrial City (RLC) in Qatar, aimed at a more intensive strategic cooperation between both parties. The agreement attempts to promote cargo flows between the industrial areas of Rotterdam and Qatar. QP-RLC will assist companies located in the Port of Rotterdam to contact potential clients and counterparts in Qatar. The Port of Rotterdam Authority, in return, brings in knowledge and experience with regard to port management. The strategic connectivity (with the Middle East) of the Port of Rotterdam and, because of that, the Netherlands, will therefore strongly increase.

<table>
<thead>
<tr>
<th>(1) Port</th>
<th>(2) Ranking 2009 (containers)</th>
<th>(3) Own port operator</th>
<th>(4) Start of the internationalization process</th>
<th>(5) Number of countries where an interest in port(s) is held</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port of Singapore</td>
<td>1</td>
<td>PSA International</td>
<td>1996</td>
<td>16</td>
</tr>
<tr>
<td>Port of Hong Kong</td>
<td>3</td>
<td>Hutchison Port Holdings</td>
<td>1991</td>
<td>26</td>
</tr>
<tr>
<td>Port of Rotterdam</td>
<td>10</td>
<td>not applicable</td>
<td>2002</td>
<td>3</td>
</tr>
</tbody>
</table>

In order to strengthen the international competitiveness of the Port of Rotterdam, the purposeful increase of the strategic connectivity with foreign ports (and industrial complexes) plays a very significant role. An important instrument for the Port of Rotterdam Authority is either entering into more sustainable, difficult-to-copy cooperations or participating in the port management of partner ports (such as the Port of Sohar). This form of strategic connectivity provides an excellent example of the qualitative dimension of strategic connectivity, enabling the Port of Rotterdam Authority to increase the international competitiveness of the Port of Rotterdam and the Netherlands.

3.5 – The strategic value of the Port of Rotterdam for the Netherlands: the Overall Fact Sheet Framework

The strategic value of the Port of Rotterdam for the Netherlands in a particular year can be estimated and presented in numerous ways. A far-reaching extent of detailing would easily result in many pages, which is unrealistic for a report that is intended to be a first exploration. Instead, a conceptual framework is developed in which the most important parts (or categories) of the strategic value are included: the so-called ‘Overall Fact Sheet of the Strategic Value of the Port of Rotterdam for the Netherlands’. In the next chapter, this Framework will be further clarified.

4 A FIRST INDICATION OF THE STRATEGIC VALUE OF THE PORT OF ROTTERDAM FOR THE NETHERLANDS IN 2010

4.1 – Introduction

Based on the Framework ‘Overall Fact Sheet of the Strategic Value of the Port of Rotterdam for the Netherlands’, see Box 4.1, a first indication will be given of this strategic value in 2010. To that end, first the quantitative part of the strategic value (the upper part of Box 4.1), representing the economic importance, will be evaluated. Then, the qualitative part of
the strategic value will be examined using the previously discussed Triple Strategic Value Contribution Framework (see Figure 3.2). This Framework shows that the Port of Rotterdam delivers qualitative strategic value on at least three levels: (1) through the Port of Rotterdam Diamond to the determinants of the Dutch Diamond; (2) through strategic connectivity of the Port of Rotterdam with other ports and logistic hubs in the Netherlands; and (3) through strategic connectivity of the Port of Rotterdam with foreign ports and other logistic hubs abroad. At the end of this chapter, conclusions will be drawn about the strategic value of the Port of Rotterdam for the Netherlands in 2010.

**Box 4.1 – Framework Overall Fact Sheet of the Strategic Value of the Port of Rotterdam for the Netherlands**

<table>
<thead>
<tr>
<th>Quantitative part of strategic value</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic importance of the Port of Rotterdam</td>
<td></td>
</tr>
<tr>
<td>- Direct value added created:</td>
<td>...</td>
</tr>
<tr>
<td>- Indirect value added created:</td>
<td>...</td>
</tr>
<tr>
<td>- Direct employment:</td>
<td>...</td>
</tr>
<tr>
<td>- Indirect employment:</td>
<td>...</td>
</tr>
<tr>
<td>- Investments:</td>
<td>...</td>
</tr>
<tr>
<td>Qualitative part of strategic value</td>
<td></td>
</tr>
<tr>
<td><strong>First contribution to the Dutch Diamond:</strong> the influence of the determinants of competitiveness of the Port of Rotterdam on the international innovation-driven competitive advantage of the Netherlands</td>
<td></td>
</tr>
<tr>
<td>- Factor conditions:</td>
<td>...</td>
</tr>
<tr>
<td>- Demand conditions:</td>
<td>...</td>
</tr>
<tr>
<td>- Related and supporting industries:</td>
<td>...</td>
</tr>
<tr>
<td>- Context for firm strategy, structure and rivalry:</td>
<td>...</td>
</tr>
<tr>
<td><strong>Second contribution to the Dutch Diamond:</strong> the influence of strategic connectivity of the Port of Rotterdam with other Dutch ports and logistic hubs on the international innovation-driven competitive advantage of the Netherlands</td>
<td></td>
</tr>
<tr>
<td>- Impact of national strategic connectivity on the Dutch Diamond:</td>
<td>...</td>
</tr>
<tr>
<td><strong>Third contribution to the Dutch Diamond:</strong> the influence of strategic connectivity of the Port of Rotterdam with foreign ports and other logistic hubs abroad on the international innovation-driven competitive advantage of the Netherlands</td>
<td></td>
</tr>
<tr>
<td>- Impact of international strategic connectivity on the Dutch Diamond:</td>
<td>...</td>
</tr>
</tbody>
</table>

**4.2 – The quantitative part of the Overall Fact Sheet: the economic importance of the Port of Rotterdam for the Netherlands in 2010**

Box 4.2 illustrates the economic importance of the Port of Rotterdam by means of three key indicators: value added, employment and investments. The figures relate to 2008 and are derived from the most recently published ‘Haven-monitor’. The amount of value added (direct plus indirect) is approx. 22.2 billion euro. The total employment (direct and indirect) adds up to approx. 145.000 persons. The expected investment volume for 2011 and the following years, as estimated by the Port of Rotterdam Authority in 2010, is around 10 billion euro. The size of these investments (including foreign direct investments) provides a strong indication of the long-term importance of the Port of Rotterdam.

**Box 4.2 – Quantitative part of the strategic value (the economic importance) of the Port of Rotterdam**

- Direct resp. indirect value added: 15,5 billion euro resp. 6,7 billion euro
- Direct and indirect value added as percentage of GDP: approx. 3,7%
- Direct resp. indirect employment: 90.000 persons (seaport-related) resp. 55.000 persons
- Expected investments in the next few years: approx. 10 billion euro

The quantitative part of the strategic value can be illustrated additionally by means of other indicators. For instance, Box 4.3 provides an illustration of the presence of ‘global players’ in the Port of Rotterdam. The presence of these large international companies – which, based on their ranking in the Fortune Global 500, belong to the top of their industry – clearly illustrates the (economic) importance attributed to the Port of Rotterdam.
Box 4.3 – Illustrative examples of ‘global players’ in the Port of Rotterdam with their Fortune Global 500 ranking (2010)

- Container terminal operators and container shipping companies: A.P. Møller-Mærsk Group (#147)
- Energy industry: E.ON (#27); Vattenfall (#303)
- Manufacturing industry: General Electric (#13); ThyssenKrupp (#123)
- Packaged consumer goods industry: Unilever (#121)
- (Petro)chemical industry: BP (#4); Exxon Mobil (#3); Shell (#2); Total (#14)

Conclusion regarding to the quantitative part of strategic value

The presented key indicators of economic importance highlight the substantial importance of the Port of Rotterdam for the Netherlands; the total (direct and indirect) value added, for instance, is approx. 3.7% of the Gross Domestic Product. The size of the expected investments in the coming years indicates that also in the years to come the Port of Rotterdam will be of great importance.

4.3 – The first contribution of the Overall Fact Sheet’s qualitative part: the influence of the Port of Rotterdam Diamond on the determinants of the international competitiveness of the Netherlands in 2010

The influence of the Port of Rotterdam Diamond on (the determinants of) the Dutch Diamond – i.e., on the determinants of the international innovation-driven competitiveness of the Netherlands – will be discussed below by elaborating on each of the determinants separately.

With regard to the contribution to the first determinant of the Dutch Diamond, factor conditions, one can speak of a difficult-to-copy and irreplaceable (i.e., for the Netherlands unique) contribution. This contribution consists of, amongst others, the multimodal physical infrastructure that unites five dedicated modes of transport in the Port of Rotterdam. But also human resources as well as the knowledge and energy infrastructure are examples of advanced factors; see Box 4.4. At least as important for the strategic value is that the factor conditions are continuously improved (by creation and upgrading) and factor disadvantages are overcome through innovation. Box 4.4 shows a number of examples. The strategic value of the determinant factor conditions of the Dutch Diamond is large. Companies involved in import, export and re-export benefit from this, as it has a positive effect on their value added and results in a better competitive position.

Box 4.4 – Illustrative examples of three aspects of the determinant ‘factor conditions’ of the Port of Rotterdam

(1) Categories of ‘advanced factors’:
- **Physical transport infrastructure**
  - five dedicated modes of transport: (1) short sea/feeder-hub; (2) inland shipping; (3) road transport; (4) railway transport; (5) pipeline transport.
  - Looking at Europe, only Maasvlakte 2 will allow the world’s largest ships to moor 24 hours a day.
  - Located uniquely at the intersection of two large rivers, at the gateway to more than 500 million Europese inhabitants, and adjacent to deep seawater.
- **Human resources and knowledge infrastructure**
  - Ca. 10% of the approx. 90,000 direct seaport-related employment relates to traditional transhipment activities.
  - Knowledge network including the Erasmus University Rotterdam, Delft University of Technology, Hogeschool Rotterdam, and the Shipping and Transport College.
- **Energy infrastructure**
  - Transport, generation and storage of energy (oil, coal, electricity, LNG, biofuels, biomass and wind power).
  - ‘Rotterdam Energy Port’; leading role in Europe.

(2) Creation and upgrading of ‘factor conditions’:
- A key example of creation is the extension of the Port into the North Sea (Maasvlakte 2 offers approx. 1000 ha. more space).
- Key examples of upgrading are the construction of fibreglass grids and ICT systems for customs authorities and other facilities, (such as Portbase), the increasing cooperation in knowledge networks around the Port of Rotterdam (such as Smart Port), and innovation facilities (such as Plant One).

(3) Overcoming factor disadvantages:
- Congestion deteriorates the competitive position; overcoming congestions improves this competitive position and stimulates innovation; examples are the ‘Verkeersonderneming’ and the Container Transferium in Alblasserdam.
The second determinant, demand conditions, contributes to the international competitiveness of the Netherlands in particular due to the function of large firms as catalysts of competition and of innovations in the factor conditions (infrastructure) and related and supporting industries. Box 4.5 provides a further clarification and illustrative examples.

Box 4.5 – Illustrative examples of the determinant ‘demand conditions’ in the Port of Rotterdam

The determinant demand conditions contributes to the international competitiveness of the Netherlands through three aspects:
1) Large international corporations (such as Shell and Vopak) and highly specialized companies (such as Imtech) in the Port of Rotterdam are very demanding in terms of their needs of products and services; in that way, they stimulate innovation and competition in the Netherlands.
2) A number of independent buyers promote innovation and competition in the Netherlands; for instance, there are five refineries (including the largest of Europe, i.e. the Shell refinery) in the Port of Rotterdam.
3) The previous two aspects contribute to the development (in the Port of Rotterdam and elsewhere in the Netherlands) of products and services that can be seen as international innovations and that could play a significant role in the world markets. Examples are high-quality water engineering (e.g. by Van Oord and Boskalis Westminster), Multi Agents Systems (as developed in the Support project in the Port of Rotterdam) and retractable ‘green’ containers (Cargoshell).

The third determinant, related and supporting industries, contributes in different ways to the Dutch Diamond. For instance, a large number of suppliers with a (very) strong international competitive position are located in the Port of Rotterdam. Examples of such companies are ABB, Van Oord and Wärtsilä (see Box 4.6). Leader firms in the Port of Rotterdam stimulate suppliers to innovative performances, of which also firms elsewhere in the Netherlands can benefit. Previous research indicates that more than half of the leader firms (see Box 3.3) contribute to the strengthening of the competitive position of suppliers by means of competitive relationships with these suppliers.

Box 4.6 – Illustrative examples of companies in ‘related and supporting industries’ in the Port of Rotterdam

- Examples of suppliers to the leader firms (as mentioned in Box 3.3): ABB, Croon, GTI, Heinen & Hopman, Hercon, Nacap, Nemag, Radio Holland, Wärtsilä.

With respect to the fourth determinant, context for firm strategy, structure and rivalry, two subjects are highlighted. First, the competition within the Port of Rotterdam is discussed. In the Diamond Framework, competition is the most important factor for the interaction between the determinants aimed at innovation and renewal. Box 4.7 elaborates on the significance of (internal) competition in the Port of Rotterdam. It turns out that competition (here referred to as internal competition) cannot be taken for granted regarding port-related activities in the Port of Rotterdam; a study in 2003 showed that the extent of competition was limited. More recent studies on this are not available. The Port of Rotterdam, however, does take an active stance in promoting internal competition. For example, a so-called tender procedure was initiated by the Port of Rotterdam Authority for the selection of terminal operators for Maasvlakte 2, which will stimulate competitive rivalry among competing operators.

In case of a monopoly position in a certain market segment in the Port of Rotterdam, internal competition is lacking. If the monopolist is also active in the same market segment abroad, it is exposed to external competition. External competition, however, is not a substitute for internal competition in the Diamond Framework (i.e., within a market segment in the Port of Rotterdam). The extent of competitive rivalry within market segments in the Port of Rotterdam plays an important role in the enlargement of the strategic value for the Netherlands; see also Box 4.7.

Box 4.7 – The importance of internal competition (within market segments) in the Port of Rotterdam

- Competition between suppliers of comparable products and services – e.g. container terminal operators – in the Port of Rotterdam (internal competition) is the most important driver of innovation and renewal. That is because competitors operate in the same competitive environment in terms of, among others, rules and regulations and the labour market.
- According to a study carried out in 2003, competition in port-related activities is limited. Since then, progress has been made in, amongst others, the container terminal operators segment.
- Competition within market segments in the Port of Rotterdam stimulates dynamics, specialization and innovation, leads to less focus on cost leadership, and to more focus on ‘value added for the customer’.
Besides internal competition, also innovation and renewal play an important role in the dynamics in the Diamond aimed at improvement of the international competitiveness. Therefore, a second important subject within the scope of the fourth determinant is the context to promote innovation and business sophistication. In that sense, the recent case of the test facility 'Plant One' offers an illustrative example; see Box 4.8. Plant One does not only accelerate the innovation of sustainable process technology in the Port of Rotterdam, but it also creates strategic value for the Netherlands. For instance, companies located outside the Port of Rotterdam can make use of this facility as well. Successful innovations in process technology that, as a result, arise elsewhere in the Netherlands, create competitive advantage for the firms involved outside the Port of Rotterdam.

