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Planning for Waterway Renewal: balancing between Institutional Reproduction and Institutional Change

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Planning for Waterway Renewal: balancing between Institutional Reproduction and Institutional Change

Modern waterway networks are ageing and need to be renewed, yet the institutional context in the waterway sector is averse to change because of path dependencies. Waterway renewal requires actors to navigate between institutional reproduction and change. Applying an innovative framework for analysing institutions in a case study of the Dutch national waterways, we mainly find instances of institutional reproduction, which turns waterway renewal into a technical and financial exercise. However, institutional change becomes increasingly evident through a new functional-relational path, suggesting that planning for waterway renewal also entails reconsidering novel waterway configurations and incorporating neighbouring spatial developments.

Keywords: institutional change; waterways; institutions; path dependency; infrastructure planning; public administration.

Introduction

Modern waterway networks in the western world are rapidly ageing. Major components of these systems, such as weirs, bridges, and navigation locks, have reached or are currently reaching a state of maturity (and partial decline). This development marks a clear need to renew and renovate them (EIB, 2016; Gil & Beckman, 2009; Van Dorsser, 2015). In addition to the technical and climate change-related challenges related to deteriorating waterway infrastructure, societal demands may also have altered considerably since the initial date of construction. Renewal of waterway networks is therefore presented as a change imperative for organisations responsible for infrastructure planning: the focus shifts from developing to redeveloping networks (Bolton & Foxon, 2015; Graham & Thrift, 2007; Kanter, 2015). However, previous research has demonstrated how the costs embedded in waterway infrastructure and institutions have created a context that is rigid and inert to change (Banister, Anderton, Bonilla, Givoni, & Schwanen, 2011; Farrelly & Brown, 2011). This context may, in

turn, create a situation in which both the physical infrastructure and the social institutions become 'locked in' in past configurations that do not take current and future conditions, such as changing societal demands, decreasing public funding, and climate-related water stresses, into account (Willems, Busscher, Hijdra, & Arts, 2016).

In order to anticipate and address a change imperative such as major waterway renewal, the central concern for planning research and practice is the organisation of collective action (see Alexander, 2005). This organisation is conditioned by institutions, since they operate as "the humanly devised constraints that structure political, economic and social interaction" (North, 1991, p. 97). Institutions can be both formal (laws, regulations) and informal (social conventions, norms). At the same time, institutions are the outcome of the organisation of collective action (cf. Giddens, 1984). As Mahoney and Thelen (2009, p. 4) argue, institutions are often treated as enduring features that are resistant to change. Accordingly, institutions are inherently conservative and self-reinforcing: this characteristic is their strength, yet also their weakness (Gupta et al., 2010). Hence, institutions embody an interesting paradox: whereas institutions are typically regarded as entities bringing predictability and stability, anticipating change and dynamism might put these entities under pressure. Indeed, change imperatives as waterway renewal may well call for ambiguity, change and dynamism – elements that can be far from predictable and stable. In the light of the anticipated waterway renewal, we have noted a research gap with regard to the agency of actors to bring about institutional change.

Emphasising the agency of actors in institutional theories at critical moments in time (Sorensen, 2010; Salet, 2018) enables us to analyse how and why institutional change is initiated. From this perspective, actors are said to have the ability to enhance both processes of institutional reproduction, i.e. exploiting existing practices, and

processes of institutional change, i.e. exploring new practices (Mahoney, 2000; March, 1991). So, we aim to understand how actors perceive the change imperative of waterway renewal and which institutional change actors find feasible. To analyse institutional change in waterway planning, we focus on agency and institutional dynamics from two key streams of institutionalism (new institutional economics and socio-constructionist institutionalism). We will analyse institutional change in the context of the highly mature Dutch inland waterway network which is undergoing a major transformation. The Netherlands has proven itself to be forward-looking regarding waterway planning (OECD, 2014) and its institutional setting is well-established and well-documented (Arts, Filarski, Jeekel, & Toussaint, 2016; Lintsen, 2002). Consequently, the Dutch waterway management system presents a perfect case for exploring processes of institutional change in regard to waterway renewal.

The structure of this article is as follows. The second section offers a dynamic, actor-centred perspective on institutions, based on the notion of path dependency. This theoretical section works towards a framework for assessing actors' motivations for institutional reproduction and change from two institutional perspectives. The third section discusses the methodology and introduces the case study of the Dutch national inland waterway network. Fourth, the findings from both institutional perspectives in our case study are presented with their implications for waterway renewal. The final section consists of the conclusions and discussion.

Theoretical Framework

A dynamic Perspective on Institutions: Path Dependency

Institutions condition actors in responding either positively or negatively to change imperatives (Gupta et al., 2010). Actors can ignore the change and discard it as

irrelevant, or they can incorporate the change, which will set a process of institutional change in motion. In general, institutions typically hinder anticipating change, because they are often regarded as stable fixtures structuring interactions between individuals, groups and organisations through self-reinforcing mechanisms (DiMaggio & Powell, 1983; Mahoney & Thelen, 2009). The self-reinforcing nature of institutions is stressed in the concept of path dependency. According to Sorensen (2015, p. 21), “[t]he core idea of ‘path dependence’ is that, once established, some institutions tend to become increasingly difficult to change over time, and so small choices early on can have significant long-term impacts”. Originally, the concept of path dependency was applied to explain ‘lock-ins’ in technical systems (Arthur, 1994; Unruh, 2000); currently, the concept is also widely applied to the social sciences (Mahoney, 2000; Pierson, 2000) including the field of planning (Bertolini, 2007; Sorensen, 2015).

Path dependency does not imply that institutions are fixed or that rigidity is the sole potential outcome. Rather, path dependency implies that changes are structured by conditions (Sorensen, 2015). Actors can either follow or challenge established paths, leading to either a mechanism of institutional reproduction or a mechanism of institutional change (figure 1; Mahoney, 2000). In line with March (1991), both mechanisms are essential for institutions to cope change, which is a complicated balancing act. Tensions may indeed emerge easily between elements that aim to bring stability and those that look for experiment and novelty. Thus, actors will have to be able to navigate between *reproduction* and *change*.

This ability becomes even more important at critical junctures. In the development of infrastructure networks, a phase of renewal can be considered such a juncture, which marks the need for re-considering the functionality of the system (Bolton & Foxon, 2015). According to Sorensen (2010, p.281), critical junctures are

“exceptional times when agency can play a much larger role in challenging existing institutions and establishing new policies that may in time become institutionalized”. Hence, pursuing either institutional reproduction or institutional change at these moments in time will have profound implications for the future of the infrastructure network.

[Figure 1 about here.]

