

Rethinking value to business in a ports' changing environment

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Abstract

Ports and port authorities are faced with a rapidly changing environment. Increasing focus on sustainability, more competition and global cargo flow changes amongst others are causing uncertainties in the traditional business of port authorities.

Investments in port infrastructure may contribute in different ways to creation of value. Till recently the dominant decision factor in making an investment decision was the economic value. However, other values such as those driven by sustainability demands of stakeholders and society, are becoming more important and these cannot always be expressed in financial terms. A port authority has to find a credible way to make a trade-off between quantifiable economic benefits and value creation through initiatives appealing to the aforementioned changes in their environment. We will use Port of Rotterdam (PoR) as a case to explore this issue.

The decision models applied by the organization provide insights into how their executives currently manage the value of their investments and activities. We will discuss how the ports' authority value management models are impacted by changes in the ports' business environment. Through desk research we aim to study the rationale underlying current value management models used in the port sector and to find out if these can be applied in situations where economic value alone is not sufficient to support decision-making.

Through interviews we explore how PoR currently assesses the value the company and the port add. Using the above input, we will be able to provide a qualitative comparison between the values that are currently important and make recommendations for further research. Possibly new methods are required to give a more balanced judgment on those activities that cannot be evaluated purely on the basis of their economic value.

Insights from this article are a start for follow up research aimed at identifying new performance indicators and steering mechanisms for the port authority.

Keywords: Ports, value management, stakeholder value, performance indicator, decision model

1. Introduction

1.1 Background

Ports and waterways can be seen as important economic assets, since they contribute to national and local economy in multiple ways. They accommodate safe berthing of vessels, freight handling and passenger transport. At the same time they can also function as multimodal logistic nodes and industrial clusters. Besides ports and waterways' notion of their historical value, they often create other values, such as facilities for recreation and fisheries, landscape and nature. However, they can also affect the environment and are therefore of influence on existing value. Therefore, ports and waterways represent value in multiple ways.

In the Netherlands, seaports are a mix between public utility and private enterprise. The development and maintenance of a port or waterway usually requires significant investments by many parties. Typical parties are (public) authorities, investors, customers, local community and society as a whole.

Commercial operations such as cargo handling and related activities are picked up by the private sector. The investment in and management of port infrastructure is often seen as a public task and is carried out by the Port Authority. It is therefore often approached from a socio-economic angle (Suykens and Van De Voorde, 1998). Each of the parties investing and operating in a port have their own set of interests and as such, value perceptions. These may be congruent with each other, but can also be conflicting.

In this paper, we use Port of Rotterdam (PoR) as a case study to further explore the topic of value management by a Port Authority (PA). PoR focuses on safe and efficient nautical operations, the sustainable development of the port industrial area as well as the socio-economic development function of it. This mixed public-private business objective of the PA, as well as changes in the business environment as will be discussed later, gives rise to the question whether or not the existing tools of the PA for managing value are still valid.

Investments may contribute in different ways to creation of value and this value cannot always be expressed solely in financial terms. Value to business of investments and activities undertaken used to be based on contribution to ports' safe nautical operations, cargo throughput or to leasing/selling land to the port tenants. However, these activities do have an environmental impact. Communities surrounding the port are increasingly turning their attention to a sustainable, liveable environment, showing a reduced tolerance for environmental and other nuisances that port activities bring. PoR has incorporated this notion into its strategic planning looking after its "license to operate and grow" and is putting more emphasis on port sustainability and stakeholder engagement.

Therefore it is imperative that the additional value of port investments must be made visible. PoR has to find a credible way to make a trade-off between quantifiable economic benefits and

value creation through initiatives appealing to the aforementioned changes. However, it is unclear how the PoR current drive for sustainability should translate in the existing value framework. Current economic value calculation methodologies based on cash flow projections such as Net Present Value (NPV) calculations may not always provide sufficient decision information to fully encompass what the impact will be of these new stakeholder and societal driven investments and policies. Also it is often unclear who will benefit from the Port Authorities' investments: the company itself, the port operators, the local community, society as a whole, or a combination of these? This may well lead to rethinking business models, performance indicators and business decisions in the future.

1.2 Objective

PoR currently uses a specific method for measuring and managing value of their investments. We will investigate the validity of current models and decision tools they are using for managing value under today's changing circumstances and in light of the Port Authorities mixed public/private character.

A qualitative comparison between different ways of looking at value will provide guidance in identifying which values for ports are promising and require additional research in order to judge their strengths and weaknesses, and compare them with current value models.

Possibly new methods are required to give a more balanced judgment on those activities that cannot be evaluated purely on the basis of their economic value. A follow up research can help identify new performance indicators and steering mechanisms for port authorities.