Box 4.8 – Improving the context for technological innovation in the Port of Rotterdam: the case of test facility Plant One

- Plant One, situated in the Port of Rotterdam, is a test facility – unique in Western Europe – for sustainable process technology. Promising (bio)chemical process improvements can be tested here on production scale and further developed for industrial applications. Plant One is available for companies in numerous branches as long as a contribution is being made to competitive sustainability (focused on aspects such as more efficient usage of raw materials and energy and residual material assimilation).
- The Port of Rotterdam Authority supported the realization of Plant One together with Deltalinqs, Carbon Stars, Rotterdam Climate Initiative and the municipality of Rotterdam.
- The 'old' situation (before Plant One): many innovations did not pass the development phase mainly due to three practical issues: (1) an average waiting period for obtaining a license to test demonstration installations of about half a year; (2) insufficient demonstration facilities; and (3) the high costs for building test installations.
- The 'new' situation: Plant One functions as the missing link between laboratory and full-scale production in the factory by passing more/better innovations through the development phase. It offers space, sufficient test facilities and has an umbrella license (shortening the waiting period for a license to about 4 weeks).
- Besides speeding up the time-to-market of innovations, Plant One contributes to, among others, a lower investment risk for companies as well as more efficiency and sustainability.

To order to increase and maintain the international innovation-driven competitiveness of the Netherlands, it is important – besides enhancing technological innovation – to initiate innovation in the areas of management (management innovation), organization and work related processes and structures. These non-technological determinants of innovation (in the Netherlands referred to as social innovation) are very important; a study in the Netherlands showed that technological innovation determines about 25% of the general innovation success, while the remaining 75% of this success is related to social innovation. The case of the Dutch inland shipping sector, which is currently facing the threat of a downward economic spiral, might be illustrative in this respect; see Box 4.9. The structure enhancing procedures in this sector – initiated by, among others, the Port of Rotterdam Authority – have a large effect on the long-term international competitiveness of the Dutch inland shipping sector, which is also important for the Dutch Diamond.

Box 4.9 – Improving the context for social innovation in the Port of Rotterdam: the case of the inland shipping sector

- Inland shipping is insufficiently able to play a key role in the hinterland transport due to, amongst others, fragmentation. For instance, approx. 90% of the companies consists of 1 to 5 employees. In general, these inland shipping companies have not yet created stable relationships with charters and freight forwarders. Scale advantages are scarce due to a lack of cooperation within the sector. And the logistic chain is insufficiently adapted to the demands of container shippers. Currently, there are mainly small-scale initiatives that manifest themselves in vessels that navigate by scheduled service to the hinterland.
- Technological innovation only is insufficient to improve the competitiveness of the inland shipping sector. Structure enhancements are needed to optimize the hinterland transport of inland shipping. Examples are the foundation of one executing organization, cooperation programs with an appropriate governance structure, the improvement of planning systems and far-reaching coordination between all relevant parties. The Port of Rotterdam Authority agreed to support the improvement of the infrastructure.
- These structure enhancing procedures – initiated from the Port of Rotterdam – stimulate renewal in managerial and organizational applications, processes and structure, or social innovation. Because of this, the inland shipping sector – an important sector for the Netherlands – will be better able to anticipate the need for more hinterland transport by inland shipping.
- Other examples of important non-technology-driven methods to improve the international competitiveness of the inland shipping sector are organizational measures to shorten waiting times at terminals and the recently started Binnenvaartgeld project of the Port of Rotterdam Authority. This project aims to replace the existing inner-port payment system – requiring stacks of paper work – by an innovative electronic payment system (by using existing technology). By doing so, the organization and management of the information processes will be improved, leading to new opportunities to improve competitiveness.
A third subject with regard to the determinant ‘context for strategy, structure and rivalry’ is the attractiveness of the Port of Rotterdam as location for corporate headquarters. Does the Port of Rotterdam, including the city of Rotterdam and adjacent municipalities, offer an attractive ‘context’ for the establishment of these headquarters? Recent research shows that fourteen of the Top 100 Dutch corporate headquarters are situated in the Rotterdam region; see Box 4.10.

**Box 4.10 – ‘Top 100 Corporate Headquarters’ located in the region of Rotterdam**

Fourteen of the Top 100 corporate headquarters in the Netherlands are established in the Rotterdam region (including Schiedam, Barendrecht and Papendrecht). These fourteen corporate headquarters are of the following companies:

- Argos Group
- Cefetra
- Facilicom Services Group
- Fondel Commodities
- Hunter Douglas
- IMCD Holding
- Nidera
- Royal Volker Wessels Stevin
- Royal Vopak
- Smit Internationale
- TBI Beheer
- Unilever
- Van Oord
- SBM Offshore

The importance of these corporate headquarters for the Port of Rotterdam and the strategic value for the Netherlands is that the decision power resides in the relevant networks. The strategic interests of the region seems to be more guaranteed if decision-making at corporate headquarters is taking place in that same region instead of elsewhere in the world. From Box 4.11 it appears that the companies with a corporate headquarter situated in the region of the Port of Rotterdam are active in different sectors. Two of the fourteen (14%) are primarily focused on trade, four (29%) on production and the rest (57%) on commercial services. The absence of corporate headquarters that are primarily related to transport and logistics services is rather remarkable; these are established in for example Hamburg and London. In order to be acknowledged as ‘world maritime city’, the presence of corporate headquarters and/or regional offices of container shipping companies and container terminal operators is essential.

**Box 4.11 – Corporate Headquarters in the Port of Rotterdam: focus of activities**

- Two (14%) of the fourteen companies with a corporate headquarter situated in the region of Rotterdam are primarily oriented on trade. Trade focuses mainly on fuels, agricultural products and metals.
- Four (29%) of the fourteen companies are primarily focused on construction and the production of, among others, fuels and foodstuffs.
- The greater part (57%) is mainly involved in commercial services. These activities relate to dredging, offshore and storage services and other commercial services.

The Netherlands has a very strong position in the West-European inland shipping sector: more than half of the vessels navigate under the Dutch flag. Considering the strategic importance of this sector for the Netherlands, and in particular for the Port of Rotterdam, a further concentration in Rotterdam of corporate headquarters and commercial services related to this sector should deserve more attention. Besides corporate headquarters is also the presence of other head offices – like divisional head offices – important. The case of Shell Downstream Netherlands illustrates this; see Box 4.12.

**Box 4.12 – Other (non-corporate) headquarters: the case of Shell Downstream Netherlands**

- The offices of Shell Downstream Netherlands will be merged into one location in the centre of Rotterdam (the so-called Rotterdam Central District) as of 1 December 2011. By doing so, Shell’s divisional head office Downstream (refining, trade and sales) returns to the place it left in 1998. At present, the head office is dispersed across several locations in Rijnmond and The Hague.
- The arrival of Shell Downstream Netherlands in the centre of Rotterdam gives a strong impulse to the important office location Weena and to employment in Rotterdam. Furthermore, Shell’s divisional head office will improve Rotterdam’s position as main energy hub of the Netherlands and Europe.
Strategic connectivity within the Port of Rotterdam

Strategic connectivity of companies and organizations within the Port of Rotterdam contributes to innovation and renewal in the Netherlands. An example of this are companies that are (literally) connected with each other in an industrial ecosystem through pipelines and cables: company’s residual heat or water is considered not as waste but as a production factor for another company. By using scarce resources (such as raw materials, energy and transport capacity) in a more sustainable way, the burden on the environment and the utilization of transport capacity and space is decreased in an innovative way. This also leads to competitive advantages for the companies involved, as being economical with scarce resources is not only effective for cost controlling, but it usually leads to, for instance, process innovations as well. Companies in industrial ecosystems become more embedded in a location and are therefore more focused on long-term investments and hence strengthen the backbone of, for example, existing (petro)chemical complexes. New methods, experiences and best practices in the field of industrial ecosystems are also becoming available for companies elsewhere in the Netherlands. Besides linkages through industrial ecosystems, ‘co-siting’ is another form of (strategic) connectivity. Box 4.13 illustrates both concepts by elaborating on the ‘Huntsman cluster’ and ‘Shell cluster’ in the Port of Rotterdam.

**Box 4.13 – Strategic connectivity within the Port of Rotterdam: illustrative examples**

- *Huntsman cluster* – Multinational Huntsman plays a central role in the chemical cluster in the Port of Rotterdam. Steam and electricity produced by Eurogen are being used as input for Huntsman’s production of mainly polyurethanes. Also Lucite International’s residual steam is used as input for its production process. In turn, Huntsman delivers water, which is released during its production process, to Lucite International as input for the production of mainly acrylics. Huntsman’s production of polyurethanes releases steam, water and electricity, which are subsequently let through as raw material for the production of polymers by Invista. These connections through pipelines and electricity cables illustrate an industrial ecosystem in which more than 25 companies (including Air Liquide, Akzo Nobel, Dutch Gas Union and WBE) are connected with each other. This form of connectivity leads to a higher resource productivity, may stimulate innovation and strengthen the competitiveness of the cluster.

- *Shell cluster* – The site (425 ha.) of the oil refinery of Shell in Pernis (the largest refinery of Europe) provides accommodation not only for refinery and chemical plants of Shell, but also – through ‘co-siting’ - for companies that provide logistic services (such as Vopak) and that produce chemical products (such as Kraton, Momentive and Shin-Etsu). The refinery is connected with, among others, 800 storage tanks and a large trading unit of Shell, and is the hub of an extensive pipeline grid of approx. 160.000 km. In total, approx. 10-15% of all the movements in the Port of Rotterdam are related to Shell.

Although the focus of this section is on strategic connectivity within the Port of Rotterdam, it is interesting to point to the fact that the Port of Rotterdam is also connected by pipeline with other petrochemical and refinery complexes, such as those in Antwerp, Geleen, Moerdijk and Vlissingen. In the next sections, examining the second and third contribution concerning the strategic value for the Netherlands, the concept of strategic connectivity will be further examined.

**Conclusion of the first qualitative contribution: the influence of the Port of Rotterdam Diamond on the Dutch Diamond**

Box 4.14 provides an overview of the first contribution of the qualitative part of the strategic value by summing up the influence of each of the determinants of the Port of Rotterdam Diamond on the determinants of the international innovation-driven competitiveness of the Netherlands.

**Box 4.14 – First qualitative part of strategic value: the influence of the determinants of the Port of Rotterdam Diamond on the determinants of the international innovation-driven competitiveness of the Netherlands**

<table>
<thead>
<tr>
<th>Factor conditions:</th>
<th>Unique contribution to the Dutch multimodal physical, transport, knowledge and energy infrastructure (illustrated in Box 4.4).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand conditions:</td>
<td>Large multinational corporations in the Port of Rotterdam function as ’catalyst’ of innovations in infrastructure, clusters and knowledge in the Netherlands (illustrated in Box 4.5).</td>
</tr>
<tr>
<td>Related and supporting industries:</td>
<td>Unique cluster (for the Netherlands) of related and supporting industries in the Port of Rotterdam (illustrated in Box 4.6).</td>
</tr>
<tr>
<td>Context for firm strategy, structure and rivalry:</td>
<td>Unique contribution of the Port of Rotterdam to a context that stimulates business sophistication, innovation (illustrated in Box 4.8 and 4.9), establishments of (corporate) headquarters (Box 4.10 and 4.12), strategic cooperation (Box 4.13) and competition between companies (Box 4.7).</td>
</tr>
</tbody>
</table>
Based on Box 4.14, the influence of the Port of Rotterdam Diamond on the determinants of the Dutch Diamond can be qualified as substantial. Having a considerable effect on the Dutch Diamond also means that the (international) competitive position of companies elsewhere in the Netherlands improves because of that. The effect thereof is that the value added and employment elsewhere will increase. This means that, over time, the strategic value of the Port of Rotterdam Diamond for the Netherlands positively affects the value added and employment of companies located elsewhere in the Netherlands. This (quantitative) effect of strategic value, however, is undoubtedly difficult to quantify; at the end of this chapter this issue will be further discussed.

4.4 – The second contribution of the Overall Fact Sheet’s qualitative part: the impact of national strategic connectivity of the Port of Rotterdam on the international competitiveness of the Netherlands in 2010

Figure 4.1 illustrates the strategic connectivity of the Port of Rotterdam with a number of other ports and other logistic hubs in the Netherlands. Strategic connectivity comprises of different forms of so-called interorganizational relations, such as joint ventures, participations, strategic alliances and other forms of cooperation. For example, the Ports of Rotterdam and Amsterdam increasingly cooperate in areas including safety and ICT platforms (such as Portbase), but also in utilizing the Betuweweg route through the joint participation in Keyrail. Customers of both ports benefit from this strategic connectivity as innovative services are developed; for instance, by logistic knowledge integration and the combining of different customer preferences. Also the related and supporting industries in both port locations can benefit from this strategic connectivity, resulting in, among others, increasing growth and specialization.

Figure 4.1 – Strategic connectivity of the Port of Rotterdam with other ports/logistic hubs in the Netherlands

In order to accommodate the growth in container flows, the development of strategic connectivity of the Port of Rotterdam with inland shipping ports in the Netherlands becomes increasingly important. The share of transport using roads needs to decrease and inland shipping should play a considerable role in this objective. The Container Transferium (CT) in Alblasserdam (see Box 4.15) and the inland shipping terminal ‘Alpherium’ in the village of Alphen aan den Rijn (see Box 4.16) are interesting examples of recent investments in strategic connectivity of the Port of Rotterdam with inland ports.

Box 4.15 – Container Transferium for inland shipping

- The Container Transferium (CT) is a hub-terminal in the business park Nieuwland in Alblasserdam (in the direct hinterland of Rotterdam) with a (water side) capacity of 200.000 TEU (on a terrain of approx. 6,5 ha.).
- The CT focuses on the inland shipping transport of containers (which up till now were transferred by road) from and to the terminals on the Maasvlakte. By doing so, the A15 highway between Rotterdam and Alblasserdam will become less congested.
- The Port of Rotterdam Authority is the initiator of the realization of the CT (the first administrative agreements took place in October 2007, and the first terrain acquisition negotiations started in the beginning of 2008) and will fulfill the role of ‘landlord’ including investing in civil water engineering. The exploitation of the CT will be carried out by the business sector.
- The CT is very suitable for the repositioning of empty containers. Therefore, the CT is able to competitively introduce the truck-barge service (its main business) in the market (as carriers can pick up or drop empty containers). Also, the presence of the CT relieves the Port of Rotterdam from the storage of long-standing containers, and makes it cheaper to store these containers.