Different path-dependent Explanations from New Institutional Economics and Socio-Constructionist Institutionalism

If we want to analyse the tensions that arise from actors pursuing either institutional reproduction or change, we need to further conceptualise how institutions are enacted by actors in practice (Healey, 2007; Salet, 2018). Under the umbrella term of new institutionalism, multiple conceptualisations for institutions as well as methodologies for researching institutions have been proposed (Hall & Taylor, 1996). Moreover, the new institutionalism can be witnessed more and more in planning research (Kim, 2011; Verma, 2007).

Following DiMaggio (1998, p. 620), two major streams of institutionalism can be distinguished on the basis of their theoretical orientation: a lens rooted in new institutional economics (NIE), and a lens rooted in social-constructionist institutionalism (SCN) (for similar distinctions, see Buitelaar, Lagendijk, & Jacobs, 2007; González & Healey, 2005; Inderberg, 2011). Although both have different theoretical (ontological) orientations, their origins are rather similar. On the one hand, both lenses argue that institutions operate in human interactions as both an enable and constraining factor (Salet, 2018). On the other hand, both lenses treat institutions as

endogenous factors that can actively be created and re-created by actors (Kim, 2011). Both NIE and SCN have developed distinct research traditions to analyse agency and institutional dynamics, in which the mechanisms of reproduction and change are differently operationalised (Mahoney, 2000). NIE presumes that institutions are inter-organisational arrangements, which actors will re-create if that is in their self-interest based on voluntary rational choice. In contrast, SCN considers institutions as cultural signifiers to which (groups of) actors can relate; actors will re-create institutions if they are considered inappropriate. Table 1 provides an overview of the two different perspectives on institutional change. Linking the two perspectives offers a complementary account of institutions, considering the logic of both instrumentality and appropriateness (Buitelaar et al., 2007). The NIE-lens predominantly considers how actors rationally seek for efficient formal organisational arrangements, while the SCN-lens complements these findings with actors looking for appropriate, often more informal types of institutions.

[Table 1 about here.]

New Institutional Economics: a Logic of Instrumentality

The lens rooted in NIE presumes that the interactions between organisations to anticipate waterway renewal come with extra costs in addition to the actual production costs (Williamson, 1998): organisations will have to invest in each other, for instance, to get to know each other and reach agreement. NIE assumes that organisations will have an internal drive to lower their transaction costs. In theory, over time, more efficient transactions will arise, as organisations are expected to act rationally and to seek utility maximisation (Hall & Taylor, 1996; Williamson, 1999). The transactions

are governed by a system of organisational arrangements (Williamson, 1998). These arrangements can be regarded as “a means to an end” that contribute to the attainment of organisations’ sets of objectives in an efficient manner (Inderberg, 2011, p. 305). Clearly defined rights of ownership are expected to result in an improved inter-organisational coordination and distribution of responsibilities, with corresponding lower transaction costs. Consequently, the new institutional economics follows a logic of instrumentality to smoothen exchanges between organisations. From this perspective, planning can be seen in terms of individuals voluntarily making joint decisions. To smoothen their transactions, individuals establish organisational arrangements, which, in the extreme, may result in either hierarchical organisations (through internalising activities) or a free market system (Alexander, 2001).

From this perspective of voluntary choice, organisations will continuously consider their transaction costs to improve efficiency. A key assumption is that as long as the costs in the current arrangements do not outweigh the costs in alternative arrangements, current organisational structures will be reproduced. Only when it is no longer in the interest of organisations to maintain the established arrangements will institutional change occur. Such a change is driven by a different cost-benefit trade-off, derived from the evaluation of institutional performance (Mahoney, 2000), in our case ensuring a well-functioning waterway system. However, organisations tend to focus on the here and now and therefore neglect the long run and the bigger picture (Levinthal & March, 1993). Consequently, following Williamson (1999, p. 1105), transaction cost economics assumes that “previously unrecognised regularities” will be detected by organisations along the way as these patterns affect organisational performance. These considerations will subsequently lead to instrumental improvements in organisational arrangements that will lower the transaction costs.

Socio-Constructionist Institutionalism: a Logic of Appropriateness

The lens rooted in SCN is a cultural approach that examines “the socially embedded process of institutionalisation” highlighting dialogue over decisions (Buitelaar et al., 2007, p. 895). From this viewpoint, institutions are not instruments for achieving certain goals more efficiently, but rather operate as frameworks of meaning. Institutions thus serve a logic of social appropriateness, instead of a logic of instrumentality (March & Olsen, 1989). The logic of appropriateness is expressed through shared belief systems and practices, demonstrating that the ‘rules of the game’ are embedded in a wider culture (Hall & Taylor, 1996). To get a grip on the shared belief systems, discursive approaches in which language plays a central role are often used (Meyer & Rowan, 1977; Van Hulst & Yanow, 2016). Organisations jointly construct meaning, thus determining the appropriate actions. This meaning-making process results in discourses that allocate meaning to social and physical phenomena which are reflected in a set of practices (Van Hulst & Yanow, 2016). Dominant discourses condition the interactions between organisations through a logic of appropriateness. As a result, planners have become aware of how the wider historical-institutional context (for example visible in public norms) conditions specific planning practices (González & Healey, 2005).

As previous research has shown, organisations have a tendency to comply with established discourses, which process has been referred to as institutional isomorphism (DiMaggio and Powell, 1983). Meyer and Rowan (1977, p. 348) argue that this compliance demonstrates how organisations legitimatise their existence by adhering to societal values that define what is considered appropriate. This inclination operates as a strong driver for the mechanism of reproduction (Mahoney, 2000). Discrepancies between prevailing belief systems may challenge the dominant institutions, which subsequently could set institutional change in motion. Such discrepancies can arise out

of actors' changing belief systems, expressing different central concepts. Ultimately, these changes may result in the breakdown of one discourse and its replacement with another. Planning research, however, has mainly shown instances of more incremental institutional change, in which institutions adapt more slowly to new circumstances (Healey, 1998).

A Synthesis

Table 2 summarises the two lenses and their perspective on institutional reproduction and change. In both strands, the mechanisms of change are driven by agents: institutional change is affected by either new organisational trade-offs or changes in organisations' belief systems (Mahoney, 2000). To conclude, the framework presented in table 2 helps to understand the motivations why and how either institutional reproduction or change is favoured by actors.

[Table 2 about here.]

Methodology

Both institutional strands focus on the agency of organisations to modify established institutions. As a consequence, in our analysis, we will highlight how actors from key organisations approach waterway renewal and to what extent they perceive current institutions as both instrumental and appropriate. Waterway renewal is defined as a critical juncture (see figure 1) which makes this moment in time a suitable opportunity for reflecting whether established institutions still suffice. Our analysis allows us to identify mechanisms of reproduction and change from two lenses (table 2). We have examined this in the context of a case study of the Dutch inland waterway network, which will be introduced first.

