Dutch and American waterway development: identification and classification of tools for value creation

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Dutch and American waterway development: identification and classification of tools for value creation.

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Abstract

Waterways can serve society in a variety of ways. However, authorities responsible for maintenance and development of waterways often have a sectoral focus. They strive for cost efficient solutions within their restricted scope; broader development of socio-economic value receives little attention. This can be seen in e.g. the Netherlands and the USA. Both countries have strong national authorities responsible for the navigation function of waterways. The societal call for broader optimization is recognized, but a systemized response to this call is lacking. Nevertheless both authorities make attempts towards increasing the socio-economic value of their capital waterway projects by deploying tools for broader optimization. Six recent cases, in which such attempts were made, are studied with the aim of identifying and classifying the tools deployed. Identification and classification is needed to evaluate where gaps and opportunities lie for more systemized responses. From these cases a total of 15 tools are identified which stimulated broad optimization. These tools are classified by identifying the transaction characteristics associated with these tools. These characteristics can relate to cost, benefits or value capturing and can be of informative, coordinative or legislative nature. The results show overlaps and voids in the domains these tools address. For practitioners the results can be helpful to navigate through the planning and implementation phase of waterway projects. More broadly the study shows that in the waterway sector, a sector in need for adaptation and renewal, the application of a variety of mixes of governance is an emerging issue.

1 Introduction

Waterways have been used as systems for transportation for many ages. Although other modalities emerged, in some countries the waterway system still plays a vital role for transportation. Besides the transportation function of waterways, many other aspects are valued by society. One can think of recreation, nature, water supply, aesthetics, hydropower and so on. Whether all of these values actually come to development can be highly dependent on the authority responsible for these waters. If such an authority has a restricted scope for operating, maintaining and developing these waters, a focus on

efficient solutions within this scope can be expected (Pahl-Wostl et al., 2010; Raadgever et al., 2008). However, such sectoral solutions may well offer restricted public value.

Amongst western countries, both the USA and the Netherlands have an extensive waterway network and large volumes of cargo are transported over these waterways by ships and barges. These two countries can be considered as illustrative cases in a rich context. The Dutch and the American waterway authorities, respectively Rijkswaterstaat and the US Army corps of Engineers, are also examples of agencies with a focus on efficient solutions within a restricted scope (Lonquest et al., 2014). This does, however, not mean the opportunities for value creation in a broader sense are not recognized by these agencies. Both organizations make attempts to increase the broad socio-economic value of their capital waterway projects by deploying tools for broader optimization (Brink van den, 2009; Hijdra et al, 2014a). By investigating their latest projects, the tools used for this purpose have been identified. In this paper, a total of six projects, three in the Netherlands and three in the USA are analyzed.

The aim of the paper is to identify and classify tools aiming at creating societal value in waterway projects. Waterway management and planning typically involves rational processes of project development, budgeting and coordination. Identification and classification is therefore framed from the perspective of an inclusive approach and the transaction costs and benefits that come with that. By applying such a dedicated framework a more systemized and fundamental understanding of practical approaches is provided. This framework helps to unravel the often-implicit drawbacks and incentives experienced by the waterway authorities when deploying value tools. A more fundamental understanding of the practical approaches can therefore contribute to the scarce literature in the field of value analysis of public projects, and it could help practitioners in selecting effective methods to optimize their projects. Also the research aims to contribute to literature of waterway planning in an international context.

2 Methodology and materials

To obtain insight in tools for value creation in waterway development, two countries have been selected where inland waterway transport plays a significant role, and where waterway authorities have actively been improving these systems in recent years. Most illustrative in this respect are the Netherlands and the United States. The agencies responsible for operation and development of these systems are highly vertically

optimized, i.e. through hierarchically organized various levels of government, but do recognize the potential of improving horizontal coordination with other policy sectors. Amongst the many western countries relying on their waterway system, the Netherlands and the United States can be considered exemplary for sectoral optimization within a rich context (Brink van den, 2009; Hijdra et al., 2015). The context can be considered as rich as in both countries many possibilities are recognized to include multiple functions and values in the process of altering waterways.

The Netherlands is often considered to be the 'main port' of Europe with ports like Rotterdam and Amsterdam (Ministerie van Infrastructuur en Milieu, 2012). Furthermore it has one of the most fine-mazed waterway networks in the world, and the highest modal split for inland waterway transport in Europe (Bureau Voorlichting Binnenvaart, 2010; Central Intelligence Agency, 2011). Therefore, waterways as a means for transportation, is certainly an important asset for the economy of the Netherlands. The responsible agency for these waterways is Rijkswaterstaat. Rijkswaterstaat operates, maintains and develops these waterways with the purpose of water management and navigation.