The CT case shows how the ‘road transport/inland shipping infrastructure interface’ further improves and how a threatening factor disadvantage (congestion on the road, especially on the A15 highway) is turned into a competitive advantage. It also demonstrates how to deal in an innovative manner with repositioning empty containers.
The *Alpherium* case, in turn, illustrates how customers can contribute to the realization of strategic connectivity; in this case, the customer (Heineken) of the customer (Van Uden Group as exploiter of the site owned by the Port of Rotterdam Authority). This form of *customer-driven strategic connectivity* also contributes to innovation and renewal. Examples are new methods and procedures for cargo bundling by companies that before were disconnected from each other. Thanks to its involvement, the Port of Rotterdam Authority can gain knowledge and experience in the development of transhipment terminals that could also be applied elsewhere in the Netherlands and abroad.

**Box 4.16 – Inland shipping terminal ‘Alpherium’**

- The inland shipping terminal in Alphen aan den Rijn (‘Alpherium’, 6 ha.) is the largest inland shipping port for containerized transhipment in the Netherlands. It was opened in October 2010 (although discussions about Alpherium already started in 1995).
- Purposes: stimulating a shift from road to inland shipping transport in order to preserve the transport system, increasing the transport certainty, and improving the accessibility of the Port of Rotterdam and Alphen aan den Rijn. Also, ‘greening’ of the logistics chain by, among others, economizing on fuel and truck kilometres and reducing CO₂ emissions.
- The principal initiators are the Van Uden Group and Heineken. The Van Uden Group invested approx. 15 million euro in the construction and is transport user and operator of the inland port. Heineken, that was looking for an alternative for the transport of beer containers from its brewery in Zoeterwoude to the Ports of Rotterdam and Antwerp by truck, acts as so-called launching customer. The terrain is property of the Port of Rotterdam Authority (an investment of 6 million euro).
- The inland shipping terminal Alpherium hence is an excellent example of ‘customer-driven strategic connectivity’.
- Possibilities of cargo bundling arised; Heineken sends full containers to the Port of Rotterdam through Alpherium, while firms as Electrolux, Intertoy, Marskramer and Zeeman Textiles will *import* full containers through Alpherium utilizing cargo bundling.

**Conclusion of the second qualitative contribution: the strategic value of national strategic connectivity**

The illustrative examples and cases demonstrate that the increasing strategic connectivity of the Port of Rotterdam with other Dutch ports and logistic hubs positively influences both the Port of Rotterdam Diamond and the Diamonds of those other ports and logistic hubs. This also positively affects the Dutch Diamond. Consequently, the international competitiveness of the involved companies improves and strategic value is created for the Netherlands. The strengthening of the competitive position of the involved companies elsewhere in the Netherlands has as effect that also the value added and employment of those companies are positively influenced.

**4.5 – The third contribution of the Overall Fact Sheet’s qualitative part: the impact of *international strategic connectivity* of the Port of Rotterdam on the international competitiveness of the Netherlands in 2010**

As already mentioned in chapter three, the influence of the Port of Rotterdam Authority on the (international) chain management and strategic positioning of the Port of Rotterdam decreases due to the increasing globalization, scale of operations and market power of global container terminal operators and container shipping companies. With that, also the opportunity for the Port of Rotterdam Authority to positively influence the strategic value of the Port of Rotterdam for the Netherlands decreases. Nevertheless, a strategy to deliberately ‘internationalize’ by means of international strategic connectivity of the Port of Rotterdam does offer this opportunity; see also Box 4.17. The case of the Omani Port of Sohar will be used to illustrate the effect of international connectivity on both the Port of Rotterdam and Dutch Diamond.

**Box 4.17 – Purposeful internationalization through strategic connectivity of the Port of Rotterdam with foreign ports**

<table>
<thead>
<tr>
<th>Purpose:</th>
<th>Enhancing the chain management and international competitive position of the Port of Rotterdam and, thereby, the strategic value creation for the Netherlands.</th>
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<tbody>
<tr>
<td>Means:</td>
<td>‘Internationalization’ of the Port of Rotterdam Authority by increasing the strategic connectivity with foreign ports.</td>
</tr>
<tr>
<td>Instruments:</td>
<td>Strategic alliances and joint ventures (among others) with regard to port management.</td>
</tr>
<tr>
<td>Effects:</td>
<td></td>
</tr>
</tbody>
</table>
- Increase of negotiation power with container terminal operators (see Box 3.9) and container shipping companies, resulting in increasing chain management control;  
- The creation of a network of strategic partner ports for customers of the Port of Rotterdam Authority;  
- Further increase of international knowledge of and experience in port management. |
| Example: | Participation of the Port of Rotterdam Authority in the port management of the Port of Sohar (Oman) since 2002. |
The international strategic connectivity between the Ports of Sohar and Rotterdam contributes to the enhancement of both the Port of Rotterdam Diamond and the Dutch Diamond. Box 4.18 elaborates on the interorganizational relation between these ports (and industrial complexes) and provides illustrative examples of the positive effects on both Diamonds. These examples relate to several determinants of the Dutch Diamond and in particular to the factor conditions.

**Box 4.18 – International strategic connectivity of the Port of Rotterdam with the Port of Sohar (Oman) and the strategic importance for the Netherlands**

- Since 2002, the Port of Rotterdam Authority has a 50% participation in the Sohar International Development Company (SIDC) and the Sohar Industrial Port Company (SIPC), the ‘landlord’ of the Port of Sohar in the north of Oman. The current joint venture agreement with the Omani government ends in 2043 and relates to both the management and development of the ‘most important Port of the Middle East’ (of approx. 6500 ha.). It already is one of the largest port development projects in the world.
- Illustrative benefits of the participation of the Port of Rotterdam Authority in the Port of Sohar in Oman for the Netherlands are:
  - Valuable knowledge gathering for Dutch companies about new technologies and foreign players in Oman.
  - Maintaining and continuously strengthening of ‘Dutch’ competencies (e.g. in the field of port management and the construction of smart infrastructure) by new (complex) international challenges, in this case in Oman.
  - Internationalization of the Dutch high-quality R&D cluster to Oman; the largely saturated European market is extended with a region in which there is still plenty of demand for e.g. high-quality port-R&D.
  - Exposure of Dutch know-how, leading to (more) foreign demand for the expertise and related products and services of Dutch companies (e.g. demand in Oman for dredging activities by Van Oord; see Box 4.19).
  - Recognizable and trustworthy port management (owing to the involvement of the Port of Rotterdam Authority) facilitates Dutch companies in starting or expanding businesses in Oman or elsewhere in the Middle East.
  - It stimulates the arrival of (potential) ‘leader’ firms from Oman and surroundings in the Port of Rotterdam or elsewhere in the Netherlands, and the relocation of (corporate) head offices to the Netherlands thanks to better trade activities with the Middle East and a more international exposure.
  - It allows strengthening of the ties of international demanding ‘leader firms’ with the Port of Rotterdam and the Netherlands as these firms (such as the Brazilian multinational Vale) benefit from more international connectivity with other ports.
  - Better opportunities to develop the Netherlands as the main ‘energy hub’ (and Rotterdam as the Energy Port) of Europe through improved connections via Sohar with regional oil and gas networks (connected through, for instance, the ‘Dolphin Gas Project’) in the Middle East.
  - Larger and a more developed unique international network of the Port of Rotterdam (with Sohar and foreign logistic hubs connected with the Port of Sohar), leading to better trade possibilities for Dutch companies.
  - The strategic position of Sohar on a junction of international navigation routes provides the Port of Rotterdam Authority with the possibility to exercise more influence on worldwide trade streams that can yield strategic advantages for the Netherlands.

Demand from Sohar (Oman) for the expertise of Dutch companies arises from the strategic connectivity. Box 4.19 provides a number of illustrative examples. With the knowledge, experiences and contacts that are gained from this, the international competitiveness of the respective industries in the Netherlands can be further strengthened.

**Box 4.19 – Illustrative examples of Dutch companies with activities in the Port of Sohar (Oman)**

- **Arcadis**: signed a contract (approx. 18 million euro) in April 2009 to deliver – with a local partner (W.J. Towell & Co.) – project management services to the Brazilian (ore producing) company Vale in Oman; it concerns the ‘Vale Oman Industrial Complex’, with, among others, a port terminal and distribution centre.
- **C. Steinweg-Handelsveem**: established a multi-purpose cargo terminal in the Port of Sohar early 2004 (C. Steinweg Oman LLC) and was awarded with a 25-year concession for all break bulk, dry bulk and container stuffing and stripping related operations in the Port of Sohar.
- **Hydronamic (Boskalis Westminster)**: is involved in the conceptual design of breakwaters in the Port of Sohar.
- **Interbeton (BAM Group) and Van Oord**: acquired as a consortium – together with the Belgian firm Six Construct – an order worth 195 million euro for the construction of quay walls and dredge activities in Sohar (finished at the end of 2008).
- **Royal Haskoning**: conducted a study in 2010 on water management in and around Sohar and is project consultant at the construction of a large deep-sea quay for bulk (until approx. May 2011) in the Port of Sohar. Moreover, Royal Haskoning is co-editor of the Master Plan (2007) North Batinah Region 2025.
- **Shipping and Transport College (STC) Rotterdam**: founded, together with the Omani government, in April 2005 the joint venture International Maritime College of Oman LLC (IMCO) in Sohar. The IMCO is situated next to the Port of Sohar and offers education in the field of shipping, ports and transport to roughly 1000 students.
- **Tebodin**: opened an office in Sohar in July 2010 and has been asked by the Sohar Industrial Port Company (SIPC) to develop a universal signage system for use in the Port of Sohar.
- **DCMR (the Rijnmond Environmental Protection Agency)**: is involved since May 2008 in the foundation of the Industrial Environment Unit of the Port of Sohar.
In the selection of illustrative cases for the strategic connectivity of the Port of Rotterdam with foreign ports and other logistic hubs abroad, we will also pay attention to developing forms of strategic connectivity created by market parties – and in particular with Germany, the most important trade partner of the Netherlands. The ThyssenKrupp Veerhaven case (see Box 4.20) is interesting for various reasons. In the first place, this case highlights the large economic importance and strategic value of the Port of Rotterdam from an international stance. Since this report focuses on the strategic value of the Port of Rotterdam for the Netherlands, this aspect will only slightly be touched upon here. The largest steel producer of Germany, ThyssenKrupp, is highly dependent on the Port of Rotterdam for its supply of coals and ores; to such an extent that an interruption would have serious consequences. Secondly, the case illustrates the key role of a well-organized inland shipping sector in the logistic chain from the Port of Rotterdam to the Port of Duisburg, Europe’s largest inland shipping port. Thirdly, this case may provide a starting point for increasing strategic connectivity of companies in the Port of Rotterdam and elsewhere in the Netherlands with the Port of Duisburg. A further improvement of the organizational ability – aimed at innovation and renewal – to better utilize and expand the existing inland shipping connections between Rotterdam and Duisburg will enhance the strategic value of the Port of Rotterdam Diamond for the Netherlands.

**Box 4.20 – Developed international strategic connectivity through inland shipping with Duisburg: the ThyssenKrupp Veerhaven case**
- ThyssenKrupp Steel is the largest steel producer of Germany (with a production of roughly 11 million metric tonnes and around 36,000 employees in 2009) and it belongs to the 10 largest steel producers in the world.
- Being a shipping forwarding agent in the Ports of Rotterdam, Amsterdam, Vlissingen/Terneuzen (Zeeland Seaports), Antwerpen and Gent, ThyssenKrupp Veerhaven (around 170 employees) – a leading push-tow shipping company – takes care of the supply of dry bulk (roughly 22 million metric tonnes a year), especially coals and ores, to the blast furnaces/harbours of ThyssenKrupp Steel in Schwelgern/Duisburg. The Veerhaven fleet returns nearly empty; all raw materials need to be delivered ‘just-in-time’.
- Approx. 90-95% of the sea import (from, among others, Brazil and Australia) that is designated for the blast furnaces in Duisburg call at the Port of Rotterdam because of its water depth, hinterland connection and infrastructure.
- From the steel factories of ThyssenKrupp Steel, the inland Port of Duisburg is an excellent hub for the transit of semifinished and finished goods for, among others, the automotive, white goods and elevator industry.

Another illustrative example of international strategic connectivity accomplished by market parties is the connectivity with the Port of Antwerp. The Port of Rotterdam is connected with (petro)chemical- and refinery complexes in the Port of Antwerp through, among others, pipelines for oil- and chemical products.

**Conclusion of the third qualitative contribution: the strategic value of international strategic connectivity**

The international strategic connectivity of the Port of Rotterdam through interorganizational involvement of the Port of Rotterdam Authority in foreign ports and other logistic hubs abroad is still developing. In any case, international strategic connectivity of the Port of Rotterdam is – as demonstrated by, for instance, the Port of Sohar (Oman) case – very important for the strategic value for the Netherlands. Also the recent cooperation agreements of the Port of Rotterdam Authority with the Chinese Port of Nangang, Qatar Petroleum-RLC and with Vietmarine (Vietnamese government company involved in port activities) illustrate this. The ThyssenKrupp Veerhaven case shows that the Port of Rotterdam is also of strategic value for Germany. In addition, this case is a good example of the efforts of market parties to initiate strategic connectivity (in this case with Duisburg, the largest inland port of Europe).

A further increase in the international strategic connectivity, also with ports in the hinterland (such as the inland Port of Duisburg) is very important for the strategic positioning of the Port of Rotterdam and for increasing the strategic value of the Port of Rotterdam for the Netherlands.

### 4.6 – Conclusions: the strategic value of the Port of Rotterdam for the Netherlands in 2010

In this chapter, the strategic value of the Port of Rotterdam for the Netherlands in 2010 has been examined. The first findings are summarized in an Overall Fact Sheet; see Box 4.21. The first part of the strategic value, the quantitative part, pictures the economic importance of the Port of Rotterdam. The second part provides indications on the contributions of the Port of Rotterdam Diamond to the international innovation-driven competitiveness of the Netherlands. This part, the so-called qualitative part of the strategic value for the Netherlands, consists of three contributions. Finally, a first indica-
tion is given of the (quantitative) effect of the qualitative part of the strategic value on the value added of firms in the Netherlands outside the Port of Rotterdam.

