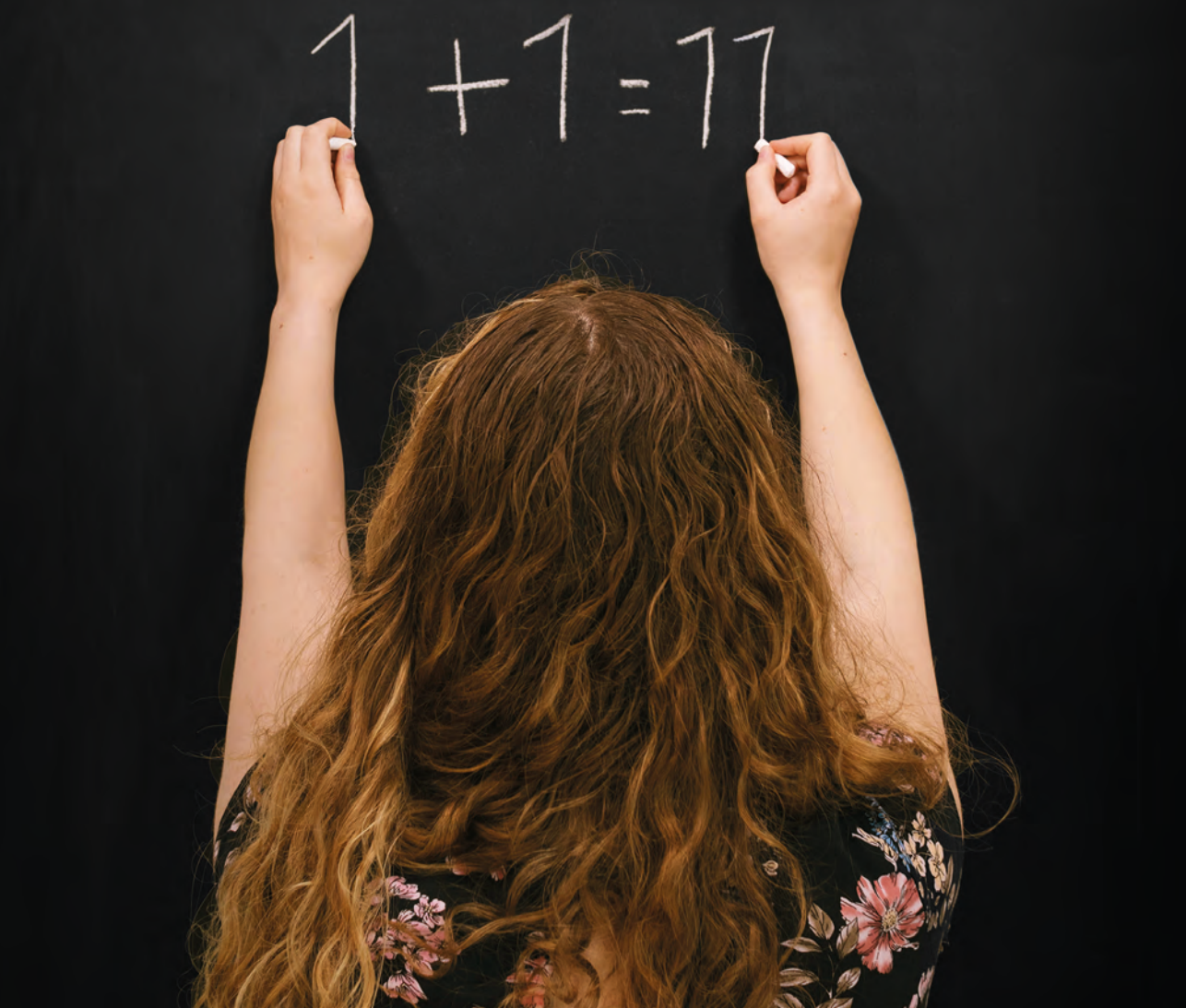
Innovating and Optimizing for Public Performance
the case of the Dutch Regional Water Authorities

Hanneke Gieske



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Colofon:

Title: Innovating and Optimizing for Public Performance
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ISBN: 978-94-6332-514-1

Cover photo by Frank van Leeuwen
Lay-out and print by GVO drukkers and vormgevers, Ede

Innovating and Optimizing for Public Performance
the case of the Dutch Regional Water Authorities

Innoveren én optimaliseren voor presteren
door de Nederlandse waterschappen

Thesis

to obtain the degree of Doctor from
Erasmus University Rotterdam
by command of the
rector magnificus

Prof. dr. R.C.M.E. Engels

and in accordance with the decision of the Doctoral Board.
The public defense shall be held on

Thursday, the 4th of July 2019 at 9.30 hours

by

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Acknowledgements

The origin of this thesis lies in an invitation by Arwin van Buuren following my remark that I missed research. 'Don't you want to start a PhD?', Arwin asked. My then supervisor at the regional water authority Delfland, Bart van der Veer, immediately supported the idea. Paul van den Wijngaart, Secretary-Director, and Michiel van Haersma Buma, Chairman of the board, consented, and so a 7 years journey started. I greatly acknowledge Delfland's support to enable this endeavour.

Of course, the research had to contribute to the practice of the regional water authorities, and a topic the regional water authorities were struggling with at that time was innovation. Should a regional water authority engage in innovation? Does it fit with its tasks? Under what conditions? How is it done? Soon research questions were formulated: 'how can innovative capacity be conceptualized, in the context of regional water authorities?', and 'how can innovative capacity be strengthened?'

As a first reconnaissance at Delfland I interviewed about twenty colleagues working on innovations. The collaborative innovation program Water Framework Haaglanden offered a great opportunity to analyse a major policy innovation, that resulted from interaction between experimentation in pilots with a great variety of stakeholders, and organizational learning in a period of organizational distress.

When conceptualizing innovative capacity it soon became clear to me that innovation should be studied in coherence with more regular incremental improvement. The ability to balance between the two is known in literature as 'ambidextrous capacity', which literally means being equaly dextrous with both hands, as the cover of this thesis illustrates. Thus I reformulated my research questions to incorporate both innovating and optimizing, and their contribution to performance. The resulting theoretical framework needed to be tested, so we designed a survey.

The survey was pretested by about twelf colleagues of the then Innovation Platform of the Dutch Association of Water Authorities, whom I wish to thank a lot for their effort. Over 670 colleagues of all water authorities completed the (lengthy) survey, a great response, thank you colleagues! We discussed the findings of the survey in ten focus group sessions, involving a group of managers and of employees in each session. I gratefully acknowledge their time, participation and input, as well as the organizing efforts of – usually – the innovation coordinator and a management-assistant of the involved water authority. We convened two additional reflection workshops, to validate the findings of the focus groups, with the innovation coordinators and the Secretary-Directors of the water authorities. Their time and contribution are also highly valued and appreciated! Without the support and participation of many colleagues I couldn't have collected so much data, and this thesis could not have been written. Thank you all again!

A part-time PhD graduate poses challenges to her supervisors, especially if she doesn't have much prior theoretical knowledge of public management science, nor of its methodologies. Ingmar's patient explanation of the SPSS and AMOS statistical intricacies and the help of Brenda if both of us got stuck are highly appreciated. Bert's brilliant idea to check for non-linearity and the 'Too Much of a Good Thing' effect led to important additional insights. Mike's friendly parallel facilitation of focus groups all over the Netherlands helped collect data. Victor's critical review improved the article on the theoretical framework, and Geert's suggestions helped to simplify the survey questions. Ingmar's consciencious and thorough support and Arwin's creative ideas, overview, critical reflection and encouragement to present my results in international conferences, are very gratefully acknowledged.

I also learned a lot from the reviewers of our papers. I am especially grateful to this reviewer: '*I think this is a very good paper and a quite commendable analysis. It was so good, in fact, that I spent an inordinate amount of time revising it. Which, in the end, may have worked against you as I have written a couple thousands words of comments*'.

Finally, Michael, Jisk and Marrit, thank you for your interest, endurance and support, and for dragging me away from my laptop when I was overdoing it again.

Leiden, May 2019.

Chapter 1

Innovating and optimizing for performance:

Introducing the research questions and approach

1.1 Introduction

A large part of the Netherlands is below sea level, which renders protection against flooding an essential public task. Regional water authorities have been executing this task since the twelfth century (Mostert 2016; Havekes 2008). They are functional democracies, tasked with regional water management, flood protection and sewage treatment, and are fully funded by the taxes they levy. They used to be rather inward looking, hierarchical and technocratic organizations applying a top-down governmental approach (Toonen, Dijkstra and Van der Meer 2006), but in recent years they have embraced more open network-oriented modes of governance (Van Meerkerk, Edelenbos and Klijn 2015). During their long history they have been adapting to changing societal demands, and have shown renowned innovations, from the well-known 16th century wind mills to present day fully automated water management. Presently, these institutions are again faced with major challenges, including adaptation to climate change, the energy transition and the transition to a circular economy, as well as demands for more responsiveness to society and participation and collaboration with a wide range of stakeholders. To meet these challenges innovations are needed in policies, techniques, processes and services. At the same time they are under continuous strain to meet their goals more effective and efficiently, i.e. 'to do more with less'. The water authorities struggle with these seemingly conflicting demands.

However, they are no exemption as compared to other public organizations in this respect. National as well as local governments face higher demands on public service delivery. Increasing complexity of policy issues, and shrinking public budgets are important factors that push governments to search for approaches to become more effective and efficient. Public organizations are in a constant process of adapting to changing demand and circumstances. These adaptive processes may be continuous, optimizing existing practices, building on existing skills and knowledge, but a discontinuous approach, that breaks with established practices and mind sets, may also be needed to maintain or improve public performance (Moore 2005; Osborne and Brown, 2011; Hartley, Sørensen and Torfing, 2013). Continous incremental improvement or optimization, and discontinous renewal or innovation are different processes, that require different approaches to their facilitation and sustenance (Osborne and Brown 2011). Scholars argue that public organizations face a trade-off between achieving short-term performance goals such as efficiency and effectiveness, for which optimization strategies are beneficial, and long-term or strategic goals centred more on societal outcomes (Verbeeten 2008), that may need more innovative approaches. This thesis will explore the interplay between innovation and optimization and their impact on performance. The water authorities will serve as our empirical setting to study how public organizations enhance their performance by dealing with innovation while at the same time optimizing existing policies, techniques, processes and services.

In the last decades the efforts of public organizations to improve quality, efficiency and effectiveness of public services and transparency of outcomes has been influenced strongly by New Public Management (NPM) principles of economic rationalization and business-like thinking. Public organizations have imported many business-like concepts, practices and instruments such as performance management, more managerial autonomy, and enhanced 'customer'-orientation (Pollitt and Dan 2013; Pollitt and Bouckaert 2017). There is evidence that performance management systems, including rational planning, target setting and budgetary control, performance measurement and lean management (Arnaboldi, Lapsley and Steccolini 2015) contribute to public performance (e.g. Walker, Damanpour and Devece 2010; Gerrish 2016). However, an incessant focus on efficiency and performance measurement can also result in a too strong focus on optimizing processes and services to achieve short term performance targets efficiently, with an inherent risk for the organization's long term results (e.g. De Bruijn 2002), and too little attention to the outcomes for external users of public services and the added value to their lives (Radnor and Osborne 2013).

At the same time innovation in public organizations is lauded as prerequisite to a more effective and more responsive government by national and international governmental institutions like the OECD and the EU (OECD 2015; Bason 2018; Arundel, Casali and Hollanders 2015) and innovation scholars (e.g. Alburry 2005; Hartley et al. 2013). However, public organizations are embedded in policy systems and institutional patterns which are rather stable during longer periods of time (Geels 2002; Loorbach 2010). Innovation in the public sector is perceived as difficult and tedious, due to organizational barriers such as red tape, risk aversion, multiple and ambiguous goals, the absence of market pressure and competition, and a strong focus on efficiency and short term results (Cinar, Trott and Sims 2018; Hartley, Sörensen and Torfing 2013). Despite the professed benefits of innovation, a recent overview of empirical studies (De Vries, Bekkers and Tummers 2015) revealed that the contribution of innovation to public service performance – if discussed at all – is rarely tested.

This illustrates that research so far doesn't offer clear answers on the benefits of innovation to public performance, and that efforts to enhance public performance through optimization of existing processes and services also come with their own flaws and pitfalls. Nevertheless both optimization and innovation are essential to enhance public performance. Althoug researchers underline that optimization and innovation are different processes that require different approaches (Moore 2005; Osborne and Brown 2011), or even a trade-off (Verbeeten 2008), they are also interdepent en potentially mutually enforcing. However, so far research on the interaction between the two processes and their impact on performance in public sector organizations is largely lacking, and little is known about the way public organizations deal with the tension between these processes nor on the capabilities they need to be proficient in

both innovation and optimization. This thesis contributes to filling these voids, as will be elaborated below.

The remainder of this chapter is structured as follows. We will discuss present research and identify the main knowledge gaps that lead to our research goal and research questions. We then describe the water authorities as locus and focus of our research. Finally we describe our methods and the relevance of this thesis to theory, methodology and practice.