Introduction to the Case Study

The Dutch national inland waterway network is among the oldest transportation networks in the Netherlands. Many components, such as weirs, locks and bridges, have been built in the 1920s and 1930s (Van Dorsser, 2015). Moreover, a review of academic literature on the case study (Arts et al., 2016; Lintsen, 2002; Van den Brink, 2009) shows the path-dependent nature of the Dutch waterway network, due to a firmly established institutional setting.

This established setting dates back to the Napoleonic era (late 18th century). Originating from that time, the Dutch Constitution defines making the land suited for human habitation and to protect and improve the living environment as the state's responsibility. Providing infrastructure is therefore considered a public task in the Netherlands. To illustrate, the Ministry of Infrastructure & the Environment yearly spends approximately 2.5% of the Dutch GDP on infrastructure development, management and operation (Statistics Netherlands, 2016). As a result, institutions developed in which the national government has the right of ownership to develop infrastructure. For instance, the centrally-led Rijkswaterstaat agency was founded in 1798 to develop and operate the waterways across the Netherlands. Currently, Rijkswaterstaat is the executive arm of the national Ministry of Infrastructure & the Environment. Together they are the main parties responsible for the national waterways. Due to decreasing public funding, the national government is in search for co-financing arrangements with regional and local governments. For infrastructure investments, there are strict legal procedures that ensure consultation with regional and local stakeholders (see Arts et al., 2016). This consultation was typified by the OECD (2014, p. 17) as “a distinctive ‘polder approach’, which values concerted, consensus-based decision-making”. The national government has traditionally been the most powerful national

actor in waterway development, exerting full control. This is symbolised in the central role of Rijkswaterstaat in the formation of the Netherlands (Lintsen, 2002), which has created a discourse that values technical expertise and made waterway management mainly an affair for engineers (Arts et al., 2016; Van den Brink, 2009). More recently, with the integration of new functions such as ecology and recreation (related to the Integrated Water Resources Management), the national government has been repositioned as an initiating or facilitating actor leaving more room for other parties to pursue their waterway-related interests (Hijdra, Arts, & Woltjer, 2014). These other parties are primarily public bodies, such as regional and local governments, but may also be private parties (e.g. container terminals, surrounding land-use owners, farmers). Despite the emergence of new institutions, the established institutional setting remains dominant. To illustrate, the Dutch national Council for the Environment and Infrastructure recently concluded that a sectoral way of working, occupied with realising new transport capacity, still prevails in Dutch planning practice (Council for the Environment and Infrastructure, 2018).

The current waterway network is ageing and requires major upgrades (Deltaprogramma, 2012; Van Dorsser, 2015; EIB, 2016). For instance, 52 out of 137 navigation locks require renewal before 2040 (Rijkswaterstaat, 2015). The rise in ageing assets has prompted a search for new ways of working that will guarantee a well-functioning system in which the organisations involved may have new roles to play (Van der Vlist, Roovers, & Barneveld, 2016). In our study, this search is regarded as an excellent opportunity for actors to reflect critically on the established institutions: according to the organisations involved, do current institutions suffice for a context of waterway renewal? And if not, how should the institutions be altered following the logics of instrumentality and appropriateness?

Data Collection and Analysis

In order to examine which institutional change actors believe is required for waterway renewal in the Dutch national waterways, 23 interviews were conducted in two rounds with senior officials working for key organisations in the waterways, such as the Ministry of Infrastructure & the Environment, its executive agency Rijkswaterstaat, regional governments (provinces), the logistic sector and port authorities, knowledge institutes, consultancies and construction companies (see appendix 1). Each interview consisted of a reflection on current practices and interactions in concrete waterway examples and projects in order to reveal existing institutions and a discussion on (required) changes in these practices. All interviews were audio-recorded and transcribed. Summaries were sent to the interviewees for confirmation.

The interview transcripts served as the basis for the explication of the established institutions and for the proposals for modification of these institutions. The qualitative data computer programme Atlas.ti was used to code the transcripts. All interviews were coded twice: first from a NIE-perspective; then from a SCN-perspective. Concerning NIE, the right of ownership is a defining concept (e.g. the right to use or modify the waterway), which can be seen in the legal responsibilities (mandates) and financial structures. To operationalise SCN, the shared belief system and practices were further divided according to content (what are the key values and practices in the culture?), roles (which roles do the parties have to play and why?) and argumentation (is the culture based on coherent and consistent reasoning?) (Fisher, 1992). As such, the coding process started with a deductively constructed code tree with two families of institutional structures and cultures.

We defined actors' views on the institutions at two moments in time (figure 1). As we were examining a highly advanced institutional setting, the established

institutions according to actors were taken as the initial conditions (t=1 in figure 1). Waterway renewal is operationalised as the critical juncture (t=2), at which moment actors will assess whether institutions can still be considered instrumental and appropriate (table 2). This assessment may trigger both institutional reproduction and institutional change (t=3). Institutional reproduction is considered in a continuation of rights of ownership and dominant discourses, institutional change in proposed changes in rights and discourses. In the end, our findings will show whether institutional reproduction, institutional change or both will take place.

Actors' Views on Institutional Change for Renewal in the Dutch National Inland Waterways

This section presents the empirical findings regarding actors' views on institutional reproduction and institutional change in the Dutch national inland waterways triggered by the topic of waterway renewal. The following sub-sections discuss the findings from the NIE-lens (in which actors are driven by a logic of instrumentality) and the SCN-lens (in which actors are driven by a logic of appropriateness) respectively (summarised in table 3 at the end of this section).

Actors Views' on instrumental Institutions

Initial Conditions: current Institutions

As all interviewees confirmed, providing infrastructure is considered a public task in the Netherlands. For instance, as interviewee #3 from the logistics sector puts it, the national government has a duty to cater for smooth inland navigation and water safety. Consequently, the national government, more specifically the Ministry of Infrastructure & the Environment (responsible for policy-making) and its executive agency Rijkswaterstaat (for the day-to-day operation), has the right of ownership. The right of

ownership is reflected in the responsibilities of the national government to safeguard the primary aims of the waterways, i.e. ensuring waterborne transportation and guaranteeing water discharge for water safety purposes. Interviewees state that the national government's overarching objective with regard to the waterways is maintaining a system that does not fail these tasks. As interviewee #9 argues, "*[maintaining an advanced system] is quite a challenge in itself*". Although the national government has full control, the Ministry is obliged to consult with regional and local parties on investments in the waterways. Other parties intend to use or modify the waterways rely on the national government, as the Ministry has to approve their plans.

