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Private management of public networks? Unpacking the relationship between network management strategies in infrastructure implementation

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Abstract

With the aim to successfully implement infrastructure, implementation arrangements increasingly assign responsibilities for network management to private actors. In the literature, two types of network management strategies are distinguished: process design and institutional design. To date, research has focused on either of these strategies. Moreover, while private actors aim to use the institutional capital built in the network before the private actor was introduced, the role of institutional capital in network management is often overlooked. Taking these research gaps together, we aim to explore the relationship between the two network management strategies and the intermediating role of institutional capital. We compare three cases of infrastructure implementation from the Netherlands. We find that institutional design strategies, through setting the network rules in the implementation arrangement, can ignite a *virtuous* or a *vicious* circle, respectively, hindering or enhancing opportunities for network management through process design.

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1 | INTRODUCTION

Infrastructure services are typically supplied through public policies established by governments, but implemented and delivered by private actors. Examples include utilities, flood defense, highways, and other public works. Policy makers, planners, and politicians usually focus on what and where to build; private actors are commonly responsible for infrastructure design and construction. This straightforward division of tasks and responsibilities also used to be reflected in the implementation arrangements for infrastructure policies. Traditionally, private actors were asked to bid and build based on a design and financial budget provided by the government. Nowadays, however, the boundaries between public and private tasks and responsibilities are shifting; private actors are increasingly asked to integrate the design, finance, operation, and maintenance with the construction of the infrastructure (Koppenjan & De Jong, 2018). Such integrated arrangements, where different infrastructure tasks are bundled in a contract awarded to a private actor, are commonly known as public–private partnerships (PPPs) (see, e.g., Cui et al., 2018; Hodge & Greve, 2017; Whittington, 2012).

PPPs can come in many shapes and sizes and they are understood in many different ways (Hodge, 2010; Hodge & Greve, 2017). Increasingly, a PPP is not only seen as an organizational construct, but also as a phenomenon with the characteristics of a network (Hodge & Greve, 2017; Steijn et al., 2011; Velotti et al., 2012). A network can be described as “a set of relatively stable relationships which are nonhierarchical and interdependent, linking a variety of actors who share common interests with regard to a policy and who exchange resources to pursue these shared interests acknowledging that cooperation is the best way to achieve common goals” (Börzel, 1998, p. 254). It is generally acknowledged that effective management of the network—that is, management of the relationships between the partners in the implementation arrangement as well as with those in the wider network—is critical to achieve good outcomes and successful implementation (e.g., Klijn et al., 2010; McGuire & Agranoff, 2011; Ysa et al., 2014). Traditionally, in the context of infrastructure policies, prior to implementation, the network is public in nature and management of the network is performed by the government (e.g., Busscher, 2014; Busscher et al., 2013). However, and this is particularly salient with the advent of PPPs, in implementation arrangements the role of network manager is increasingly shared—or even transferred—to private actors (e.g., Verweij, 2015; Verweij et al., 2017). At the same time, however, many private actors are scrambling in their network management and benefits traditionally ascribed to private actors, such as swift and effective decision making and coordination (e.g., Koppenjan, 2005; Kwak et al., 2009), are oftentimes not delivered in practice.

So far, explanations for the success of implementation arrangements have on the one hand focused on exogenous factors such as political backing (Van den Hurk & Verhoest, 2015) or government support (Wibowo & Alfen, 2015, see Cui et al., 2018; Biygautane et al., 2019 for overviews); or, on the other hand, endogenous factors such as the influence of differences in knowledge base, goals, interests, and values between public and private actors (e.g., Caldwell et al., 2017; Kivleniece & Quelin, 2012). In other words, these explanations focus on *what* factors are needed for successful network management in PPPs—instead of exploring *how* network management during the implementation of the infrastructure was influenced by the network management prior to implementation (c.f. Verweij et al., 2021).

Generally, two types of network management strategies are distinguished in literature (Klijn et al., 2010; Newell et al., 2017). First, *process design strategies* are aimed at enhancing the interaction and collaboration between actors in the network. In this way, these strategies aim to facilitate the development of resources such as shared perspectives, trust, and reciprocity—in

other words: build *institutional capital* (Cars et al., 2017)—within the network (Klijn & Koppenjan, 2016). Second, *institutional design strategies* are aimed at influencing the rules of the network, through changing the underlying institutional characteristics of the network. These strategies influence the extent to which built institutional capital can also be exploited in the network. In the context of network management, research is often focused on one of the strategies. For instance, Agranoff and McGuire (2001) and Klijn et al. (2010) focus exclusively on process design strategies, while Klijn and Koppenjan (2006) and Sandström et al. (2014) focus on institutional design. Although research focused on the combination of the strategies is growing (e.g., Benítez-Ávila et al., 2018; Klijn & Koppenjan, 2016; Newell et al., 2017), most of these studies focus on the influence of built institutional capital or on outcomes of the network. How the two strategies relate to—and are influenced by—each other has received less attention in the literature. At the same time, there are indications from practice that the interaction of the two is important for successful network management during implementation.