1.2 Theoretical background and knowledge gaps

The public sector is urged to innovate and at the same time enhance efficiency and lower cost (e.g. Osborne and Brown 2011; Pollitt and Bouckaert 2017). March (1991) already argued that finding the optimal balance between exploitation and exploration is essential to improve the performance of organizations. Exploration or innovation is usually associated with adaptation to a changing environment and anticipating future performance, by pursuing new knowledge and developing new products and services to new clients (March 1991; Gupta, Smith and Shalley 2006; Gibson and Birkinsaw 2004; Jansen, Van den Bosch and Volberda 2006; Cannaerts et al. 2016; Plimmer et al. 2017). Exploitation or optimization is associated with enhancing efficiency and alignment of current operations to maintain or enhance short-term performance, by incremental improvement of existing designs, products and services for existing clients (e.g. Gupta, Smith and Shalley 2006; Gibson and Birkinsaw 2004; Jansen, Van den Bosch and Volberda 2006; Cannaerts et al. 2016; Plimmer et al. 2017).

In public sector research innovation is generally conceptualized as the implementation of a new concept, that involves breaking with existing mind sets, generating new knowledge, risk-taking and experimentation, in order to create public value (e.g. Rogers 2003; Moore 2005; Osborne and Brown 2011; Hartley et al. 2013). This concept is perceived as new by an individual or other unit of adoption (Rogers 2003), and represents a discontinuity with the past (Osborne and Brown 2011; De Vries et al. 2015).

Optimization concerns the gradual, incremental improvement of current practices, products and services, exploiting existing knowledge and skills, within current mind sets, associated with stability, and representing continuity with the past (e.g. Moore 2005; Osborne and Brown 2011; De Vries, Bekkers and Tummers 2015). In this thesis we use the term ‘optimization’ for continuous incremental improvement - except in chapter 3 where we use incremental improvement. This is done to avoid confusion related to the term ‘improvement’, which is sometimes conflated with innovation (Osborne and Brown 2011) or with a sole focus on efficiency. However, efficiency is one of the dimensions of public performance.

Public performance is a multidimensional construct (Andrews, Boyne, Moon and Walker 2010). Central to the concept is the creation of public value (Moore 2005; Van Dooren, De Caluwe and Lonti 2012). Desired outcomes are usually defined in terms of efficiency, effectiveness, quality, future proofing, and responsiveness and legitimacy towards stakeholders (Boyne 2002; Yang and Panday 2007). We conceptualize public service performance as achieving public goals in an effective and efficient manner, preserving the present and future quality of public services as well as responsiveness and legitimacy among stakeholders (Verbeeten 2008).

Furthermore, we should stress that we are interested in "total" or "overall" innovation and optimization – including policies, services, processes and techniques -, and their impact on "overall" public performance, rather than in the impact of specific types of innovation or optimization carried out at one point in time (Yang and Pandey 2007; Walker, Damanpour and Devece 2010; Walker, Berry and Avellaneda 2015; Damanpour, Walker and Avellaneda 2009).

As indicated above, in public sector research the attention for the interaction between the different processes of innovating and optimizing is limited, and attention for their contribution to performance is largely lacking (Choi and Chandler 2015; De Vries et al. 2015).

Capacities for innovation and optimization

Innovation studies have a tendency to look for barriers that have to be overcome to spur innovation. For instance, in a systematic review Cinar et al. (2018) identify organizational barriers, barriers in the interaction between organizations and stakeholders, and barriers during the innovation process, especially during the implementation phase. Besides a focus on barriers, innovation studies tend to research conditions or antecedents that affect innovation processes, or a specific type of innovation (De Vries et al. 2015). This results in a broad range of rather diverse antecedents at the environmental, organizational or individual level, often not addressed in coherence (De Vries et al. 2015). And, as Wegrich (2019) puts it: especially scholars advocating collaborative innovation seem to assume that organizational barriers to innovation are simply bureaucratic weaknesses, that political leaders and public managers can overcome if only they make an effort.

Remarkably, there is much less attention for capabilities needed for innovation, nor are these related to or contrasted with capabilities supporting optimization. However, it is essential that public organizations identify and build capacities that are needed to maintain and enhance public performance (Piening 2013; Pablo et al. 2007). Research attention on capabilities of public and private organizations that support innovation and optimization is distributed over different streams of literature. Within the literature on business administration, ambidextrous capacity,

i.e. the ability to balance innovation and optimization, is emphasized (Tushman and O'Reilly 1996; Jansen, van den Bosch and Volberda 2006). Literature on collaboration and network governance emphasizes connecting or boundary spanning capacity as being vital for innovation (Williams 2002; Klijn, Edelenbos and Steijn 2010). Network sciences underscore the need of establishing both strong and weak ties, or bonding and bridging ties. Optimization is supported by bonding ties, that encourage knowledge sharing and mutual understanding, while bridging ties support the new connections between ideas and actors and the larger cognitive distance needed for innovation (Granovetter 1973; Nooteboom et al. 2007). And literature on individual, organizational and social learning underlines that first order learning is instrumental for optimization, and second order learning for innovation (Argyris 1976; Schön 1983; Pahl-Wostl et al. 2007). In our research, we aim to bring together the insights on these different capacities to understand their relative contribution to optimization and innovation.

The need for a multi-dimensional and multilevel framework

De Vries et al. (2015) find that antecedents of innovation are often addressed independently at different levels, i.e. the individual, organizational or the inter-organizational or network level, ignoring possible connection or interaction between them. The same is valid for literature on potentially relevant capacities. E.g. scholars advocate leadership of public managers (e.g. Ricard, Lewis and Klijn 2017), or point to the indispensable role of entrepreneurial employees (Kingdon 1995; Huitema and Meijerink 2010), whereas a substantial body of research rather focusses on organizational antecedents (De Vries et al. 2015), or argues that network management (Klijn et al. 2010) and collaborative or social innovation are key (Hartley et al. 2013; Voorberg, Tummers and Bekkers 2015). However, the focus on either individual, organizational or collective approaches leads to a lack of attention for the interplay between the individual, organizational and network levels.

The multilevel perspective (MLP) developed in literature on socio-technical transitions to analyse co-evolving developments on the wider societal level, the regime level of interrelated actors in a policy field, and the level of niches or experimental arenas (Schot and Geels 2008; Loorbach, Frantzeskaki and Huffenreuter 2015) provides a useful frame for longitudinal analysis of more radical policy innovations at the regime level. We will use this framework for a reconnaissance of the interaction between levels, and an introduction to the context and challenges of water authorities.

However, the focus of this thesis is on the capacities that public organizations need for dealing with innovation and optimization to enhance performance. It is highly relevant to enhance our understanding of which capacity at which level contributes to innovation and/or optimization, as this will provide public organizations with guidance and focus in strengthening their proficiency in innovating and optimizing

in a comprehensive and coherent manner. Such a comprehensive, multilevel framework of relevant capacities for public organizations so far is lacking.

Dealing with tensions between innovation and optimization in practices

Public organisations experience tensions between innovation and optimization, on the one hand they are urged to innovate, on the other to enhance efficiency and lower costs. Innovating comes with risks and consumes resources that cannot be used for regular processes. Tensions between innovating and optimizing can be dealt with in several ways: structural approaches aim at separating the two processes in time or space, whereas trade-off approaches treat this tension as a dilemma and advocate finding an optimal comprise, and dialectic approaches seek to identify synergies and integration (Smith and Lewis 2011; Lövstål and Jontoft 2017). Paradoxical 'both-and' approaches assume that tensions persist and are beneficial, and aim at dealing with competing interrelated demands simultaneously (Smith and Lewis 2011; Lövstål and Jontoft 2017), and are widely advocated (e.g. Gibson and Birkinsaw 2004; Andriopoulos and Lewis 2009).

However, little is known on how these tensions play out in practice and what organizational antecedents define how these practices are shaped. Private sector research indicates that innovation and optimization should be strategically integrated, and supportive procedures are needed to conciliate tensions between different demands (O'Reilly and Tushman 2013). A management style that combines transformational and transactional activities would allow managers to deal with tensions between innovation and optimization (Raisch and Birkinsaw 2009; Junni et al. 2015). Furthermore an organizational culture that promotes seemingly paradoxical values, such as flexibility and control, creativity and discipline (O'Reilly and Tushman 2013) and balances cohesiveness and diversity (Andriopoulos and Lewis 2009) would be needed.

In addition, informal routines of organizational members are needed to cope with 'eventualities' that are not pre-described in organizational policies and procedures or by management (Brown and Duguid 1991). If formal and informal systems are congruent they are mutually reinforcing and beneficial for organizational ambidexterity (Plimmer, Bryson and Teo 2017). Different configurations of these organizational antecedents can result in different innovation and optimization practices in very similar public organizations (Cannaerts, Segers and Henderickx 2016).

It is highly relevant to further investigate how public organisation deal with tensions between innovation and optimization and the impact of organizational antecedents on innovation and optimization practices.

Too much focus on optimization or innovation?

Public organizations are urged to enhance efficiency and accountability, and strengthen performance management to achieve better results against lower costs. However, an incessant focus on efficiency and performance measurement may lead to too much focus on short-term quantifiable goals, at the expense of long-term or strategic goals, and introduce barriers to innovation (e.g. Hartley et al. 2013; De Bruijn 2002). On the other hand scholars warn for the positive overtones of innovation (Brown and Osborne 2011). The pressure of higher tiers of government, a moral imperative to innovate (Jordan 2014), and the desire to stand out as 'innovative', may draw necessary resources away from other government services (Jordan 2014), lead to rhetoric reframing of improvements as 'innovations' (Osborne and Brown 2011), and disregard the costs of failure (Choi and Chandler 2015).

March (1991) already describes the risk that organizations that focus too much on either innovating or optimizing run the risk of over-innovating or over-optimizing, which can undermine their performance. Patterns of learning associated with innovation and optimization tend to be self-reinforcing often to the exclusion of one another (Bedford, Bisbe and Sweeney 2018). Over-optimizing organizations stick too long to an optimization strategy where innovation is needed, because of its short-term success and limited risk (Levinthal and March 1993; Choi and Chandler 2015; Uotila et al. 2009), the so-called success trap. Organizations that engage too hastily in innovation may suffer the costs of experimentation and take too many risks without gaining many benefits, which can trap an organization in an endless cycle of failure and unrewarding change, the so-called failure trap (Levinthal and March 1993; Choi and Chandler 2015).

However, although there is a broad concern that a strong focus on performance measurement and efficiency may hamper innovation, there are only a few quantitative studies that provide evidence for an adverse effect of a bias towards optimization in public organizations (Andrews and Boyne, 2011; Andrews, Boyne and Mostafa 2017). Studies describing adverse effects of too much innovation are even more rare (Wynen, Verhoest and Kleizen 2017). Given the concerns raised in literature related to both an over-engagement of public organizations in optimization as well as to strong pressure on public organizations to innovate it is highly relevant to deepen our insights in this respect and to evaluate if adverse or sub-optimal levels of optimization or innovation do occur in public organizations.

1.3 Aim and research questions

As we have seen above, despite the high expectations of - on the one hand - the contribution of innovation, and - on the other hand - of the introduction of private sector concepts such as performance management, to public sector performance,

there is very little quantitative research that tests these propositions. Innovation research mainly focusses on barriers, many of them supposedly induced by the performance management systems and other NPM concepts that were introduced with the same goal of enhancing public performance. Research on how public organizations deal with the tensions between the different processes and demands of innovating and optimizing is scarce, as well as research on capacities that public organizations need to be equally dextrous in both. This thesis aims to address those knowledge gaps by exploring, testing and explaining the contribution of innovation and optimization to performance, which capabilities public organizations need to be proficient in both innovating and optimizing, and how public organizations can organize the interaction and mutual enforcement of the two.

Our main research question thus is: What is the impact of innovating and optimizing on performance and what capabilities and organizational antecedents contribute to innovation and optimization? We aim to translate our findings into implications for practice that can serve as guidance for public organizations to enhance their proficiency in dealing with both innovation and optimization. Based on the knowledge gaps identified above, our research questions are:

1. How do the individual, organizational and network level interact?
2. What capabilities support innovating and optimizing?
3. What is the relative contribution of innovating and optimizing to performance?
4. How do public organizations deal with the tensions between optimizing and innovating?
5. How do organizational antecedents impact practices of innovation and optimization?

1.4 Dutch regional water authorities in context

We selected Dutch regional water authorities to be studied in this thesis. Their history goes back to medieval times, when collective action was needed to improve drainage of swampy areas and protect low-lying lands from flooding. Many local bodies took care that dikes were built and maintained, and water levels controlled. In 1850 there where about 3500 of these water boards. The present Dutch governance context of a decentralized structure with strong local and regional governments, and its consensual 'polder model' dates back to this early decentralized form of government and the constant deliberation that was needed to balance different interests (Schreuder 2001). In the last decades the water authorities have undergone few structural reforms, besides a continued history of merging; their number reduced from 125 in 1990 to 21 in 2018. Nevertheless, there have been recurring attempts to abolish the water authorities, following debates on the legitimacy of functional democracy with reserved seats for special interest groups and low turnout at elections. The debate has recently been settled after an influential OECD report

(OECD 2014), that stated that the Netherlands is a "global reference for water management" (Mostert 2016).