The United States shows similar highlights. It has the largest waterway system in the western world, it is intensively used and it is of vital importance for the energy sector (coal), agriculture (fertilizer, agro-products), and the oil industry (oil-products) (US Army Corps of Engineers, 2009a). Similar to the Netherlands the USA has a strong centrally guided agency responsible for these waterways: the US Army Corps of Engineers. This agency has a clear mandate to maintain operate and develop these waterways with the purpose of water management and navigation.

To investigate the application of tools for value utilization case studies are presented here. For both countries recent cases of waterway development with involvement of the national agencies have been selected to investigate the way these centrally guided agencies include functions outside their own objective. From the entire set of projects with involvement of these agencies, selection of cases took place around three major themes in waterway development. These themes are: ageing and replacement of assets, waterway improvement, and flood protection.

Ageing of assets and replacing these is an issue strongly on the rise as many assets in waterways have been constructed in the 1930s. These projects often require high

investments, and can become rather urgent if safety or functionality is compromised. Waterway improvement, the second theme, often takes place in zones where the traditional role and design of the waterway is under pressure. This could mean more functionality is required and/or economies of scale ask for accommodating larger ships. The third theme, flood protection, has a driver from outside the transportation sector but can seriously affect waterways. Due to increased flood protection levels and/or changing climatological and hydrological conditions waterways need to be adapted to protect the surrounding areas from flooding.

A total of six projects have been selected, a pair for each theme. For the first theme, ageing of assets, two navigation lock projects are studied; the Beatrix lock project in the Netherlands (Rijkswaterstaat, 2014)and the Inner Harbor Navigation Canal lock expansion in New Orleans, USA (Walsh, 2009). Both take place in a mixed urban and industrialized zone, both need to solve a major transportation problem. For the second theme, waterway improvement, two recent projects of the national agencies have been selected which cover a stretch of a waterway to be (re)developed; the Zuidwillemsvaart in the Netherlands (Rijkswaterstaat, 2011) and the Miami river in the USA (MRSC, 1998). These projects take place in an urban environment in a context where broader societal functions are hard to ignore. A third pair of cases was selected around the theme of improving flood-protection in a navigable waterway; Room for the River Waal, part of the Room for the River program (Room for the River, 2012), in the Netherlands and the Napa river in the USA (US Army Corps of Egineers, 1998). Both take place in an urbanized zone, which is not surprising as these are the zones where flooding is troublesome. In table 1 an overview of the selected cases is shown.

Table 1 capital waterway projects selected as case studies

Waterway investment theme	*focus on asset replacement*	*focus on waterway improvement*	*focus on flood protection*
Netherlands	Beatrixsluis. Planning of a third lock in the inland shipping route between Amsterdam and Rotterdam.	Zuid-Willemsvaart around den Bosch. A new canal of around 9 km is being constructed to replace the old canal through the inner city of Den Bosch.	Room for the river Waal project, Nijmegen. The river Waal is adapted to be prepared for an increase of discharges.
United States	IHNC lock expansion. Planning of a second lock next to an existing old lock in the Inner Harbor Navigation Canal. The lock	Miami River. A stretch of 8 km of the Miami river, it highly resembles a canal, has been redeveloped since the	Napa river. One of the most flooded cities of the USA, Napa, is protected against recurrent

	provides access to sheltered port terminals and the intracoastal canal.	90s. Various elements of the redevelopment are still ongoing.	flooding by the Napa river.

Data collection for the case studies took place through semi-structured interviews with project officials, document analysis, field visits and website postings. Four of the cases were visited once (Napa, New Orleans, Miami, Waal), two cases were visited multiple times (Zuid Willemsvaart, Beatrixlocks). The interviews were conducted with 21 officials related to the investigated projects. The interviews took 1 to 2 hours each, depending on the time available by the interviewee. Some of the interviews had multiple interviewees simultaneously (Napa, New Orleans, Miami). One interview was done by conference call (Miami). The data from the interviews, document analysis, field visits and website postings were analyzed using a value classification system. This value classification system was developed on the basis of transaction cost theory. Within this framework all single elements of transaction cost, transaction benefits and value capturing elements are defined. In section 3 this is described in more detail.