In this article, we address this research gap and aim to explore the relationship between the two network management strategies and the intermediating role of institutional capital. To this end, we analyze three infrastructure projects in the Netherlands: the flood risk management project Depoldering Noordwaard; and the A2 Maastricht and A15 Maasvlakte-Vaanplein road infrastructure development and management projects. We will show how institutional design strategies, often employed prior to infrastructure implementation, can ignite either a *virtuous* or a *vicious* circle, thus either stimulating or severely hindering access to institutional capital, specific process design strategies, and interaction between actors in the network.

The remainder of this article is structured as follows. In Section 2, we outline our analytical framework. In Section 3, we explain our data and methods. Section 4 provides the results of our analysis. In Section 5, we discuss our findings and draw conclusions.

2 | NETWORK MANAGEMENT IN INFRASTRUCTURE IMPLEMENTATION

2.1 | Institutional capital

Traditionally, prior to implementation, the actor network involved in the development of infrastructure can be seen as a public network. One of the involved governments acts as network manager and together the actors will build institutional capital. As the process transitions toward implementation, however, private actors are introduced into the network. Increasingly, implementation arrangements assign responsibilities for network management of—previously public—networks to private actors (e.g., Verweij, 2015; Verweij et al., 2017). In order to successfully manage the network during implementation, private actors aim to make use of the institutional capital that is built in the network before the private actor was introduced. Institutional capital consists of three forms of resources typically developed in networks: intellectual capital, social capital, and political capital (Cars et al., 2017).

Intellectual capital refers to the various knowledge resources that are either included or excluded in the governance network. Healey (1998), for example, emphasizes the importance of including local knowledge, in addition to expert knowledge, in planning processes. Breukers and Wolsink (2007) differentiate between technical, environmental, local, experiential, and tacit knowledge and stress the dynamic nature of these types of knowledge and the need to frequently (re)construct them through mutual interaction. Whereas intellectual capital refers to

the ability to come to a common basis for problem definition and agreements, social capital refers to the “features of social organization such as networks, norms, and trust that facilitate coordination and co-operation for mutual benefit” (Putnam, 1993, p. 36). In other words, social capital can be seen as those attributes of actors and their mutual relationships that enhance the ability to solve collective problems. According to Ostrom and Ahn (2009), this refers to the trustworthiness of actors, reciprocal relationships between actors in a network, and to institutions that facilitate cooperation. Finally, political capital refers to the ability of actors to “draw resources, rules, and ideas into the effort” (Cars et al., 2017, p. 52); and to activate the other actors in the network to act collectively on a particular issue. It can be seen as the capacity to mobilize social and intellectual capital so as to enable the development of collective, shared, and high-quality solutions (Giest & Howlett, 2014).

2.2 | Process design strategies to build institutional capital

As explained by Howlett and Ramesh (2014), institutional capital cannot simply be established or emerge spontaneously, but needs to be built through active management of the network. An important way to do this is through process design strategies, which focus on improving the quality of interactions between actors and on enhancing the credibility of actors in the network. In the literature, a multitude of actions, interventions, and types of process strategies can be found (see, e.g., Agranoff & McGuire, 2001; Klijn et al., 2010). However, as also explained by Giest and Howlett (2014), in the process of building institutional capital—that is, network management through process design—in particular the role of network managers is crucial, because it is especially the network manager who influences the interaction and dynamics in the network (c.f. Provan & Kenis, 2008). We therefore correspond the multitude of actions, interventions, and types of process design strategies to the three different roles that a network manager can take: convener, mediator, and catalyst (see also Ansell & Gash, 2012; Hovik & Hanssen, 2015).

Conveners facilitate collaboration by convening stakeholders, structuring deliberation, safeguarding collaboration, and protecting the integrity of the collaboration. Conveners seek to utilize intellectual capital through ensuring the information flow, producing documents, and ensuring compliance to agreements. In this way, conveners serve as stewards of the collaborative process. They focus on ensuring the legitimacy of the collaboration and they enable social capital and political capital to develop. Mediators need to be able to tap into the social and political capital; they nurture relationships by managing conflict and arbitrating exchange between stakeholders. They do so through brokering and facilitating discussion and debate. In a role as mediator, network managers aim to “facilitate positive exchanges between different stakeholders through adjudication of conflict, to arbitrate between different positions, to stabilize the conditions for positive exchange, and to promote trust-building” (Ansell & Gash, 2012, p. 11). Catalysts, in turn, facilitate collaboration by helping to identify and realize value-creating opportunities. This requires them to engage with the substantive content of negotiations, so as to identify and exploit opportunities for producing value. As such, catalysts build as well as seek to employ intellectual, social, and political capital, *inter alia* through motivating network members, raising awareness about their contribution, and by ensuring ownership of the process and the results.