1.3 Research Approach

We explore changes that ports and port authorities are facing in general. The way that the organisation values its investments provides insights into how the executives currently manage the port. Through desk research we aim to identify the scientific background behind contemporary value models and how they can be used to encompass the aforementioned changes and challenges, especially in those situations where economic value is less suitable.

Through a series of interviews at the Port of Rotterdam, we assess the value (management) model currently employed by the organisation and analyse it.

Using the above input, we will be able to provide a qualitative comparison between the different types of values that are relevant to ports and make recommendations for further research.

1.4 Boundaries of research

In this article we focus on Port of Rotterdam, a government corporation that manages the largest port in Europe. PoR looks after safe and efficient nautical operations in the port area and it develops the port and industrial zone according to the landlord model. In this organisation model it is responsible for providing basic port infrastructure to operating companies in the port. These operating companies are responsible themselves for organising their own super- and suprastructure; cranes, warehouses, plants as well as labour and auxiliary maritime services.

We focus on value as one of the key factors for managers at PoR to base their (investment) decision upon. Value is used in many different contexts but here it is assumed as the worth of something. This immediately indicates the subjective character of it. When used in its plural form, values are assumed to mean belief and social behaviour.

In this paper we will explore the different aspects of value theory on a high level, in the context of the port business. We will explain how creation of value is dependent on one's perspective of the ports (business) environment. We will seek to understand how so called non-use values are relevant to Port of Rotterdam, and the challenges the company faces in making investment decisions around them.

2. Changes in the environment of the Port Authority

2.1 Changing environment and values

Before the Industrial Revolution, ports were labour intensive and geared towards merchants' activities. They progressed to become manufacturing sites, where vast quantities of bulk commodity goods were processed with increasingly expensive equipment.

Through containerization and specialization of ships and terminals, the ports became capital intensive. Nowadays, ports and port authorities are faced with an even more rapidly changing environment. With falling land prices and reduction of cost of the maritime transport, hinterlands started to overlap with each other, boosting inter-port competition (Musso *et al.*, 2006). Increasing global competition, global cargo flow changes, increasing regulatory pressure from outside the direct span of control and financial constraints may force leads many port authorities to become corporatized. Robinson (2002) states "it is clear that ports are now operating in a new environment, one which is globalized, corporatized, and privatized and is exceptionally competitive; it is also a logistics-restructured environment. In this new environment the role of ports has changed fundamentally."

In the Netherlands, seaport authorities have been corporatized or are in the process to become so. This development allows the port authority to become much more agile in their decision making processes, corporate financing and human resources, putting more emphasis on commercial

results and financial control and allowing the companies' employees to rotate much faster than before. The ownership of the corporatised port authority is still with municipality and –in case of PoR- with national government however, which infers that political and electoral cycles still have an influence on the Port.

This also means that public values such as the ports' safe nautical operations, maintaining sufficient accessibility and caring for a sustainable environment of the port may have to compete for resources against private values such as new investments' contribution cargo throughput increase or to leasing/selling land to port operators.

Nowadays the focus on sustainability of port activities is increasing. Values driven by sustainability demands of stakeholders and society, are assuming greater importance. A larger public scrutiny, perhaps fuelled by the current economic crisis, requires port authorities to become much more aware of those, more intangible values. Port Authority decision makers need to balance between focusing on specific strategic directions, and retaining sufficient degrees of freedom in their decision making to cope with changing circumstances.

For PoR, current economic value calculation methodologies are based on cash flow projections such as NPV calculations. This may not always provide sufficient decision information to fully encompass what the impact will be of new stakeholder and societal driven requirements. Traditional business case thinking will not suffice anymore to fully encompass all aspects that need to be considered when making a port project investment decision.

2.2 Section summary

The role of ports and PoR as a Port Authority has changed over the years. A balance needs to be struck between various factors: changing port business, changed institutional context and organisational setup, changing demands of stakeholders. New values need to be taken into account. Therefore a set of business decision tools spanning a wider array than economic criteria is required.

In order to acquire a deeper understanding about the different approaches for managing value, we will assess scientific literature regarding this topic in the next section.

3. Managing value in a port

3.1 Why is value important to Port Authority?

The success of an investment activity of a port authority can be measured by the value that it is creating. To understand what value creation means for a Port Authority is therefore crucial for its management to make the right (investment) decisions.

Musso *et al.* (2006) state that profitability, economic impact and financing are seen as critical nodes in the complex chain of port investment decisions. This means that for a port authority economic value (creation) is linked to the income generated (minus costs) as a result of the ports activities.

However, investments may contribute in different ways to creation of value and this value cannot always be expressed in financial terms. The social desirability analysis of a port investment would encompass the comparison of external benefits with costs. Musso *et al.* (2006) state that this would be undertaken by those appointed to represent the collective interest (such as local government).

Port of Rotterdam has to find a credible and consistent manner to make a trade-off between quantifiable economic benefits and value creation through initiatives appealing to the changes in their environment as mentioned in the previous section.