**Box 4.21 – Framework Overall Fact Sheet of the Strategic Value of the Port of Rotterdam for the Netherlands in 2010**

<table>
<thead>
<tr>
<th>Quantitative part of strategic value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The economic importance of the Port of Rotterdam for the Netherlands</td>
</tr>
<tr>
<td>- Direct value added created: 15.5 billion euro</td>
</tr>
<tr>
<td>- Indirect value added created: 6.7 billion euro</td>
</tr>
<tr>
<td>- Direct port related employment: 90.000 persons</td>
</tr>
<tr>
<td>- Indirect employment: 55.000 persons</td>
</tr>
<tr>
<td>- Expected volume of investments: approx. 10 billion euro</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Qualitative part of strategic value</th>
</tr>
</thead>
<tbody>
<tr>
<td>First contribution to the Dutch Diamond: the influence of the determinants of competitiveness of the Port of Rotterdam on the international innovation-driven competitiveness of the Netherlands.</td>
</tr>
<tr>
<td>- Factor conditions: Unique contribution to the Dutch multimodal physical, transport, knowledge and energy infrastructure.</td>
</tr>
<tr>
<td>- Demand conditions: Large multinational firms in the Port of Rotterdam challenge innovations in infrastructure, clusters of industries and knowledge in the Netherlands.</td>
</tr>
<tr>
<td>- Related and supporting industries: The Port of Rotterdam provides the Netherlands with unique clusters of industries containing world players.</td>
</tr>
<tr>
<td>- Context for firm strategy, structure and rivalry: Unique contribution to the Dutch context for stimulating business sophistication and innovation, corporate headquarter locations, strategic connectivity and competition.</td>
</tr>
</tbody>
</table>

| Second contribution to the Dutch Diamond: the influence of strategic connectivity of the Port of Rotterdam with other Dutch ports and logistic hubs on the international innovation-driven competitiveness of the Netherlands. |
| - Impact of national strategic connectivity on the Dutch Diamond: Difficult to substitute, i.e. unique, growing and already strongly positive impact on the Dutch Diamond, in particular regarding improvement of specialization and integration of knowledge and logistics chains in the Netherlands and of domestic competition and innovation. |

| Third contribution to the Dutch Diamond: the influence of strategic connectivity of the Port of Rotterdam with foreign ports and other logistic hubs abroad on the international innovation-driven competitiveness of the Netherlands. |
| - Impact of international strategic connectivity on the Dutch Diamond: Difficult to substitute, i.e. unique, growing and already positive impact on the Dutch Diamond, in particular regarding the improvement of international knowledge and chain integration, specialization and innovation. |

| Indication of the effect of the qualitative part of strategic value. |
| - Effect of the qualitative part of strategic value for the Netherlands: The contribution of the Port of Rotterdam to the international innovation-driven competitive advantage of the Netherlands is estimated to be at least 6 billion euro of added value for firms located elsewhere in the Netherlands. |

The quantitative part of the strategic value (the economic importance) of the Port of Rotterdam for the Netherlands

The size of the direct value added and direct employment of the Port of Rotterdam is without question very large, see the upper part of Box 4.21. If these key indicators of the economic importance are examined in a purely quantitative manner, however, then this economic importance should be compared with other types of economic activities in the Netherlands. To this end, Box 4.22 compares the Port of Rotterdam with both the horeca and food industry in terms of direct value added and direct employment generated.

**Box 4.22 – Key indicators of economic importance: implications for the strategic value for the Netherlands?**

<table>
<thead>
<tr>
<th>Direct value added (x billion euro)</th>
<th>Direct employment (number of employees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port of Rotterdam</td>
<td>approx. 15.5</td>
</tr>
<tr>
<td>Horeca industry</td>
<td>approx. 9.1</td>
</tr>
<tr>
<td>Food industry</td>
<td>approx. 15.8</td>
</tr>
</tbody>
</table>

What stands out from this comparison is that the direct value added of the Port of Rotterdam is around 70% more than the value added of the horeca industry. And the value added of the food industry is slightly more than that of the Port of Rotterdam. Also, the direct employment generated by the Port of Rotterdam is far below that of the other two sectors. But what does this quantitative comparison of key indicators mean for the (relative) importance of the strategic value of
the Port of Rotterdam for the Netherlands? For instance, is the strategic importance of the Port of Rotterdam about 70% higher than that of the horeca industry and slightly less than that of the food industry?

The key message of this report is that the quantitative economic importance only provides insufficient understanding of the strategic value of the Port of Rotterdam for the Netherlands; it is not plausible, for instance, to assume that the strategic value of the Port of Rotterdam for the Netherlands would be 70% more than the strategic value of the horeca industry, and slightly less than the strategic value of the food industry for the Netherlands. Therefore, a new method has been developed in this report to assess the qualitative part of the strategic value of a sector, in this case the Port of Rotterdam. The main findings are summarized below.

The qualitative part of the strategic value of the Port of Rotterdam for the Netherlands in 2010

From the analysis it appears that, of the three distinguished contributions of strategic value creation for the Netherlands (see Box 4.21), the first contribution – i.e. the strategic value of the Port of Rotterdam Diamond for the four determinants of the Dutch Diamond and their interaction – is the largest. Both the national and international strategic connectivity of the Port of Rotterdam still seem to be in the initial phase of development. The national strategic connectivity, however, has advanced more than the international strategic connectivity, and therefore takes the second place in terms of the contribution to the innovation-driven competitiveness of the Netherlands.

The question can be raised whether the qualitative part of the strategic value of the Port of Rotterdam for the Netherlands yields more than the increase of the international competitiveness of the Netherlands? This question pertains to the effect of the qualitative part of the strategic value. In this sense, it can be argued that the competitiveness of companies elsewhere in the Netherlands is positively influenced; especially of those companies and branches where the determinant factor conditions for the import and export (as well as re-export) has a large impact on their competitiveness. Companies can create more value added products and services as a result of better factor conditions. This is possible due to, among others, lower import, export, inventory and transport costs. But advanced factor conditions also increase the ability of firms to competitively cope with and even anticipate (logistic) preferences of customers, leading to higher revenues. Hence, the qualitative part of the strategic value of the Port of Rotterdam for the Netherlands has as effect that the economic importance (value added and employment) of companies elsewhere in the Netherlands increases. This effect could be referred to as the effect on the value added and employment of companies elsewhere in the Netherlands thanks to the strategic contribution of the Port of Rotterdam, i.e. to the international competitiveness of the Netherlands.

A first and rough estimate of this effect could be obtained as follows (see also the end notes). The size of the Gross Domestic Product (market prices, 2008) in the Netherlands was 596 billion euro. The Port of Rotterdam produced 22.2 billion euro of direct and indirect value added (see Box 4.2). If an improvement in the international competitiveness of companies elsewhere in the Netherlands, thanks to the Port of Rotterdam (see Figure 3.2), would imply that their value added is – assume – at least around 1% higher, this results in roughly 6 billion euro of value added elsewhere in the Netherlands. This effect, then, is at least of the same order of magnitude as the indirect value added of the Port of Rotterdam. Box 4.23 provides a summary of the overall strategic value of the Port of Rotterdam for the Netherlands.

**Box 4.23 – Summary: the overall strategic value of the Port of Rotterdam for the Netherlands**

- The quantitative part of the strategic value, i.e. the economic importance, of the Port of Rotterdam in itself is large: the direct and indirect value added is 15.5 billion and 6.7 billion euro, respectively.
- The qualitative part of the strategic value of the Port of Rotterdam for the Netherlands is substantial (see e.g. Figure 4.3).
- The (quantitative) effect of the qualitative part of the strategic value on the international competitiveness – and, with that, on the value added and employment – of companies elsewhere in the Netherlands is important:
  - this effect is reflected in, among others, efficiency, innovations and the ability to better anticipate customer preferences, especially in import, export and re-export. This leads to lower costs and/or higher revenues, and hence to more value added. It is assumed that this is at least 1% (rough estimate) of the Dutch GDP (market prices). An alternative estimate, based on the effect on import, export and re-export, leads to a percentage that is twice as high (see the end notes);
  - a rough estimate of this quantitative effect is at least roughly 6 billion euro in 2008; in other words, at least of the same order of magnitude as the indirect value added of the Port of Rotterdam.
Box 4.23 (continued)

- Summary of the direct and indirect value added and of the effect of the qualitative part of the strategic value of the Port of Rotterdam for the Netherlands in 2010:
  - The direct value added created by firms in the Port of Rotterdam is 15.5 billion euro.
  - The indirect value added created by companies elsewhere that supply to firms in the Port of Rotterdam is 6.7 billion euro.
  - The contribution of the Port of Rotterdam to the international competitiveness of the Netherlands, as a result of which companies elsewhere in the Netherlands can create more value added, is estimated to be at least around 6 billion euro.
  - Total: 28.2 (15.5 + 6.7 + 6) billion euro, which is at least 4.7% of the Gross Domestic Product (GDP).
  - This means that the qualitative part of the strategic value of the Port of Rotterdam increases the overall strategic value for the Netherlands with around 30% compared to the so-far reported economic importance of the Port of Rotterdam.

Spider diagram of the indicative strategic value of the Port of Rotterdam for the Netherlands in 2010

The quantitative and the qualitative parts of the strategic value of the Port of Rotterdam for the Netherlands can be shown not only by a Fact Sheet (see Box 4.21), but by a so-called spider diagram as well. The spider diagram in this report (see Figure 4.3) consists of seven axes; the first (vertical) axis represents the quantitative part of the strategic value (which has been given a score of 4.5), while the other six axes each represent a qualitative part of the strategic value.

The relative scores on the axes 2 to 7 indicate – based on the analyses – that the determinant factor conditions has, in comparison with the other three determinants of international competitiveness, the largest contribution; here given an estimated indicative score of 3.5. The contribution of the determinant demand conditions and that of the determinant related and supporting industries have been assumed to be equal, but clearly lower than the score on the factor conditions; here, they have been given an estimated indicative score of 2.0. The contribution of the fourth determinant, the context for firm strategy, structure and rivalry, is estimated to be slightly lower (with an estimated indicative score of 1.5) than the two determinants just mentioned; one reason for this is that available study results have indicated that strong internal competitive dynamics are still missing in the Port of Rotterdam. The contribution of the strategic connectivity in the Netherlands (axis number 6) is estimated to be higher (given an indicative score of 2.0) than that of the international strategic connectivity (axis number 7; given an indicative score of 1.5); analyses show that the strategic connectivity within the Netherlands is clearly further advanced than the latter.

Figure 4.3 – Spider diagram of the indicative strategic value of the Port of Rotterdam for the Netherlands in 2010
We would like to emphasize that the (scores of the) qualitative strategic contributions, such as the contributions of each of the four determinants, cannot be added up to produce one measure of the strategic value of the Port of Rotterdam for the Netherlands. What a spider diagram can do, however, is to provide an indication of the relative contributions of the various parts of the strategic value.

**Baseline measurement of the current strategic value and the assessment over 5 years**

Figure 4.3 offers the possibility to – in addition to the Overall Fact Sheet Strategic Value (see Box 4.21) – periodically map the strategic value of the Port of Rotterdam for the Netherlands. The changes in this strategic value, reflected by changing scores on the seven axes, can basically be compared with the indicative scores for the year 2010. In that sense, the indication of the strategic value for 2010 functions as a so-called baseline measurement.

If in the next five years the strategic connectivity of the Port of Rotterdam in the Netherlands as well as internationally further increases, this will lead to higher scores on the axes 6 and 7 in Figure 4.3. The same applies to further improvements in the four determinants, with which higher indicative scores can be attained on the axes 2 to 5. Both strategies lead to a further increase of the qualitative part of the strategic value of the Port of Rotterdam for the Netherlands. The quantitative effect of that increase will, in turn, increase as well.

Finally, it should be noted that the economic importance of the Port of Rotterdam (measured here in value added, employment and investments) provides a view, like a photo, on what has been realized in a particular year. The strategic value of the Port of Rotterdam for the Netherlands, on the contrary, provides a view, as it were a panorama, of the possibilities for Dutch companies to benefit from the contribution of the Port of Rotterdam to the international competitiveness of the Netherlands. The utilization of those possibilities (the realization) will usually stay behind the full range of possibilities created by the qualitative part of the strategic value.

### 5 HOW TO INCREASE THE STRATEGIC VALUE OF THE PORT OF ROTTERDAM BY THE PORT OF ROTTERDAM AUTHORITY? THE FRAMEWORK FOR THE STRATEGIC BALANCE

#### 5.1 - Introduction

The previous sections of this report have provided a better understanding of the strategic value of the Port of Rotterdam for the Netherlands. In this chapter, the question is addressed how this strategic value can be further increased by the Port of Rotterdam Authority. For that, a strategic balance – an extension of the economic balance – is needed to assess which current and possible future activities in, or related to, the Port of Rotterdam (will) contribute more or less, or ‘add more or less weight’, to this strategic value. In this way, long-term decisions with regard to, for example, the allocation of port sites (and commercial real estate) and investments in the infrastructure can be evaluated. In Box 5.1, the currently used (business) economic balance is compared to the newly developed strategic balance. The economic importance is included in the strategic balance as it forms part of the quantitative component of this balance. Besides the partial overlap, the strategic balance and the economic balance have a different focus and (partly) use different decision criteria.

**Box 5.1 – Comparison of the existing (business) economic and newly developed strategic balance for the Port of Rotterdam Authority for evaluating strategically comparable alternative options in long-term decision-making**

- **Economic balance:**
  - **Focus:** on quantifiable expected revenues and costs of an alternative option.
  - **Criterion:** mainly the expected returns for the Port of Rotterdam Authority and the economic importance.
  - **Advantage:** good comparability by applying existing methods.
  - **Disadvantage:** underexposes the strategic value of an alternative option for the Port of Rotterdam and its use of scarce resources.

- **Strategic balance:**
  - **Focus:** on the quantitative (the economic importance) and qualitative part of the strategic value of an alternative option.
  - **Criterion:** strategic value, i.e. the contribution of an alternative option to the international innovation-driven competitiveness of the Netherlands.
Box 5.1 (continued)
- **Advantage:** captures the qualitative part of the strategic value for the Netherlands as well as the use of scarce strategic resources (for the Port of Rotterdam Authority), and supports the strategic positioning of the Port of Rotterdam.
- **Disadvantage:** no current method(s) available so far.

- The economic and (qualitative part of the) strategic balance complement each other.

This chapter will further elaborate on the strategic balance. To that end, first the principle of the strategic balance is explained. Next, the weighing of strategically comparable alternative options by means of this balance is clarified and then demonstrated through an illustrative case. Finally, implications for the Port of Rotterdam Authority are discussed.

### 5.2 – The principle of the strategic balance

The strategic balance offers the Port of Rotterdam Authority the opportunity to evaluate (strategically comparable) alternative options by assessing possible differences in their strategic value for the Netherlands and in their use of scarce resources that are strategically important for the Port of Rotterdam Authority. An illustrative case would be a choice that has to be made between two or more customers for the allocation of the same port site; these customers need to be compared with each other. More generally put, the strategic balance compares alternative options. An ‘alternative option A versus alternative option B’ comparison could, therefore, also pertain to, for instance, alternative options to reduce the congestion on the A15 highway in the Port of Rotterdam. In this example, an improvement of the traffic management of and around the A15 (option A) could be weighed against an improvement of modal split activities to relieve this congestion (option B). Within this case of the congestion problem, the mentioned alternative options are strategically comparable.

Yet another example is the trade-off between various forms of cooperation. For instance, the Port of Rotterdam Authority could intensify the strategic cooperation with multiple Dutch as well as foreign ports. Which of these alternative options or combination of options offers the most strategic value for the Netherlands, taking into account their expected use of scarce resources that are strategically important for the Port of Rotterdam Authority?

Basically, the strategic value is operationalized in the same way as shown in chapter 4 (see Box 4.1): in a quantitative and a qualitative part. The quantitative part refers to the economic importance of alternative options in terms of, among others, value added, employment and investments. The qualitative part includes the influence of alternative options on the determinants of the innovation-driven competitiveness of the Netherlands; see Box 5.2.