Based on Ansell and Gash (2012), facilitating collaboration and interaction in the network—the core of network management through process design—requires network

management “to play all three of these roles” (p. 18). Additionally, given the recursive interplay between network management and institutional capital, the opportunities for network managers to play multiple roles would, as discussed above, require the development as well as the exploitation of institutional capital. The extent to which built institutional capital can also be exploited is, however, influenced by institutional design strategies (Klijn & Koppenjan, 2016; Torfing et al., 2020). While institutional design strategies are therefore crucial for successful network management, the influence of institutional design strategies to enable exploitation of institutional capital has been largely overlooked (Klijn & Koppenjan, 2006).

2.3 | Institutional design strategies

Institutional design can be seen as deliberate attempts to change the set of rules that structure the interactions within networks (Klijn & Koppenjan, 2006). According to Klijn and Koppenjan (2006), institutional design strategies are dependent on strategic timing. In the context of infrastructure implementation, a natural and important moment for institutional design strategies to alter existing rules and to set new ones—thereby influencing the ability of actors to exploit institutional capital—is during the development of the implementation arrangement. As discussed by Van Buuren et al. (2015), implementation arrangements can be considered as a specific set of “rules of the game”—as the formal and informal rules that tie actors together and structure the interaction and collaboration between the actors involved in the implementation of the infrastructure. As such, implementation arrangements can be seen to constitute the network rules during infrastructure implementation.

We distinguish between five types of rules that structure interactions in a network (Klijn & Koppenjan, 2016). First, interaction rules regulate the interactions between the actors and define what is (not) allowed. These rules influence the interaction between the public partner, the private partner, and between these partners and the other network participants. Second, position rules specify the positions, tasks, and responsibilities of the actors. We focus in particular on who is responsible for stakeholder management, as this can be seen as the management of the network during the implementation of the infrastructure (see De Schepper et al., 2014). Third, access rules specify the actors that are allowed to have a position in the network and also detail the position of the actors. Fourth, reward rules define the pay-off structures. We distinguish between the rigidity of the pay-off structure and the source thereof. Fifth, product rules prescribe the professional codes and evaluation criteria. These rules specify the evaluation criteria based on which the private partner receives payments from the public partner. We distinguish between service- and product-oriented output criteria. Together, these rules influence not only the structure of the network; they also determine whether actors—and in particular the newly introduced private actors—can also make use of the institutional capacity built in earlier stages of the network.

In the context of infrastructure implementation, institutional design strategies are prominent on two specific occasions: (i) in the organization of the tendering process and (ii) in the rules that are set in the contract between the public and the private partners of the implementation arrangement. The tendering process, that is, the process from advertisement of the tender toward contract award, can be organized in multiple ways, enabling various kinds of interaction between government, market actors, and possibly also other actors prior to infrastructure construction (Liu et al., 2016; Van Valkenburg & Nagelkerke, 2006). The contract between the principal and market actors can be seen as “a legally bound, institutional framework in which each

party's rights, duties and responsibilities are codified; and goals, policies and strategies underlying the relationship are specified" (Zheng et al., 2008, p. 44). In this way, the contract has a large influence on the network rules during infrastructure implementation. At the same time, however, the exchange between public and private partners in infrastructure development is rather complex and contracts can only cover foreseeable contingencies (Poppo & Zenger, 2002). Most contracts are thus incomplete (Bertelli & Smith, 2010; Hart, 2003). To fill the gap left by incomplete contracts, relationships are pivotal in ensuring good performance (Warsen et al., 2019). These social relationships are largely conditioned by informal rules. These informal rules, which emerge through enactment of the formal rules (the contract), as well as in response to contingencies, are again the focus of process design strategies. To understand and to foster successful network management in the implementation of infrastructure, therefore, we need to gain insight into how institutional design strategies either stimulate or hinder access to institutional capital, process design strategies, and consequently influence the interaction between the actors in the network.

3 | DATA AND METHODS

3.1 | Research approach

This article employs a comparative case study design (Yin, 2009). For analytical generalization and robust results, the selection of appropriate cases is crucial. We have strategically selected three cases (Flyvbjerg, 2006): the Depoldering Noordwaard, the A2 Maastricht, and the A15 Maasvlakte-Vaanplein. Because we are first and foremost interested in the interaction between network management strategies, we selected three cases where network management strategies—both with regard to institutional design and process design—have been applied during implementation. Second, since we also want to gain insight into the role of private actors as network managers, we selected projects where a private consortium was explicitly assigned with the responsibility to manage the network during infrastructure implementation. All cases deal with the implementation of national infrastructure in the Dutch context. We knew that the cases were informative regarding the relationship between these strategies, because we had researched them in earlier studies (see italicized references in Table 1). Therefore, we also knew that in each of the cases, governments built institutional capital prior to infrastructure implementation. This is also reflected in a number of additional studies that have focused on these cases as well (see Table 1). Table 1 provides an overview of the studies that demonstrate the institutional capital built by governments in earlier phases of the network.