The existing institutions (t=1 in figure 1), developed to secure current waterway performance to maximise utility, can be typified as formal and hierarchical, with clear responsibilities for each party (captured in legal and financial agreements). Every year, the Ministry approves the national infrastructure budgets, which are derived from the national Infrastructure Fund (for transportation such as highways and waterways) and Delta Fund (for the national water system) (see also Arts et al., 2016). These funds run until 2030, with allocated budgets for infrastructure construction and maintenance. According to interviewee #5, who works for the Ministry, the construction budget is expected to resolve the major bottlenecks in the transportation systems before 2030, based on current scenarios. In addition, there are funds for maintenance and operation, which the executive agency Rijkswaterstaat uses to ensure a smooth operation of the transportation system. This budget category includes renewal and renovation (I&M, 2017).

As a consequence, waterway renewal has been operationalised as primarily a task for the infrastructure operator. Between the strategically-operating Ministry and its

implementer Rijkswaterstaat, organisational arrangements have been established to streamline the funds allocated. Over time, the responsibilities and exchanges have been formalised and institutionalised. As a result, the transaction costs are perceived as relatively low by interviewees #5 and #14, as both parties know each other well and the aims are clear. As considerable budgets are involved, accountability to parliament is important. The whole process is streamlined in strict procedures that prescribe responsibilities and budget allocations between the Ministry and Rijkswaterstaat. Given that Rijkswaterstaat as the operator has more hands-on knowledge, the Ministry tries to overcome information asymmetries, for instance by commissioning Rijkswaterstaat to deliver an overview of the technical state of the waterway network to the Ministry every two years. The executive agency underscores that renewal is mainly a technical exercise. Interviewees argue that the need for consultation with other parties is limited, since renewal often does not lead to altered or new functionalities. A Rijkswaterstaat employee (interviewee #13) specifies that:

“In the national inland waterway system, you will find all types of infrastructure assets which reach their technical end-of-life-cycle. We just ask [the Ministry] for money to replace those assets with new ones. That is the common procedure, which remains within the technical domain.”

To conclude, the NIE-lens reveals that actors perceive institutions focusing on the budget and technical issues as instrumental. Consequently, the organisational arrangements centre on the Ministry and Rijkswaterstaat and do not have much political influence, so transaction costs are perceived as low.

Critical Juncture: instrumental Institutions for Renewal

For waterway renewal (t=2 in figure 1), the public task of providing infrastructure is not put into question. Interviewees argue that, if the infrastructure starts deteriorating, the

national government has a responsibility to continue (or even upgrade) current performance levels. The right of ownership remains therefore unaffected. The growing importance of waterway renewal incited Rijkswaterstaat to start several exploratory studies. These studies, amongst others, can be considered a reflection on existing institutions and have led to new insights and demands on how to approach renewal.

The project Renewal Challenge Hydraulic Works (in Dutch: *Vervangingsopgave Natte Kunstwerken*) and an exploratory study on the Meuse river (*Grip op de Maas*) have raised the awareness that replacing waterway assets on a one-to-one basis might lead to a ‘lock-in’ of the current waterway system with dated functionalities. As a Rijkswaterstaat interviewee (#20) argues, replacing assets one by one “*implies that (...) the [waterway] system configuration will also function for the long term, that it is durable.*” Interviewees involved in the studies became aware that waterway renewal is not necessarily purely related to maintenance. As interviewee #13 illustrates with an example:

“[The asset] is part of a waterway system, which has been designed for [specific purposes]. By now, these purposes have changed. So you want to replace [an asset] for a dated objective... Don’t we need to take a closer look? Well, that was not commonplace.”

This quote demonstrates that there may exist a variety of alternatives for renewing waterway assets besides just replacing them. As a result, renewal discussions obtain a political dimension, in which existing functionalities are questioned. In addition, functionalities such as recreation, energy generation, and ecological issues are increasingly incorporated into waterway planning as well. Waterway renewal is no longer only the operator Rijkswaterstaat’s responsibility, but other parties are getting involved too. Thus, actors put the instrumentality of current institutions into question,

which marks a shift from technical, hierarchal organisational arrangements towards more functional, relational arrangements.

Interviewees propose several modifications of established institutions to move away from an arrangement in which the Ministry and Rijkswaterstaat take the lead. The first modification relates to the funding source. At the moment, the Infrastructure and Delta Fund only provide funding for one-to-one renewal from the maintenance budget (figure 2). For additional functionalities, new funding sources should be found.

Interviewee #4 from the Ministry indicates that the Ministry has gained quite some experience co-financing water system projects with fellow public governments, for instance in the national Delta Programme (*Deltaprogramma*) and the Flood Protection Programme (*Hoogwaterbeschermingsprogramma*) in which national and regional governments co-operate. A similar approach is taken in the transportation sector, in which the national programming, planning and budgeting (PPB) framework of key Dutch national infrastructure projects is followed. This framework encompasses the Multi-Year Programme for Infrastructure, Land Use and Transport (*Meerjarenprogramma Infrastructuur, Ruimte en Transport*) and translates strategic transportation policies into specific national projects. The PPB-framework extensively describes the rules of the game for national and regional parties to negotiate and decide upon either the construction of new infrastructure or the renewal of existing infrastructure (see Arts et al., 2016).

[Figure 2 about here.]

Positioning waterway renewal in the national programming, planning and budgeting framework creates a new institutional setting, in which the Ministry (and its

executive agency, Rijkswaterstaat) is no longer the only responsible player.

Transactions between mainly public governments become the core focus. The Ministry has declared that it is willing to discuss regional initiatives, as interviewee #4 demonstrates: *“You can link [your ambitions to ours] and participate. But if you want to join, you’ll have to contribute financially, too.”* Even so, these discussions take place within certain boundaries (rights of ownership), as national interests can overrule regional ambitions: *“If you want to arm wrestle, you should not do that with us of course.”* (interviewee #4) Some provinces, although not all (yet), see an opportunity to connect regional ambitions with national renewal projects. As interviewee #8 from a province explains, *“If you have ambitions [as a province], you have to take your responsibility. And in financial terms, too.”* Both quotes illustrate that discussions can easily become a financial matter (figure 2). Although the Ministry argues that other parties had better just join this new ‘game’, regional parties feel that the sectoral (transportation) angle is still dominant, since the Ministry is tied to fixed budgets and can overrule regional parties. The Ministry confirms: *“Only when there are great ideas [from regional parties] can we explore whether we can expand our budget. It does not work the other way around.”* (interviewee #4) Moreover, the new arrangements currently still operate in a rather informal way and, according to interviewee #10, are highly reliant on regional political ambitions. As a consequence, arrangements become more open, yet also appear more ad hoc.