The concept of value and value creation is still subject for widespread debate. Value is understood as the worth of something, but this can be explained in different ways and different contexts.

A generally accepted statement is that value is subjective, i.e. how one values things is dependent on ones school of thought, viewpoint and definition.

Graeber (2005) suggests that value is the way actors represent the importance of their own actions to themselves as part of some larger whole. This importance is always seen in comparative terms. Some forms of value are seen as unique and incommensurable, others are ranked. For others, in market systems, value can be calculated precisely and it is realised through some kind of material token.

3.2 Economic Value

In classical economy exchange is at the heart of the value concept (Fernandes, 2012). It says that most of the classical and neoclassical economy concepts consider only economic goods having value to us, while goods subject to quantitative relationship responsible for non-economic character cannot attain value at all (Menger, 2007).

Vis (2006) states that “creating or adding economic value is causing the desire of actors to act economically. It is expected that after a transaction the actor will be in a better position and/or situation”. Vis goes on stating that it is assumed that there is a desire to measure economic value. This is not necessarily conflicting with the subjective character of value as long as the ordinal character of the result is kept in mind.

Broadly speaking, value from an economic point of view considers the income generating ability of a certain object or transaction and is expressed in monetary terms. The value that is created in this case would be calculated comparing the direct benefits and costs with each other. This

analysis would be undertaken by the (potential) investor. This could be the government, or a commercial lender.

3.3 Network Value

A study carried out by Van Den Bosch *et al.* (2011) suggest that the economic importance of the port is relevant, but it does not encompass the value for the country of the Netherlands as a whole.

This value encompasses the presence of strategic connectivity of the port which allows easy access to foreign markets, the push for (supplier) innovation created by international companies operating in the port area, as well as the port area being a pole of attraction for corporate headquarters of companies, boosting international competitive power of the Netherlands.

The study suggest that this value can develop further by increasing dynamics, competition and innovation in the port, as well as connecting to other (foreign) ports and logistical nodes

Since 2002 Port of Rotterdam has been venturing out investing in and developing overseas ports and industrial zones. Internationalisation has become a strategic priority for the port, and their aim is to create a network of ports in selected regions throughout the globe. As suggested by Van Den Bosch *et al.* (2011) this network of ports can help to foster value on a broader level, where port authorities and their related business communities can exchange value within and among each other.

Value creation in this respect is: exchange of goods/services/revenue, knowledge, governance models and intangibles such as reputation. It is expected that the expansion of the 'branded' port network to new locations should provide value to the newly developed regions that would not be feasible without the network.

3.4 Value to Society

Most political scientists and economists would agree that the purpose of public decisions is to promote the welfare of society (Samuelson and Marks, 2008).

One way of determining the value to society is by means of social cost benefit analysis (SCBA). This is an analysis of welfare increases and –decreases now and in the future, so that net effect on society can be determined. SCBA is an extension to Cost-Benefit Analysis (CBA), which is a method to compare the benefits of a certain project, policy or decision against the costs. Main principle is to allow decision-makers to compare benefit/cost ratios between the project and the alternatives. CBA, including SCBA, has been established as one of the core instruments to perform economic evaluation and comparison in a broader, societal sense. CBA has been extensively used for the evaluation of investments in transport infrastructure (Grant-Muller *et al.*, 2001) and a wealth of literature can be found on the development and the application in this sector, from which the port sector could benefit.

In the Netherlands, CBA has been adopted as a standard approach to evaluate infrastructure investment decisions (Eijgenraam *et al.*, 2000), such as port extensions (Annema *et al.*, 2007). The method has been developed over the years to also include so called non-use welfare effects such as impact on the environment using Contingent Valuation methods. An overview of non-use values is provided by Crowards (1995). It is argued that costs can be placed using on the value of –for example- the environment in eliciting the public's Willingness to Pay (WTP) for hypothetical preservation or provision of it or Willingness to Accept (WTA) compensation. WTA and WTP have become fundamental notions in Cost Benefit Analyses for representing economic benefit or costs of non-monetised effects. Saz-Salazar (2012) describes how Contingent Valuation and WTA are applied to assess the value of environmental damage related to a Spanish ports' growth.

In the Netherlands however, the Contingent Valuation method has not been adopted on Dutch government level (Stolwijk, 2004), for a variety of reasons, but most notably complexity of the analysis and “the notion that monetization of non-market consequences, i.e. the reduction of environmental values to euros can be seen as an abstraction” (Stolwijk, 2004), possibly leading to an oversimplified view of what is really living in society.