Turning to previous case studies and reanalyzing the data collected in light of fresh research questions—often discussed as secondary data analysis—is an increasingly valued research strategy; it is seen as an important means to gain methodological and substantive insights (Bishop & Kuula-Luumi, 2017). However, particularly in the case of qualitative studies, issues regarding the clarity, transparency, and the rigor of secondary data analysis need to be addressed (Ruggiano & Perry, 2019).

First, it needs to be clear how the researchers were involved in the parent studies and original data collection. In each of the three cases selected for this article, researchers were involved as main researcher responsible for both data collection and analysis. This means we had first-hand knowledge of the data and could be consistent in our interpretation.

TABLE 1 Overview of data demonstrating the building of institutional capital in the cases

	Depoldering Noordwaard	A15 Maasvlakte-Vaanplein	A2 Maastricht
Intellectual capital (i.e., <i>the ability to come to a common basis for problem definition and agreements</i>)	Schut et al. (2010)	Eversdijk et al. (2011)	Lenferink et al. (2013a)
	<i>Van den Brink et al. (2019)</i>	Neerlands Diep (2016)	Heeres et al. (2016)
	<i>Busscher et al. (2019)</i>		
Social capital (i.e., <i>the ability for fruitful discussions to take place among otherwise potentially conflicting stakeholders</i>)	<i>Van Buuren et al. (2010)</i>	<i>Verweij et al. (2014)</i>	<i>Verweij (2012)</i>
	Zwemer et al. (2011)	<i>Verweij (2015)</i>	Verhees (2013)
	<i>Busscher et al. (2017)</i>		<i>Verweij and Gerrits (2015)</i> <i>Verweij et al. (2017)</i>
Political capital (i.e., <i>the ability to activate the other actors in the network to act collectively on a particular issue</i>)	<i>Van den Brink (2009)</i>	KING (2009)	Verhees (2013)
	Van Buuren et al. (2010)	<i>Verweij et al. (2014)</i>	<i>Verweij and Gerrits (2015)</i>
	Warner et al. (2012)	<i>Verweij (2015)</i>	<i>Verweij et al. (2017)</i>

Second, the congruence between the data and the new research question needs to be made transparent. The primary study of the A2 Maastricht project focused on the management of events in the implementation phase of the public-private contract. This was also the case of the A15 Maasvlakte-Vaanplein project. Finally, the Depoldering Noordwaard case involved an evaluation of the process instruments used to improve spatial quality. We experienced a large degree of congruence because network management strategies and components of institutional capital were an important part of the earlier research projects. Moreover, where the original data showed gaps, we collected additional data in the form of policy documents, project Web sites, and evaluation reports. For example, the initial A15 Maasvlakte-Vaanplein study focused on the implementation phase; and we collected additional data for the planning and procurement phase (e.g., KING, 2009; Eversdijk et al., 2011; Neerlands Diep, 2016). Other documents, Web sites, and reports are included as references in the case analyses in Section 4.

Third, it is important to be rigorous in our methodologies and clear about the limitations of the study. The A2 Maastricht project was studied late 2011 and relied mainly on open interviews ($N = 18$), project documents, and site visits. The A15 Maasvlakte-Vaanplein project was studied in 2012–2013 and relied on open interviews ($N = 20$), project documents, and site visits. The Depoldering Noordwaard was studied in 2017–2018 and relied on semi-structured interviews ($N = 8$) and project and program documents. The different study periods are not a matter

here, because all studies focused on the same implementation phase as well as their relationship with the preceding phase. However, due to the fact that much of the data were collected more than 5 years ago, we found ourselves to be less immersed in the data and felt that we, because of this new distance, could be more objective (see Ruggiano & Perry, 2019). Furthermore, guided by the theoretical framework detailed in Section 2, each case was first analyzed individually before cross-case comparisons were made, enabling us to provide a detailed and contextualized understanding of how—in the context of infrastructure implementation—process design strategies are influenced by institutional design strategies and the intermediating role of institutional capital herein.

3.2 | Case descriptions

As depicted in Table 2, in each of the cases, Rijkswaterstaat—which is the executive arm of the Dutch Ministry of Infrastructure and Water Management—acted as the principal. Implementation of each project ended around 2016. The infrastructures were implemented on the basis of implementation arrangements that use integrated contracts in which different infrastructure tasks are bundled and awarded to a private partner. Design-and-Construct (D&C) contracts are the standard form of integrated contracting by Rijkswaterstaat (Lenferink et al., 2013b). Design-Build-Finance-Maintain (DBMF), the typical PPP option in the Netherlands, started to take off in the Netherlands around 2007 (Eversdijk & Korsten, 2015) and the A15 Maasvlakte-Vaanplein was one of the first projects with this type of contract procured by Rijkswaterstaat.