In these new, more political arrangements, Rijkswaterstaat has difficulty defining its responsibility. Interviewees from Rijkswaterstaat perceive themselves as operators who can put issues on the agenda of the Ministry. A consultant (interviewee #1) observes that Rijkswaterstaat likes to attend negotiations within the national PPB-framework as a neutral party (the operator as the expert that other parties can consult

with), but regional governments especially consider Rijkswaterstaat a representative of the Ministry. As interviewee #16 from Rijkswaterstaat confirms, “*We are not independent.*” Being one of the parties at the table, Rijkswaterstaat is also less familiar with combining its own interests with those of the others, as the agency considers its own interests of higher national importance. For example, interviewee #12 argues “*[Rijkswaterstaat] should not all of a sudden allow activities that may harm how our waterway network currently functions. You have to be very alert in that respect, (...) or else you’ll devalue your own system.*”

Regional and local governments gain more responsibilities and are often represented by the Dutch provinces. Whereas some provinces are very active in connecting waterway developments with regional economic development (e.g. Overijssel, Noord-Brabant), others are more hesitant or even unaware of the possibilities. The latter group of provinces (e.g. interviewee #7) argues that the Ministry should initiate waterway (re-)development programmes which regions can join later. However, the Ministry is taking a similar perspective in waiting for regional initiatives, because, according to interviewees #4 and #5, only then will be revealed what certain projects are really worth to the regions. Other regional parties, such as semi-public agencies (e.g. energy companies), can participate in renewal developments, but so far, their contributions can only be seen in small-scale pilots initiated by the national government.

Private parties have not experienced great changes in their responsibilities. To illustrate, interviewees #2 and #22 from the logistics sector and water construction companies argue that they remain fully dependent on the national government, as waterway development remains a public task. The interviewees acknowledge that they

have good connections within the national government, so they can raise potential concerns.

As the division of responsibilities becomes messier (and is still under discussion), approaching waterway renewal within the national programming, planning and budgeting scheme with a view to include more functional discussions on the waterways, may add to the ambiguity. These discussions may increase transaction costs between parties. As interviewee #1 observes, “*A mismatch is likely to arise between the agendas and rhythms of the different parties*”. At the same time, the ‘corners of the playing field’ are still undefined: interviewees adhere to different views on what is most instrumental. The differing views underline the different operationalisation of utility maximisation, which has changed for some through the exploratory studies by broadening the goal of renewal. Still, reassuring the dominant path, a group of interviewees questions to what extent the PPB-framework is indeed suitable for renewal and whether the current organisational arrangements are already sufficient. At the moment, these existing institutions are expanding (thus slowly changing) with an explicit assignment to inventory potential renewal options that adhere to the national PPB-framework, as seen in Rijkswaterstaat’s updated strategic vision on renewal and renovation (I&M, 2016).

To conclude, institutional change is occurring through an extension of the dominant organisational arrangements as the outcome of new insights and demands (table 3; t=3 in figure 1): in addition to a technical focus (a result of institutional reproduction), a functional perspective (institutional change) has emerged that is presented by actors as more instrumental with the potential to approach waterway renewal in a more comprehensive fashion that includes national and regional actors. However, the functional perspective has yet to be explored in practice.

Actors' Views on appropriate Institutions

For the SCN-lens, we re-constructed institutions that actors find appropriate based on content, roles and argumentation. As with the previous section, we looked at current institutions and institutions for renewal.

Initial Conditions: current Institutions

The availability of the waterway system for the main users (shipping) was put forward by interviewees as a central concept in the discourse on waterway renewal. A smooth operation of the waterway network is therefore regarded appropriate, as reflected in concrete performance levels (e.g. navigation locks have to be available 98% of the time) that are set by the Ministry of Infrastructure & the Environment and with which its executive agency, Rijkswaterstaat, has to comply. To illustrate how appropriateness is linked to availability and reliability, interviewee #4 refers to former minister Karla Peijs (2003-2007) who often emphasised to “maintain what we have got” (in Dutch: “*houwen voor bouwen*”). From this perspective, ageing infrastructure could challenge the performance of a waterway network. As infrastructure ages, “*Regular maintenance and renewal has received more attention.*” (interviewee #5)

This emphasis has clear implications for the management of the network. In the exploitation of the waterway system, operator Rijkswaterstaat is the main player as it is responsible for the preservation of the availability. According to interviewee 9, “*A typical operator is rather conservative, it is someone who just wants to have it right. So (s)he will always rebuild what was there, as (s)he knows it was of good quality.*” In other words, a proven system should be maintained. Interviewees from Rijkswaterstaat perceive themselves as apolitical and rational experts: “*We have become an executive agency and as a result [we have been placed] outside of the political domain. (...) We*

are judged on availability.” (interviewee #19) Rijkswaterstaat translates the objectives from the Ministry to specific performance indicators (e.g. ‘service level agreements’) and projects resonating new public management thought with ‘value for money’ principles. In this respect, Rijkswaterstaat relies on a technical knowledge base, which is explained by interviewee #1:

“[This reliance on technical knowledge encompasses] a feasibility or steerability way of thinking of Rijkswaterstaat. You can construct a completely rational system [with] performance indicators which you then translate for the different branches that you have to manage, but I do not believe in that approach.”

To summarise, the institutions that actors regard appropriate are risk-averse, rationality-driven and somewhat conservative (t=1 in figure 1). In this discourse, Rijkswaterstaat plays a central role.

Within the context of waterway renewal, a culture has emerged in which the reasoning goes that if an asset in the waterway network reaches its technical end of life, the asset will be replaced in order to safeguard performance. Interviewee #14 explains:

“When a piece of infrastructure does not function anymore, and so technically is written off, well, you’ll have to make an investment to bring the asset back to its previous level. The goal is then linked to maintaining the current waterway network.”

As Rijkswaterstaat is predominantly in charge, not only the regional stakeholders have limited awareness of the emerging issue of waterway renewal, but also the Ministry did initially not perceive renewal as their responsibility. Interviewee #12 states that “*[Renewal] is a task that is on the agenda of Rijkswaterstaat as the responsible operator and maintainer of the waterways.*” This perception is reinforced because renewal issues are programmed by Rijkswaterstaat within the available budgets (figure 2).

Critical Juncture: appropriate Institutions for Renewal

In view of the number of waterway assets that have to be renewed, interviewees argue in favour of expanding the appropriateness of availability and reliability with novel, additional concepts. According to interviewee #13, the focus has been too much on minor, technical elements (the “*bolts and nuts*”) and on isolated objects. Instead, interviewees would prefer to include wider developments. For instance, interviewee #14 states:

“That you can provide additional input based on, what do I see in regard to the functionality [of the waterway system], and in regard to the surroundings? What do I have to take into account? That [question] is really new.”