3 Theoretical framework

Infrastructure projects in general have many stakeholders, as the works have many logistical, environmental, physical, financial and other effects. Involving a wide variety of stakeholders in the process of infrastructure development seems like a logical choice to address these issues. These stakeholders can be individuals, groups, firms, governmental bodies or non-governmental organizations. To capture mutual gains, or simply avoid opposition, agreements have to be made between the developer and the stakeholders related to the development; a transaction.

Transactions are not without cost and effort; these require information, interaction, coordination and so forth. If transactions would be without such costs and efforts, land use value would maximize instantaneously (Coase, 1960). To properly address the variety of elements involved in transactions (institutionalized) tools are used. The transactions have to lead to reasonable value for each individual party. And generally, these transaction benefits need to exceed the transaction cost in order to add value.

Insight into transaction costs in the field of land use planning has been offered by (Alexander, 1992, 2001, 2010, 2012). Alexander emphasizes the three dimensional nature of transaction costs: interdependency, uncertainty and timing. Various

publications of further operationalization have come forward on this basis (Buitelaar, 2004; Paavola, Adger, 2005; Widmark et al, 2013).

Inversely, the transaction benefits could be drawn from the field of negotiation theory (Lax, 1986; Raiffa, 1982). The benefits described are of generic nature, but Blomqvist (2002) described these benefits in more detail, which can be used for infrastructure development. On these elements, a framework including transaction value and tailored definitions has been developed for the specifics of the infrastructure sector by Hijdra (Hijdra et al, 2014b).

The creation of value is only of use for an agency if this value can be claimed or captured (Huxley, 2009). It is important to note here, that claiming and capturing value can require substantial efforts itself, and can therefor add to the transaction costs as described above. From the organizational point of view, ultimately, five basic categories can be defined in which value can be captured to the benefit of this same organisation. These categories relate to costs, benefits and strategic advantages. The cost elements can be split into cost reductions, and cost sharing. The benefits can be split up in a similar way; increased benefits, and additional return flows. A fifth category captures the strategic advantages, which cannot be monetized directly. In other words, claiming or capturing can come 'naturally' through the effects of the infrastructure itself, or results from the arrangement between the participating organizations. In the sectoral approach the value could e.g. be captured by general taxes, special taxes (ship fuel tax), tolls, shadow tolls, leases etc. In a joint approach, the value might come from society, or equally likely from the partnering organization (Heeres et al., 2015; Hijdra et al., 2014a). The elements of transaction costs and transaction benefits, and the ways of claiming or capturing value are shown in table 2.

Table 2: Classification system of the value elements.

Transaction costs*	Transaction Benefits**	Claiming and capturing value
-Exploring and evaluation cooperative options. -Preparing, crafting, negotiating an agreement -Inter-agency coordination: local representation, preparing and attending meetings, communicating.	-Joint assets value surplus. This is the case when the joint use of (complementary) assets generate more value than when used separately. -Joint surplus of complementary skills, routines and capabilities. Joint surplus comes from the	-Reduction cost/risk. Cooperating might lead to lower cost or risk for either one or both of the parties. -Cost/risk sharing. This usually involves an agreement on the

-Intra-agency coordination: communicating, administrating, and addressing partnership issues internally. -Education and training related to the cooperation -Monitoring interagency issues. -Transaction enforcement (e.g. dispute resolution, litigation, financial hostage) -Activities to build trust	melting of these instead of isolated deployment. -Cooperative use of asset x increasing pay-off generated through asset y. -Economies of scope. This is based on cost advantages, which come forward through the integration of various elements or subsequent steps of a project, and stimulates tighter vertical integration. -Economies of scale. When cost advantages or learning effects can be found through scale effects this would drive horizontal integration.	specifics of sharing. -Increased return flows, builds on return flows already happening. -Additional return flows. This usually requires operationalization of new cash flows. -Strategic benefits. This could be reputation, skills, knowledge or access to new opportunities.

* The elements all refer to actual costs, but there might be 'resistances' which do not translate to costs but certainly add to the balance. This might be the case when collaboration leads to the perception of higher risks, uncertainty or complexity without having any tools to counter these effects (Hijdra, Woltjer, et al., 2014a).

** These elements are derived by Blomqvist et al (2002) and described in more detail for infrastructure projects by Hijdra et al (2014b)

4 Results

The results for each of the six case studies are briefly described in the following paragraphs. Each description starts with some general background of the case followed by information about the tools used to increase socio-economic value of the project. The tools described are the tools that were considered by the interviewees and actively used in stimulating the socio-economic value of the project. For each tool a code-name is introduced (between brackets) for further reference.