Estimating non-monetized effects for usage in Cost-Benefit Analysis remains a topic for ongoing discussion. A recent study by Mouter (2013) showed that this is still one of the main difficulties experienced by Dutch practitioners of CBA. Life Cycle Analyses (LCA) has been suggested as an alternative powerful diagnostic instrument for environmental value. However demands are high on setting clear boundaries and processing vast amounts of data. The initial inventory to be included is ultimately down to the discretion of the analyst. Also Triple Bottom Line Analysis (3BL) is mentioned as a way to reckon with societal value. 3BL assessments borrow from accounting metaphors, such as double entry bookkeeping. Foran (2005) describes it as “a way in which firms can realise broader societal objectives in addition to increasing shareholder value”. Strategic Environmental Assessment (SEA) is a process tool in which environmental concerns are integrated into policy decisions and plans. It is a future-oriented analysis, though in practice often static and not accounting for changes in the evolving world (Höjer *et al.*, 2008). Selecting and calculating the benefits of non-use effects of port investments therefore remains a topic of continued research.

In a CBA the calculation steps are equal to a Business Case (BC) approach (Ruigrok, 2011). The difference however, according to Ruigrok, is that in the BC only welfare effects for the initiator of the project are considered, whereas in the CBA all welfare effects for the whole society are incorporated.

However, if PoR would be willing to adopt the method, in combination with tools for assessing environmental and other non-use effects however, it should take into account to invest the time in detailed analysis as well as the critique on these methods described hereafter.

3.5 Ethical considerations with regards to Value

Literature reveals many debates over the limitations of CBA as an indicator for value to society. It is argued that the outcomes of an CBA analysis is dependent on the preferences of the analyst (Eliasson and Lundberg, 2011, Wolfson, 2011); that the outcomes can show a great range of results, largely determined by who was doing the costing to what ends and by what was selected for inclusion (Alexander, 2005) and effects that may happen in the future are hardly accounted for.

Menger (2007) states that in economic terms value is defined by the monetary sacrifice that people are willing to make to acquire a product, good or service. The emphasis is placed on the point of exchange, with money being the fundamental index of value. Money in itself however does not hold value. It is a token to enable trade or exchange of goods or services.

In the Western market the economic domain has become dominant, and money is seen as a way to express everything. We attempt to use money as a token to denote value not only in the economic domain. However items in other domains are not necessarily transferable, or the value of items cannot (always) be translated into monetary terms. These type of considerations come to play when viewing value from an ethical point of view.

From axiology, which is an area of psychology concerned with theory of value, a distinction is made between an objectivist and subjectivist view of value. In search of the meaning of value of a good or in marketing terms, a subjectivist view of value creation is when “perception of benefits” received from the transaction of a good exceeds the “cost of ownership” (Christopher, 1996). This type of value is related to customer value. Examples of more objective forms of expressing value of a good or service are use value or product value.

Since value becomes more understood as a perception function (Fernandes, 2012), it is important to note that customer perception is influenced by cultural values, personal values, consumption values and product benefits (Clawson and Vinson, 1978). From this, it can be understood that valuation of a good from a customer perspective may not all be expressible in tangible benefits (utility value), but some attributes could be emotional (intangible/esteem value).

The creation of value in an economic sense in the Western world appears to be an autonomous process, and frequently portrayed as surmising social life and sometimes even the environment (Alexander, 2005). From an anthropologists point of view, Graeber (2005) explains that in the Western world the supreme value has become the individual, and each person is assumed to be unique and by definition incomparable. This has allowed the market, as the sphere of self-realisation, to become hierarchically dominant.

When comparing value in an economic sense with –for example- how one values the environment, we have to recognise the difference between value and its plural form values. The

latter has to do with behaviour, morals and beliefs. These are influenced by society, and related to the interaction between individuals in society. Fernandes (2012) points out that it seems that value in the singular sense and when related to products (goods or services) is related to behaviours in many ways". How (human) values influence peoples' behaviour is the domain of anthropologists.

Values, and especially human values are seen by some ethicists as not fitting together, but incompatible and incommensurable with one another. Two values are incommensurable if there is an 'absence of a common measure' between them, such that neither of the values is better than the other nor are they of equal value (Raz, 1997).

It is therefore that humans tend to regard the impact of investments on the environment in different ways. Environmental economists may consider the difference between the pain of the investment (or policy implementation) and the pleasure accruing from it. In this way concerns for environmental damages resulting from a certain action is expressed within a utilitarian mode, requiring costs and benefits to be compared with each other (Spash, 1997). This principle lies at the foundation of cost benefit analysis and its tools such as contingent valuation method. Adding to this, Spash (1997) argues that utilitarian approaches assume that "individuals are able and willing to consider quantity and/or quality of public goods". The principal question arising out of environmental ethics is whether or not environmental can be assigned a utility value at all.

Rutherford (1998) expressed that using CBA or even using money as a means to express non-use value is at least, very dangerous. The critique includes that money is not neutral. Using money as numerator, will disadvantage those who put a large use on nature compared to those who put a usage value on money. What society values is not necessarily the same as what the market values.