Although the water authorities used to be rather technocratic, professional organizations (Toonen et al. 2005), in recent years they increasingly embrace New Public Governance approaches (Rhodes 1996; Osborne 2006), connecting their goals with those of other governments and stakeholders, with whom they build long-term and trustful relations (e.g. Edelenbos and van Meerkerk 2015). The new Environment and Planning Act (Ministerie van Infrastructuur en Milieu 2014), expected to enter into force in 2021, that encourages a coherent approach of the physical environment and more responsiveness to initiatives of citizens, forms a new challenge to all involved governments, including the water authorities.

Structural attention for innovation in water management in the Netherlands started when water was designated as one of the focal points of a national Innovation Platform. This platform was initiated in 2003, as a part of national innovation efforts triggered by the Lisbon Agenda of the EU (van der Toren 2010). For the water authorities systematic attention for innovation started mostly in the preparation phase of their fourth strategic planning period (2010-2015). In line with a vision on innovation of the Association of Water Authorities (Unie van Waterschappen 2011) most water authorities stated in their strategic plans that innovation was needed to anticipate future developments. Efforts were undertaken in many water authorities to formulate innovation programs, to allocate some resources for innovation, and to stimulate innovativeness of the organization and its employees. At the same time NPM-like measures have been implemented extensively in Dutch public organizations over the last three decades, including the water authorities. As functional democracies that levy their own taxes, the relationship between tasks and taxes is quite transparent, which allows for well specified performance measurement and benchmarking (Tillema 2007). The water authorities thus aim to strengthen their innovative capabilities while at the same time executing their tasks in an effective and cost-efficient manner.

The water authorities thus experience similar tensions as other public organizations when it comes to innovation and optimization. And although the water authorities are a rather specific type of regional governments, due to diversity in their tasks they face a broad range of innovation challenges. For example, adapting sewage treatment plants in order to retrieve energy, nutrients or bioplastics calls for technological innovations as well as for new institutional arrangements for delivery of the new products. Adapting regional water management to climate change demands concerted and collaborative innovation within the external network of local governments, citizens and other stakeholders. Their tasks show sufficient diversity to allow for ample generalisability of the findings and to substantiate their relevance for other public organizations, as we will elaborate in our conclusions chapter.

1.5 Methods

We applied complementary research strategies, consisting of literature search, qualitative research applying interviews, focus groups and document analysis, and quantitative research consisting of a survey and statistical analysis, modelling both linear and non-linear relations. As such we followed a sequential exploratory mixed-method approach (Creswell 2014), that allowed us to quantitatively test our theoretical assumptions, and subsequently deepen our insights by a qualitative follow-up, and to further deepen our insights by revisiting both our quantitative and qualitative data. Below the different research steps are introduced.

Case study of policy innovation on interaction between multiple levels

We conducted an explorative case study in order to deepen our understanding of the context and challenges of an water authority as an actor in a highly institutionalized regime, to evaluate interactions between the network, organisation and individual levels and to explore capabilities relevant for innovation. The study included a longitudinal analysis of a collaborative innovation effort of a water authority, several municipalities and other stakeholders that resulted in a major policy innovation at the regime level. It analyses the non-lineair pathway of this policy innovation and the conditions that enabled innovation at the regime level. This explorative case study thus aimed to analyse the interaction between the level of experimental pilots in the collaborative innovation program and the organisational level, and the role individuals play in connecting these levels. We collected data by semi-structured interviews and document study. We mapped the interaction between experimenting in pilots and organizational transformative learning by applying the Multi-Level Perspective framework (a.o. Rip and Kemp 1998; Geels and Kemp 2007).

Literature study on capacities for innovating and optimizing

In order to analyse which capacities are relevant for innovation and optimization and to build a multilevel framework of capacities we did a comprehensive literature study, including public and private sector literature from different streams of literature, including public and private sector innovation, organizational sciences, learning, network sciences, performance management, and public governance. This literature study thus was not aimed at systematically reviewing all articles in a specific domain about a topical issue regarding innovation and optimization. Rather, it aimed to overcome the fragmentation in different disciplinary perspectives on processes of innovation and optimization, in order to formulate a more integrated and cohesive framework that sheds light upon the capacities that contribute to optimizing and innovating.

Testing the multilevel framework of capacities by structural equation modelling

To test our multidimensional and multilevel framework of capacities we operationalized our constructs into measurement scales. We used mainly existing scales, although for some constructs new scales were formulated. After pretesting our questionnaire we sent the survey questionnaire to the then 22 water authorities, inviting respondents from the primary task fields. See Appendix A for the questionnaire. We received 667 valid responses, a response rate of 33%. We formulated hypotheses on the relative contribution of the different capabilities at the different levels to optimizing and innovating and on the contribution of innovating and optimizing to performance. To test the hypotheses we used structural equation modelling (SEM), which allows simultaneous analysis of all the variables in the model and enables measurement of direct and indirect effects.

Comparative focus group research of innovating and optimizing practices

To deepen our understanding of the relationships found in the survey and to understand the differences between the water authorities with respect to their engagement in optimizing and innovating, we discussed the results in focus groups in 10 water authorities. Focus groups discussion is an efficient technique for qualitative data collection through group interaction (Morgan 1996; Robson 2002; Robinson 1999), eliciting individual and collective views and experiences and providing insights into the underlying sources of complex behaviours and motivations (Morgan 1996; Ryan et al. 2014). We aimed to take stock of the views of managers as well as employees, and convened parallel sessions consisting of managers and employees to ensure safety for employees in expressing concerns and reduce the risk of influence of hierarchy and power dynamics (Robson 2002). We used a comparative analysis to evaluate different configurations of formal routines, management style and culture and their impact on practices.

Testing and explaining nonlinear relationships

Finally, to evaluate the presence of over-innovation or over-optimization we used nonlinair statistical analysis to investigated nonlinear relations of innovating and optimizing with performance, in addition to our structural equation modelling described above. We analysed our focus group data to reveal indications and underlying causes of over-innovation or over-optimization.

1.6 Contribution to theory and practice

Whereas some scholars argue that public sector innovation is still undertheorized and under-researched (Hartley et al. 2013; De Vries 2018), this is certainly the case for public sector ambidexterity (Smith and Umans 2015), i.e. the capacity to simultaneously deal with innovating and optimizing to enhance public performance. This thesis aims to enhance our understanding of ambidexterity in public organizations. It aspires to contribute to our understanding of the relation between innovation and optimization with public performance, and to how public organizations deal with and reconcile tensions between the two. Rather than elaborating on drivers and barriers it takes a capability perspective (Piening 2013; Pablo et al. 2007) and investigates which capabilities contribute to innovation and optimization. It intends to do so from a comprehensive multilevel and multidimensional perspective.

This thesis also aims to elaborate a more comprehensive view on organizational antecedents for enhancing organizational ambidexterity (Plimmer et al. 2017), and to identify underlying causes for differences between similar public organizations (Miles and Snow 1978; Andrews et al. 2009; Cannaerts et al. 2016). It also aspires to elaborate if – indeed – public organizations tend to over-optimize and under-innovate, which is often argued to be an undesirable outcome of NPM-type measures and performance measurement systems (Hartley et al. 2013; De Bruijn 2002), or rather over-innovate, due to intensive normative pressure (Jordan 2014; Osborne and Brown 2011; Choi and Chandler 2015).

Public organizations are urged to innovate more, but provided with very little guidance on how to do so (Moore 2005; Osborne and Brown 2011). This thesis offers a more comprehensive approach, in which innovation is not a 'stand-alone' activity, but rather integrated in strategies, management and practices that balance innovation and optimization to enhance public performance. It thus offers leverage points for public organizations for a more comprehensive approach for both continuously and discontinuously improving their performance, at the individual, organizational as well as network level. These are especially relevant for managers, who are often called upon to enhance their leadership skills to overcome innovation barriers, but are straitjacketed in strict result-oriented performance measurement systems. As we will elaborate in this thesis, leverage points can be found in addressing both innovation and optimization in strategy, culture and management style, strengthening relevant capacities and encouraging ambidextrous practices.

1.7 Structure of this thesis

In table 1.1 we present an overview of the structure of this thesis, including research questions, publications, data and methods.

In chapter two of this thesis we use the MLP framework to describe empirically how a policy innovation evolved in the interplay between landscape developments, regime change, and niche dynamics, and the role that policy entrepreneurs played in this process. We use this framework for a reconnaissance of the interaction between levels, but also to introduction the task, context and challenges of a water authority.

In chapter three of this thesis we elaborate which capacities are needed for innovation and optimization. We determine the main attributes of these capacities at the individual, organizational and network levels, and formulate a multi-dimensional and multi-level framework of innovating and optimizing capacity.

In chapter four we operationalize the framework and test it in a survey among the then twenty-two water authorities. We use structural equation modelling to identify the relative contribution of the different capabilities at the different levels to innovating and optimizing. We also describe to what extent innovating and optimizing contribute to performance.

In chapter five we describe results of focus group discussions in eight water authorities, and elaborate which organizational antecedents impact on innovation and optimization practices. We analyse how these organizational antecedents mutually interact by comparing their configurations in low, moderate and high ambidextrous water authorities.

In chapter six we investigate whether optimization or innovation traps occur in the water authorities, using nonlinear statistical analysis, and how public organizations deal with tensions between the two processes.

We conclude this thesis by presenting our main conclusions and their implications for practice and indicating further research directions in chapter 7.

This thesis is based upon one book chapter (chapter 2) and four peer reviewed journal articles (chapter 3 – 6). These are:

1. Gieske, H. and A. van Buuren. 2015. “Collaborative innovation processes in Dutch regional water governance - The role of niches and policy entrepreneurs in fostering (strategic) policy innovation”. In *Collaborative Governance and Public Innovation in Northern Europe*, edited by A. Agger, B. Damgaard, A. Hagedorn Krogh and E. Sørensen, 157-180. Sjarjah, U.A.E.: Bentham Science Publishers
2. Gieske, H., A. van Buuren, and V. Bekkers. 2016. “Conceptualizing public innovative capacity: A framework for assessment.” *The Innovation Journal: The Public Sector Innovation Journal* 21(1): 1-25.
3. Gieske, H., I. van Meerkerk, I., and A. van Buuren. 2018. “The Impact of Innovation and Optimization on Public Sector Performance: Testing the Contribution of

Connective, Ambidextrous, and Learning Capabilities". *Public Performance and Management Review*. https://doi.org/10.1080/15309576.2018.1470014.

4. Gieske, H., M. Duijn and A. van Buuren. 2019. "Ambidextrous practices in public service organizations: innovation and optimization tensions in Dutch Water Authorities." *Public Management Review*. https://doi.org/10.1080/14719037.2019.1588354
5. Gieske, H., B. George, I. van Meerkerk, and A. van Buuren. 2019. "Innovating and optimizing in public organizations: does more become less?" *Public Management Review*. https://doi.org/10.1080/14719037.2019.1588356

Table 1. Overview of research questions, structure of the thesis, outlet, data and methods.

research question		chapter	publication	data	methods
1.	How are the individual, organizational and network level connected?	2	1	interviews, documents	case study
2.	What capabilities support innovating and optimizing?	3,4	2,3	survey	statistical analysis
3.	What is the relative contribution of innovating and optimizing to performance?	4,6	3,5	survey, focus groups	statistical analysis, coding, comparative qualitative analysis
4.	How do public organizations deal with the tensions between optimizing and innovating?	5	4	survey, focus groups	coding, comparative qualitative analysis
5.	How do organizational antecedents impact practices of innovation and optimization?	5,6	4,5	survey, focus groups	coding, statistical analysis, comparative qualitative analysis

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Chapter 2

Collaborative innovation processes in Dutch regional water governance

The role of niches and policy entrepreneurs in fostering (strategic) policy innovation

This chapter is published as:

Gieske, H. and A. van Buuren. 2015.
"Collaborative innovation processes in Dutch regional water governance - The role of niches and policy entrepreneurs in fostering (strategic) policy innovation".

In *Collaborative Governance and Public Innovation in Northern Europe*, edited by A. Agger, B. Damgaard, A. Hagedorn Krogh and E. Sørensen, 157-180. Sjarjah, U.A.E.: Bentham Science Publishers.

Abstract

In this chapter, we investigate how collaborative governance contributes to spurring innovation in regional water management. We analyse a collaborative innovation effort in regional water management in the Netherlands. In a unique endeavour, nine municipalities united in a city region and a regional water authority, together with private parties, crafted a joint innovation program aimed at developing new knowledge and innovative solutions for persistent inundation problems in the area. In addition to innovative solutions in selected experimental areas, the collaborative effort gave rise to a paradigm shift in regional inundation protection policy – from a norm-oriented approach to a more modern, adaptive, effect-oriented approach. We apply a multilevel perspective to analyse the (co-evolving) developments at three levels: the macro level of the national (policy) landscape, the meso level of the regional water management regime, and the micro level of experimental areas or niches. Our analysis reveals that learning processes on these three levels are important to trigger policy innovation, but that these processes have to become connected by the deliberate interventions of policy entrepreneurs to really result in a paradigm shift.