### Box 5.2 – What measures the strategic balance: the strategic value side

- The quantitative part of the strategic value for the Netherlands of an alternative option; e.g. direct and indirect value added, direct and indirect employment, investments (as in the Havenmonitor 2008).
- The qualitative part of the strategic value for the Netherlands of an alternative option; see the Triple Strategic Value Contribution Framework (Figure 3.2).
- The Overall Fact Sheet provides an overview of the quantitative and qualitative part of the strategic value (see Box 4.1).

### The use of strategic resources

In the trade-off between (strategically comparable) alternative options by the Port of Rotterdam Authority it is not just the strategic value of these options that needs to be evaluated. As stated above, also the use of strategic resources by choosing for these alternative options needs to be taken into account. The **use of strategic resources** is defined as: the (expected) utilization by an alternative option of scarce resources that are alternatively usable by the Port of Rotterdam Authority. In the (business) economic balance, financial resources are perceived as the prominent scarce, alternatively usable, resources. For a strategic approach, however, multiple types of scarce, alternatively usable, resources are important to take into account. In this report, we limit ourselves to five types: (1) the natural environment, (2) transport capacity and (3) space, as well as the Port of Rotterdam Authority’s (4) financial and (5) management resources.

For example, the use of space is important as space in the Port of Rotterdam is scarce and alternatively usable. Two alternative options of comparable strategic value could differ in the extent they (would) utilize (in square meters) and
make effective use of port site space. The effectiveness of the use of port site space could be measured by various indicators, such as the value added per square meter.

The same applies to the use of the natural environment; alternative options can differ in, for instance, CO₂ emissions and noise pollution. The Rotterdam Climate Initiative is aiming for a 50% reduction in CO₂ emissions per sector in 2025 in comparison with 1990. This also applies to companies in, for example, the energy generating industry in the Port of Rotterdam. Looking at the traffic congestion issues in and around the Port of Rotterdam, it becomes apparent that it is also relevant to take into account the use of the transport capacity, or transport resources. Alternative options can differ in the use of the transport modalities road, rail, coastal and inland shipping, air and pipeline. Usage of the road infrastructure ‘seizes’ more of the transport resources than inland shipping transport. Mercedes-Benz announced at the end of 2010 that its freight transport from the region of Stuttgart will be largely shifted from road to rail and inland shipping. This illustrates the fact that, among others, many large international firms have started to come up with an innovative use of the available transport capacity.

A strongly underexposed strategic resource of firms, especially in the scientific literature, is management capacity (or management resources). Research on the decisive factor for autonomous growth of firms revealed management as key resource. This also applies to the Port of Rotterdam Authority. If two alternative options would strongly differ from each other in terms of attention and effort of the management in the strategic decision-making process, then this provides insights in the different use of management resources. Box 5.3 summarizes important aspects of strategic resources.

**Box 5.3 – What measures the strategic balance: (the side of) the use of strategic resources**

- The use of strategic resources by alternative options means: the utilization by those alternative options of scarce resources that are alternatively usable by the Port of Rotterdam Authority.
- At least five types of scarce, alternatively usable (by the Port of Rotterdam Authority) strategic resources can be distinguished that can be used by an alternative option: the (1) natural environment, (2) transport capacity, (3) port site space, (4) financial resources of the Port of Rotterdam Authority and (5) management resources of Port of Rotterdam Authority.
- The use of strategic resources by an alternative option is not estimated for one particular year, but qualitatively over a period of time (as is also the case with the strategic value side).

**Weighing up strategically comparable alternative options**

The strategic balance needs to be used ‘relatively’ by weighing up or comparing alternative options in terms of their strategic contribution. Hence the strategic balance is not used for evaluating just one particular option, but for evaluating two or more alternative options in comparison with each other. In case one particular option would be evaluated, the strategic value and use of strategic resources – and, with that, the strategic contribution – of just that option would be measured; and this does not really tell how this option would score with regard to a, strategically comparable, alternative utilization of resources. Figure 5.1 illustrates how two alternative options for the Port of Rotterdam Authority can be weighed up against each other.

**Figure 5.1 – Evaluation of strategically comparable alternative options ‘A’ and ‘B’ with the strategic balance**

For important alternative options, the strategic value for the Netherlands is assessed and, taking into account the use of strategic resources for the Port of Rotterdam Authority, also its net strategic contribution. Before elucidating the means by which the strategic value, the use of strategic resources and the strategic contribution of alternative options is deter-
mined, a further clarification is provided on the selection of strategically comparable alternative options to be evaluated with the strategic balance; see Box 5.4.

**Box 5.4 – Strategically comparable alternative options for the Port of Rotterdam Authority**

- Strategically comparable alternative options: options that are, from a strategic perspective, alternative utilizations of scarce resources that are alternatively usable by the Port of Rotterdam Authority. These resources include, at least, the (1) natural environment, (2) transport capacity, (3) port/commercial site space, (4) financial resources of the Port of Rotterdam Authority, and (5) management resources of the Port of Rotterdam Authority.
- A strategic comparison of alternative options can imply:
  - a strategic comparison between two or more new customers ‘competing’ for the same location in the Port;
  - a strategic comparison between new and existing customers;
  - a strategic comparison between existing customers;
  - a strategic comparison of two or more investment options;
  - a strategic comparison of different forms of cooperation with other ports (or port authorities);
  - a strategic comparison of two different market segments;
  - a strategic comparison of alternative destinations of new and existing locations.
- Example: the strategic balance could be used for comparing alternative options aimed to strengthen the role of the Port Authority to influence, respectively, road, coastal and inland shipping and rail transport.
- The time period chosen for (weighing up) the alternative options needs to be similar; it could be considered also to use a period of e.g. 5 to 10 years to take account of follow-up developments.
- A strategic comparison can relate to both realized decisions (‘ex post’) and upcoming decisions or future scenarios (‘ex ante’), e.g. in context of the port vision. A successful ex post case can serve as a benchmark for alternative options.

**5.3 – Evaluation of alternative options**

The method of evaluation of alternative options is illustrated in Box 5.5. The illustrative example is related to arrow (1) in Figure 3.2. This may represent an imaginary case of two firms, ‘A’ and ‘B’, that both want to have the same site in the Port of Rotterdam for carrying out their business activities; the Port of Rotterdam Authority can only allocate the port site to one firm and has to make a well-reasoned decision based on, among others, the (expected) contribution of both options to the innovation-driven international competitive advantage of the Port of Rotterdam and the Netherlands. Such a strategic comparison of ‘option A versus option B’ could also be interpreted in a broader sense as, for instance, two existing customers, operating in the same market segment, that want to expand their operations; this also leads to alternative options for the Port of Rotterdam Authority.

Based on a period of, for instance, 5 to 10 years, reasoned estimates should be made of the scores of alternative option A relative to alternative option B with regard to (parts of) the economic importance and the contribution to each of the determinants of the Dutch Diamond. Also the score on the use of strategic resources for the Port of Rotterdam Authority needs to be investigated; here, a score of 1 compared to a score of 2 would indicate a lower use of strategic resources. Subsequently, as shown is Box 5.5, on each (horizontal) row the score of option A is reduced with the score of option B. In the illustrative example, option A scores higher than B on employment but lower on value added, while both options score the same in terms of investments. In case it has been decided to give equal weight to these three key indicators of economic importance, the conclusion would be that option A and B do not differ in terms of economic importance.

However, the contributions of both options to the determinants differ considerably. Compared to option B, option A scores higher on the contribution to both the factor and demand conditions, lower on the contribution to the third determinant, and the same on the contribution to the context of firm strategy, structure and rivalry. In case it has been decided to give equal weight to all four determinants, option A would score higher on the qualitative part of the strategic value than option B. The overall use of strategic resources by option A is, despite its relatively higher use of financial resources of the Port of Rotterdam Authority, substantially lower than is the case for option B (a score of 10 versus 13); the lower this score on the use of strategic resources, the more positive the strategic contribution (the strategic value minus the use of strategic resources). Also if the use of the natural environment and transport capacity would, for instance, have two times more weight for the strategic value than the use of the other strategic resources, it would turn out that, overall, option A uses less of the strategic resources than option B. Hence in the illustrated case depicted in Box 5.5, option A scores overall higher than option B. In other words: its strategic contribution is higher than that of B.
Box 5.5 – Illustrative example: trade-off of the strategic contribution of alternative options A and B by means of the strategic balance

<table>
<thead>
<tr>
<th>Quantitative part of the strategic value of the option</th>
<th>Score option A</th>
<th>Score option B</th>
<th>Prioritization: score A minus score B</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Employment</td>
<td>★★★★★</td>
<td>★★★★★</td>
<td>+1</td>
</tr>
<tr>
<td>- Value added</td>
<td>★★★★★</td>
<td>★★★★★</td>
<td>-1</td>
</tr>
<tr>
<td>- Investments</td>
<td>★★★★★</td>
<td>★★★★★</td>
<td>0</td>
</tr>
<tr>
<td>Qualitative part of the strategic value of the option</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Factor conditions</td>
<td>★★★★</td>
<td>★★★★</td>
<td>+2</td>
</tr>
<tr>
<td>- Demand conditions</td>
<td>★★★★</td>
<td>★★★★</td>
<td>+2</td>
</tr>
<tr>
<td>- Related and supporting industries</td>
<td>★★★★</td>
<td>★★★★</td>
<td>-2</td>
</tr>
<tr>
<td>- Context for firm strategy, structure and rivalry</td>
<td>★★★★</td>
<td>★★★★</td>
<td>0</td>
</tr>
</tbody>
</table>

| Use of strategic resources by the option                |                |                |                                       |
| - Use of the natural environment                        | ★★★★★          | ★★★★★          | -1*                                   |
| - Use of the transport capacity                         | ★★★★          | ★★★★          | -1                                    |
| - Use of the port site space                            | ★★★★          | ★★★★          | 0                                     |
| - Use of financial resources                            | ★★★★          | ★★★★          | +1                                    |
| - Use of management resources                           | ★★★★          | ★★★★          | -2                                    |

Strategic contribution of alternative option A in comparison with option B:

Option A scores higher than alternative option B

*A score of -1 (concerning the use of strategic resources) means that option A imposes less burden on this strategic resource than option B.

Box 5.6 extends the illustrative example above by including also the business economic balance. Based on the strategic balance, option A scores higher in Box 5.5 than option B. In Box 5.6 it is assumed that on the business economic balance, option B scores higher than A owing to a 1.5 percentage-point higher return per year for the Port of Rotterdam Authority. Hence in this example, option A has a relatively higher strategic value for the Netherlands and a more modest use of strategic resources that are alternatively usable by the Port of Rotterdam Authority. Option B, on the other hand, leads to a higher return for the Port of Rotterdam Authority. In comparison with option B, option A imposes less burden on the natural environment and the transport capacity. Moreover, option A demands less management resources. However, this option does require more financial resources of the Port of Rotterdam Authority.

Box 5.6 – Comparing option A and B [period of analysis of e.g. 10 years]

- **Business economic balance:**
  - Expected returns/yield for the Port of Rotterdam Authority: option B scores 1.5% higher than A.
  - Strategic balance (see Box 5.5):
    - Quantitative part strategic value: option A and B have a similar score.
    - Qualitative part strategic value: option A scores higher than B.
    - Use of strategic resources: option A imposes less burden on strategic resources than B.
    - Trade-off on strategic balance: option A has a larger strategic contribution than B.

Based on this type of analysis, the Port of Rotterdam Authority can conduct negotiations with customers in a more integral manner. For example, in the pre-decision-making phase regarding the case of customer A versus B, the Port of Rotterdam Authority could point out to customer B that it imposes a relatively large burden on the strategic resources and that its contribution to the factor conditions is relatively limited. Such an analysis enables requesting this customer to consider alternatives in its conduct of business in order to increase the company’s strategic contribution. This could also result in contract conditions and tariffs for customers aimed at increasing the strategic contribution. The ‘greenest’ ships already receive a discount on port tariffs. Extending the same logic, firms that score well and keep scoring well in terms of a limited burden on strategic resources such as the natural environment (the ‘least’ CO₂ emissions), transport capacity (promoting modal split and cargo bundling; decreasing congestion) and space (the ‘most’ value added per square meter), should be eligible for (more) favourable tariffs/conditions. In the international tendering procedure for sites on Maasvlakte 2, the score on sustainability has already been taken into account.
5.4 – Evaluation of strategic options with regard to the increase of (inter)national strategic connectivity

The illustrative example in Box 5.5 is related to alternative options within the Port of Rotterdam. The procedures for evaluating alternative options to increase the national and/or international connectivity, however, are rather similar. To illustrate this, consider the following example regarding national connectivity: if the design of the strategic connectivity of the Port of Rotterdam with Zeeland Seaports is investigated, this option could be compared with, for example, the further development of the existing relation with the Port of Amsterdam. For both alternative options it would then be analyzed how, and to what extent, each of these options would strengthen the determinants of the Port of Rotterdam Diamond, what their implications are for the use of strategic resources, and what the nature of the strategic connectivity is (e.g. the influence on the network; hub and broker functions). The existing relation with the Port of Amsterdam could also serve as a ‘benchmark’, on the basis of which one can learn about, among others, the success factors and pitfalls in designing the strategic connectivity with Zeeland Seaports.

The following example illustrates the application of the strategic balance to international connectivity decisions. The current option of creating strategic connectivity with the Port of Duisburg could be compared with an alternative option, such as the creation of strategic connectivity with a port outside the EU, for instance in Latin America. Choosing for the Duisburg option means investing in the transport of cargo to the hinterland of Rotterdam. Approximately 10% of the total freight transport from Rotterdam to the hinterland already goes by inland shipping and railway through the intermodal hub of Duisburg. The option to invest in strategic connectivity with a port in Latin America, on the other hand, would be especially valuable for, among others, increasing and maintaining future goods flows to the Port of Rotterdam. Also in this case both alternative options should be evaluated in terms of their strengthening of the determinants of the Port of Rotterdam Diamond and the implications for the aforementioned strategic resources. The option that scores the highest on the strategic balance provides the largest strategic contribution to the international innovation-driven competitiveness of the Netherlands.

5.5 – Conclusion

Complementary to the quantitative business economic balance that weighs the business economic/financial importance of alternative options, the strategic balance offers the possibility to assess their (relative) strategic value for the Netherlands and, on the other hand, their use of scarce strategic resources (such as the natural environment and transport capacity). With that, the Port of Rotterdam Authority possesses a more elaborated instrument for long-term strategic decision-making, also with regard to, for example, the development of scenarios and visions.

By using the strategic balance for such decision-making, but also for the analysis of the impact of different scenarios in the vision development process, the central focus will be on the strategic contribution to the international innovation-driven competitiveness of the Netherlands. This contributes not only to strategic renewal and innovation, but also to a further increase in support and, with that, to maintaining the ‘license’ of the Port of Rotterdam to operate and grow. Over time this will help to attain a strategic positioning towards a more strategically connected (nationally as well as internationally), ambidextrous, green and innovation-driven Port of Rotterdam that also contributes to the international competitiveness of the Netherlands.