Other critique is that outcomes can show a great range in results, largely determined by who was doing the costing to what ends and by what was selected for inclusion (Alexander, 2005). Furthermore it is pointed out that the CBA concept does not take into account opportunity costs Alexander (2005) or changing values (Sen, 2000) over time.

Often, environmental problems have long term implications and may even be irreversible. Naess (1986) suggests that there are stakeholders in society who, out of philosophical principle, oppose any violation of the environment in exchange for economic gain. They would reject the notion of calculating the usefulness to humans of preserving the environment and deny that "everybody has their price". In neoclassical terms this is referred to as lexicographic preference (Freeman, 1986). While this point of view may seem unrealistic and of little relevance, some evidence suggest that when it comes to –for example- wildlife, lexicographic preferences may be expressed by 25% of individuals (Stevens *et al.*, 1991). Port investment and managers and policymakers should ask themselves on the basis of which grounds extension of a port to promote economic activity should take prevalence over –for example- the preservation of

breeding grounds for creatures living in the extension area, and whether or not the decisions they make now will continue to bring welfare for future generations.

There are a number of objections against CBA stemming from ethical point of view. In this overview we discussed that 1) Not every effect can or should be monetised 2) Not all ethical dimensions can be covered in a CBA 3) A utilitarian approach may not always be suitable 4) Values may change over time 5) The CBA outcomes can vary greatly, depending on who is doing the analysis.

As Hansson (2007) put elegantly "The [CBA] device malfunctions in several ways, and the fundamental construction may be flawed. However, we have no better alternative to recommend. It can therefore be used, but only with great caution". It would only be wise to take these considerations into account when developing a value management framework for ports. In the transport sector Van Wee (2012) suggest to combine CBA and Multi-Criteria Analysis for deciding on non-use effects. Potentially this could be applied in the port sector as well. Any new approach would need to take the different objectives, perspectives, criteria from different groups and scientific angles into account.

3.6 Section summary

We have discussed the different theoretical viewpoints towards value of a port investment arising out of economic, network and societal perspectives. Value is a subjective notion and each method to measure value has its own merits and pitfalls. By introducing considerations from the ethical domain to the discussion of value of port investments, we want to show that solely adapting an accounting or cost-benefit based approach to assess the impact of port investments on the environment is not undisputed.

In the next section we will discuss our findings on how Port of Rotterdam manages value.

4. Which approaches to Managing Value were found in Port of Rotterdam?

4.1 Introduction

In its strategic plans, PoR recognises a number of changes in their business environment, varying from changes in world economy: influence of shortage of raw materials on geopolitics, increasing transport scales, integration logistics chain, changing energy and petrol mix in Europe, specialisation of industry in Europe, development of knowledge economy (including increased usage of ICT applications) and climate change and sustainability.

These changes have been captured in programmes addressing these themes. PoR sees itself developing into Europe's hub for global and intra-European cargo flows. Many of the Port

Authorities' investment activities are aimed at increasing efficiency in logistic transport chain, industrial development or securing the Companies' "license to operate and grow".

In exploratory interviews with officials from different departments, it was found that there are different perspectives on the creation of value by the activities undertaken by the company. (Investment) activities aimed at facilitating the private sector (for example building a new quay wall) are judged upon by an economic business case and specific return on investment. However, the value of an investment activity with a mere public character such as building a road junction is measured in a different way. In this section we will explore our findings.

4.1 Economic Value and Business Cases

The economic value is determined by discounting all free cash-flows attributable to that object/investment against a certain factor. This is also the way that PoR analyses the Business Case of a project for which it has to undertake an investment.

PoR is an actor with a mixed public/private objective. The value of a private investment project is measured using economic tools since cash-flows generated by this private project are aimed at improving the position of the port authority itself. Examples of such private projects are designing, building and financing a jetty to be leased to an operating company against commercial conditions.

However, when it comes to investing in public projects, it is not always clear whose position is actually improved, or what the monetary benefit is to PoR. An investment in a port access road, in economic terms, will probably have a negative business case, destroying economic value to the Port Authority. Such public project in fact can be seen as a redistribution of (economic) value created by private projects to a less tangible value, which is in this case accessibility.

This redistribution is not always fully understood and appreciated by port operating companies and tenants, who are usually tied to long term lease contracts with PoR. This sentiment may be reinforced by the notion that PoR in fact is a monopolist and companies may feel that resources are redistributed in a way that is not fair to an individual company. Vis (2006) even states in this respect that governments cannot create value at all, due to one of the prime reason for their existence which is unfair redistribution of value.

For PoR it is therefore important to balance between value it creates between for private and public objectives. The authority therefore has a high interest in measuring public value it seeks to add.