These issues all relate to the current configuration of the network. As a result, a shift in content and argumentation can be observed: what is considered appropriate is extended to the notion of functionality. With this concept, waterway renewal becomes not just a way to maintain the current system in order to safeguard performance, but also an opportunity to integrate different developments and to transform the waterway network. For instance, interviewee #8 argues that renewal is an opportunity for his region to boost the current regional economic situation.

In this discourse, in which actors stress the possibilities of transforming the network, the parties involved are developing new roles. The Ministry of Infrastructure & the Environment, for instance, aims to move away from its prescribing role. According to interviewee #4, “*[Taking the lead] is a position we do not want so much anymore. Others just lean back, they think that it is the national government’s turn, they will pay, so we do not have to think about renewal.*” Instead, the Ministry is looking for initiatives shared with regional and local governments to create widely supported waterway renewal plans. Still, the Ministry remains a dominant player: “*We obviously*

have a clear role, as we are the party with the large sums of money. (...) Without us those major infrastructure projects cannot proceed.” (interviewee #4) Also, the Ministry stresses that initiatives need to be sober and effective. Other parties that want to participate in renewal projects have to contribute financially, as budgets are limited (see figure 2). There must be a clear synergy and, with infrastructure at the eve of breaking down, there is a clear time horizon before plans and projects have to be finalised.

On the regional level, the province as the regional government considers itself a linking force that can bring together varied interests. Provinces are already familiar with this role from having had to deal with many cases involving adjacent land use. Provinces argue that they often know their region better than the Ministry or Rijkswaterstaat. Interviewees distinguished two types of provincial roles. Some provinces take a ‘wait-and-see’ stance which is a more traditional role. Only once the national government has launched a plan for their region will provinces lobby to incorporate their regional interests in the plan. For them, the Ministry remains a “*black box*” (interviewee #7) which “*so to speak still operates from its ivory tower in The Hague*” (#8). Other provinces are much more pro-active and often have ambitious regional development agendas. For instance, interviewee #10 from the province of Overijssel states: “*We are currently very busily looking to expand the renewal challenge to logistic opportunities for Overijssel. (...) How can we achieve more economic growth to benefit from [renewal] as much as possible?*” Provinces actively approach the national government with their ideas, often backed by a regional lobby of either businesses or citizens’ initiatives. Since provinces typically also provide additional financial resources, synergy with national ambitions can be created. Currently, the latter, pro-active stance seems to be favoured by the Ministry.

The interviewees have less clear ideas about a possible role for Rijkswaterstaat. On the one hand, Rijkswaterstaat is commissioned by the Ministry. As the Ministry argues, “*We have to keep Rijkswaterstaat focussing on [functional issues], too.*” (interviewee #5) On the other hand, Rijkswaterstaat has most of the expert knowledge on the waterway system, as the agency handles its day-to-day operation. Discussions between the Ministry and regional governments can lead to novel configurations of the waterway system; Rijkswaterstaat will basically have to comply with the outcomes. Interviewee #20, working at Rijkswaterstaat, argues: “*Anything is possible, but we are responsible for the system.*” Put differently, Rijkswaterstaat’s focus on the operation of the network can clash with functional negotiations by the Ministry and regional governments. Here, a discrepancy can be observed between the established, risk-averse discourse of reliability and the emerging discourse that is more opportunity-driven and open to new initiatives.

In this emerging stream, a relatively different belief system with regard to appropriateness has developed, in which actors emphasise the larger picture to be taken into account. From this perspective, renewal is not just a technical issue, but also relates to the waterway system (what do we want to do with the waterway system and the surrounding region? – an object-related question) and what parties aim for (who to involve? – a more process-related question). As interviewee #6 observes, “*Other parties had the comfortable position kicking against [complaining about] Rijkswaterstaat and the Ministry, but that does not hold anymore.*” Nevertheless, the national government remains powerful as it has the largest budget (Ministry) and the expertise (Rijkswaterstaat). To conclude, institutional change is slowly occurring and the concept of appropriateness is being expanded by actors, by incorporating a more functional,

relational understanding of waterway renewal in an addition to the operator-dominated perspective (table 3; t=3 in figure 1).

[Table 3 about here.]

Conclusions and Discussion

As waterway networks in the western world are increasingly ageing, waterway renewal becomes a change imperative for redeveloping and transforming these networks to meet current and future demands. For waterway planning and management, renewal brings up strategic considerations of what we want to do with these mature networks which typically last fifty to one hundred years. The aim of our article was to understand from two institutional lenses how actors perceive the change imperative of anticipating waterway renewal and which institutional change actors find feasible. In this article, institutions are not seen as stable entities, although they are often depicted as such, but rather as dynamic entities that actors can re-create. The literature on path dependency has demonstrated how anticipating change can be strongly conditioned by established institutional paths. In these paths, both institutional reproduction and institutional change occurs. For the successful anticipation of waterway renewal, actors need to navigate between reproduction and change – i.e. exploit current practices and explore new ones (March, 1991).

This article has developed a framework that enables us to identify these two mechanisms as approached from new institutional economics and socio-constructionist institutionalism. Both approaches presume different motivations why either institutional reproduction or institutional change is chosen. In new institutional economics, actors are

driven by a logic of instrumentality; in the socio-constructionist institutionalism, actors adhere to a logic of appropriateness (table 2). Actors' motivations were explored from both institutional angles in a case study of the Dutch national inland waterway network. Our results demonstrate that newly established transactions consider the longer term and wider regional developments leading to different trade-offs; new interpretations include not only technical aspects of the ageing infrastructure but also look into its functionality (table 3). Still, in line with previous research (Banister et al., 2011; Farrelly & Brown, 2011), existing institutions condition to a great extent how waterway renewal is approached, therefore indicating that the balance between institutional reproduction and change is currently tipping to the former. Accordingly, actors perceive discarding existing institutions as not instrumental and inappropriate, but rather opt for modifying and complementing them with new institutions in order to make them "work". New institutions are thus emerging, which Mahoney and Thelen (2009) refer to as institutional layering.

The implications for planning practice are a broadening up of approaches to waterway renewal (figure 3). The analysis from both theoretical lenses shows that, in addition to the dominant path (A in figure 3), a new path is emerging (B). Consequently, we have observed a shift from approaching renewal as a technical and financial issue (focused on isolated objects) towards an issue that requires functional-relational discussions related to wider system implications. In our case, these discussions aim to enhance the coherence between national infrastructure investments and regional spatial developments, for instance through exploring potential synergies. Thus, the technical-hierarchical way of working was seen by interviewees as inappropriate, since renewal requires larger-scale discussions about the future of the waterway network. Likewise, with this broader scope in mind, the instrumentality of the

existing institutions was considered inadequate. Interviewees argued that, depending on the size of waterway assets, either a more technical or a more functional approach can be followed. A reconsideration by actors of the logics of instrumentality and appropriateness thus leads to a diversification of approaches to renewal. For planning theory and practice, these findings demonstrate that actors are deliberately aiming at institutional change in order to tailor institutions to a new situation. As existing institutions are mainly complemented by new ones, institutional change in our highly institutionalised case study demonstrates to be an incremental process. Given the explorative nature of our empirical work, future research can further ground these findings.