6 SUMMARY AND CONCLUSIONS

The economic importance has been central in discussions about the importance of ports and industrial complexes, such as the Port of Rotterdam. This is manifested in the use of quantitative performance indicators, such as the transhipment volumes, R&D expenditures, employment and value added. In this report, the importance of the Port of Rotterdam for the Netherlands is complemented by – for the first time – examining its strategic importance, or strategic value, for the Netherlands. Such a strategic perspective explicitly emphasizes, unlike the quantitative performance-indicators, innovative and competitive dynamics. To that end, the international innovation-driven competitiveness of the Netherlands has
been chosen as an external benchmark for determining the degree in which strategic value is added. An existing scientific framework, the so-called Diamond Framework, provides a useful basis for this and has been adjusted to this purpose, contributing to the answering of the two main research questions addressed in this report; see Box 6.1.

**Box 6.1 – Main research questions addressed in this report**

- Two main research questions:
  1. How can the strategic value of the Port of Rotterdam for the Netherlands (including a first indication for 2010) be determined?
  2. How can the strategic value of the Port of Rotterdam for the Netherlands be increased by the Port of Rotterdam Authority by using a strategic balance?
- These two research questions make it possible to address a third, related question:
  3. What are the possible implications of increasing the strategic value for the strategic positioning of the Port of Rotterdam?

### 6.1 – Conclusion first research question

In three ways a contribution has been made to answer the first main research question. Firstly, by making a distinction between a quantitative part (i.e., the economic importance) and a qualitative part of the strategic value. Secondly, by having developed a method to illustrate and provide insight into the qualitative part. And thirdly, by its application: providing a first indication of the strategic value of the Port of Rotterdam for the Netherlands in 2010. Based on the findings, three conclusions can be formulated: one about the strategic value in 2010, one about how this strategic value can be increased in the future, and the third about the role of the government and the existing rules and legislation. Box 6.2 provides an overview of these conclusions.

**Box 6.2 – Conclusions: the strategic value of the Port of Rotterdam for the Netherlands**

- The strategic value of the Port of Rotterdam for the Netherlands is large due to its significant contribution to the international innovation-driven competitiveness of the Netherlands:
  - The quantitative part of the strategic value (i.e., the economic importance) of the Port of Rotterdam is – based on the most recent data – substantial, considering quantitative indicators such as the direct and indirect added value (approx. 22 billion euro) and direct and indirect employment (145,000 persons).
  - The qualitative part of the strategic value of the Port of Rotterdam in 2010 shows both a large contribution of the Port of Rotterdam Diamond (in particular of the determinant factor conditions) and increasing contributions through national and international strategic connectivity of the Port of Rotterdam to the Dutch Diamond (i.e., to the international innovation-driven competitiveness of the Netherlands).
  - The (quantitative) effect of the qualitative part of the strategic value of the Port of Rotterdam on the employment and value added of companies elsewhere in the Netherlands is substantial. A rough estimate indicates that this effect amounts (at least) to roughly 6 billion euro (see Box 4.23), which increases the overall strategic value for the Netherlands with around 30% in comparison with the so-far reported economic importance.
- The strategic value of the Port of Rotterdam for the Netherlands can be further increased by:
  - improvement of the determinants and of the dynamics, competition and innovation in the Port of Rotterdam Diamond;
  - improvement of the strategic connectivity of the Port of Rotterdam with Dutch and foreign ports and other logistic hubs.
- The government and legal and regulatory requirements take insufficiently into account the necessity to timely facilitate developments aimed at strengthening the (international) competitive position of the Port of Rotterdam. Insight in the importance of the strategic value of the Port of Rotterdam for the Netherlands should change this.

### 6.2 – Conclusion second research question

The second research question addressed in this report is how the strategic value of the Port of Rotterdam for the Netherlands can be increased by the Port of Rotterdam Authority. To provide an answer to this question, the concept of the strategic balance has been developed. This instrument can be used for weighing, or evaluating, alternative options (such as choosing between different market segments in the allocation of new sites in the Port of Rotterdam) not only on business economic principles, but also with regard to their strategic value and use of scarce strategic resources. The strategic value of an alternative option is basically determined in the same way as in answering the first research question. The use of strategic resources by an alternative option refers to the utilization of, or burden on, alternative usable scarce resources for the Port of Rotterdam Authority. These resources include, at least, the natural environment, transport capacity and port/commercial site space as well as financial resources and management resources of the Port Authority.

Based on the findings, two conclusions can be formulated; see also Box 6.3. Firstly, that a complementary instrument – the strategic balance – is needed to realize, besides the business economic trade-off, a trade-off concerning the strategic
value for the Netherlands. And secondly, that the use of the strategic balance contributes to both the increase of support by stakeholders of the Port of Rotterdam and the strategic positioning of the Port of Rotterdam over time.

Box 6.3 – Conclusions: how to increase the strategic value of the Port of Rotterdam by the Port of Rotterdam Authority?

- To determine differences of two or more strategically comparable alternative possibilities (options) regarding their strategic value for the Netherlands, the Port of Rotterdam Authority needs – besides the existing business economic criteria such as return on investment – the strategic balance as complementary instrument:
  - the strategic balance compares the strategic value of alternative options for the Netherlands with the associated use of strategic resources, i.e. the utilization of (or burden on) alternatively usable scarce resources for the Port of Rotterdam Authority.
- Use of the strategic balance:
  - enlarges the support (license to operate and grow) of stakeholders of the Port of Rotterdam as, besides the strategic value for the Netherlands, also the use of strategic resources (e.g. the natural environment, transport capacity and space) is weighed;
  - contributes over time to the strategic positioning of the Port of Rotterdam in which an innovative use of the natural environment, transport capacity and space is put central.

6.3 – Conclusion regarding the implications for the strategic positioning of the Port of Rotterdam

Paying attention to the two research questions (see Box 6.1) has implications over time for the vision development and the strategic positioning of the Port of Rotterdam. In other words: how to compete in the long term. For instance, a focus on strategic value for the Netherlands means that innovation and competitive dynamics are becoming more central as features of the strategic positioning of the Port of Rotterdam. And, with that, the development of a strategic positioning towards an Ambidextrous Port (focusing on both efficiency and innovation). This development will be strengthened by the increase in national as well as international strategic connectivity, by means of which a strategic positioning is realized that is more integrated in various chains and networks. On the basis of the used frameworks and findings, a number of conclusions can be formulated; see Box 6.4.

Box 6.4 – Conclusions: implications of a focus on strategic value for the Netherlands and of the use of the strategic balance by the Port of Rotterdam Authority for the strategic positioning of the Port of Rotterdam

- The strategic positioning indicates how to compete in the long term; the associated competitive characteristics are influenced by focusing on the strategic value for the Netherlands and by using the strategic balance.
- Over time, a focus on the strategic value for the Netherlands leads to:
  - more attention to the international innovation-driven competitiveness and the corresponding strategic positioning as ‘Ambidextrous Port’: bilateral focus on both efficiency and innovation;
  - an increase of the national and international strategic connectivity of the Port of Rotterdam and, through that, to a strategic positioning that is more integrated in chains and networks of the port.
- Over time, the use of the strategic balance and, with that, a focus on strategic value in relation to the use of (or burden on) strategic resources for the Port of Rotterdam Authority leads to:
  - environmental gains and, because of that, to a more ‘green’ positioning of the Port of Rotterdam;
  - a more intelligent organization and a more effective utilization of the multimodal transport and (port) site capacity and, therefore, to a positioning in terms of maintaining accessibility and flexibility during continuous growth of the Port of Rotterdam.

The Port of Rotterdam Authority should be dedicated towards the development of an Ambidextrous Port: a port and industrial complex with a bilateral focus on both efficiency, or exploitation (i.e., focus on improving existing products and services for existing markets), and innovation, or exploration (i.e., focus on new products, services and markets). Previous research has demonstrated that in fast changing environments with significant competitive dynamics, of which a world port is an excellent example, ‘ambidextrous’ firms and organizations are better able to adapt and therefore have more chances of survival and better performances. Also, ambidextrous organizational structures and management processes are more difficult to imitate by competitors, leading to a competitive position that is better defendable over time.

Also the use of the strategic balance has implications over time for the strategic positioning. For example, taking account of the use of (or burden on) strategic resources such as the natural environment will lead to the development of a more ‘green’ positioning. Consistently taking into account the use of transport capacity and the utilization of (port site) space – also in the contract conditions of firms in the Port of Rotterdam – will lead to maintaining and the improvement of the accessibility and flexibility of the Port of Rotterdam in times of, as expected in various scenarios, continued growth.
Based on the analyses, findings, interviews and the conclusions in the previous chapter, various recommendations are formulated here. These recommendations are grouped according to the research questions referred to in Box 6.1. Besides, multiple recommendations are formulated with regard to the management and organization of the Port of Rotterdam Authority.

### 7.1 – Recommendations with regard to the strategic value of the Port of Rotterdam for the Netherlands

The most important recommendation for the preservation and further increase of the strategic value of the Port of Rotterdam for the Netherlands is the continuous enhancement of the Port of Rotterdam Diamond. This occurs through improvement of the four determinants aimed at, among others, the increase of internal competition, dynamics and innovation. To this end, also the increase in strategic connectivity within the Port of Rotterdam (see Box 4.13) is important.

Following the logic of the Triple Strategic Value Contribution Framework, a second recommendation is to further increase the national strategic connectivity of the Port of Rotterdam (i.e., with ports and other logistic hubs in the Netherlands). In particular, increasing the strategic connectivity with inland shipping ports and inland terminals deserves more attention. In doing so, transport by inland waterways will be stimulated while the share of road transport in the total surface traffic movement, and (hence) the burden on the natural environment, will be decreased. The third recommendation is to speed up the international strategic connectivity (with foreign ports and other logistic hubs abroad). As appears from the analyses, this third recommendation – in combination with the previous two recommendations – is in particular very important for the preservation and strengthening of the international competitive position of the Port of Rotterdam itself. Box 7.1 summarizes these recommendations regarding the strategic value of the Port of Rotterdam.

**Box 7.1 – Recommendations regarding the strategic value of the Port of Rotterdam for the Netherlands**

| (a) | Priority: the further improvement of the determinants of the Port of Rotterdam Diamond aimed at, among others, increasing competitive dynamics and innovation. |
| (b) | Accelerate the increase in national strategic connectivity of the Port of Rotterdam (with Dutch ports and other logistic hubs in the Netherlands), with special attention to inland ports and inland shipping terminals. |
| (c) | Accelerate the increase in international strategic connectivity of the Port of Rotterdam (with foreign ports and other logistic hubs abroad), with special attention to the hinterland of the Port of Rotterdam. |

### 7.2 – Recommendations with regard to increasing the strategic value by the Port of Rotterdam Authority by using the strategic balance

An important possibility to increase the dynamics in the Port of Rotterdam Diamond is provided by weighing the strategic value of the *existing activities*. Therefore, it is recommended to not use the strategic balance for weighing up only new activities. Since the Port of Rotterdam Authority is confronted with scarce resources – such as the natural environment, transport capacity and port site space – a periodic evaluation with regard to the strategic value of existing activities relative to the use of these activities of strategic resources for the Port of Rotterdam Authority is very important.

In decision-preparing and in decision-making documents about long-term issues, business economic criteria – up till now – have taken central stage. The strategic balance should receive the same attention in those documents, integrating both the business economic and the strategic assessment in the final decision-making. Moreover, it deserves attention to point to the strategic balance, as well as to its influence on decisions that are taken, in both the internal and external communication with stakeholders; just as the business economic balance has been developed and adjusted over time, such a process will be the same for the strategic balance. It is important to involve external stakeholders in this process as well, in particular governments. Such an involvement could result over time in an acceleration of decision-making trajectories of governments with regard to the Port of Rotterdam. Proactively taking into account the strategic value for the Netherlands as well as the use of strategic resources will speed up these decision-making trajectories of governments; see also Box 7.2.
### Box 7.2 – Recommendations regarding the increase of the strategic value of the Port of Rotterdam by using the strategic balance

(a) Not only use the strategic balance for new options, but use it for the evaluation of *existing activities* as well. By doing that, scarce strategic resources (e.g., the natural environment, transport capacity and space) are better utilized, resulting in improved dynamics, competition and innovation within the Port of Rotterdam. Also, the contract conditions could contribute to that end; the strategic balance could be used to formulate contract terms.

(b) Use the criteria of both the business economic and strategic balance in decision-preparing and in decision-making documents.

(c) Involve institutional stakeholders, governmental agencies in particular, in the further development of the strategic balance as a legitimate instrument for the long-term decision-making of the Port of Rotterdam Authority, aimed at making the decision-making processes of governments less time-consuming.

### 7.3 – Recommendations with regard to the strategic positioning of the Port of Rotterdam

Strategic positioning refers to the competitive characteristics: the features of how to compete on the long-term. An example of such a characteristic is the pursuit of increasing sustainability with regard to the natural environment (*‘green positioning’*); this has, for instance, already been reflected in the international tendering procedure for Maasvlakte 2, in which the score on sustainability has been explicitly taken into account. Another example of such a competitive characteristic is the pursuit of increasing strategic connectivity of the Port of Rotterdam with, among others, ports and other logistic hubs in the Netherlands and the inland ports in Europe (*‘integrated positioning’*). The long-term focus on the creation of strategic value for the Netherlands and the use of the strategic balance has an effect on the vision regarding the development of the Port of Rotterdam and on its strategic positioning (which will change compared to the current situation).

**Competitive characteristics** such as accessible, flexible, green, integrated and, in particular, innovation-driven will become more prominent. It is recommendable that these characteristics are not perceived as separated, but as *complementary*; mutually reinforcing each other. This implies that, for instance, being more sustainable with respect to environmental resources requires more innovation, leading to an increase in (multimodal) accessibility as well as flexibility. Becoming an *Ambidextrous Port* can facilitate this combination of competitive characteristics by aiming to achieve world-class efficiency and productivity while at the same time carrying through renewals and innovations.

To maintain its strong international competitive position, the distinctive capacity of that competitive position of the Port of Rotterdam is very important. This distinctive capacity will be less related to the scale of operations, efficiency and low costs; in other words, to be the ‘cheapest port’ for all market segments (*cost leadership*). Through the focus on strategic value of the Port of Rotterdam for the Netherlands by using the strategic balance, its distinctive capacity shifts more towards both *differentiation* (such as being the most accessible, flexible, green and integrated port and industrial complex of Europe) and *focus* (being focused on only a number of market segments, such as energy).

The Port of Rotterdam is not disconnected from the city of Rotterdam and its surroundings. The environment of the Port of Rotterdam plays a significant role in the workplace choice of employees and the location decisions of companies. The Port of Rotterdam Diamond is not spatially limited to the port area itself. For instance, port-related knowledge-intensive business service firms are mainly situated in the cities surrounding the Port of Rotterdam. Therefore, it is recommendable to increase the connectedness (or, in a broader sense, the strategic connectivity) between the Port of Rotterdam and the Rijnmond region including the city of Rotterdam. Preserving and attracting corporate headquarters – as illustrated by the establishment of Shell’s divisional head office Downstream in the city centre of Rotterdam as of December 2011 – as well as knowledge-intensive business service firms contributes to this connectedness.