4.2 Measuring public value

4.2.1 “Value to Business”

In PoR there are investment examples in port based real estate developments that, on the basis of NPV calculations, would not render a positive business case. Redevelopment of the real estate object had a positive effect on safety and the reputation the area however, though this was not immediately expressible in a higher rate of return of the project. These decisions were made based upon qualitative decisions criteria such as improvement of liveability of a certain area, reduction of crime rate, and improvement of aesthetic quality. The latter has become a value in itself, according to interviews with the PoR.

Acknowledging that other value dimensions are becoming more important in making an investment decision, PoR has experimented with Societal Cost Benefit Analyses as an indicator for non-economic value. This initiative has not been expanded however beyond a limited number of case studies, given the elaborate data gathering and analysis required to perform such SCBA. It was also indicated that the company “was not ready yet” to incorporate this analysis method in its business decision making processes.

Instead, PoR has developed its own tool which should help decision makers to judge on those qualitative dimensions that are linked with PoR long term ambitions. A set of qualitative criteria for a certain project is lumped together as “value-to-business”, which consists of three benefit categories: client based criteria, spatial criteria and environmental criteria (see figure 1). Indicators underlying these qualitative criteria are scored on the basis of a scoring table, and

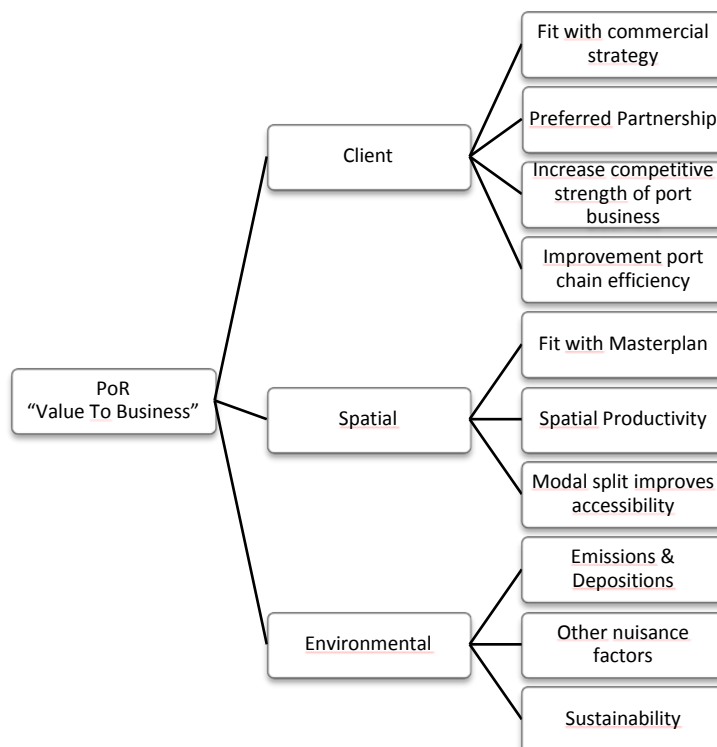


Figure 1 - Value to Business categories and indicators at PoR (Source: PoR)

lumped together applying weighing factors. Choice of weighing factors will depend on the public or private character of the investment. The sum of the values in the model is represented in a portfolio graph (resembling a BCG-matrix) where the value-to-business is graphically combined with project NPV, investment budget and risk.

This enhancement in the decision making presents to PoR a step into the direction of a more balanced approach compared to straightforward NPV calculation. The use of dimensionless scored indicators circumvent the monetisation issues that are mentioned as a difficulty with Cost Benefit Analyses. The portfolio graph also works well for decision communication and presentation purposes.

The model is under development, but there is a certain arbitrariness in the choice of value indicators as well as with the scoring mechanism. Air emissions are –understandably- an important indicator, but for example energy reduction, which is also an important environmental concern in ports (Ecoports, 2012), is missing from the environmental criteria of PoR's value-to-business model. In terms of the scoring mechanism, the way that indicator scores are added up, make many of the projects gravitating towards an overall middle score in terms of value-to-business. Furthermore the model does not tell how value creation is distributed over the various stakeholders. Public and private value categories are lumped together, though they each represent value from a different perspective. Incommensurability issues will also play a role here. Also changing values over time are not taken into account.

4.2.2 “Added Value”

The reason for a successful entities existence is the creation of customer value (Slater, 1997) and to add value (Vandermerwe and Rada, 1989). Over the years PoR found that the scope of value creation was extending beyond the borders of the company itself and the area it governs. Knock-on effects and implicit consequences and a wider scope area needed to be taken into account as well.

For PoR, the “extras” that come with port investments are referred to as “added value”. This is different from the microeconomic definition, where added value represents the difference between the revenue and the costs of a form in relation to a product or activity. In macro terms, it becomes the contribution for gross domestic product and serves the basis for VAT computation. This touches upon the meaning of added value to PoR; the provision of additional socio-economic benefits as a result of PoR or operating companies investing in port

For example, investments in the port can give rise to value to more parties than the Port Authority itself as a result of spin-off effects, generating employment, service business etc. Within PoR this is called added value. For example, in 2010, every 1 euro of added value in the port caused another 61 cents of added value in the rest of the Dutch economy.