[Figure 3 about here.]

More generally, our research indicates that institutional change is accelerated once actors deliberately put the dominant logics of instrumentality and appropriateness under pressure. This finding raises the question whether planners have the capacity to enhance mechanisms for institutional change. Since institutions have a tendency to reinforce themselves, questioning established institutions does not come easy. Our case study of the institutional setting in the Dutch inland waterway network was no different in that respect. These questions – and proposed modifications to institutions – often stay within the realm of exploratory studies and are yet to be raised in actual practice. Our findings reconfirm the vested interests in both the waterway infrastructure and the institutions in which the national government plays a leading role (e.g. in terms of right of ownership and being the main financial contributor). Both institutional lenses offered different insights for agents pursuing institutional change. From a new institutional

economics perspective, actors re-created institutions once they observed promising co-financing arrangements between different levels of governments. From a socio-constructionist institutionalism perspective, established institutions were perceived as inadequate, because their focus was considered too “engineeristic”. Hence, new institutions that stress functional-relational aspects were developed. Together, both institutional lenses offer clues how more integrative forms of waterway planning can be achieved. From both lenses, institutional change can be fostered through the incorporation of multiple stakeholders, either through co-financing arrangements (perceived as more efficient than “siloes” policy processes) or through functional-relational discussions in which a wider array of stakeholders participates (perceived as more appropriate than a mono-functional, engineering focus). Cases of infrastructure renewal are likely to appear more structurally in the future, with questions about institutional change becoming more apparent. Our case study is an initial examination, so future research can further substantiate the role of change agents in effectuating institutional change.

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Declaration of Interest

No potential conflict of interest was reported by the authors.

References

Alexander, E. R. (2001). A transaction-cost theory of land use planning and development control: towards the institutional analysis of public planning. *The Town Planning Review*, 72(1), 45-75.

- Alexander, E. R. (2005). Institutional transformation and planning: from institutionalization theory to institutional design. *Planning Theory*, 4(3), 209-223.
- Arthur, W. B. (1994). *Increasing Returns and Path Dependence in the Economy*. Ann Arbor, MI: University of Michigan Press.
- Arts, J., Filarski, R., Jeekel, H., & Toussaint, B. (Ed.) (2016). *Builders and Planners. A History of Land-use and Infrastructure Planning in the Netherlands*. Delft: Eburon.
- Banister, D., Anderton, K., Bonilla, D., Givoni, M., & Schwanen, T. (2011). Transportation and the environment. *Annual Review of Environment and Resources*, 36, 247-270.
- Bertolini, L. (2007). Evolutionary urban transportation planning: an exploration. *Environment and Planning A*, 39(8), 1998-2019.
- Bolton, R., & Foxon, T. J. (2015). Infrastructure transformation as a socio-technical process—Implications for the governance of energy distribution networks in the UK. *Technological Forecasting and Social Change*, 90(B), 538-550.
- Buitelaar, E., Legendijk, A., & Jacobs, W. (2007). A theory of institutional change: illustrated by Dutch city-provinces and Dutch land policy. *Environment and Planning A*, 39(4), 891-908.
- Council for the Environment and Infrastructure (2018). *Better and Different Mobility: Investing in Mobility for the Future*. The Hague: Council for the Environment and Infrastructure.
- Deltaprogramma (2012). *Vervangingsopgave Natte Kunstwerken*. The Hague: Delta programme, Ministry of Infrastructure & Environment
- DiMaggio, P. J. (1998). The new institutionalisms: avenues of collaboration. *Journal of Institutional and Theoretical Economics*, 154(4), 696-705.
- DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Collective rationality and institutional isomorphism in organizational fields. *American Sociological Review*, 48(2), 147-160.
- Duit, A., & Galaz, V. (2008). Governance and complexity—emerging issues for governance theory. *Governance*, 21(3), 311-335.
- EIB (2016). *Opgaven en middelen voor infrastructuur tot 2030*. Amsterdam: Economisch Instituut voor de Bouw.

- Farrelly, M., & Brown, R. (2011). Rethinking urban water management: Experimentation as a way forward?. *Global Environmental Change*, 21(2), 721-732.
- Fisher, W. R. (1992). *Narration, reason and community*. In: Hinchman, L.P. & Hinchman, S.K. (Ed.) (1997). *Memory, Identity, Community: The idea of narrative in the human sciences*. Albany, NY: State University of New York Press.
- Giddens, A. (1984). *The Constitution of Society: Outline of the Theory of Structuration*. Cambridge: Polity Press
- Gil, N., & Beckman, S. (2009). Introduction: Infrastructure meets Business: Building New Bridges, Mending Old Ones. *California Management Review*, 51(2), 6-29.
- González, S., & Healey, P. (2005). A sociological institutionalist approach to the study of innovation in governance capacity. *Urban Studies*, 42(11), 2055-2069.
- Graham, S., & Thrift, N. (2007). Out of order: understanding repair and maintenance. *Theory, Culture & Society*, 24(3), 1-25.
- Gupta, J., Termeer, C., Klostermann, J., Meijerink, S., Van den Brink, M., Jong, P., ... & Bergsma, E. (2010). The adaptive capacity wheel: a method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. *Environmental Science & Policy*, 13(6), 459-471.
- Hall, P. A., & Taylor, R. C. (1996). Political science and the three new institutionalisms. *Political Studies*, 44(5), 936-957.
- Healey, P. (1998). Building institutional capacity through collaborative approaches to urban planning. *Environment and Planning A*, 30(9), 1531-1546.
- Healey, P. (2007). *The New Institutionalism and the Transformative Goals of Planning*. In: Verma, N. (Ed.) (2007). *Institutions and Planning*, 61-87. Bradford: Emerald Group Publishing.
- Hijdra, A., Arts, J., & Woltjer, J. (2014). Do We Need to Rethink Our Waterways? Values of Ageing Waterways in Current and Future Society. *Water Resources Management*, 28(9), 2599-2613.
- I&M (2016). *Integraal Duurzaam Opdrachtgeverschap Vervanging en Renovatie*. The Hague: Ministry of Infrastructure & the Environment.
- I&M (2017). *Rijksbegroting 2017 A Infrastructuurfonds*. The Hague: Ministry of Infrastructure & the Environment