Beatrixsluis, the Netherlands

The Beatrixsluis in the Netherlands is a navigation lock complex with two chambers. It is located in the Lekkanaal, a short canal of 4km. This canal connects the Amsterdam-Rijnkanaal with the Nederrijn-Lek. It is an intensively used shipping route. The lock complex was built in the 1930s. Policy documents indicate its capacity is viewed as insufficient to handle the busy shipping traffic, therefore the construction of a third lock has been announced. The incentive to start the project was therefor rather technical, or as one of the interviewees phrased it: *'Thinking in terms of ambitions was not really done when we started the project'*. Tendering and contracting this project is in preparation since 2014. Together with this third lock the canal has to be adapted to allow pushing convoys to align properly for this new lock (Rijkswaterstaat, 2014). Widening of the

approaches runs into a variety of interactions with other, current, uses of the land adjacent to the canal. These uses include agricultural land projected to be converted into an industrial zone, and military bunkers part of a large historic defence system (Nieuwe Hollandse Waterlinie). Stakeholders included farmers, the municipality and the National Heritage agency. One of the interviewees mentioned about this: '*I noticed at the Beatrix lock project that when you start doing things together, then you achieve results which may not be earth-shattering, but in the end it leads to better overall results.'* Project officials mentioned they deployed a variety of tools. The most prominent tools mentioned in the interviews were stakeholder group involvement *(Bea – Stakeholder)*, and the application of a contract form in which the contractor is responsible for design, construct, finance and maintenance of the new lock *(Bea – DBFM contract)*.

New Orleans Inner Harbor Navigation Canal Lock (IHNC), USA

The IHNC lock is a deep draft single lock built in 1923. It is located in the IHNC, a 9km long canal connecting the two most intensively used waterway systems of the USA, the Mississippi and the Gulf Intracoastal Waterway. It is located in industrial and residential areas (lower 9th ward) of New Orleans. Policy documents indicate that the current lock is considered too small to accommodate modern generations of oceangoing vessels. Another problematic issue coming forward from these documents is that inland pushing convoys need to be disassembled to pass through. One of the interviewees summarized the situation as follows: *'The lock severely limits the size of ocean going vessels that can go through it. It also severely limits the size of barge traffic that can go through it. So it is extremely inefficient for all purposes because of how old it is.'* For this reason a larger, deeper lock to replace this old lock is proposed (US Army Corps of Engineers, 2009b; Walsh, 2009). According to the plans, the canal and bridges have to be adjusted as well. Due to budgetary and legal problems the tendering process is delayed several times. In 2015 the scope of the project is being reconsidered as the court decided that the effects of the construction plans are insufficiently addressed. Project officials stated that two tools played a prominent role in the process with regard to their stakeholders: a co-financing agreement with the Port of New Orleans *(IHNC – cofunding)*, and a design and tendering process with a focus on local mitigation elements and local revenue generation *(IHNC – tendering)*.

Zuidwillemsvaart, the Netherlands

The Zuidwillemsvaart project embodies digging 9 km of new canal around the city of Den Bosch. The old canal ran straight through the historic city. The project

documentation describes this old situation as narrow, lacking upgrading possibilities, and shipping traffic causes congestion in the inner city due to many bridge openings. Policy documents mention that a new stretch of canal is required to facilitate and stimulate transport of goods over water (Rijkswaterstaat, 2011). By-passing the city by such a new stretch of canal had long been anticipated for and was considered as a project with a large impact, both positive and negative. Two different quotes from interviewees describe this paradox: *'You're going to rearrange the area there anyway, why don't you make it in such a way that the entire region of Rosmalen and Den Bosch gets a new beautiful area?'* and *'The local people, they didn't ask for the project, it is imposed on them, forced, and they are affected in their own environment…'.*

After a planning period of decades, which was halted and reinitiated several times, the contract was awarded in 2010. Construction of the new canal is completed and it has been officially opened in February 2015. The new stretch has been named 'Maxima canal'. Project documentation showed the project had considerable implications for a wide variety of current and future infrastructure plans of the city Den Bosch. Through an intergovernmental agreement, cooperation, co-development and co-financing were arranged *(ZWV – intergovernm)*. The construction works itself were tendered to construction companies. The contract for construction was a design-build contract. Such a contract allows the contractor to optimize the design of the works and the associated construction processes as long as the functional requirements of the design and build contract are met *(ZWV – DB contract)*.