For a number of years, PoR has been publishing data on added value that the investment and activities has been creating in the port area. The direct and indirect effects of the Dutch seaports are regularly measured and reported, for example see table 1. Indirect effects are the economic effects of purchases that port business do in the Dutch economy.

Table 1 – Direct and Indirect Added Value generated by activities in Port of Rotterdam in 2010

Direct added value	€15.5 billion
Indirect added value	€ 6.7 billion
Direct and indirect added value	3.3% of GDP
Direct employment	90,000
Indirect employment	55,000
Average annual Corporate investments of operating companies	1.5 billion

Source: (Nijdam, Van der Lugt et al. 2012)

4.4 Value creation by linking Networks

PoR has embarked on an internationalisation programme, resulting in the creation of a Joint Venture (JV) port management company in Oman, together with the Government of Oman. This JV has been given a concession for the development of a port and industrial zone in the town of Sohar. The presence of PoR governance has inspired several of the Rotterdam port business community members (Odfjell Terminals, ECT/Hutchinson Port Holdings, Steinweg Handelsveem, Shipping and Transport College, DCMR Environmental Protection Agency) to also set up operations in Oman.

At the same time, PoR hopes to be able to connect to new growth markets and new business communities and add these to a growing port network spread across the globe. In its development efforts to expand its port network worldwide, PoR encounters situations where local governments lease out or sell land at a relatively low price. This could have an effect that value is distributed unevenly in the chain of stakeholders in a port. PoR claims that one of the benefits of a port management setup, such as the one chosen in Sohar, is the introduction of contemporary models and techniques for commercially developing a port, whilst keeping a sharp eye on public goals as well. Making use of the companies' knowledge on commercial tendering and long-term contract negotiation, PoR assumes that the economic value created by a port management company "PoR style" can become much bigger. As a result, the costs to society for the development and exploitation of such port would be lower, compared to a scenario where an inexperienced government body ventures out on its own developing and exploiting the port.

4.5 Ethical considerations

Stretching the value concept into the ethical domain in the way that has been described in 3.5 is new to PoR. Company programmes that could be considered to take ethical considerations into account are the Corporate Social Responsibility programme, the Strategic Community Management programme and PoR's drive for sustainability as a key component for development of the port area.

Over the last years, sustainability has gained importance on the strategic agenda of the Port Authority. These days sustainability has become one of the company's core values. In its latest port expansion project Maasvlakte 2, in which 1500 hectares of deep sea port area has been reclaimed from deep sea, sustainability has been a major point of attention. This has led to restricting emission levels of tenants and users of the new port area, to limits that are excess of legal requirements. This has helped in shortening the lengthy process of obtaining the required permits to start construction of the port expansion project. Much attention has been devoted to creating additional recreational facilities to compensate for lost nature value. Commercial contracts with new port tenants have radical changes compared to existing tenants with regards to sustainability demands of their operations.

The Company has also set up a strategic stakeholder management programme, providing a platform to addressing any concerns of the Ports' surrounding communities. These initiatives are geared towards the companies' license to operate however and value in whatever shape or form is ideally expressed in monetary terms. Comparison of projects with non-economic or sustainability value with each other is still a challenge.

The concept of bringing ethics in decisions regarding infrastructural investments and design processes is yet to be implemented. In order to consider alternative approaches arising out of ethical considerations, it would be required to demonstrate their value. This will be subject for future research.

5. On-going research with regards to value

5.1 Elicited Values

PoR acknowledges the existence other value approaches. However, till recently it has predominantly applied economic / financial value calculations to base investment decisions upon. As long as value is based on projected cash flows, it can be measured explicitly in monetary terms through a business case analysis.

When one requires softer value drivers such social or environmental factors to be measured or incorporated as well, the situation becomes even more complicated.

Also these less explicit value approaches were often coined together as “strategic”, though they are different than the strategic value by connecting networks as described in 3.3. In our interviews within the PoR it appeared as that there were different perceptions what (strategic) value encompasses. The definition and scope of value, and how it should be managed, differed by level in the organization and department. For example: one department would see value creation in maintaining maximum availability of the assets under the department’s control, where another would stress the value of the Ports’ resilience to change. On another level the aesthetic appearance of the port was mentioned as a main value component. Confronted with a wide range of value perceptions, research has been carried out (Van Der Lei and Ligtoet, 2012) in eliciting value (statements) from PoR managers. They have constructed a value tree containing five core values domains (safety, sustainability, accessibility, reputation, creation of societal value), which in turn are divided into value-indicators (see figure 2).