4 | RESULTS: NETWORK MANAGEMENT IN DUTCH INFRASTRUCTURE IMPLEMENTATION PRACTICE

4.1 | Process design strategies

In its core, network management through process design aims to improve the quality of the interaction between the network participants and to enhance to process of collaboration. To that purpose, network managers should be able to play the roles of convener, mediator, and catalyst. In all three cases, the private partner was assigned with the task to manage the network. However, in each of the cases, the private actor could play the three roles to different extents.

The Depoldering Noordwaard case focused on the construction of an innovative high-water channel and related flood defense structures in such a way that the spatial quality of the area would improve. Both flood protection and improving the spatial quality were considered equally important (Van den Brink et al., 2019). In this project, the private consortium—Combinatie Noordwaard (see Table 2)—acted as network manager. However, its role was limited to that of convener. The focus of the interaction between the actors in the network was strictly on the contractual relationship. To illustrate, in the interaction between Combinatie Noordwaard and Rijkswaterstaat, a tension emerged since, on the one hand, particularities of the spatial design required further discussion, while on the other hand the actors involved in the implementation of the infrastructure just “had to deliver what was promised”—as explained by the consortium’s project manager. As a consequence, any discussion regarding the spatial quality was immediately perceived as a discussion about the entire contract. Because the

TABLE 2 Case descriptions

	Depoldering Noordwaard	A15 Maasvlakte- Vaanplein	A2 Maastricht
Network characteristics			
Main network participants	Rijkswaterstaat; Province of Noord-Brabant; Municipality of Werkendam; Waterboard Riverienland; Local residents; Local farmers; Agricultural organizations	Rijkswaterstaat; Municipality of Rotterdam; Province of South Holland; ProRail; Port of Rotterdam Authority	Rijkswaterstaat; Province of Limburg; Municipality of Maastricht; Municipality of Meerssen; Local interest groups; Local stakeholders
Implementation arrangement			
Start tendering process	2009	2008	2006
Contract	Design-and-Construct (D&C)	Design-Build-Finance-Maintain (DBFM)	Design-and-Construct (D&C)
Scope	A high-water channel, multiple dikes, quays, and pumping stations, with a strong focus on the spatial quality of the area	A new bridge, 85 km of additional traffic lanes and smaller scale civil structures including bridges, road tunnels; and the management and maintenance of the entire infrastructure systems up to 2035	A 2.3 km long north-south tunnel corridor and related urban redevelopment
Duration	2011–2015	2010–2016 (management and maintenance contract ends in 2035)	2010–2016
Principal	Rijkswaterstaat	Rijkswaterstaat	Rijkswaterstaat; Province of Limburg; Municipality of Maastricht; Municipality of Meerssen
Private consortium	Combinatie Noordwaard	A-Lanes A15	Avenue2
Size	€300 million	€2000 million	€890 million

contract was so fundamental to the collaboration between the partners, any attempt to discuss how to interpret the contract was immediately seen to undermine the integrity of the collaboration. As the legitimacy of the collaboration was so closely connected to the formal rules stipulated in the contract, network management by the Combinatie Noordwaard focused on structuring the interaction and deliberation in accordance to these formal rules. Opportunities to assume a role more focused on trust-building (i.e., to act as mediator) or to explore value-creation opportunities (i.e., to act as catalyst) were simply not present.

Whereas the Depoldering Noordwaard case was focused on flood defense infrastructure, the A15 Maasvlakte-Vaanplein involved the construction of new highway infrastructure, most prominently the renovation and widening of the Botlek bridge—a crucial bridge in connecting the Port of Rotterdam to its hinterland. In the A15 Maasvlakte-Vaanplein case, the private consortium A-Lanes A15 was responsible for the management of the network. Rijkswaterstaat, as principal, used so-called “administrative agreements” that aimed to codify the institutional capital that was built prior to implementation. However, A-Lanes A15 only received these agreements a few months before construction started. Consequently, A-Lanes A15 was ill-prepared to act as network manager. Its role could be described as convener. When the relationships between the network participants and A-Lanes A15 increasingly deteriorated—because the stakeholders felt their wishes and demands, as agreed in the administrative agreements, were not honored by A-Lanes A15—Rijkswaterstaat decided to step into the network management and adopted a role as mediator (Verweij, 2015). This resolved conflicts between A-Lanes A15 and the other network members. Rijkswaterstaat not only became more involved in the interaction with the other network members—which helped in improving the relationships—the role of network manager was also shared between A-Lanes A15 and Rijkswaterstaat. In effect, Rijkswaterstaat now acted as mediator in the network as well as mediator for A-Lanes A15 in their efforts to tap into built institutional capital. While this resulted in the fact that both the role of convener and of mediator were played in the network management, the role of catalyst still proved a bridge too far.