Miami River

The city of Miami was founded at the riverbanks of the Miami River. In the 19th century the riverbanks became an industrialized and port zone. In the 1980s and 1990s the canal-like-river and adjacent zones became deprived zones. The river was polluted, sedimentation and derelict vessels hindered port activities. Project officials mentioned that in the 1990s a growing awareness was felt by city officials and state officials that something had to be done. Or as one of the interviewees phrased it: *'At some point it didn't take a lot of brains to conclude it is not good to have a sewer through this city.'*
It was felt that cities worldwide embraced and redeveloped their waterfronts, while Miami ignored its river. The Miami River project was born. The project had the purpose of re-development of the river. Policy documents showed this re-development had the purpose of improving navigation conditions for short sea cargo ships, clean up the river,

and upgrade the entire area around the river (Florida Atlantic University, 2008; Miami Downtown Development Authority, 2009).

The interviewees mentioned a variety of tools had been deployed to stimulate the redevelopment process. The Miami River Commission was raised in 1998 and acted like a trading house, boosting horizontal coordination (*MIA – MRC trading*). Or in other words, as posted on the MRC website: *'Our mission: To act as the official coordinating clearinghouse for all public policy and projects related to the Miami River.'*

Permits for real estate development included conditions to provide public access and development of continuous walkways along the river (*MIA – permitting*). The use of federal funds to clean up the river and improve navigation had the pre-condition of matching co-funding (*MIA – cofunding*). Furthermore the development process itself was based on a step-by-step approach with separate contracts for each step (MIA – step-by-step).

Room for the River Waal, the Netherlands

The Room for the River Waal project refers to a problematic narrow curved zone of the River Waal exactly where the city of Nijmegen is located. To prevent future flooding, the river had to be made capable discharging up to 18.000 m3/s (Room for the River, 2012). The project documentation showed that Rijkswaterstaat, the national agency responsible for navigation and flood management of the river, calculated and designed a cost efficient solution by deepening and widening the river where possible. Where other institutions had additional ambitions for the zone, these institutions were invited to present alternative local plans, including their own ideas and ambitions. The original cost efficient design was taken as a reference for comparison. When alternative plans required no increase in national financial contribution, and showed to be equally effective, these could be awarded. Awarding such plans was called an '*omwisselbesluit*', or translated: 'a swap decision' (*Waal – swap*). This process resulted in an adaptive planning approach and led to the execution of an alternative plan where riverfront development, recreation, housing and flood protection go hand in hand.

Instead of Rijkswaterstaat, the city of Nijmegen took the lead (*Waal – auth. by munic.*). Their ambition for the project was phrased by one of the interviewees as: *'Most important is that a high quality public space for the city of Nijmegen is developed.'* Furthermore, project officials stated that private developers could get involved by

presenting plans adding to the broad project goals in return for real-estate development opportunities (Waal – real estate)(Wolff & Spaans, 2010). The project is at its final stage and is expected to be completed in 2015.

Napa Valley

Napa valley is located in California in the proximity of the San Francisco bay area. The valley is named after the Napa river. The city of Napa emerged at the riverbanks of the river in the early 19th century, as this was the furthest inland place to be reached by a cargo vessel. The city of Napa is nowadays often referred to as the most flooded city of the USA. In 1986 the US corps of engineers initiated a flood protection project to prevent further floodings. The plan comprised straightening and widening of the river, and protecting the riverbanks with artificial constructions. Inhabitants of the valley rejected this plan. As one interviewee stated *'In the past there have been attempts to channelize the Napa river like they did in LA. […] It's ugly, it's against nature, and all they do is move the problem downstream. […] So the people said let's look at something else'.* From documentation, interviewed city officials, project officials and stakeholders came forward that a group of volunteers continuously negotiated with a variety of stakeholders (Napa – volunteers). A more broadly defined plan, including nature restoration, riverfront developments and landscaping was embraced (US Army Corps of Egineers, 1998). Additional funding had to be found, which was done by raising local taxes, based on a 2/3rd majority vote in 1998 (*Napa – tax hike*). The contracting was done is such a way that most of the spending was directed to local and regional contractors. The project has been implemented in phases and was completed in 2013.

In the above paragraphs the individual projects have been described briefly, and the tools deployed have been highlighted. In table 3 the tools have been classified on the basis of the elements of the value elements classification system in table 2.