- Inderberg, T. H. (2011). Institutional constraints to adaptive capacity: adaptability to climate change in the Norwegian electricity sector. *Local Environment*, 16(4), 303-317.
- Kanter, R. M. (2015). *Move: Putting America's Infrastructure Back in the Lead*. New York: WW Norton.
- Kim, A. M. (2011). Unimaginable change: Future directions in planning practice and research about institutional reform. *Journal of the American Planning Association*, 77(4), 328-337.
- Levinthal, D. A., & March, J. G. (1993). The Myopia of Learning. *Strategic Management Journal*, 14(S2), 95-112.
- Lintsen, H. (2002). Two Centuries of Central Water Management in the Netherlands. *Technology & Culture*, 43(3), 549-568.
- Mahoney, J. (2000). Path dependence in historical sociology. *Theory and Society*, 29(4), 507-548.
- Mahoney, J., & Thelen, K. (Ed.) (2009). *Explaining Institutional Change: Ambiguity, Agency, and Power*. Cambridge, UK: Cambridge University Press.
- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71-87.
- March, J. G., & Olsen, J. P. (1989). *Rediscovering Institutions: The Organizational Basis of Politics*. New York: The Free Press.
- Matthews, T. (2013). Institutional perspectives on operationalising climate adaptation through planning. *Planning Theory & Practice*, 14(2), 198-210.
- North, D. C. (1991). Institutions. *The Journal of Economic Perspectives*, 5(1), 97-112.
- OECD (2014). *Water Governance in the Netherlands: Fit for the Future?* OECD Water Series. Paris: Organisation for Economic Co-Operation and Development.
- Pierson, P. (2000). Increasing returns, path dependence, and the study of politics. *American Political Science Review*, 94(2), 251-267.
- Rijkswaterstaat (2015) MultiWaterWerk: slimme standaardisatie bij nieuwe sluizen. *Rijkswaterstaat &*, 1(1). Accessible via: <https://www.magazinesrijkswaterstaat.nl/zakelijkeninnovatie/2015/01/mww> (last accessed 15-10-2018)
- Salet, W.G.M. (2018). *Institutions in Action*. In: Salet, W.G.M. (Ed.) *The Routledge Handbook of Institutions and Planning in Action*. London: Routledge.

- Sorensen, A. (2010). Land, property rights, and planning in Japan: institutional design and institutional change in land management. *Planning Perspectives*, 25(3), 279-302.
- Sorensen, A. (2015). Taking path dependence seriously: an historical institutionalist research agenda in planning history. *Planning Perspectives*, 30(1), 17-38.
- Statistics Netherlands (2016). *Bruto Binnenlands Product: Nederland en de wereld*. The Hague: Statistics Netherlands.
- Unruh, G. C. (2000). Understanding carbon lock-in. *Energy Policy*, 28(12), 817-830.
- Van den Brink, M. A. (2009). *Rijkswaterstaat on the horns of a dilemma*. Delft: Eburon.
- Van der Vlist, M., Roovers, G., & Barneveld, A. (2016). Vervangingsopgave Natte Kunstwerken in het Hoofdvaarwegensysteem en Hoofdvaarwegennet in Nederland. *Water Governance*, 2, 76-83.
- Van Dorsser, J. C. M. (2015). *Very long term development of the Dutch Inland Waterway Transport System: Policy analysis, transport projections, shipping scenarios, and a new perspective on economic growth and future discounting*. Doctoral dissertation TRAIL Research School. Delft: University of Technology Delft.
- Van Hulst, M., & Yanow, D. (2016). From Policy “Frames” to “Framing” Theorizing a More Dynamic, Political Approach. *The American Review of Public Administration*, 46(1), 92-112.
- Verma, N. (Ed.) (2007). *Institutions and Planning*. Bradford: Emerald Group Publishing.
- Willems, J. J., Busscher, T., Hijdra, A., & Arts, J. (2016). Renewing Infrastructure Networks: New Challenge, New Approach?. *Transportation Research Procedia*, 14, 2497-2506.
- Williamson, O. E. (1998). Transaction cost economics: how it works; where it is headed. *De Economist*, 146(1), 23-58.
- Williamson, O. E. (1999). Strategy research: governance and competence perspectives. *Strategic Management Journal*, 20(12), 1087-1108.

Table 1: A framework to research institutions from two lenses.

	New institutional economics (NIE)	Socio-constructionist institutionalism (SCN)	Source
<i>Key focus</i>	Institutions are <i>organisational structures</i> that smoothen human interactions in order to achieve specific ends	Institutions are <i>cultural signifiers</i> that shape human interaction, visible in shared attitudes, norms and values	Hall & Taylor, 1996; Inderberg, 2011
<i>Understanding institutional change in practice</i>	Institutions are assessed by individuals against a <i>logic of instrumentality</i>	Institutions are assessed by individuals against a logic of <i>social appropriateness</i>	March & Olsen, 1989; Williamson, 1998
<i>Research approach</i>	Analysis of actors' considerations in their search for efficient organisational structures by assessing the different transaction costs	Analysis of actors' views on appropriate cultural signifiers through interpretative research rooted in a socio-constructionist worldview	Hall & Taylor, 1996; González & Healey, 2005

Table 2. The two institutional strands offer different explanations for institutional reproduction and change (adapted from Mahoney, 2000).

	Mechanism of reproduction	Mechanism of change
NIE: <i>Logic of instrumentality</i>	Rational cost-benefit trade-off (lowering transaction costs)	New insights leading to new trade-off: challenging the instrumentality
SCN: <i>Logic of appropriateness</i>	Reconfirming appropriateness; 'compliance to the norm'	Changes in the values of actors: challenging the appropriateness

Table 3. Institutional reproduction and change in the Dutch inland waterway network.

	Mechanism of reproduction	Mechanism of change
NIE: Logic of instrumentality	<p>Advancement of a technical approach, financed by regular maintenance budgets; Ministry and Rijkswaterstaat are leading actors</p> <p>→ <i>Transactions oriented towards the here and now</i></p>	<p>Rise of a new functional and relational approach: using the PPB-framework for co-financing with national and regional parties</p> <p>→ <i>“Broader” transactions oriented towards the long term and the bigger picture</i></p>
SCN: Logic of appropriateness	<p>Continuation of an operator-dominated (i.e. Rijkswaterstaat) culture that takes a technical perspective on waterway renewal</p> <p>→ <i>Actors espousing the dominant discourse</i></p>	<p>Emergence of a more strategic, functional discourse that questions current waterway configurations with wide stakeholder involvement</p> <p>→ <i>Actors questioning the dominant discourse with novel concepts</i></p>

Figure 1. Path dependencies (adapted from Mahoney, 2000; see also Matthews, 2013).

Figure 2. Renewal as perceived by the Ministry of Infrastructure & the Environment (adapted from I&M, 2016).

Figure 3. Institutional layering in the Dutch inland waterway system for waterway renewal.