Box 7.3 summarizes the aforementioned recommendations regarding the strategic positioning of the Port of Rotterdam.

### Box 7.3 – Recommendations regarding the strategic positioning of the Port of Rotterdam

(a) The use of the strategic balance and the focus on the strategic value for the Netherlands influences over time the competitive characteristics of the strategic positioning of the Port of Rotterdam. These competitive characteristics, such as accessible, efficient, flexible, green, innovation-driven and integrated, should mutually reinforce each other in an *Ambidextrous Port*.

(b) Base the distinctive capacity of the international competitive position of the Port of Rotterdam (*differentiation and focus*) on the strategic positioning of the Port of Rotterdam.

(c) Increase the connectiveness between the Port of Rotterdam and the city of Rotterdam (and the Rijnmond region) in order to preserve and attract corporate headquarters of firms as well as, among others, knowledge-intensive business service firms that are related to the port (such as banks, insurers and consultancy firms).
The Port of Rotterdam Authority should play a pioneering role in increasing the strategic value of the Port of Rotterdam for the Netherlands and in the use of the strategic balance. This creates challenges for the management and organization of the Port of Rotterdam Authority. With respect to this, two recommendations are provided; see also Box 7.4.

Box 7.4 – Recommendations for the management and organization of the Port of Rotterdam Authority

(a) Further enhance national and international institutional entrepreneurship and the organizational capacity to develop the strategic connectivity of the Port of Rotterdam (in particular with Dutch and foreign ports and other logistic hubs), including the related management capacities and skills.

(b) Regarding to renewal and innovation, pay more attention to the innovative utilization of existing infrastructure by using a bottom-up approach to stimulate renewal of the ‘software’ of firms (social innovation) besides investing in the ‘hardware’ (technological innovation, physical infrastructure).

The first recommendation highlights the necessity to further enhance (national and international) institutional entrepreneurship (i.e., the ability to achieve alterations in national and international institutional fields, rules and regulations) and the organizational capacity to further develop the national and international strategic connectivity of the Port of Rotterdam. With that, a more integrated Port of Rotterdam could be realized. Here, the term ‘integrated’ refers to both integration within the Port of Rotterdam as well as the integration of the Port of Rotterdam within the Netherlands and internationally. Strategic connectivity refers to the interorganizational relations between two or more firms and/or organizations – including port authorities, governments and knowledge institutions – aimed at innovation, renewal and improvement of the competitiveness.

Starting and intensifying such interorganizational relations requires, in the existing strongly regulated context, especially institutional entrepreneurship and the organizational capacity to deal with various kinds of organizations, private as well as public. Such an organizational capacity should also be adequately managed, for which management capacity and skills are required. Increasing the international strategic connectivity requires also contributing to renewal in international institutions, rules and regulations: the international dimension of institutional entrepreneurship. This is illustrated by, for instance, the strengthening – in cooperation with the Port of Antwerp – of the strategic connectivity of the Port of Rotterdam with the largest inland port of Europe, Duisburg.

The second recommendation is about the choice of focus regarding renewal and innovation in the Port of Rotterdam. In a strongly technologically oriented context, such as that of world ports, where scale of operations has taken centre stage, it appears almost self-evident to consider renewal and innovation more top-down instead of bottom-up. From the top-down perspective, the main focus is on technological renewal and the ‘hardware’ side of the physical infrastructure, likely to result in more roads and more transport movements. The associated use of financial resources is usually substantial.

A strategy directed at the so-called ‘software’ of firms to stimulate renewal and innovation in a bottom-up way, however, is usually more difficult to copy by competitors. That is to say, a focus on the non-technological determinants of innovation (social innovation) with a key role for management, organization and incentives in the involved firms to bring about renewal and innovation within those firms and their (own) networks. Such a focus may drastically improve the transport capacity, environmental use and the flexibility of the existing physical infrastructure in the Port of Rotterdam. This is already going on at large international companies such as Heineken, Mercedes-Benz and Philips, which are decreasing their road transport volumes and, instead, utilize more the inland shipping and railway capacity. Social innovation can be further stimulated if the Port of Rotterdam Authority creates a context in which companies are self-stimulated to introduce new management, organization structures, and incentives in logistic chains and involved parties (for example, in the inland shipping sector). In addition, this is possible by creating new organizations (such as the ‘Verkeersonderneming’) aimed at renewal and innovation in a context that is dominated by rules and regulations.
The Rotterdam way

In conclusion, it is important to point out that the focus of the Port of Rotterdam on strategic value creation for the Netherlands and the use of the strategic balance offers new opportunities for both the Port of Rotterdam and the Netherlands. However, there are also numerous threats, such as established interests, competing ports and long decision-making processes of governments. It would be good if those existing threats are handled and tackled in the light of these new opportunities, in a innovative manner and, most of all, in ‘the Rotterdam way’.

END NOTES

Executive Summary

- The economic importance of the Port of Rotterdam has been based on the most recent data (2008). For a clarification of the economic importance, see the end notes of Box 4.2. For a clarification of the estimate of the qualitative part, see the contents of Box 4.23 and the accompanying end notes.

Chapter 1: Introduction

1.1 – Two choices

- In consultation with the Port of Rotterdam Authority, it was agreed that the strategic value of the Port of Rotterdam is being limited to the contribution to the international competitiveness of the Netherlands and not, for example, to that of the European Union (EU). Recent notifications of a possible cooperation between the Ports of Antwerp and Rotterdam show that the strategic value might and should be perceived in a broader perspective (see Het Financieele Dagblad of January 11, 2011).

1.2 – The Port of Rotterdam

- Source Box 1.1: Port of Rotterdam Authority. The total port area is 10,570 ha, including 5,167 ha. industrial park. Maasvlakte 2 will extend the total port and industrial park area with 1000 ha. The figures of value added, employment and number of companies relate to port-related activities in 2008; source: Nijdam et al. (2010) and Havenmonitor (2008). Based on cargo weight, worldwide the 4th largest port and the number one port in Europe. Internationally, the Netherlands scores very high with respect to the quality of the port infrastructure, of which Rotterdam takes the lion’s share. In 2010, the World Economic Forum has placed the Netherlands on the third place (after Hong Kong and Singapore) in the worldwide ranking of national port infrastructure quality.
- Source Figure 1.1: Port of Rotterdam Authority.

1.3 – The strategic value of the Port of Rotterdam for the Netherlands

- For the Diamond Framework, see Porter (1990) and Van Den Bosch & De Man (1997).
- The concept of strategic connectivity is further examined in chapter 3.

1.4 – How to increase the strategic value of the Port of Rotterdam: the strategic balance

- Chapter 5 provides an illustration of this.

1.5 – Structure of the report

Chapter 2: Problem definition

2.1 – Introduction

2.2 – Economic importance and strategic value of the Port of Rotterdam

- For strategic value see e.g. Grant (2007), Rivkin (2000) and Penrose (1959).

2.3 – Contributions to the international competitive position of the Netherlands

- For analyses of the changing position of the Netherlands in the yearly published World Economic Forum ranking, see Van Den Bosch & Volberda (2003); Volberda & Van Den Bosch (2005).
- Source Figure 2.1: World Economic Forum (2010).
- Source Figure 2.2: World Economic Forum (2010).
- For the meaning of new management, organization, and work methods for strategic renewal and innovation (e.g. management innovation), see e.g. Volberda & Van Den Bosch (2004) and Vaccaro et al. (2011).

2.4 – Approach

- In prior research, the perception of ports has been changed over time; see Box A.
Chapter 3: Determining the strategic value of the Port of Rotterdam for the Netherlands

3.1 – Introduction

3.2 – Determinants of international competitiveness

- Source Figure 3.1: based on Porter (1990).
- Source Box 3.1: Port of Rotterdam Authority; authors.
- Source Box 3.2: Port of Rotterdam Authority; authors.
- Source Box 3.3: Nijdam (2010), table 5-9 (p. 107).
- For a recent and profound analysis of the maritime sector (and for figures of the offshore sector), see Webers et al. (2010); for the offshore sector, see p. 45-49.
- Source Box 3.4: authors. An ‘Ambidextrous Port’ combines (1) a focus on the present, aimed at exploitation of what is already there (i.e. improving existing products and services for existing markets within existing management and organizational structures), with (2) a clear focus on the future by developing new products and services and by utilizing new management (management innovation) and organizational processes to anticipate future developments. See also: Gibson & Birkinshaw (2004), Mom et al. (2007, 2009) and O’Reilly & Tushman (2008). Companies with a central focus on exploitation often also focus on corporate governance principles that put shareholder value creation central; see e.g. Kwee et al. (2011).
- Source Box 3.5: authors, based on information provided by the Port of Rotterdam Authority and the General Electric website.
- Source Box 3.6: authors and statutes of Port of Rotterdam Authority, article 2. For the role of the government, see Porter (1990); Van Den Bosch & De Man (1994). For strategic renewal in a changing institutional context see e.g. Stienstra (2008) and Hollen (2009). And for ‘institutional entrepreneurship’, see Oliver (1991) and Garud et al. (2007). Institutional entrepreneurship is not limited to external regulations. It is also applicable within large firms and organizations where rules, procedures and ‘not-invented-here’ cognitions and views may impede renewals. Stakeholder management is an instrument for institutional entrepreneurship. In that sense, an interesting case is the decision-making concerning the renewal of the Shell refinery in Pernis. Both internal and external stakeholders were important in the decision-making process, see Van den Bosch (1996). For evidence about the expertise of the Port of Rotterdam Authority regarding complex decision-making processes for large infrastructural projects, see the interview with Ronald Paul in Het Financieele Dagblad of January 10, 2011.

3.3 – Diamond Framework and strategic connectivity

- Source Box 3.7: CBL-Containers (2010).
- Source: Box 3.8: authors. See also Burt (2005), Nahapiet & Ghoshal (1998), Rivkin (2000) and Vlaar et al. (2007).

3.4 – Three times strategic value of the Port of Rotterdam: Triple Strategic Value Contribution Framework

- Source Figure 3.2: authors and (for the right side of the Figure:) Porter (1990).
- For the ‘Dutch Mainport Network’ concept, see the (Dutch) Ministry of Economic Affairs (2009).
- Source Box 3.9: Drewry Shipping Consultants Ltd., Annual Review of Global Terminal Operators (2010). The worldwide turnover is based on equity-adjusted throughput, i.e. corrected for shareholder interest in terminals of other operators. Figures on turnover in the Port of Rotterdam and ECT are derived from the Port of Rotterdam Authority. Regarding the negotiating power of ports, Verhetsel & Sel (2009) mentioned: “It is necessary for ports to adapt to shipping companies’ strategies and to offer them the best locations” (p. 243). For an analysis of the Port of Singapore, see Gordon et al. (2005).
- Box 3.10: Internationalization strategy of world ports:
  - column (1): the choice of the largest ports is limited due to the availability of data;
  - column (2): figures of the Port of Rotterdam Authority are based on the number of transported (incoming and outgoing) containers in 2009;
  - column (3): Hutchison Port Holdings (HPH, the world’s largest investor, developer and operator of ports, subsidiary of Hutchison Whampoa Limited in Hong Kong) has been founded in 1994; PSA International in 1997;
  - column (4): PSA in Dalian in 1996; HPH in Port Felixstowe in 1991 and the Port of Rotterdam Authority in Oman in 2002;
  - column (5): the interests in number of ports: PSA International (28), HPH (51).

3.5 – The strategic value of the Port of Rotterdam for the Netherlands: the Overall Fact Sheet Framework

- The Overall Fact Sheet could also be used for strategy formulation with reference to, for instance, the positioning of the Port of Rotterdam and the desired development of the strategic value. Spider diagrams could be used for illustration purposes.
Chapter 4: A first indication of the strategic value of the Port of Rotterdam for the Netherlands in 2010

4.1 – Introduction
- Source Box 4.1: authors.

4.2 – The quantitative part of the Overall Fact Sheet: the economic importance of the Port of Rotterdam for the Netherlands in 2010
- Source Box 4.2: authors and the Havenmonitor (2008). Expected investments including foreign direct investments: estimation (2010) by the Port of Rotterdam Authority. An example of a foreign direct investment is the €670 million investment of the Finnish firm Neste Oil in a biodiesel factory; source: Dutch Foreign Investment Agency. The value added and employment figures are derived from the Havenmonitor (2008) and pertain to the Rotterdam seaport area and to the year 2008; more recent data were not available at the time of publication of this report. The value added has been estimated by multiplying the number of employees per sector with an average value added per active worker for a particular sector, corrected for differences in productivity per region; see the Havenmonitor (2008), p. 129.

The estimates of the indirect value added and employment are partly based on far-reaching assumptions. For instance, it was stated that (translated in English): “These theoretical conceptions make sufficiently clear that estimates of the indirect effects of seaport-related activities in the rest of the Dutch economy should be read with the necessary caution” (Havenmonitor 2008, p. 135). These assumptions lead to an estimate of a so-called multiplier: besides the direct effects, there are also indirect effects for suppliers; these indirect effects are also been called backword effects.

The investment figures have been provided by the Port of Rotterdam Authority. The Havenmonitor (2008) does not contain a breakdown of private investments with reference to the Rotterdam seaport area. The private investments in the Rijn/Maas-delta amounted to around €1.8 billion euro in 2007 (the most recent year for which these figures are available) and the GDP (Gross Domestic Product, market prices) was approx. €596 billion euro in 2008. (Source: CBS, National Accounts, Table p. 20).
- Source Box 4.3: Fortune Global 500 (2010).

4.3 – The first contribution of the Overall Fact Sheet’s qualitative part: the influence of the Port of Rotterdam Diamond on the determinants of the international competitiveness of the Netherlands in 2010
- Source Box 4.4: authors
- Source Box 4.5: authors.
- Source Box 4.6: authors.
- Source Box 4.7: authors. For research on competition, see the dissertation of Peter De Langen (2003) on competition within clusters in the Port of Rotterdam. Based on expert interviews, it is concluded that: “In Rotterdam, internal competition is limited.” (p. 128).
- Source Box 4.8: authors, based on: Projectplan Technopark Rotterdam (‘Bijdrage A bij subsidieaanvraag Pieken in de Delta’).
- For research on social innovation see e.g. Volberda et al. (2007), chapter 4.
- Source Box 4.9: authors; Verberk (2010).
- Source Box 4.10: authors. Corporations that are considered as belonging to the Top 100 Corporate Headquarters (Baaij et al., 2009) in the Netherlands, meet the following criteria: only corporate headquarters in the Netherlands, so no divisional or regional head offices; presence of substantial staff in the corporate head office; 100 largest corporations in terms of revenue; private corporations; no pension- or investment funds; international activities. For World Maritime Cities, see Verhetsel & Sel (2009).).
- Source Box 4.11: websites of the companies involved. The classification in the categories trade, production and commercial services is based on the description of the main activities of the companies involved. By determining the share of the various categories in the total concern turnover, a more accurate and elaborated classification could be attained.
- For figures about the Dutch inland shipping sector, see e.g. Webers et al. (2010) p. 49-53.
- Source Box 4.12: authors. Source Box 4.12: authors, based on press releases.
- Source Box 4.13: authors, based on information provided by the Port of Rotterdam Authority, corporate websites and MainPort Magazine (July 2010), edition 6, volume 49. For industrial ecosystems, see e.g. Baas & Booms (2007); Gibbs (2003); Jelinski et al. (1992).
- Source Box 4.14: authors.