Table 3: classification of tools – classified from the perspective of the waterway authority

		Bea- stakeholder	Bea – DBFM contract	IHNC – co-funding	IHNC - tendering	ZWV – Intergovernm.	ZWV – DB contract	MIA – MRC trading	MIA - permitting	MIA – co-funding	MIA – step-by-step*	Waal - swap	Waal – real estate	Waal – auth. by munic.	Napa – volunteers**	Napa – local tax hike**

Transaction cost	Exploring	x				x		x			x	x		x		x
	Preparing	x	x	x	x	x	x	x	x	x		x	x	x		x
	Interagency coordination	x	x	x	x	x	x		x	x		x	x	x		x
	Intra-agency coordination	x	x	x	x	x	x	x	x	x		x	x	x		
	Education and training		x				x								x	x
	Monitoring		x		x		x		x			x	x	x		
	Enforcing		x		x		x		x			x		x		
	Build trust	x						x							x	
Transaction benefits	Joint assets			x		x		x	x	x						
	Complementary skills	x	x		x		x	x				x	x		x	
	Cooperative use of assets					x		x				x	x			
	Economies of scope		x			x	x					x		x	x	
	Economies of scale		x		x	x	x			x						
Value capturing	Reduced cost/risk	x	x		x		x			x		x		x		
	Shared cost/risk			x				x		x			x			
	Increased return flows							x	x							x
	Additional return flows															
	Strategic value			x	x	x		x	x	x		x		x	x	

Grey cells: most encountered
Hatched cells: least encountered
* The MIA - step-by-step approach anticipates on future opportunities. Interaction with partners will take place in the future, therefore no specifics, other than exploration of the opportunities can be given yet.
** From municipality of Napa perspective.

5 Analysis

The variety of tools as presented in this paper will be analysed here on the basis of the findings for transactions costs, transactions benefits, and the ways of capturing value (see table 3). This will be followed by a description of the differences and similarities in Dutch and American application of tools.

Transaction costs

In terms of transaction costs, all tools investigated include elements of such costs. Most common are the cost elements of making preparations for an agreement, interagency and intra-agency coordination (see table 3). Therefore, the theoretical notion by Coase (1960), that land use value would maximize instantaneously if there were no transaction cost, seems indeed to be theoretical here. All tools do not only have transaction cost, they all included multiple elements of transaction cost. The transaction cost elements for the step-by-step approach in Miami were not available yet, as future opportunities for value are not clear yet. The findings did show, however, that for each involved party in the cooperation as pursued by the tool the transaction costs might differ. For instance, the MRC trading tool, is quite intensive in terms of preparation and intra-agency coordination for the MRC itself, but for some of the involved stakeholders it just means they have to show up in a meeting and express their opinions. In fact this is exemplary of this kind of tool, it focuses on reducing transaction costs for other agencies. This is similar to the principles of the Napa volunteer group, and to a lesser extend to the 'Waal - real estate' initiative and the 'Waal - swap' decisions. All these focus on a facility to allow synergetic transactions without having the individual agencies having to pioneer a deal themselves.

Transaction benefits

In terms of transaction benefits, the tools show a large degree of variation. This means the tools address different elements of benefits that come with cooperation. The beneficial element of 'complementary skills' is found most often in the tools investigated. And as transaction benefits are the driver to seek transactions, the capabilities of partnering organizations seem to be a main driver amongst the benefits. The benefit of cooperative use of assets was least often addressed, and therefore a much less prominent driver to engage in transactions. Some of the tools relate to a single benefit only like Bea-stakeholder, IHNC co-funding and Waal-authority by municipality. The Napa-special tax hike to fund the Napa-River project is a bit of an a-typical tool in the set. It is a tool with an aim to capture value. It does not focus on some sort of transaction with stakeholders, and therefore it is without a specific benefit in terms of cooperation. It could be argued that it does not belong in this set of tools, but as it was an important element in making the Napa project to a success, it has been included here nevertheless.

Some of the tools addressed multiple transaction benefits. The tendering and contracting tools (Bea-DBFM, IHNC-Tendering, ZWV–Design Build), but also the trading

facilities (MRC-trading house, Waal – swap) are examples of these. In table 3 it is shown that all these tools address 'complimentary skills' together with one or more other benefits.

Value capturing

The data showed two remarkable results for the value capturing and claiming group of elements. First of all, strategic value is often mentioned or referred to by the interviewees. Building and maintaining the relationship with regional partners was often mentioned in this context. Secondly, no additional return flows have been mentioned or found for all of these tools. No direct explanation for this is provided through the empirical evidence. A logical reason behind this might be that this type of value capturing required much more coordination than the other types. Furthermore, a reduction of risk/cost comes forward as an important mechanism to capture value for many of the tools. The MRC trading facility is the single tool that combines both a cost and return element.