2.1 Introduction

Over the last two decades, we have witnessed an increasing demand for innovation in the public sector. Higher demands on public service delivery, increasing complexity of policy issues, and shrinking public budgets are important factors that push governments to search for innovative approaches in order to become more effective and efficient. However, as Sørensen and Torfing (2011, 844) state: "*Despite the growing interest in spurring innovation in the public sector, the current understanding of the sources of public innovation is inadequate.*" This is especially true in relation to public policy innovation. As Duijn (2009) notes: public policy innovation presupposes a shift in policy paradigm, and thus not only in existing practices but also in the underlying rules and routines, value propositions, and assumptions. Such a paradigm shift thus alters the existing policy regime and is a complex, multifaceted phenomenon.

From the literature on socio-technical transitions, we know that experimenting in relatively protected innovation spaces (Beckers et al. 2011) or niches (Schot and Geels 2008) is often deemed of crucial importance to bring about enduring change on the meso level of institutional regimes. Transitions or regime shifts come about as the result of tensions that build up from micro-level niche developments and pressure from the landscape level, the macro level (Geels, 2002; Rotmans et al. 2001).

However, there seems to be a long, unpredictable, and non-linear way from experimenting in pilot projects to policy paradigm shifts, and to date we do not know much about how these two are related. Pilots are frequently used as the starting point for innovation processes in the public domain to test innovative ideas before full-scale application (Vreugdenhil et al. 2010; Van Buuren and Loorbach 2009). However, several hurdles such as limited representativeness and learning, lack of institutionalization, and poor timing limit the diffusion of new practice-based knowledge from pilots into standardized policy (Vreugdenhil et al. 2010).

In this chapter, we analyse the relationship between collaborative innovation at project level (in pilots or niches) and policy innovation at regime level, from a multilevel perspective. We thus try to understand how learning and change processes at several levels (niches, regime, landscape) are interrelated and how policy entrepreneurs link developments at different levels in order to realize cross-level breakthroughs. Recent literature (Huitema and Meijerink 2010; Brouwer 2013) emphasizes the importance of policy entrepreneurs for realizing change, but the question of how entrepreneurship, innovation, and learning are interlinked is still unanswered. For this analysis, we selected an in-depth case study of a policy paradigm shift in regional inundation protection policy at the Dutch regional water authority, Delfland, which happened in the slipstream of a pilot-based regional innovation program.

We give special attention to the organizational routines, procedures, and strategies in the implementation phase of the new policy, because the implementation phase in particular is the most important phase of the innovation cycle – as the proof of the pudding is in the eating.

The Hague Region is a cooperative entity made up of nine municipalities, administered by representatives of the nine town councils. It is a densely populated area mainly below sea level, with major cities like The Hague and important greenhouse and agricultural areas within the district of the Delfland regional water authority (see figure 2.1). Regional water authorities are task-oriented regional government bodies with regulative authority, have an elected board, and levy taxes. Delfland is responsible for protecting the area from sea and river by dunes and dikes, for water management in the district, and for the management of water quality and sewage treatment.

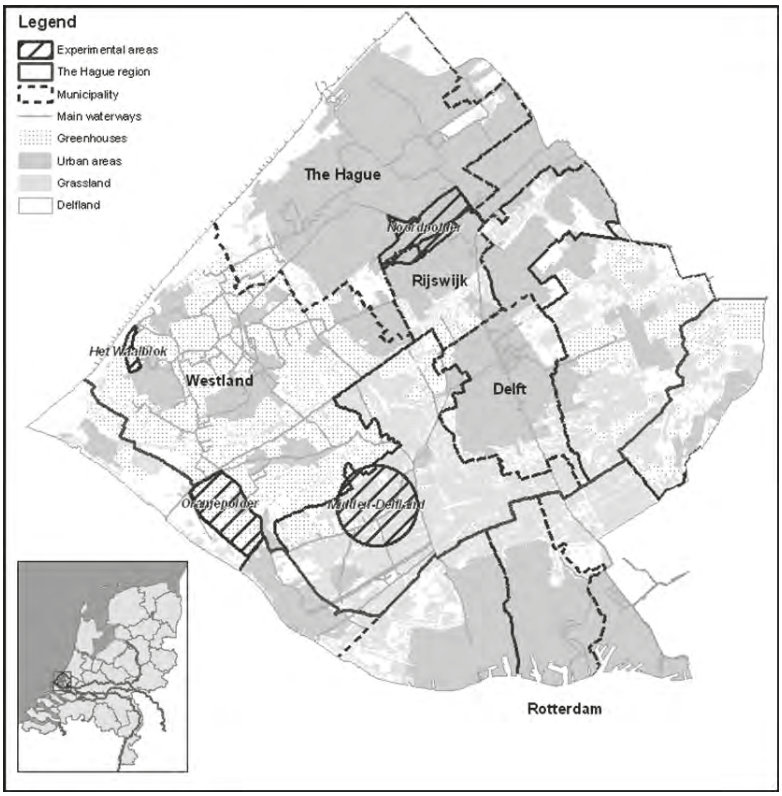

Figure 2.1. Delfland regional water authority, The Hague Region, and the experimental areas discussed in this chapter.

In 1998 and 2001, extreme rainfall led to flooding in The Hague Region, causing significant damage to crops in the greenhouse area and to households and firms. Delfland therefore started to work out a water policy to prevent flooding in the future, anticipating national protection levels, which it translated into an easy-to-handle water storage norm expressed in cubic meters per hectare. It soon ran into severe implementation problems, resulting in tensions between the municipalities and the regional water authority. Responding to these tensions, the governmental actors in the region drew up a regional covenant – The Water Framework The Hague Region – to find solutions together to prevent inundation in the region, including a program aimed at finding innovative combinations of water management and other spatial functions. Additional developments – such as the availability of new hydrological models that allowed a better understanding of the physical system, and especially severe financial pressures within the regional water authority – opened up a major policy window in 2009 in which these new insights could become accepted and resulted in an intriguing policy innovation. The incumbent water policy based on water storage norms was suspended and a new effect-oriented approach was embraced and finally integrated into the regional water management policies and regulations.

In this chapter, we analyse how this policy innovation evolved in the interplay between landscape developments, regime change, and niche dynamics, and the role that entrepreneurs played in this process. In section two, we present our theoretical framework. In section three, we describe how we conducted our empirical research. In the next three sections, we describe the co-evolving developments that led to a transition from a norm-driven to an effect-driven policy paradigm, its implementation, and the role of policy entrepreneurs in coupling developments on the different levels. In section seven, we analyze this development by reconstructing the co-evolution between landscape, regime, and niche dynamics. We conclude by formulating a couple of implications that are important for the question of how to facilitate policy innovation.

2.2 Theoretical framework

Innovation, learning, and the role of policy entrepreneurs

We define innovation in the public sector as the implementation, by people in an institutional context, of a new (technical, organizational, policy, and so forth) concept that substantially improves the functioning and outcomes of the public sector (Moore 2005; Hartley 2005; Van de Ven et al. 1999). The innovation process is only completed when the innovation has resulted in the implementation of the new concept, has been integrated into the activities of the regime, and has become part of the rules, routines, and practices of the regime by institutionalization, and is therefore no longer visible or experienced as an innovation.

In order to analyse more precisely the non-linear pathway and nested character of a policy innovation at the level of the strongly institutionalized regional water management regime, influenced by tensions and interactions between the overarching national policy environment and the role of more localized pilots and experiments, we apply the notions and language of the multilevel perspective on socio-technical transitions as developed by Rip and Kemp (1998); Geels (2002); Geels and Kemp (2007). This framework seems to be useful for the study of public policy innovations as it enables a multilevel analysis of co-evolving developments on the landscape level (the wider policy and institutional environment), on the regime level of interrelated actors in a policy field, and on the level of niches or concrete projects in which the building blocks of a new paradigm are developed. In this section, we elaborate briefly on this theoretical framework and extend it with insights from literature on policy learning and the role of policy entrepreneurs.

As stated in the previous section, the multilevel perspective organizes the analysis of socio-technical systems on three levels of structuring processes: the micro level of niches (which can be seen as breeding places for new, innovative ideas and practices), the meso level of the highly institutionalized regimes currently fulfilling societal functions, and the landscape level, the macro-level context of social and physical factors. The multilevel perspective proposes that innovations at regime level come about through the interplay between processes at these three levels in different phases: niche innovations build up internal momentum, changes at the landscape level create pressure on the regime, and destabilization of the regime creates windows of opportunity for niche innovations. Transitions can follow different paths (Geels and Schot 2007), e.g. more top-down reconstellation paths, bottom-up empowerment paths, and internally induced adaptation paths (De Haan and Rotmans 2011).

Regimes consist of groups of actors, e.g. policymakers, scientists, public and private organizations, and societal groups, linked together in semi-coherent sets of rules, strongly embedded in institutions and infrastructures. Regime constellations are dominated by strong internal relations and relatively weak external relations (Geels and Kemp 2007). Innovation processes can be facilitated by the creation of niches (Schot and Geels 2008). Niches are (partly) protected institutional spaces (innovation milieus: Bekkers et al. 2011; Castells 1996) in which actors have (some) freedom to think about, and experiment with, innovative ways of doing, concepts, technologies, and instruments, in specific arrangements – including pilot projects, experiments, experimental areas, and so forth – that aim at protected experimentation to find new solutions to persistent problems. Learning processes are crucial to develop better knowledge and shared meanings, and attention should be given to socio-cognitive dynamics (Schot and Geels 2008). We assume that niche experiments become especially successful when they become connected to learning processes already happening within the regime. Niches provide innovative solutions, ideas,

and concepts that can provide the answer to questions raised in the regime because of failing paradigms or ineffective policy instruments. As these learning processes generate several tensions, new ideas or concepts can help to overcome them. This theoretical framework allows for an inclusive analysis of collaborative innovation.

We thus assume that learning processes at regime level play an important role in innovation pathways, and that it is necessary to analyze the way in which learning processes at niche and regime level become interconnected and mutually strengthening. That learning is a crucial precondition for policy innovation is extensively argued by authors like Sabatier (1987), Bennett and Howlett (1992), and Hall (1993). Heclo (1974, 307) defines policy-oriented learning as "*relatively enduring alterations of thought or behavioral intentions that result from experience and that are concerned with the attainment or revisions of policy objectives.*" Learning may concern incremental changes within the same policy paradigm. Policy paradigms can be described as the framework of ideas and standards that specifies not only the goals of policy and the kind of instruments that can be used to attain them, but also the very nature of the problems they are meant to be addressing (Hall 1993). Learning may also concern fundamental changes in the framework of policy ideas. These changes come from inconsistencies within the existing policy paradigm that arise when that paradigm does not result in the goals as set, and when the assumptions behind the paradigm are proven to be wrong. Until new ways of doing are fully developed and accepted, these learning processes are dominated by growing tensions between existing routines, beliefs, and values, and the growing recognition that other ways of doing are necessary to remain legitimate and effective.

Connecting niche results to learning processes within the regime presupposes the presence of entrepreneurs who are able to respond to policy windows that are open only for a short period. Such a policy window occurs when three conditions are met: there are some useful niche results that can be pushed forward, there is a quest for new answers because of tensions arising at regime level, and the surrounding landscape is receptive to a more structural reform of existing policy paradigms. From the literature we know that policy entrepreneurs (Kingdon 1995), boundary spanners (Leifer and Delbecq 1978; Williams 2002), or innovation champions play an important role in advancing innovative ideas and solutions in connecting within and between the different levels. Policy entrepreneurs often operate in (deliberately constructed) niche-type arrangements, like experimental areas, pilot projects, shadow networks, and the like (Lovell 2009). These groups are either part of the regime or build up pressure from outside the regime, but somehow have to connect their results to regular policies and activities. Strategies of these policy entrepreneurs described in policy change literature include generating and selling new ideas, building coalitions, using windows of opportunity, exploiting or manipulating venues, and managing networks (Huitema and Meijerink 2010). From an analysis of the role and actions of policy entrepreneurs in Dutch water management, Brouwer

and Biermann (2011, see also Brouwer 2013) report attention- and support-seeking strategies, linking strategies, relational management strategies, and arena strategies. In summary, to understand policy innovation, we look not only at the multilevel dynamics between niches, regime, and landscape, but also at the more endogenous dynamics and policy learning at regime level. We now try to uncover both the vertical dynamics (between niche developments and landscape changes) and the horizontal dynamics of learning processes at regime level, and the role of entrepreneurial, advocating, and brokering individuals therein.

2.3 Methods

Although (socio-technical) transition theory has been developed for longitudinal analysis (and management) of transitions at the scale of societal systems, it can also serve as a framework to analyze smaller scale innovations in regional water management, which displays the characteristics of a (socio-technical) regime: its highly institutionalized character, its dependence on existing physical infrastructure, and strong entwinement between professional values, technical provisions, and legal prescriptions (see also Van Buuren et al. 2014).