Whereas network management was constrained in the first two cases, this was different for the A2 Maastricht. The A2 Maastricht focused on the conversion of a highway in the city center of Maastricht into a tunnel and the urban redevelopment of that area. In contrast to the other cases, here the interaction and collaboration between Avenue2 (the private consortium) and the other network members worked well. Smooth network management worked on the basis of understanding and support, which were reinforced during the entire process. Moreover, although there was a division of risks and responsibilities (Verweij, 2012), the public and private partners assumed shared responsibilities for—and worked together in—network management. In doing this, not only the roles of convener and mediator were covered, but also the role of catalyst was played. For instance, when a local waterboard had to issue a permit applied for by Avenue2, it imposed additional requirements regarding water retention and drainage. Avenue2 and the Project Bureau interpreted this as an opportunity to add value to the project and subsequently cooperated in submitting a new permit application and the Project Bureau agreed with some contract changes (Verweij & Gerrits, 2015).

Given the fact that in each of these cases institutional capital was built by governments in earlier phases of the network, and yet the extent to which the private actors could take the three roles necessary to successfully manage the network varied considerably, this begs the question of how this was influenced by the institutional design strategies that were applied (i) in the organization of the tendering process and (ii) in the rules of the contract between the public and private partners.

4.2 | Institutional design strategies

4.2.1 | Organization of the tendering process

The organization of the tendering process is an important moment for institutional design strategies to influence the network rules, as this is the moment when potential private partners are

introduced to the network. Institutional design strategies regarding the tendering relate mostly to the interaction, position, and access rules. Table 3 outlines how the various institutional design strategies have influenced these rules in each of the cases.

In the case of the Depoldering Noordwaard, the interactive public planning process and the subsequent tendering process were designed in such a way that they were disconnected from each other. There was no interaction between the private actors and the stakeholders in the network; only with Rijkswaterstaat. As a result, the private consortium was positioned at a distance from the other network members and the private actors were not involved in the development of institutional capital. This was only developed between the network members and Rijkswaterstaat, aimed at codifying the built institutional capital into formal agreements;

TABLE 3 Institutional rules in the tendering process

	Depoldering Noordwaard	A15 Maasvlakte– Vaanplein	A2 Maastricht
Interaction rules	Network members interact in the public planning process, organized by Rijkswaterstaat.		Network members interact in the public planning process, organized by the partnership called the 'Project Bureau'.
	Traditional separate tender process, organized by Rijkswaterstaat to select a private partner. Potential partners only interact with Rijkswaterstaat as principal; no interaction between private actors and other network members.	Competitive dialogue organized by Rijkswaterstaat to select a private partner. The tendering process is organized in close connection to the public planning process, yet private actors and other network members do not interact.	Competitive dialogue organized by Project Bureau is interwoven with public planning process, enabling interaction between potential partners and other network members.
Position rules	Administrative agreements were made by the Project Office with the members of the network, ensuring commitment as long as implementation was in line with agreements. Private consortium was responsible for adhering to these agreements.	Implementation agreements were made by Rijkswaterstaat with the members of the network, ensuring commitment as long as implementation was in line with agreements. Private consortium was responsible for adhering to these agreements.	Stakeholder interests were internalized and institutionalized into the project via the partnership. The Project Bureau was responsible for overseeing private partners during implementation.
Access rules	Rijkswaterstaat alone set project goals and bid criteria to select private consortium.	Rijkswaterstaat, in interaction with participating consortia in competitive dialogue, set project goals. Bid criteria were set by Rijkswaterstaat.	Project Bureau, in interaction with participating consortia in competitive dialogue, set project goals. Bid criteria were set by Project Bureau.

that is, so-called “administrative agreements” that the private partner should take into account during implementation (Zwemer et al., 2011).

In the case of the A15 Maasvlakte-Vaanplein, the public planning and tendering processes were designed in close connection to each other. Here, the public planning process was used by Rijkswaterstaat to collect the information needed to define the scope of the problem and to determine a general solutions framework. In the closely connected tendering process, through a competitive dialogue, private consortia were asked to prepare bids that contained the more detailed solutions for the problem. However, even though interaction rules enabled more open communication, still the private consortium was not to interact with the network members, but only with Rijkswaterstaat. Consequently, also here, private actors were not involved in building institutional capital. Instead, similar to Depoldering Noordwaard, Rijkswaterstaat tried to codify and formalize built institutional capital into administrative agreements (Verweij, 2015; Verweij et al., 2014).