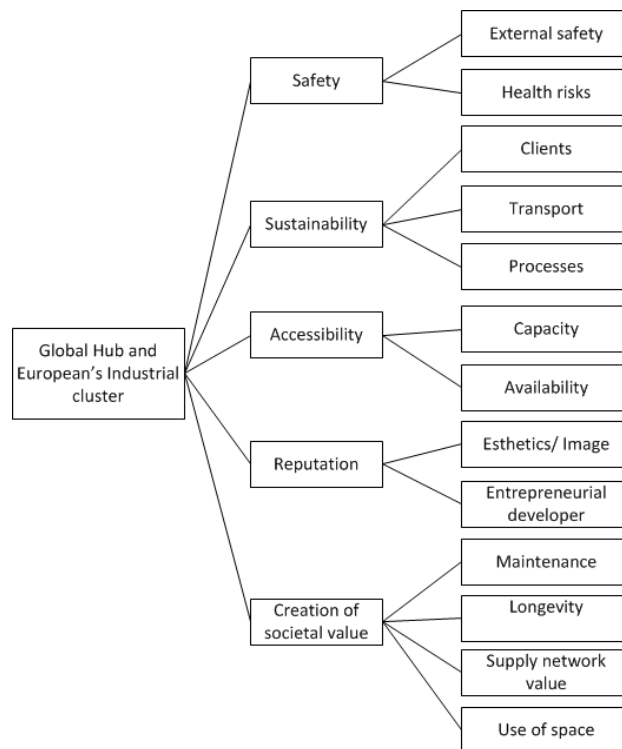


Figure 2 – Elicited values from statements of PoR managers

However, the management of these elicited values is not aligned at different levels in the organisation. Also the monetisation of the values is still open for debate, as well as the issue of comparing financial consequences of these values. These areas are a focus of on-going research.

5.2 Measuring sustainability

In its port expansion project ‘Maasvlakte 2’, the company has embarked on a course where sustainability is an integral element in master-planning, stakeholder management and tight contractual obligations for new tenants with regards to their emissions from operations in the

port. The discussion about the merits of sustainability targets in excess of legal requirements, though strongly enforced with new tenants and encouraged with existing clients, is merely held in qualitative terms.

In the Netherlands, the Ministry of Infrastructure has adapted a methodology based on SCBA as a standard approach to quantify non-use values, including sustainability, environmental and transportation consequences of an infrastructure investment. However, the method has not been adopted yet within PoR as a standard approach to quantify elicited non-use or sustainability values. Instead, as described earlier, the PoR has developed its own value indicator, in which sustainability is an element: Value-to-Business. A need remains for PoR to find a credible way to assess societal impact, especially with respect environmental and sustainability value resulting of its investments. More follow up research is required.

5.3 Shifting values and uncertainty

Port project valuation from an economic perspective can be done on the basis of discounted cash flow analysis. This is very sensitive to the forecast of costs and income. Future economic situation and competitive situation of the port needs to be taken into account. Too often forecasts of the returns are based upon some form of trend extrapolation or some simplified scenario (Meersman, 2005). This may lead to a wrong investment decisions.

Investment decisions should be taken with these changes and varying time scales in mind. Implications of investment decisions in a wider context and over a prolonged period may therefore not be always fully understood. Though PoR has put efforts in identifying risks and has developed mitigation measures against many of these risks, not all uncertainties can be named and quantified. A broader and more robust perspective in the future requires more research into uncertainty related to port development and the values that are associated with it.

6. Next step in the research

Decision models used by an organization provide insights into how executives currently manage the value of their investments and activities. Therefore decision models currently employed by these organizations need to be assessed and analysed. We argue that for PoR, the current economic value calculation methodologies based on cash flow projections such as NPV calculations do not provide sufficient decision information anymore to fully encompass what the impact will be of new stakeholder and societal driven investments and policies.

Decision models that are under investigation include the SCBA that has been discussed extensively in this paper. There is an immediate need to quantify value from non-market investments, and to assess financial exposure associated with risks elicited from PoR value tree. Ideally, individual investment risks would be incorporated in the projection of cash flows arising

out of it. The largest objection against current methodologies is the amount of data that requires to be analysed. A model that is useful to PoR management should be simple –but not simpler than that–, yet provide sufficient information to base sound decisions upon.

But most importantly is the question how far incommensurability of values should be taken into account, when drawing up a decision model regarding non-market values. If using money as a denominator for value indeed leads to biased decision, a new token for exchange needs to be researched.

Changing business circumstances as well as changing values draws up a complex future, in which uncertainties will be large. We therefore propose to engage in new ways to explore the implications of varying assumptions and hypotheses about the future of port, and to gain insight into the effect of shifting value across an ensemble of models of the future.

The insights of this research will provide guidance in identifying which value management methods for Port of Rotterdam are promising and require additional research in order to judge their strengths and weaknesses, and compare them with current models. In the following research, we hope to use the insights from literature and the lessons learned from other sectors dealing with value management to create a value model for port investments which will do justice to all stakeholders.

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