In this chapter, we focus on the evolution of the paradigm shift within the Delfland regional water authority, which is the major regulative and executive authority for regional water management. This transition in essence has to do with the replacement of a traditional focus on applying and realizing strict quantitative norms in regional water management with a more adaptive approach focusing upon realizing effect-oriented measures as the outcome of a collaborative innovation program.

In our empirical study, we reconstructed what happened on the three levels of analysis in the period between 2001 and 2011: the landscape, the regime, and the various niches, and the role of learning processes within the niches and in the regional water authority. We further analyzed the way in which the evolvement on the various levels can be explained by either vertical dynamics (linkages between niche, regime, and landscape dynamics) or horizontal dynamics (learning processes at regime level) and whether policy entrepreneurs were important in the process by which the various levels co-evolved towards a policy innovation in terms of a paradigm shift and its implementation.

We analyzed the evolution of the regime by interviewing water experts of the Delfland regional water authority to ascertain which learning processes evolved during implementation of the former policy paradigm and how the implementation of the new policy paradigm took shape. On the basis of these interviews and of an earlier evaluation of the collaborative innovation program (van Buuren and Bressers 2011), we analyzed the development within several niches and their main outcomes. Subsequently, we analyzed the dynamics on the landscape level (mainly national

policy changes with regard to climate adaptation and water management). Then we made a time line of when landscape changes, niche changes, and regime changes occurred, and analyzed how developments on the various levels impacted one another and resulted in the observed paradigm shift. In addition, we tried to discover which actors could be characterized as policy entrepreneurs because of their activities in connecting developments at the level of landscape, regime, and niches.

2.3 Towards a policy paradigm shift

Developments at various levels

In this section, we describe the developments at the various levels (landscape, regime, and niches) that preceded and culminated in Delfland's paradigm shift. By coupling niche developments and tensions that arose at regime level, policy entrepreneurs were able to realize a breakthrough with regard to a policy paradigm that gradually became ineffective.

Landscape developments

In the Netherlands, awareness of the effects of climate change and of the need for adaptation arose in the late nineties of the last century. A new national strategic water policy in 2000, Water Policy for the 21st Century, aiming to adapt to climate change, stated that water should be a guiding principle in land use planning, and excess rainwater should be first retained, then stored, and finally drained. Room for Water was the label of this new guiding principle. This is part of a larger transition from a sectoral and technocratic water management approach to a more integrated and interactive approach (van der Brugge 2009). Municipalities, provinces, regional water authorities, and the national government agreed in 2003 to implement the new water policy. The National Water Covenant specified levels of protection from inundation due to excessive rainfall to be reached before 2015. Regional water authorities and municipalities started to work out water plans to comply with these inundation protection levels.

Regime developments

In the framework of our study, we consider the public and private parties involved in regional water management, as well as the water-related knowledge and technologies, water-related policies, rules, and regulations as part of the regime. We focus in our description on the regional water authority as the main water-related regulative authority and the municipalities within The Hague Region, especially Westland, the largest greenhouse area in the Netherlands,

In the aftermath of flooding caused by extreme rainfall around the millennium, the Delfland regional water authority drew up a plan in 2001 to prevent flooding in the future, anticipating the national inundation protection levels. Drawing on extensive hydrological analyses, Delfland stated that a surface water storage capacity of 325 m^3/ha in its main drainage system and its 70 polders was needed, and this became a cornerstone of its inundation protection policy and regulations. In all municipalities, water storage basins were to be constructed, and regulations were put in place that obliged all private spatial construction developers to comply with this inundation protection norm in their spatial projects. The regional water authority's elected council approved initial investments of 60 million euro and an increase in water taxes. The regional water authority started installing ambitious, doubling pumping capacity and broadening major runoff channels, but ran into problems when it wanted to realize the agreed extra storage capacity for excess rainwater. It confronted the municipal authorities with the outcome of its calculations, which amounted to extensive claims for space, e.g. 600,000 ha in the agro-industrial greenhouse area and 225,000 ha in the city of The Hague, stating at the same time that it would not purchase the necessary land. Although attempts were made to combine the reconstruction of the surface water system with spatial reconstructions in municipal and greenhouse areas, this proved difficult. Political problems arose as space is scarce and land is expensive. In 2008, the Westland municipal council approved the water plan, but not the financial section. The political problems that arose led to mediation attempts by a former minister, but could not be resolved.

The municipalities within The Hague Region and Delfland agreed in 2006 in their Water Framework The Hague Region Covenant that innovative solutions were needed and seized an opportunity that coincidently arose to acquire financial support from the national government to establish a joint knowledge and innovation program aimed at finding innovative solutions for excess rainwater storage. An essential part of the innovation approach was experimentation in experimental areas (in Dutch *proeftuinen*, literally: trial gardens, see figure 2.1), in which the regional water authority, municipalities, and stakeholders collaborated, and regular policy was temporarily suspended.

Niche level developments

Some of the *proeftuinen* aimed at the multiple use of space, working out solutions to store excess rainwater under greenhouses or in parking garages. In one of the *proeftuinen* (Waalblok) and as an outcome of intensive consultations with farmers and the municipality, a water storage cellar was constructed under a greenhouse as a part of a larger plan to purify and recycle drainage water for irrigation of crops. In another *proeftuin* (Midden-Delfland) in a grassland area, parties set their stakes on so-called blue services by farmers: farmers accepting flooding more often than the inundation protection norm in exchange for a predefined financial compensation. In

one of the *proeftuinen* in the city of The Hague (the Noordpolder), with a calculated lack of water storage capacity of 50,000 m^3, a new hydrological modeling approach was applied, enabling the mapping of predicted inundated areas, which showed that flooding would occur, but would be limited to sporting facilities and parks. In this *proeftuin*, discussions started about whether the huge public investments needed to achieve extra water storage capacity were legitimate given the forecasted limited effect of inundation at these locations.

Learning processes and tensions at regime level

In the context of these pilots or niches, but also in more regular settings, such as drawing up the water plan for the city of Delft, or studies on water management in the eastern part of the district, further knowledge development supported by advanced hydrological models provided a better insight into the functioning of the physical system and the effect of inundations. However, in these more regular settings, it proved difficult to apply these new insights to propose and design alternative measures. As all plans, measures, and related investment budgets already approved by Delfland's elected general board were based on the earlier – less advanced – calculations, it was decided after ample deliberations with the responsible alderman to translate the results showing predicted actual inundation back into the inundation norms in cubic meters laid down in the regional water authority's policy, and the measures proposed were subsequently based on these calculations.

At the same time, regional water authority professionals tried to expand the inundation protection policy to include the option of innovative solutions, but this was also met with considerable cautiousness by the regional water authority executives who had been held responsible for the earlier floodings and would rather stick to the robust solution of "*digging for extra water*."

As the costs of the inundation protection program were much higher than initially anticipated – in 2008 the projected investment budget was 280 million euro – because of the complicated solutions that had to be found due to the densely built-up areas, and following better insights into the functioning of the physical system and the effect of inundation, doubts arose among the regional water authority professionals about the legitimacy of investing public resources for measures necessary to comply with the water storage norms versus accepting inundation more often when this would not lead to significant damage.

Window of opportunity and a paradigm shift within the water authority

In 2009, the water authority's new water management plan for the period 2010–2015 was discussed by the newly elected general board. The discussions took place against a backdrop of financial and economic crisis, and national budget cutbacks

that also affected the regional water authorities and municipalities. The new board members argued that Delfland was overstretching its finance-bearing capacity and urged the executive board to reconsider its earlier plan and to come up with solutions to reach a sustainable financial policy. In the framework of this ambition check, mixed groups of policymakers, engineers, fieldworkers, and external inspirers were formed that in two subsequent sessions were encouraged to rethink the regional water authority's tasks fundamentally and freely. In the first session, they tried to answer questions like: What is the very essence, what are the core values and goals of regional water management? What would you do if regional water management had to be re-invented and anything was possible to reach these goals? In the second session, they worked on questions like: If protecting society against flooding due to excess rainwater is such a goal, is the exclusive search for storage capacity the best solution to fulfill this goal? Can measures be designed that are more cost efficient, or better match the needs or interests of specific stakeholders? The experiences with the *proeftuinen* and insights gained in more regular settings were brought into the discussions. During the sessions, a mental shift occurred: increasing storage capacity would no longer be the main policy goal, but was now seen as only one of various possible solutions to obtain the higher goal of protecting society from inundation due to excess rainwater. And, as it was argued that the protection levels were based on anticipated climate conditions in 2050, the deadline of 2015 was deemed too ambitious as well. A new guiding principle to express this shift was formulated: "*from norm-oriented – to effect-oriented*."

The executive board embraced the new approach readily and obtained the support of the general board to adjust the water inundation policy based upon the new guidelines in the framework of the overall adjustment of the water management plan. Annual investment budgets were cut back from 60 to 25 million euro for inundation prevention.

In summary, we have seen that the regional water authority and the municipalities tried to resolve increasing tensions by installing a mutual innovation program including several experimental areas. The innovative solutions found, however, initially remained within the norm-oriented policy paradigm. Only when a policy window opened consequent to severe financial pressures within the water authority, brought to light by the new elected board, new insights developed within the experimental areas and learning processes within the regime became connected, and a policy paradigm shift occurred.

2.4 Implementation of the policy innovation

Although the new policy concept was accepted almost overnight, it took a strenuous effort to implement the new policy paradigm. Regional water authority executives, as well as professionals, had to advocate the policy shift to the executives and

professionals from the municipalities and the province. Regulations and existing plans and agreements had to be adjusted, planned investments had to be revised. In this section, we describe the implementation of the new policy paradigm at both niche and regime level, and also how the paradigm shift in its actual implementation was brought into accordance with conditions set by the regional water authority's broader policy landscape.

Implementation at niche level

One of the *proeftuinen* – called Oranjepolder – offered an opportunity for the regional water authority to work out this new approach with its partners, the Westland municipality and greenhouse farmers in the area. In a two-day brainstorming session, the partners embraced the new approach. Much to the surprise of the farmers, they were no longer asked to help *"search for the cubic meters of Delfland,"* but to work together with Delfland and Westland to explore all kinds of solutions that would protect the polder and their greenhouses from water damage. Another fruitful coincidence occurred. Delfland had engaged in an innovation network with a.o. an university, a knowledge institute, and the Delft municipality, called Delft Blue Technology. Through this network, an innovative consortium offered a new technique for fast hydrological calculations and 3D visualizations. The consortium advocated this new technique for fast calculations in cases of actual flooding, but the Delfland professionals saw, besides the huge calculation speed advantage, its communications potential. Now, for the first time, the involved parties' suggestions for measures in the polder could be calculated and visualized almost immediately. The visualization technique offered images of areas that would or would not flood consequent to the suggested measures in specific circumstances.

Implementation at regime level

While Delfland was working to include the new policy paradigm in its policies and regulations, Delfland and the Westland municipality took on the task of translating the effect-oriented policy and the experience of *proeftuinen* like the Oranjepolder to formulate a joint approach to water management. They worked out an approach for the water plan process called Follow the Water, which seeks solutions along the lines of rainwater falling on the houses, greenhouses, streets, and farmlands and running off to sewage systems and surface water. The approach structures the way parties define the problem and seek solutions. In a first phase, parties analyze the physical system (how does it really work) and seek for the best solution, from a technical as well as a financial perspective, regardless of the formal division of responsibilities. The symbol of this phase is a pine cone – project members are to be prickly, to stimulate one another and involved stakeholders to find creative solutions. In later phases, parties negotiate about who does what, and their financial contributions. Several mechanisms are put in place to make the boundaries between the two local

governments more permeable and to increase trust, such as low profile conference dinners and the like.

At the level of the regional water authority, numerous investment projects were revised, and regulations adjusted. Some professionals worked out the new guiding principle towards guidelines for prioritizing measures for the bottlenecks in the 70 polders, using practical knowledge from fieldworkers in addition to the modeling results. Field visits requested by farmers were grasped as opportunities to find solutions that would fit with farmers' restructuring plans, such as raising the level of lower lying parcels. Considerable effort went into adjusting the obligatory water advice on infrastructural and spatial projects in such a way that initiators of projects could choose either the original water storage norm or water advice based on functional specifications, in which they had to prove that their projects complied with the inundation protection goals.

Landscape dynamics

The new water law, enacted by the end of 2009, defined the tasks of municipalities and regional water authorities in the field of water management more clearly – municipalities are responsible for rainwater management and the sewage water system, and regional water authorities for surface water management (and sewage treatment) – but also obliged them to collaborate if otherwise no effective and cost-efficient solution could be found. This supported Westland and Delfland in their search for new ways of working. However, as the provinces supervise the regional water authorities, Delfland also had to convince the province of Zuid-Holland, which monitors its progress in realizing surface water storage expressed in cubic meters, of its new effect-oriented approach. As other regional water authorities in the low-lying part of the Netherlands were facing similar problems, they joined forces to form an alliance to convince provinces as well as the national level that the formerly agreed protection levels would pose problems if they were translated too bluntly into storage capacities expressed in cubic meters or areal percentages, and that innovative approaches were necessary to avoid unacceptable societal costs in densely built-up areas and farmlands alike. The Zuid-Holland province and the regional water authorities agreed to work out the new approach in the framework of their new water agenda that was put in place following provincial elections. Influencing the national level is an ongoing process. In the more elevated, less populated eastern part of the Netherlands where water is scarce, it is much easier to find fruitful combinations with nature development and recreation. The regional water authorities in this part of the Netherlands do not favor adjustment of the national policy.