Finally, in the case of the A2 Maastricht, a dual-process including both a public planning and a tendering process was designed. Different from the other two cases, the two processes were completely interwoven and ran parallel to each other (Lenferink et al., 2013a; Van Valkenburg & Nagelkerke, 2006). The dual-process was initiated by the Project Bureau A2 Maastricht, a partnership consisting of Rijkswaterstaat, the Municipalities of Maastricht and Meerssen, and the Province of Limburg. This means that stakeholder interests were internalized and institutionalized into the project via the partnership—in contrast to the other cases where they were externalized and laid down in implementation agreements (Verweij et al., 2017). It also means that, during the tendering process, direct interaction between private actors and a wide variety of public partners occurred. Moreover, the tendering process also included “a unique step” (Verhees, 2013, p. 168) in which, in an additional voluntary consultation round, three private consortia presented and discussed their proposals with local residents and other members in the network. In this way, interaction between private actors and the other actors in the network occurred and, consequently, private actors were involved in the development of institutional capital.

Together, the different institutional design strategies applied in the tendering processes influenced the degree to which private actors were included in the development of institutional capital. In contrast to the A2 Maastricht, in the cases of the Depoldering Noordwaard and A15 Maasvlakte-Vaanplein, the private actors did not partake in the development of the institutional capital during the public planning process. Hence, their opportunities to tap into the institutional capital were much more dependent upon the rules outlined in the contract.

4.2.2 | Contract rules

As also outlined in Table 4, with regard to the contract, different institutional design strategies were applied across the cases. These strategies did not impact the access rules, since access to the network was already determined in the tendering process, but did influence the other four institutional rules.

In the case of the Depoldering Noordwaard, a D&C contract formed the core of the implementation arrangement (see Table 2). The contract was strict in its interpretation of the interaction between the private actors, the Combinatie Noordwaard, and the other network members. The private consortium was expected to adopt a formal role and restrict its interaction with the other network members to information sharing. This managerial approach was

TABLE 4 Institutional rules embedded in the public–private contract

	Depoldering Noordwaard	A15 Maasvlakte–Vaanplein	A2 Maastricht
Interaction rules	Private consortium interacts with members in the network to inform about construction activities.	Private consortium interacts with members in the network to coordinate activities and to inform about construction activities.	Project Bureau interacts with members in the network to discuss construction activities.
Position rules	Risks for design and construction are with private consortium. Responsibility for network management is with the private consortium.	Risks for design, construction, and maintenance are with private consortium.	Risks for design and construction are with the private consortium. Responsibility for network management is shared between Project Bureau and private consortium.
Reward rules	Rigid pay-off structure due to strict system-based contract management.		Pay-off structure more flexible due to possibility for development real estate and absence of private financing.
Product rules	Payments based on quality of product output.	Payments based on quality of service output.	Payments based on quality of product output.

also reflected in the position, reward, and pay-off rules. Regarding the position rules, Rijkswaterstaat and the private consortium both were to focus on their separate pre-defined tasks. Regarding the reward and pay-off rules Rijkswaterstaat applied strict system-based contract management to control whether the Consortium Noordwaard indeed delivered the products that it had promised. The strong output-orientation and managerial approach to collaboration between Combinatie Noordwaard, Rijkswaterstaat and the other network participants hindered the private consortium to utilize the built institutional capital: only formal interaction, within the set agreements, was possible between the actors in the network.

In the case of MaVa, a DBFM-contract formed the core of the implementation arrangement. The private contractor, A-Lanes, created a Special Purpose Vehicle (SPV) and Rijkswaterstaat had a contract with this SPV. The SPV is a “virtual organization” that has secondary contracts with financiers and with three different joint ventures. These joint ventures are between the three participating construction firms; these joint ventures are also that are responsible for design, construction, and maintenance (Verweij, 2015). Because the contractual relationship is between Rijkswaterstaat and the SPV, and not between Rijkswaterstaat and the construction companies, the interaction between Rijkswaterstaat and the private companies is contractually limited. The SPV was assigned with the responsibilities for the design, construction, and maintenance. Similar to the Depoldering Noordwaard, Rijkswaterstaat and the private contractor also here applied “system-oriented contract management” where Rijkswaterstaat monitors the progress and outcomes by the private contractor from a distance (Rijkswaterstaat, 2014). The private consortium, A-Lanes, receives income from Rijkswaterstaat in the form of availability fees: two large payments (one at partial availability and one at the full recommissioning of the

infrastructure system) and regular availability fees during the whole course of the contract up to 2035 (Verweij, 2015). Availability, here, was defined as the service that A-Lanes was supposed to deliver. This defines the product rules in the project. Similar to the Depoldering Noordwaard, also in the case of the MaVa network management by the private consortium was confined to a formal and contractual task. There was little room for interaction and relationship building and, subsequently, also in case of the MaVa the private actors could not tap into built institutional capital.