Comparison Netherlands-USA

If we compare the results for the tools as applied in the Dutch and the American situation a few specifics arise. In the American situation the use of local co-funding is mandatory for federal navigation projects. This actually played an important role in the IHNC case and the Miami river case. For the Napa case co-funding was applied, but as the federal objective was flood protection, it was not mandatory. Secondly, volunteer groups with impact and active long-term involvement, as seen in the Napa case, could be related to the American culture and tradition of volunteering. However, it does not rule out it could take place in other countries as well. Furthermore, the Dutch have been exploring the path of contract forms in which contractors are responsible for design, and sometimes finance, and maintenance as well. This is not witnessed in the American cases, nor has any reference to this kind of contracting been found there. Reference to contracting forms by US Corps of Engineers interviewees revealed that the design responsibility is in generally held close to the Corps itself, and not transferred to contracted parties. More generally there appears to be more attention for alternative contract forms in the Netherlands in comparison to the USA.

A striking difference in the results was the lack of addressing return flows in the Dutch tools, while this appeared several times in the American cases. This needs a bit of nuance though; increasing return flows only appeared to be viable in case a local

authority could influence the project significantly. Or as one of the interviewees for the Miami case phrased it; *'90% of the river is controlled by the city. Taxes go to the city, and the state, but mostly the city. Now condos go for a million a piece. The city had no political will before the MRC was in place. But once they learned the value was there, the money was there, people would go there, tax base was there, they understood you would have to do something there.'* There seems to be no specific hurdle for stakeholders in the Dutch context to act in a similar way. This means Dutch local authorities could try to influence the plans to optimize for increasing local tax revenues similar to the way this was actively done by local permitting in the Miami river case.

Three waterway themes

As described in the section 2, the cases are selected from three mayor categories of waterway investments; replacement of assets (Bea, IHNC), waterway improvement (ZWV, MIA) and flood protection (Waal, Napa). In deployment of tools, three notable differences are observed. First of all, in replacement of assets the benefit element of 'cooperative use of assets' is not addressed at all. In these cases this means that these assets are considered to be of single purpose. The second observation is that economies of scale are not addressed in the flood protection cases. This benefit is closely related to contracting forms, which is not a dominant tool in the flood protection cases. The third observation lies in the fact that tools deployed in the replacement of assets category do not address increased return flows at all. This is in contrast to both other categories. Again, an explanation could be that the focus lies in developing a cost efficient single purpose solution, and not so much in stimulating broader value.

The tools identified have been verified on the fact whether these include the mentioned elements of transaction cost, benefits, or value capturing mechanisms. From the observations it came forward that the way these elements are addressed can take several forms of governance. Taking these mechanisms encountered in consideration, basically five forms of governance were observed. Below these five forms are ranked from closed to more open types of governance (Martens, 2007):

- Permitting – with a purpose to optimize benefits (MIA- permitting, Waal real estate)
- Financial instruments – with a purpose to capture value through taxes or co-funding (IHNC – co-funding, MIA - co-funding, Napa – local tax hike)
- Contracting – with a purpose to optimize benefits or with a purpose to redirect expenses to regional returns (Bea – DBFM, ZWV – DB contract, IHNC –

tendering)

- Cooperative instruments – with a purpose to reduce transaction costs (Bea-Stakeholder, ZWV – Interngovernm, Waal-auth by munic, Napa-Volunteers).
- Trading house – with a purpose to transfer transaction costs from stakeholders to trading unit (MIA – MRC trading, Waal swap).

Special mention has to be made of the MIA step-by-step approach, as this tool seems to be of different nature. This tool was indeed meant to optimize the overall value of the project by enabling the actors to decide on timing of decisions, plans, contracts, designs and so on. As it appears to be a fundamental different type of tool, it is not mentioned in one of these groups. Such a step-by-step, or adaptive, approach can be seen as an overarching tool to optimize the deployment of tools by phasing developments in time.

6 Conclusions and discussion

The deployment of tools and instruments to increase value of waterway projects has been analysed. A series of six recent projects, three in the Netherlands and three in the USA have been studied to gain insight in contemporary developments in the waterway sector. Both national waterway authorities, Rijkswaterstaat and the US Army Corps of Engineers, showed recognition of the societal call for broader optimization of waterway projects and made attempts to optimize their projects in such way. As these attempts can be defined as planning practise in progress, it is certainly not evolved yet to a level of fit for purpose, refined and balanced practice.