In summary: to effectuate the new policy paradigm, activities were undertaken at all three levels. The experimental areas were used to experiment with the new paradigm, the Westland municipality and the regional water authority designed and

applied a new integrative cooperative governance approach, and lobbying activities were undertaken together with adjacent water authorities to induce a new policy at provincial level.

2.5 Connecting levels – The role of policy entrepreneurs

In our case study, we have seen parties in The Hague Region – at regime level – seeking to resolve conflicts by installing an innovation program. The innovation program was actively pursued by an accounts manager for this region at the regional water authority and a staff member of The Hague Region, who also took care that the innovation program was included in the covenant on water between the municipalities and the regional water authority. Once the innovation program was put in place, enthusiastic senior professionals from the regional water authority and the municipalities initiated collaboration at niche level with receptive representatives of farmers, companies, and other stakeholders, searching for opportunities to combine ideas and interests of parties in the experimental areas, involving experts from knowledge institutes, consultancy firms, and so on. Within the regional water authority, these were mostly the members of a spatial planning team that had experienced how difficult it was to realize the inundation protection policy in real life, engaging their more technical- and policy-oriented colleagues in discussions on innovative solutions. For the latter, as we have seen, it was difficult to convert improved insights on the functioning of the water system into alternative solutions that did not fit with the existing inundation policy at regime level. The preferences of the executive board, who had been held responsible for the earlier extensive flooding, for robust *digging for water* solutions played an important role. Professionals did, however, exchange their ideas in knowledge sharing meetings and in informal consultations, thus connecting learning processes at niche and regime level. When the financial tensions within the regional water authority opened a policy window, these professionals linked their ideas to the creative process of rethinking that took place during the sessions. During the policy innovation implementation process, senior professionals from Delfland and the municipalities worked out the new policy together, at niche level, e.g. in the Oranjepolder *proeftuin*, linking new technology to the niche level processes, and at regime level in the Follow the Water approach for Westland, a process that included relation and trust building, as well as experimentation with a more integrative technical approach. A Delfland professional responsible for investment projects played an important role in translating the rather abstract guiding principle for more practical workers and engineers when revising the measures needed to solve the bottlenecks in the other 70 Delfland polders, thus contributing to learning processes at regime level. A professional from the regional water authority's planning team initiated the process of reformulating regulations to allow compliance with functional specifications instead of water storage norms, linking external expertise and seizing an opportunity for experimentation in a water advice process for new infrastructure.

We conclude that several senior professionals within the water authority and the municipalities, interconnected in formal and informal networks, indeed played an important role in linking learning processes between the different levels and in furthering innovative concepts and solutions. In numerous informal consultations, they exchanged new insights but also conferred intensively about the strategies to obtain political and organizational support. Although we did not categorize their strategies very strictly, we discern idea-generating strategies, seizing emerging opportunities, venue strategies, and relational management strategies.

2.6 Discussion

In this section, we summarize the main factors resulting in the observed paradigm shift from a norm-based towards an effect-based approach to regional water management. We show how this innovation was the result of a co-evolution of several developments at landscape, regime, and niche level that were deliberately connected by some entrepreneurs who made use of a policy window created by serious budgetary problems at the regional water authority.

Dominant policy beliefs on the landscape level

A longer transition towards a more adaptive approach to water management in the Netherlands resulted around the millennium in a national policy called Water Management for the 21st Century. More "*room for water*" had to be created, and excess rainwater should be "*first retained, then stored, and finally drained*," in that sequence. Inundation protection levels were installed. The regional water systems had to be *in order* by 2015 for rainfall amounts expected under a midrange climate scenario for 2050. The regional water authorities in the Netherlands translated the inundation protection levels into norms for water storage capacity expressed in spatial variables, such as cubic meters, areal percentages, or square meters. The approach thus depended heavily on climatological and hydrological modeling, and the focus on water storage and the language used coincided with the way hydrological models worked at that time.

Tensions and anomalies at regime level

At regime level, where municipalities and regional water authorities cooperated, this soon led to problems, at least in the low-lying densely populated polders in the western part of the Netherland, where water is abundant and space is scarce. Uneasiness grew about the extent of the calculated measures and the associated huge investment cost in relation to the sometimes relatively small effects in the event of inundation. We thus can distinguish four major tensions on the regional water management regime in the Delfland district:

- Realizing extra space for water storage in densely built-up areas was difficult and

expensive.
- The time frame in which the water system had to be in order, 2015 according to the National Water Covenant of 2003, did not fit with the rhythm of reconstruction of housing areas or greenhouses.
- The advent of faster computers and software developments made it possible to calculate inundation patterns and to visualize the effect of the shortcomings in the water system. The new insights into the physical functioning of the water system contributed to the belief that the inundation norms were too rigid.
- Budgets were constrained due to internal and external financial pressures.

Creation of niches in The Hague Region

Although all municipalities and the Delfland regional water authority had started drawing up water plans following the National Water Covenant of 2003, difficulties connected to realizing more water storage in the densely populated district soon became apparent. The municipalities cooperating within The Hague Region and the Delfland regional water authority drew up their own covenant in 2006, The Water Framework The Hague Region, including an ambitious innovation program for knowledge development and experimentation in experimental areas. In the multilevel perspective language: the regime parties deliberately created the niches where current policies were suspended and innovative solutions could be worked out. Herein we discern an internally induced adaptation path (De Haan and Rotmans 2011). The collaborative spirit that characterized most of the pilot projects formed an important impetus for their success (van Buuren and Bressers 2013).

In fact, the innovation program itself can be considered as a niche created by the regime to work out solutions in a setting where experimentation, collaboration, and joint knowledge development and innovative idea formation were actively stimulated. The very existence of the innovation program, the collaborative effort of all parties to find solutions that fitted best with the actual problems in the experimental areas, the relative freedom from regular policies, the possibility to engage knowledge institutes and consultants facilitated by a program bureau, and sufficient resources all contributed to new knowledge development and new insights, and a better understanding between parties.

However, in spite of the freedom to experiment, the solutions implemented in the *proeftuinen* before the policy paradigm shift were innovative (e.g. the water storage cellar in Waalblok *proeftuin*) but did not deviate from the norm-oriented approach, and it took considerable effort to get the consent of the responsible executive. Only after the policy paradigm shift could the effect-oriented approach be worked out in a.o. the Oranjepolder *proeftuin*. The increased insights into the physical system connected with the development of faster computers and hydrological models and the learning processes at regime level were crucial.

The paradigm shift within the regional water authority – a policy window

Measures to improve the regional water system itself, such as increasing pumping capacity and canals, were advanced with great speed from 2001, putting significant strain on the regional water authority's budget. The (political) difficulties of realizing water storage "on land" on the one hand, and the better understanding of the functioning of the water system under severe rainfall conditions supported by more advanced modelling and the experiences in the experimental areas on the other hand, led the regional water authority professionals increasingly to doubt the often costly measures taken following their studies. It was not, however, until a newly elected board was installed in 2009 that these problems could be addressed. Following a resolution put forward by the general board that pressed for a sustainable financial policy and the subsequent reconsiderations of the regional water authority professionals and managers, the above-described paradigm shift occurred. Thus, the reconsideration sessions opened up a policy window where several developments – decreasing budgets, implementation problems, experiences in the experimental areas, and increased insights into the functioning of the water system – could be coupled, leading to this policy innovation.

Implementation at niche and regime level

The policy innovation was worked out further in a myriad of actions at different levels, ranging from experimentation in areas such as the pilot project Oranjepolder and more regular regime-level processes like the water plan process for the Westland municipality, to adjusting investment projects, often with other parties, and adjusting policies and regulations. In this phase also, joint experimentation, learning, and gaining insight into the functioning of the water system by combining advanced technologies and field knowledge played an important role.

Several senior professionals from the regional water authority and the municipalities acted as policy entrepreneurs, when they – while interacting informally and intensely – actively sought to develop new insights and solutions that fitted better with real-life situations and interests of other parties, and seized opportunities to connect these to more regular processes and decision making in their own organizations.

Our case nicely shows how collaboration and innovation are strongly entwined. Innovation in policy resulted from focused collaboration between various actors inside and outside the regional water authority. This collaborative innovation took place in niches created by the regime actors in which actors felt more freedom to explore alternative strategies (cf. Van Buuren et al. 2014). Niches can contribute to learning processes at regime level as people participating in different niches exchange ideas and knowledge. However, our case also shows that policy entrepreneurs who

utilize opportunities and policy windows resulting from emerging tensions in the regime, and connect insights developed in niches to learning processes at regime level, are needed to alter dominant policy paradigms.

2.7 Conclusions

We started this chapter by asking about the relationship between collaborative innovation at project level (in pilots or niches) and policy innovation at regime level, from a multilevel perspective. We have tried to understand how learning and change processes at several levels (niches, regime, landscape) are interrelated and how policy entrepreneurs link developments at different levels in order to realize cross-level breakthroughs.

When we analyze how Delfland's initial technocratic norm-oriented policy approach towards more water storage developed into a more pragmatic and adaptive effect-oriented approach, we see two main enabling factors. First, there were the collaborative learning processes at niche and regime level. Learning processes at niche level were intentionally provoked by the regime by putting in place an innovation program to overcome some persistent problems in relation to combining water storage and land use planning that were causing significant tensions within and between the involved regime parties. These concerned actors from different governments, stakeholders, and knowledge institutes and consultants. These niches in which collaboration between diverse actors was encouraged resulted in innovative ways of dealing with water retention. Learning processes at regime level occurred as part of the regular work of the water professionals and the growing anomalies with implementing the norm-oriented approach. These anomalies essentially had to do with legitimizing expensive measures and drastic claims on space, which consequent to new insights could no longer be substantiated.

However, the insights gained in these niches and regular projects were able to lead to the observed policy change process only because the regional water authority came under severe financial pressure, with the associated internal political tensions. The learning processes within the niches and at regime level became connected within various visioning sessions, finally leading to a paradigm shift towards another dominant policy paradigm. It is interesting to see that the implementation of the new policy paradigm took shape by (again) making use of niches, e.g. the experimental areas, but also several other pilots and experiments within the regional water authority as well as in collaboration with municipalities and stakeholders. A lobby with other regional water authorities to influence the landscape level is ongoing.

We assumed that policy entrepreneurs fulfilled a crucial role in connecting developments at niche, regime, and landscape level. We see that in our case there were indeed active civil servants from the regional water authority who were

involved both in several niches and in informal networks within the regional water authority. At the municipalities also, especially Westland, several civil servants acted as policy entrepreneurs. Their entrepreneurial activities seem to have the following components: in their own organizations, they further their experiences and innovative solutions arrived at in the niches by engaging in informal interactions and connecting their insights to formal political decision-making processes. They discuss and align their strategies – idea-generating strategies as well as venue strategies and relational management strategies. They function as boundary spanners between niche and regime and further collaboration between relevant regime players in order to stimulate learning at regime level.

At landscape level, the transition towards a more adaptive water management approach, the growing awareness of the effects of climate change, and the subsequent covenant between the different governments to take adaptive measures are supportive developments. In 2009, the new water law clarified responsibilities in water management and strongly encouraged cooperation between governments. Finally, the financial and economic crisis forced all parties to strengthen their focus on the effective use of public resources.

From our analysis, we can derive three important implications for the governance of collaborative innovation processes in the public domain. They have to do with:
- Strategic niche management in which collaboration and learning is fostered;
- Stimulating learning processes at regime level;
- Supporting policy entrepreneurs connecting dynamics at different levels.

First of all, from our case we can learn that innovation spaces fulfil a valuable role: they provide space for learning processes and testing a policy paradigm in real-life situations. Consequently, they contribute to the reflexive capacity of public organizations and to identifying the problems that the regime is encountering, and enable the improvement and adjustment of policy paradigms. It is important that the various niches get enough freedom to explore new avenues and to apply solutions in practice. The latter is quite difficult and cannot be overstressed, because dominant policy paradigms often steer idea generation and hinder the actual implementation of alternative solutions. The niches should be well managed, in the sense that sufficient diversity (creativity) and cognitive distance are ensured in a context of collaboration and mutual adjustment (Van Buuren and Loorbach 2009), especially when they are created by the regime, and that the niches are well connected to learning processes at regime level.

Secondly, although there may seem to be a tension with ambitions to improve the effectiveness of public service delivery that is served by a coherent set of rules, procedures, and arrangements, it is important to stimulate learning processes at regime level, especially to flexibly develop and adapt to new insights and reflect upon

anomalies and inefficiencies in the dominant policy paradigm. Provisions should be put in place to provide opportunities for executives, managers, and professionals to feel confident to critically discuss current practices and to express their doubts and develop new practices; such provisions could include informal reflection sessions, knowledge sharing meetings, and the like.