Finally, in the case of the A2 Maastricht, a D&C contract was at the core of the implementation arrangement. In contrast to the other two cases, however, this contract was not managed by Rijkswaterstaat alone, but instead by the partnership “Project Bureau A2 Maastricht.” In this partnership, Rijkswaterstaat was the main stakeholder and contributed most of the budget to the project. In contrast to the other cases, the rules in the A2 Maastricht were determined much more by the local, more informal project culture. For example, the Project Bureau and Avenue2 were housed in the same building, which is representative of the intense and proximate interaction between the partners (Verweij et al., 2017). This is also reflected in the position and reward rules. Although the partners contributed to the project financially to different extents, and although their management activities focused on different aspects—that is, the Rijkswaterstaat managers focused on risk management and system-oriented contract management to monitor the private contractor’s progress and outcomes and the Maastricht managers focused on informal steering, interaction, and communication with the environment (Verweij, 2012)—they participated as public partners on an equal footing. In addition, private partners could also recoup their investment in the project through developing and selling real estate on top and nearby the constructed tunnel in the period up to 2025. As a result, the intensive, informal and mutual interaction between all parties in the network also enabled the private partners to access the institutional capital build in earlier phases of the network for their network management which, in turn, facilitated network management by the private partners. This is in sharp contrast to the other two cases, where the institutional design caused Rijkswaterstaat and the private parties to operate more at a distance from each other, both in the tendering process and during infrastructure construction, which consequently also applied to the collaboration between the private partners and the other network members. Likewise, interaction was more formal and reward rules were more rigid, which together severely strained the ability of the private actors to perform effective network management—even though they were considered to be formally responsible to do so. As a result, while the need for process design strategies in order to improve—or perhaps safeguard—the quality of the interaction is evident in these cases, at the same time, the applied institutional design strategies have left rather limited opportunity to effectively employ these.

5 | DISCUSSION AND CONCLUSION

This article provided in-depth insight into how the interaction between institutional design strategies and process design strategies influences successful network management during implementation. In doing so, we have gone beyond the traditional focus on exogenous conditions for successful implementation (Biygautane et al., 2019; Cui et al., 2018), and are able to caution against often-made calls for strong government coordination, oversight, and contract management (Caldwell et al., 2017; Kivleniece & Quelin, 2012), when private actors need to perform public tasks such as management of the network. Our article demonstrated that the

acting space for network managers in implementation processes is already oftentimes limited. Our results show that institutional design strategies, oftentimes applied already prior to the involvement of private actors in the network, have significant influence on the opportunities for effective network management of private actors. As also argued by Giest and Howlett (2014), successful network management requires network managers to be able to tap into built institutional capital. Access to institutional capital would allow private actors to play multiple roles as network manager, and thereby to apply a wide variety of process design strategies to maintain and enhance the quality of the interaction and the collaboration. Both in the Depoldering Noordwaard and the A15 Maasvlakte-Vaanplein cases, however, institutional design strategies were found to hinder private actors in tapping into built institutional capital. As a result, private actors were constrained in their ability to perform multiple network management roles.

Consequently, in the context of infrastructure implementation, we postulate that if institutional design strategies of governments only allow for limited interaction during the tendering process, and if they only allow very formal interaction between the network members under the contract, this will ignite a *vicious circle* that hinders private actors to build or utilize institutional capital, and subsequently will restrict opportunities for network management through process design. As a result of a vicious circle, network managers will need their efforts to safeguard the legitimacy of the collaboration, as the interaction will be easily undermined by a lack of trust and legitimacy. This indeed proved to be the case in the Depoldering Noordwaard (see, e.g., Nationale Ombudsman, 2017).

Conversely, we postulate that if institutional design strategies of governments enable ample interaction already during the tender process, and allow or even stimulate intensive informal interaction and formal interaction under the contract, this will ignite a *virtuous circle* with sufficient opportunities for private managers to build or utilize institutional capital, which in turn also provides ample opportunities for management through process design. In other words, a virtuous circle enables network management “to play all three [...] roles” during infrastructure implementation, as suggested to be important by Ansell and Gash (2012, p. 18).

As such, we find a clear tension between institutional design strategies based on efficiency versus those based on enhancing collaboration (Klijn & Koppenjan, 2016). This tension appears to relate largely to the role of network managers during infrastructure implementation. As also the A15 Maasvlakte-Vaanplein case demonstrates, as soon as implementation arrangements break through the notion that network management is either the responsibility of the public or the private partner, and governments instead opt for a shared responsibility for network management, this enhances the opportunities for utilizing institutional capital and for playing the different roles of network management. In that way, opportunities for network management through process design, and thereby effective network management during infrastructure implementation, increase considerably.

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DATA AVAILABILITY STATEMENT

Data available on request from the authors

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