In the six case studies the use of a variety of tools was observed. Literature on the precise working of these tools in waterway planning appeared to be scarce. By analysing the tools deployed on the basis of a classical transaction cost and transaction benefit framework, deeper insight has been provided on the elements these tools address in the optimization process. Transaction cost theory provides a useful framework as it says that land use value would optimize instantaneously if no transaction costs existed. By finding the way transaction costs are reduced, benefits increased and value capturing mechanisms deployed, we have seen that a structured identification and categorization of the tools can take place.

A total of 15 tools were found, all had a purpose to increase the value of the project in some way. All these tools addressed elements of transaction costs, transaction benefits and value capturing. The variety in transaction-cost-elements addressed and transaction-benefit-elements addressed was large; in value capturing the variation was much lower. Reduced cost/risk was often used as a way to capture value, together with strategic value. An explanation for this might be that these two types of capturing hardly ask for extra coordinative efforts, the benefits of the transaction 'fall' to the partners almost without extra effort. The strategic value element often referred to maintaining good relationships with other local or regional actors due to the recurrence of transactions beyond the project investigated. None of the tools added a new return flow in the system, and increased return flows were only witnessed in the USA situation. In the Dutch situation contracting tools stood out as a way to increase benefits by transferring (design-) responsibility to the contractor. This was not encountered in the American situation. In the US situation, however, contracting included directing expenses to local firms to increase the local return flow. This was not found in the Netherlands.

The cases were tied to three mayor categories of waterway projects; asset replacement, waterway improvement and flood protection. The tools from the cases in the first category appeared to focus most on developing a cost efficient strictly defined solution. Resolving an urgent specific problem is the key issue here. The tools applied in the projects of the category 'waterway improvement' addressed most transaction benefits and value capturing elements. These kinds of projects appear to have ample opportunities for broad optimization. Explanatory is the wider geographical and functional impact, which brings many ties to a variety of stakeholders and institutions. With many ties, come many opportunities and a call for wider optimization. The 'flood protection' projects seem to take a position in between these two themes. The geographical impact is wide, but the functional need is narrowly defined. Such projects seem to be able to go either way. This can be a strictly focussed solution, as initially proposed for both for the Waal and Napa River, or, a much broader optimized project, as later on realized for both projects.

At a more abstract level the tools could be categorized into five types of governance based on the purpose related to value elements pursued. These were: (1) permitting instruments, (2) financial instruments, (3) contracting to optimize benefits or stimulate local returns, (4) cooperative instruments, and (5) trading houses. And although the

purpose of each instrument might be clear and defendable, the data provided a rather dispersed image on the elements addressed according to transaction cost theory. This means room for further optimization is likely to be found. Ideally all transaction costs are to be minimalized and all benefits and value capturing elements maximized, in practice this appears to be difficult.

Optimizing waterway projects in a broad sense, taking into account many of the linked issues valued by society, can be a complex task. Tools can be helpful in this process. The effects of these tools in the optimization process are, however, rather complex itself. This is due to the wide variety of transaction cost elements and transaction benefit elements associated with these tools. These effects can also vary due to differences in context; an industrial zone will give different dynamics than a residential zone or a rural zone.

The cases learn that practitioners should keep in mind that inclusiveness comes with transaction costs and transaction benefits. The benefits are often explicit and highlighted by stakeholders, the transaction benefits are much more implicit. The benefits do not only need to be larger than these transaction costs, but have to be captured in an efficient way as well. Attention should be paid to these aspects when selecting a mix of tools to optimize a project.

Practitioners can expand their set of tools by adopting and application of successful tools as seen in other countries. Examples could be application of trading facilities or an obligatory requirement for co-funding in the Netherlands, or trying out alternative contract forms in the USA. Ideally deployment of mixes of tools should be complimentary and synergetic. Systematically considering application of tools in a structured way could be a practical step forward.

More broadly the study shows that current planning process in waterway development seems to be advancing. Both in the Netherlands and the USA a shift is seen from a traditional cost effective sectoral approach towards the application of tools to stimulate inclusiveness. There is a strong incentive to continue on this path as waterways need to be adapted to new circumstances, and at the same time assets are ageing and need to be renewed. Waterway authorities are forced to take action, but need to take into consideration the wide variety of issues related to these waters. Applying new mixes of tools and types of governance can be considered an emerging issue in the waterway

sector. These mixes vary greatly in characteristics. Further research into selecting effective mixes of governance, improving tools and instruments and providing guidance for harmonization of deployment of tools could strengthen the advancements in the sector.

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