Finally, the success of policy innovation is strongly dependent on the extent to which the creativity developed in niches and ongoing learning processes at regime level are synchronized. Entrepreneurial professionals participating at both levels play an important role. Although these professionals are known to have strong intrinsic motivations (Kingdon 1995), public organizations could support entrepreneurial activities by more explicitly recognizing the importance of this role and offer training to professionals to develop further the specific competences associated with it.

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Chapter 3

Conceptualizing public innovative capacity: A framework for assessment

This chapter is published as:

Gieske, H., A. van Buuren,
and V. Bekkers. 2016.
"Conceptualizing public innovative capacity:
A framework for assessment."

The Innovation Journal:
The Public Sector Innovation Journal 21(1): 1-25

Abstract

Different bodies of literature deal with the question what constitutes innovation capacity of organizations and of inter-organizational collaborative arrangements or networks. These different streams highlight different aspects of innovation capacity. Within the literature on business administration, the issue of ambidexterity is emphasized: the capacity to combine both explorative and exploitative activities. Within the literature on collaboration and governance, connecting or boundary spanning activities are underlined as being vital for innovation. And finally, within the literature on innovation and creativity, the capability to absorb new information, to learn and to alter existing insights is highlighted.

In this paper we bring these different insights together and conceptualize the concept of innovative capacity. We distinguish three layers of determinants of innovative capacity: actors, organizations and networks. Per level we distinguish three dimensions of innovative capacity with which we can assess the innovative capacity of public organizations: combinative or connective capacity; ambidextrous capacity; and learning capacity.

We conclude this article with a critical reflection upon the applicability of the framework presented in the paper.

3.1 Introduction

Due to political and societal demands public sector organizations are in a constant process of adapt to changing circumstances in order to remain effective, efficient and legitimate in dealing with societal problems and delivering public services. Accompanying changes may be incremental,[1] when improvements can be achieved by relatively small adjustments within a dominant policy paradigm, or new technologies fit with existing regulations, but may also be larger, when fundamental change is needed to maintain, improve or alter the service level of the public sector organization. The call to foster and fasten innovations in the public domain is expressed by many think tanks and governmental organizations like the World Bank and the OECD. This raises the question what capacities public sector organizations need to be able to realize incremental and radical innovation.

In this article, we consider innovation in the public sector as the implementation of a new (technical, organizational, policy, institutional or other) concept that changes and substantially improves the functioning and outcomes of the public sector, thereby creating public value (Moore 2005). As Van de Ven (1986) states, innovation may be defined as the development and implementation of new ideas by people who over time engage in transactions with others in an institutional context. Moore and Hartley (2008) formulate concisely: "innovations are new ideas and practices brought into implementation". Osborne and Brown (2005, 4) define innovation as the introduction of new elements into a public service, which represent a discontinuity with the past, as opposed to change, which concerns gradual improvement. We recognize four important aspects in these definitions: the fact that public organizations may be faced, due to internal or external pressures, with the necessity to innovate to be able to realize their task of rendering high quality services to society, that to this end new ideas are only the start of the process, implementation is the final goal and test, that both people and institutional context are important, and that innovation concerns radical, discontinuous change.

Public sector organizations are embedded in policy subsystems or regimes (Geels 2002; Loorbach 2010) with a societal function which are often rather stable during longer periods of time and becomes change-resistant due to the development of routines and institutional patterns (Baumgartner and Jones 1991; Sabatier and Jenkins-Smith 1993; Rip and Kemp 1998). This presents a challenge to the involved organizations and individuals when internal or external developments require a radical change of policy, practices or technology, while at the same time other developments can be dealt with in more continuous change processes. For public organizations it is important to combine the ability to radically transform and to gradually adjust to ensure public value and maintain legitimacy.

1 As introduced in chapter 1, par. 1.2, in this chapter the term incremental improvement may also be read as optimization.

In this article we investigate what capacities public organizations need to be able to innovate while at the same time continuously improving their services and processes. We will develop an integrative framework to assess the innovative capacity of public organizations with which we are able to explain their innovative performance. This framework synthesize three different bodies of literature dealing with the issue of innovation and brings together their main insights on what constitutes innovative capacity. In the next sections (2 – 6) we discuss a multilevel and multidimensional framework for innovative capacity. Finally we discuss some challenges related to this framework and reflect upon its added value.

3.2 Introduction to the theoretical framework

Innovation capacity as a multi-level construct

Several authors have elaborated on what is needed for effective innovation within the public sector, thereby acknowledging that we have to take into account the multi-level character of innovation processes. Many contributions however focuses on one or two levels, the individual, the organizational or the inter-organizational level (Crossan and Apaydin 2010). In our approach we will try to conciliate these three (Innes and Booher 2003).

Individuals play an important role. Entrepreneurial activities of civil servants have since long been recognized as crucial for policy change (Kingdon 1995) and innovation (Kanter 1985). And also managers (Moore 1995; Borins 2002; Pablo et al. 2007) and political leaders (Borins 2002; Scholten 2011; Kaats and Opheij 2008; Huxham and Vangen 2005) are important players in public innovation processes.

However, also *organizations* and their capabilities are important. Organizational characteristics explain for example whether these organizations are able to facilitate entrepreneurial behavior which is a necessary precondition to develop innovations (Kim 2010). Dependent on their specific capabilities, organizations are able to balance exploitation and exploration (March 1991; Jansen 2005), i.e. improvement and innovation, or incremental and radical change (Crossan et al. 1999).

Finally, the inter-organizational or *network* level has to be taken into account when we analyze public sector innovation. Public organizations operate within complex networks of organizations and their possibilities to develop and apply innovations highly depends upon the characteristics of this network (Bland et al. 2010). From an innovation perspective, on the network level open innovation (von Hippel 2005), or networked (Swan and Scarbrough 2005) or collaborative innovation (Sørensen and Torfing 2011) is advocated, whereby public sector organizations cooperate, innovate and learn in networks with other governmental organizations, knowledge institutions, private sector organizations, NGO's, and other actors.

We thus assume that to assess the innovative capacity of a public sector organization in more depth we need to look at capacities at the individual level, at the level of the organization and at the inter-organizational level (Nooteboom et al. 2007) of governance networks (De Bruijn and Ten Heuvelhof 2007; Kickert et al. 1997) within the context of the societal regime (Geels 2002) the public organization is part of. In table 3.1 we describe these three levels.

Table 3.1: Levels of capacity

Individual level	Characteristics and capabilities of involved individuals and their relationships
Organizational level	Organizational policies, rules and strategies and managerial activities that structure (intra- and inter-)organizational behavior
Network level	Characteristics of inter-organizational arrangements, provisions for network collaboration and institutional rules that structure interaction between actors within a certain regime

Innovation capacity as a multi-facetted construct

Different disciplinary bodies of literature deal with the concept of innovative capacity differently. Within the literature on private and public sector innovation the ability to arrive at new combinations (Schumpeter 1934) is emphasized. New ideas, knowledge and actors, that share their resources and risks need to become connected (von Hippel 2005; Dyer and Singh 1998; Sørensen and Torfing 2011; Bekkers et al. 2011). The first component of innovative capacity we distinguish thus is *connective capacity*, encompassing the skills and provisions (Fenger et al. 2012; Ansell and Torfing 2014) that are needed to facilitate collaboration and to establish and maintain meaningful and novel connections between actors and between content.

From a resource-based view of the firm the capacity of firms to build upon, recombine and renew current knowledge and practices is seen as vital for the capacity to innovate, an ability often referred to as dynamic capacity (Teece et al. 1997; Piening 2013). We concur with March (1991) and many others that balancing exploitation and exploration, continuity and change, improvement and innovation, i.e. ambidextrous capacity (Andriopoulos and Lewis 2009; Jansen 2005) is a major capability. Ambidextrous capacity is the ability of an organization to combine both exploitation and exploration, improvement of existing routines or services based on existing knowledge and innovation (March 1991; Jansen et al. 2005) and to manage the paradoxes between improvement and innovation processes (Andriopoulos and Lewis 2009; Jansen 2005). It poses challenges to individuals within the organization (Lin and Donough 2014). At the network level balancing exploration and exploitation supports innovative outcomes (Gilsing et al. 2008). In order to sustain and balance ways of improving current qualities and

developing new ones a public sector organization must be able to install and maintain ambidextrous policies and management styles as well (Piening 2013). Therefore we suppose that *ambidextrous capacity* is a second dimension of innovative capacity.

Finally, from studies focusing on individual, organizational and social learning, and on the *learning economy* or *learning regions* and the relation between (regional) economic development and innovation, we can discern the notion that learning is a crucial element of innovation (Glynn 1996; Lundvall and Johnson 1994; Nonaka and Takeuchi 1995; Crossan et al. 1999; Morgan 1997, 2007). People and organizations have to be able to adjust their ideas, practices and routines due to new knowledge and experience, i.e. to learn. The third dimension thus is the *capability to learn*, that is to absorb new knowledge, experiment, reflect, adapt and implement (Cohen and Levinthal 1990; Kolb 1984; Duijn 2009), in a continuous process of reflecting on experiences, knowing and acting (Duijn 2009, 198-199). The capacity to learn is strongly entwined with other issues relevant for innovation, like creativity and knowledge creation.

Thus, when we look into the nature of the capabilities necessary to innovate three dimensions can be singled out: connective capacity, ambidextrous capacity and learning capacity. In the reminder of this paper we develop a framework for the assessment of innovative capacity based on these three constitutive capabilities at the individual, organizational and network level.

Connective capacity

Fragmentation is a dominant characteristic of modern societies. It is the consequence of ongoing processes of modernization and specialization (Fenger et al. 2012) which necessitates more collaborative forms of governance (Sørensen and Torfing 2011). The capacity to establish and maintain connections is an important building block of governance capacity (Edelenbos et al. 2013; van Meerkerk et al. 2014), but is also vital to realize innovation. Therefore, connective capacity is the first element we distinguish within innovative capacity.

Individual level

In our search for the main connective capacities at the individual level we draw on literature on the strategies and activities of policy entrepreneurs (Kingdon 1995), boundary spanners (Williams 2002), network managers (Klijn et al. 2010) and political leadership (Scholten 2011; Huxham and Vangen 2005). In addition we recognize that these strategies and activities cannot always be attributed to a single person, but are often divided over several roles. Policy entrepreneurs display different strategies, e.g. idea generation (Huitema and Meijerink 2010), attention and support-seeking

strategies, linking strategies, relational management strategies, and arena strategies (Brouwer 2013). Williams (2002), arguing that wicked, cross-boundary societal issues calls for inter-organizational connective capacities, describes the features of competent boundary spanners. These are able to operate effectively in networks, by building sustainable relationships, manage interdependency through influencing and negotiation and have innovative and entrepreneurial skills. According to Van Meerkerk et al. (2014) boundary spanners manage information exchange between external networks and their own organization, build and sustain relationships, connect developments in the external network to their parent organization, have a feeling for the interests of other organizations and mobilize their own organization timely.

It is also useful to pay some attention to the role of formal administrative and political leadership. We tentatively concur with Scholten (2011) who states that a transformative style of political leaders, connecting content and process, is helpful in furthering innovations in a multi-actor context. According to Huxham and Vangen (2005) connective leaders use strategies aimed at connecting and facilitating different actors, while at the same time 'manipulating the collective agenda's' and 'playing the politics'.

However, these strategies and activities are not necessarily attributable to single individuals. Voets and de Rynck (2011, 168; building on Agranoff 2003, 2007) distinguish several complementary roles within networked innovation processes, i.e. vision keeper, creative thinker, promoter, champion and network operator. Sørensen and Torfing (2011) state that the roles of convener, mediator and catalyst are important in collaborative innovation. Aalbers and Valk (2013) put forward that within an organization complementary roles contribute to its innovative capacity, which they describe as scouts, connectors and sponsors. Notwithstanding the exact definitions of these roles, this illustrates that the necessary competences and strategies are often too much for the ability of just one person and should rather be understood as the combined action of different influential individuals – informal or formal leaders - in a network. The presence and successful combination of these roles (Borins 2002) and strategies contributes to intra- and inter-organizational connective capacity (Bekkers et al. 2013).

We thus come to the following set of main attributes for individual connective capacity. We draw on the strategies that network managers, boundary spanners, entrepreneurs and political leaders apply. The strategies have in common that they aim to link content, link actors, in sense of establishing a network and in the sense of inclusiveness and adding social capital to the network, and link roles, including administrative and political leadership roles (Voets and de Rynck 2011, 167). We group these strategies under linking of content (idea generation and connecting content), linking of actors (within and between organizations), and linking of roles.

These individuals do this with a keen eye on opportunities of timing in selecting venues and arenas and utilizing policy windows. They can do so in different complementary roles, and it should be checked if the combination of connective capacities is sufficiently covered and complete in the collaborative network.

The attributes of connective capacity at the level of individuals are thus:
1. Linking of content (ideas, insights – *neue Kombinationen*).
2. Linking of actors and roles within and between organizations by building meaningful relations in terms of trust, social capital and reciprocity and overcoming institutional, organizational and socio-cultural borders.