4.4 – The second contribution of the Overall Fact Sheet’s qualitative part: the impact of national strategic connectivity of the Port of Rotterdam on the international competitiveness of the Netherlands in 2010
- For arguments in favour of more cooperation between the Dutch ports and other logistic hubs, see e.g. the (Dutch) Ministry of Economic Affairs (2009); NEA (2009); and the Dutch Council for Transport and Water Management (2010).
- Source Figure 4.1: authors.
- Source Box 4.15: authors, based on information provided by the Port of Rotterdam Authority; Mercator Novus. The ‘Projectplan Container Transferium’ (January 6, 2010) of the Port of Rotterdam Authority poses that an empty depot is of strategic importance for the CT, as it allows to competitively position the truck-barge product in the market: a shipping agent will only be prepared to charge an one-way tariff from and to the CT if he can structurally match its ride with a return ride. This mainly concerns the picking or dropping of empty containers. By storing many long standing containers, the CT relieves the Port of Rotterdam from accessibility and storage problems. In addition, storage of those containers is cheaper at the CT. (Source: Projectplan Container Transferium, 2010, p. 13).
- Box 4.16: authors, based on information provided by the Port of Rotterdam Authority.
4.5 – The third contribution of the Overall Fact Sheet’s qualitative part: the impact of international strategic connectivity of the Port of Rotterdam on the international competitiveness of the Netherlands in 2010

- Source Box 4.17: based on data of the Port of Rotterdam Authority.
- Source Box 4.18: various corporate websites.
- Source Box 4.19: authors, based on corporate websites and information provided by the Port of Rotterdam Authority.

4.6 – Conclusions: the strategic value of the Port of Rotterdam for the Netherlands in 2010

- Source Box 4.21: authors. For figures on the quantitative economic importance, see the end notes of Box 4.2.
- Source Box 4.22: figures on the Port of Rotterdam are derived from the Havenmonitor 2008, and figures on the horeca and food industry from Statistics Netherlands (CBS; National Accounts), 2009. The value added is in market prices and employment in number of employees. In comparison with the other two sectors, the labour productivity in the Port of Rotterdam is remarkably high.
- Source Figure 4.2: authors. The economic importance relate to the year 2008.
- Box 4.23: the direct and indirect value added data are derived from the Havenmonitor 2008, see also the Box 4.2 end notes.

The assumption of at least 1% of the GDP (market prices) can be made plausible in an alternative manner: by first looking at the strategic value of the Port of Rotterdam for the re-export in the Netherlands and, secondly, by carrying out a similar analysis of the import and export excluding re-export.

Re-export is defined by Statistics Netherlands (CBS) as goods that are imported and exported and, thereby, are (temporarily) property of a Dutch inhabitant. Based on CBS data (National Accounts, 2009), the re-export in 2008 as part of the total import amounted to around 160 billion euro, and as part of the total export to around 178 billion euro. This resulted in around 18 billion euro (approx. 11%) value added. This percentage corresponds to the assumption in Jaarsma (2005, p. 520) about the size of the value added by re-export. Without the Port of Rotterdam in its current form, i.e. without the current strategic value for the Netherlands as described in chapter 4, the re-export would certainly not have reached the current volume. Also, significantly less value added would be created. The TNO Inro report (2003) points to the fact that the Port of Rotterdam is the dominant transit port in the Netherlands, measured in value, metric tonnages as well as in containers; it constantly pertains to approximately 90% of the total good flows (p. iii). A very conservative assumption of one third less value added, when the Port of Rotterdam would ( fictively) suddenly disappear, would correspond to at least about 6 billion euro less value added in 2008 due to the impact on re-export.

Based on CBS data (National Accounts, 2009), the total import (excluding the part designated for re-export) amounts to about 247 billion euro and the total export (excluding re-export) to about 279 billion euro in 2008. If it is assumed that the current strategic value of the Port of Rotterdam for the Netherlands implies that the total import (excluding the part for re-export) becomes available for Dutch companies at least 1% lower-priced, this would correspond to a potential increasing amount of value added of around 2,5 billion euro. When the strategic value of the Port of Rotterdam has a negative effect on the export costs and a positive effect on the price formation of Dutch companies’ export, and this effect would be assumed to be at least 1% as well, this would correspond to around 2,8 billion euro of potentially more value added. Both effects on import and export combined amount to around 5,3 billion euro.

Both analyses of, respectively, re-export and import/export lead to an estimated effect of the strategic value for the Netherlands in the order of magnitude of at least 5 to 6 billion euro. Combined, the results of both analyses would indicate at least 10 to 12 billion euro in 2008, which would mean about 2% of the value added elsewhere in the Netherlands. In the report (see Box 4.23), however, is chosen for a conservative estimate of 1%.

It deserves emphasis that in cost-benefit analyses, it is also necessary to formulate (sometimes far-reaching) assumptions, due to which the effect on the obtained results is not always clear. This means that various judgements could be made about the plausibility of those assumptions, which can strongly influence the soundness of the results. In the cost-benefit analysis of Maasvlakte 2, for instance, it has been assumed that, with regard to the indirect effects, the ‘right’ prices are known: ‘prices resulting from frictionless markets’ (p. 156). The opinions regarding the realism of this assumptions will undoubtedly vary. For insights in the problems around not being able to quantify – in accordance with the current Dutch cost-benefit analyses directives – meaningful benefits, as well as for insights in the sensitivity of the results for the presumed size of the long-term discount rate, see e.g. the report of the Veerman Committee (2009) on the North/South Metro Line Amsterdam.

Chapter 5: How to increase the strategic value of the Port of Rotterdam by the Port of Rotterdam Authority? The framework for the strategic balance

5.1 – Introduction

- Source Box 5.1: authors.
5.2 – The principle of the strategic balance
- Source Box 5.2: authors.
- Source Box 5.3: authors. Penrose (1959) was the first who pointed out the key role of the management of companies.
- Source Figure 5.1: authors.
- Source Box 5.4: authors.

5.3 – Evaluation of alternative options
- Source Box 5.5: authors.
- Source Box 5.6: authors.

5.4 – Evaluation of strategic options with regard to the increase of (inter)national strategic connectivity
- An interesting case to learn about the key success factors of cooperation between port authorities is that of the Exploitatiemaatschappij Schelde-Maas (ESM).
- The case of the increase of the strategic connectivity with Duisburg is relevant; in Het Financieele Dagblad’ of February 8, 2011, it was mentioned that (translated in English): “Duisburg has to remain German, Hamburg states that the sale of Duisport to Rotterdam would clash with national interests.”; Duisburg is not only of strategic value for the Port of Rotterdam and the Netherlands, but also for Germany.

5.5 – Conclusion

Chapter 6: Summary and conclusions
- Source Box 6.1: authors.

6.1 – Conclusion first research question
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- Source Box 6.4: authors.

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- Source Box 7.1: authors.

7.2 – Recommendations with regard to increasing the strategic value by the Port of Rotterdam Authority using the strategic balance
- Source Box 7.2: authors.

7.3 – Recommendations with regard to the strategic positioning of the Port of Rotterdam
- Source Box 7.3: authors.

7.4 – Recommendations for the management and organization of the Port of Rotterdam Authority
- Source Box 7.4. For the top-down versus bottom-up approach with regard to renewal and innovation, see e.g. Van Den Bosch (2010).

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- Mrs. Jeannette Baljeu, Alderman for the Port, Transport and the Regional Economy, Rotterdam
- Mr. John Paul Broeders, CEO, Vopak
- Mr. Hans Gerson, Former Alderman for Traffic, Transport and Infrastructure, Amsterdam
- Mr. Peter Goedvolk, CEO, Argos Group, Rotterdam
- Mr. Jeroen Kamphuis, Partner, Ernst & Young
- Mr. Arjen van Klink, Senior Strategy & Innovation Advisor, Rabobank Rotterdam
- Mr. Bart Kuipers, Senior Research Manager, Erasmus School of Economics, Erasmus University Rotterdam
- Mr. David Moolenburgh, Deputy Director/Head of Public and General Affairs, Zeeland Seaports
- Mr. Michiel Nijdam, Senior Research Manager, Erasmus School of Economics, Erasmus University Rotterdam
- Mrs. Larissa van der Lugt, Port Economist, Erasmus School of Economics, Erasmus University Rotterdam
- Mr. Roland Pechtold, Board Member, Argos Group, Rotterdam
- Mrs. Caroline Rodenburg, Senior Manager, Ernst & Young
- Mr. Tjeerd Schipper, District Director Rotterdam, ABN Amro
- Mr. Frank Smeele, Associate Professor, Rotterdam Institute for Shipping & Transport, Erasmus University Rotterdam
- Mr. René Smit, Member of the Supervisory Board, Port of Rotterdam Authority
- Mr. Kees van der Waaij, CEO, Unilever Netherlands
- Mr. Peter de Wit, CEO, Shell Netherlands

Port of Rotterdam Authority:

- Mr. Arènso Bakker, Head Site Development
- Mr. Henk de Bruijn, Director Corporate Strategy
- Mr. Roger Clasquin, Director Port of Rotterdam International
- Mr. Pieter van Essen, Project Director Port/Strategic Advisor
- Mr. Peter de Langen, Corporate Strategist
- Mr. Teije Smittenaar, Head of Investment Management
- Mr. Bram van der Staaij, Strategic Advisor

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ABOUT THE AUTHORS

Prof. dr Frans A.J. Van Den Bosch

Frans Van Den Bosch is Full Professor of Management Interfaces between Organizations and Business Environment at the Department of Strategic Management and Business Environment, Rotterdam School of Management (RSM), Erasmus University. He holds a BA in Mechanical Engineering from the Polytechnic of Rotterdam (with distinction), received his Master’s degree in Economics (cum laude) from the Erasmus University Rotterdam and his PhD in Law from Leiden University, the Netherlands. He has published several books and over 165 articles in scientific journals, supervised 32 PhD-theses, has been member of more than 30 PhD-committees and is board member of several scientific top journals. His major research interests are the development of integrative strategy frameworks incorporating both the externally and internally focused view of strategy, and the application of these frameworks to general management issues such as corporate governance and stakeholder management, knowledge creation processes, management innovation, organizational ambidexterity and strategic renewal processes. Professor Van Den Bosch has been actively involved in the business community and the public sector, e.g. as chairman of the Board of Non-executive Directors of Dutch companies, vice-chairman of the Rotterdam Chamber of Commerce, member of the Rotterdam City Council (including the Port Committee) and advisor of a Dutch trade union association. Presently, he is a Fellow and chairman of the Programme Advisory Committee of the Erasmus Research Institute of Management (ERIM), director of the Erasmus Strategic Renewal Centre and of the Dutch Partner Institute of the World Economic Forum (WEF). In 2009 he was advisor regarding cost-benefit analyses to the Veerman Committee (North/South Metro Line Amsterdam).

Rick (M.A.) Hollen MScBA

Rick Hollen is part-time research associate at the RSM Erasmus University in the areas of strategic port management and strategic renewal in changing institutional environments. In addition, he works as a project manager at a global technology and services company focused on the life sciences industry. He obtained a master’s degree in Business Administration (cum laude) from the RSM Erasmus University in 2009, with a specialization in Strategic Management. During his study period Rick attended MBA courses at the Pontificia Universidad Catolica (Chile) and studied at the École des Hautes Études Commerciales (HEC) Montréal (Canada) and Copenhagen Business School (Denmark). Besides, he conducted a consultancy study in Vietnam for a Dutch multinational and won a business plan competition in Mumbai (India) on social entrepreneurship. In 2010, he coordinated the World Economic Forum survey in the Netherlands. He also worked three years as a research assistant at the Department of Strategic Management and Business Environment of the RSM Erasmus University. In this function, he has contributed to research and publications in the areas of corporate governance beliefs, headquarter location decisions, management innovation, media exposure, ownership structures and strategic renewal behaviour of Dutch listed companies.

Prof. dr Henk W. Volberda

Henk Volberda is Professor of Strategic Management and Business Policy and Director Knowledge Transfer at the RSM Erasmus University. He obtained his doctorate in Business Administration (cum laude) from the University of Groningen. He has been a visiting scholar at the Wharton School at the University of Pennsylvania and Cass Business School, London. Professor Volberda has worked as a consultant for many large European corporations. His research on organizational flexibility and strategic renewal received the NCD Grant, ERASM Research Award, Erasmus University Research Award, ERIM Impact Award and the prestigious Igor Ansoff Strategic Management Award. In Management Team he was mentioned as one of the most important Dutch international management gurus. His work has been published in many refereed books and scientific journals, for which he received among others the ROA Publication Prize, SAP Best Strategy Paper Award and the SMS McKinsey honourable mention. His book ‘Building the Flexible Firm: How to Remain Competitive’ (1998) received wide acclaim, and his book together with Tom Elfring ‘Rethinking Strategy’ (2001) was awarded with the ERIM Best Book Award. Recently he published ‘Strategic Management: Competitiveness and Globalization’ (2011), a new strategy textbook. Professor Volberda is director of the Erasmus Strategic Renewal Centre, Coordinator of the ERIM Strategy Research Program and Scientific Director of the top institute INSCOPE: Research for Innovation. He is a member of the Editorial Board of among others the Global Journal of Flexible Systems Management, Journal of Management Studies, Journal of Strategic Management Education, Journal of Strategy and Management, Long Range Planning, Management Executive, and Organization Science.

Dr Marc G. Baaij

Marc Baaij is Associate Professor of Strategic Management at the Department of Strategic Management and Business Environment, RSM Erasmus University. Furthermore, Marc is academic director of RSM’s part-time Master of Science in Business Administration Program and is involved in contract research for companies and executive teaching of the university. Previously, he worked for the Boston Consulting Group and IBM. Marc received his doctor’s degree with a dissertation on Fortune Global 500 corporations with a sustained superior performance. His current research focuses on retaining corporate competitive advantages, the internationalization of headquarters of multinational companies, and methods and techniques of management consulting firms. His scientific papers on these topics have appeared in various Dutch and international journals.
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Erasmus University Rotterdam

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AUTHORS
Prof. dr Frans A.J. Van Den Bosch
Rick Hollen MScBA
Prof. dr Henk W. Volberda
Dr Marc G. Baaij

RESEARCH ASSISTANTS
Leon De Wilt MScBA, Pim Van Calsteren MScBA,
Rianne Van Nieuwland & George Ankomah