Organizational level

To operate effectively, organizations must be both internally and externally collaborative because of the importance of shared skills and information (Innes and Booher 2003). Considine and Lewis (2007) found that internal and external networks significantly constitute political power and influence policy choices and are more important than hierarchical positions of individual actors in explaining innovation. Intra-organizational connectedness mediates the development of trust among the members of an organization, which supports the adoption and legitimacy of an innovation (Adler and Kwon 2002; Hansen 2002; Jansen et al. 2006). Intra-organizational connectedness is also favorable for knowledge-sharing, which is crucial for innovation (Lin 2007). Although dense intra-organizational networks may support the diffusion of shared norms and behavioral expectations, which may constrain innovation, Jansen et al. (2006) found a positive effect of dense social relations on exploratory as well as on exploitative innovation.

Sørensen and Torfing (2011) state that inter-organizational connectedness in networks of interdependent public and private actors facilitates collaborative innovation efforts by knowledge-sharing, risk-sharing and resource exchange. Linking capabilities of public sector organizations to engage in meaningful interactions therefore are an important asset, and include network management of more institutionalized as well as of informal networks (Bekkers et al. 2013). Network management is an important factor in achieving successful outcomes in governance networks (Klijn et al. 2010; Van Meerkerk et al. 2014). Seeking collaborative advantage however is a resource-consuming activity (Huxham and Vangen 2005) and investments in building the external networks of individuals, teams, or organizations need to be balanced by investments in internal networks (Adler and Kwon 2002).

At the organizational level skills and routines are needed to build and sustain both internal and external networks (Innes and Booher 2003). Building internal networks can be supported by socialization (e.g. teambuilding activities) and coordination tactics (e.g. establishing cross-functional teams) (Jansen et al. 2005; Zahra and George 2002).

Building and sustaining external networks requires networking skills and network management (De Bruin and Ten Heuvelhof 2007). Organizations may support their members in acquiring those skills and design routines to support network management. It also requires that networking roles or tasks are assigned to organization members.

Main attribute of internal and external connective capacity on organizational level is therefore the presence of skills, policies and practices for creating and sustaining internal and external networks which facilitate making meaningful connections:

1. Provisions to create and sustain intra-organizational networks:
   a. Socialization tactics.
   b. Coordination tactics.
2. Provisions to create and sustain inter-organizational networks:
   a. Training and support on networking skills for organization members.
   b. Attributing networking roles or tasks, e.g. relation or account managers.
   c. Policies to support networking and network management.

Network level

For regime actors, including public sector organizations, networked relationships have become more and more important (Castells and Hall 1994; Cooke 2001). Public sector organizations participate in or initiate networks, either as a part of their regular public tasks, or in pursuit of improvement or renewal. Networks of multiple actors, public and private, are potentially better capable of addressing wicked societal problems (Weber and Khademian 2008). In networks actors collaborate through formal and informal negotiation, jointly creating rules and structures governing their relationships and ways to act or decide on the issues that brought them together; developing shared norms and mutually beneficial interactions (Thomson et al. 2009) and social capital (Adler and Kwon 2002). As the structure and content of these networks differ, creating and sustaining appropriate networks is an important capacity (Adler and Kwon 2002). Brugnach et al. (2008) stress the importance of inclusiveness and a shared problem definition: which actors are included in the problem definition and formulating solutions, and how are these being framed. Effective collaborations engage diverse interests and allow their decisions to be informed by the knowledge of these differing stakeholders, but should also take power issues into account (Huxham and Vangen 2005). According to Innes and Booher (2003) vital collaborative relations are characterized by free exchange of information and constructive dialogue rather than debate and argument. Trust is an important asset of networks as it reduces uncertainty due to interest conflicts or opportunistic and strategic behavior (Klijn and Koppenjan 2012). In the same line, Sørensen and Torfing (2011) stress the importance of collaboration throughout the innovation cycle of generating ideas, selection, experimentation and implementation.

Main attributes and indicators of connective capacity at the regime level thus have to do with provisions that enable collaboration throughout the innovation process, i.e. the ability of regime actors to:

1. Create and sustain networks, alliances, cooperative programs and the like, i.e. the *reticulation* of networks.
2. Create and sustain social capital, by collaborative dialogue, trust-building, inclusiveness and reciprocity.

Ambidextrous capacity: balancing exploration and exploitation

Many authors emphasize the importance of balancing exploration and exploitation as a key to innovative capacity (March 1991; Andrioupolis and Lewis 2009; Nooteboom and Stam 2008). Exploration or innovation includes search, uncertainty, risk taking and experimentation, while exploitation includes refinement, efficiency, and implementation (March 1991). Ambidextrous individual, organizations or networks are able to pursue both incremental (exploitative) and discontinuous (explorative) innovation (Tushman and O'Reilly 1996), of exploring new opportunities and at the same time enhance the efficiency of their current operations. Ambidextrous organizations perform better (Junni et al. 2013) and show more innovative capacity (He and Wong 2004; Janssen 2005) compared to organizations that favor one of the two approaches, as they are able to respond better to internal or external developments.

Individual level

The individuals that have an important role in this respect are public managers. Public managers manage issues in situations of ambiguity and potential public exposure. The ability of managers to deal with the tension between exploration and exploitation is a key predictor of organizational performance (Tushman et al. 2011). A manager's ambidexterity can be referred to as a manager's behavioral orientation toward combining exploration and exploitation related activities (Mom et al. 2015). Ambidextrous managers host contradictions, are multitaskers, and both refine and renew their knowledge, skills, and expertise (Mom et al. 2009). In order to balance change and continuity, innovation and incremental improvement public managers need to apply different leadership styles (Rosing et al. 2010). Whereas transformational leadership emphasizes experimentation, risk taking, punctuated change and multiple alternatives, and supports exploration, transactional leadership is aimed at incremental change, efficiency, and continuity and supports exploitation (Bass and Avolio 1993; Vera and Crossan 2004). Transformative leadership is more supportive during the idea generation and selection phases of innovation processes and transactional leadership is more suitable during implementation and institutionalization (Vera and Crossan 2004). An ambidextrous (or dynamic, Volberda et al. 2011) management style, that combines a transformational with a

more transactional, hierarchical style supports the adaptation of new ideas, the linkage to existing knowledge and routines, and the implementation of innovation.

Ambidextrous capacity at the individual level thus mainly relate to capabilities of managers to balance exploration and exploitation, renewal as well as incremental improvement:

1. Balancing autonomy and experimentation versus control and efficiency: i.e. aware and capable of applying and balancing transformative and transactional styles of management.
2. Linking innovation process to regular organizational routines: i.e. capable of connecting the innovation process to the goals of the organization, its regular knowledge base and to the regular decision making processes.

Organizational level

Ambidextrous organizations combine exploration and exploitation and are capable of simultaneous, yet contradictory, knowledge management processes, exploiting current competencies and exploring new domains by a mix of integration and differentiation tactics. They take advantage of the paradoxes between exploration and exploitation rather than resolve them (Andriopoulos and Lewis 2009). Ambidextrous organizations are aligned and efficient in achieving predefined goals, while also adapting effectively to changes in the environment and future challenges (Hodgkinson et al. 2014; Gibson and Birkinshaw 2004). Organizations have several mechanisms to combine innovation and efficiency. Formal mechanisms include centralization or decentralization, formalization and standardization, (strategic) planning and control. Informal mechanisms include lateral or cross-departmental relations, temporary teams, integrating roles, informal communication and socialization techniques such as inculcating organizational culture through training and reward systems (Chen and Kannan-Narasimhan 2014). Organizations need to support the individuals who face ambidextrous cognitive orientations due to contradictory activities, such as efficiency-oriented versus variability-increasing tasks (Bonesso et al. 2014) and apply supportive human resources management practices. HRM practices that support ambidextrous learning and firm performance are high-involvement practices, i.e. ability-, motivation-and opportunity-enhancing HR practices (Prieto and Pérez Santana 2012).

Both exploration and exploitation are important for an organization, but they compete for scarce resources (March 1991). Ambidexterity can only be achieved by applying balanced strategies, policies and routines aim at using the organizations resources in such a way that both innovation and efficiency are achieved (Sarkees and Hulland 2009) and connect explorative processes to regular routines. ’

Main attributes of ambidextrous capacity at the organizational level are strategies, policies and routines to balance exploration and exploitation and support seemingly contradictory roles and tasks, and a balanced resource allocation:

1. Balanced strategies, policies and routines supporting both innovation and efficiency:
    a. Presence of strategies analyzing present or future needs for innovation or improvement to maintain or improve public value.
    b. Presence of policies and routines supporting the innovation process and connecting the innovation process to regular routines.
    c. Supportive HRM policies that enhance employee ability, motivation and opportunity.
2. Balanced resource allocation:
    a. Provisions to secure a balanced allocation of resources to exploration and exploitation.

Network level

Research on socio-technical or societal transitions has shown that innovation at the level of a societal regime often requires changes in dominant structures, processes, paradigms and actors (a.o. Geels 2002; Olsson et al. 2006). However, regime actors may strive for collaborative innovation in more temporal inter-organizations networks (a.o. Sørensen and Torfing 2011; Bommert 2010; Swan and Scarbrough 2005), and join forces in developing, experimenting and implementing innovative solutions. Collaboration between private firms, governments and knowledge producers – the triple helix – enhances the innovative capacity of economic regions (Etzkowitz and Leydesdorff 2000). An important characteristic of successful innovative regions is the embeddedness of their actors, i.e. the extent to which a social community operates in terms of shared norms of cooperation, trustful interaction and 'untraded interdependencies', which are more likely to develop via partnership relations in networks (Cooke 2001; Vangen and Huxham 2003). Nooteboom et al. (2007) put forward that in inter-organizational cooperation there is an optimal cognitive distance. Exploitation is supported by a strong familiarity and mutual understanding between organizations, while for exploration a larger cognitive distance is needed. Strong ties encourage knowledge-sharing and building of trust and social capital, while weaker ties may support new connections between ideas and actors (Granovetter 1973). It is in therefore the mix of strong and weak ties, by combining what is already known and what is new, that novelty is created. Ambidextrous alliances, featuring weak ties for the creation of novel combinations as well as strong ties to validate and exploit the new knowledge, e.g. a configuration in which novelty originates from new combinations of ties and where selection and exploitation is endogenous to the network through a dense core of strong ties, have shown to be effective (Gilsing and Duysters 2008). Attributes of ambidextrous capacity at the inter-organizational or network level thus have to do with balancing

openness and closeness for new ideas, issues and actors, and cognitive diversity and consensus between the involved actors (Van Buuren and Loorbach 2009).

Attributes of ambidextrous capacity at the regime level are the ability to create and sustain appropriate networks:
1. Balanced structure of the network, balancing weak (bridging) and strong ties: less variety in actors and a higher network density for exploitation, more diversity in actors and unusual linkages and looser coupling for innovation.
2. Balanced content of the network: balancing openness and closeness, consensus and cognitive diversity.

Learning capacity

Learning is an individual and cognitive process, in the minds of people, where knowledge and experiences are internalized and ideas originate (Kolb 1984). It is also a social and interactive process of interpretation and sense-making on the level of groups, organizations or society as a whole (Weick 1995). Learning is an ongoing process of action and reflection through which knowledge is acquired, combined, and applied (Argote and Miron-Spektor 2001). Learning in itself does not always lead to progress, improvement or advancement (Duijn 2009, 200), but is a pre-requisite to innovation. Innovation is an outcome of learning (Jansen 2005). In the domain of regional studies, much effort is devoted at unraveling the determinants of (collective) learning as an important prerequisite for innovation (Morgan 2007).

Individual level

In the literature a huge variety of characteristics of innovators can be found. Crossan and Apaydin (2010) describe leadership characteristics associated with innovation, based on an extensive literature review. We presume, building on their findings, that tolerance of ambiguity and change, openness to experience and unconventionality are important characteristics of individual learning capacity. Innes and Booher (2003) list several characteristics of individuals that are crucial for learning in collaborative processes, such as self-reflectiveness and self-awareness, and the willingness to experiment and learn from mistakes. While first order learning supports incremental change, for transformative second order learning a reflective attitude towards one's own norms, values and practices and those of the organization is necessary (Merkx 2012; Duijn 2009). Reflection can be seen as a mental tool for transforming individual and collective experience into new thinking and acting (Hilden et al. 2014).

Main attributes of transformative learning capacity at the individual level thus are:
1. Reflective attitude towards own norms and values.
2. Tolerance to ambiguity and change.

3. Openness to experience, a diversity of ideas, new knowledge and expertise and contexts.

Organizational level

Organizations store knowledge in their strategies, culture, procedures, rules, systems and structure. They accumulate such knowledge over time, learning from their members. At the same time, individuals in an organization are socialized to organizational beliefs. Thus, in mutual learning, an organization learns from its members and vice versa.

Crossan et al. (1999) present a framework for the process of the mutual learning of an organization and its members, by describing organizational learning as four socio-psychological processes - intuiting, interpreting, integrating, and institutionalizing - linking the individual, group, and organizational levels. At the individual level innovative insights and ideas originate in the minds of individuals (intuiting). At the group level these insights are shared and interpreted with others, and at the organizational level integrated in the activities of the organization. By institutionalizing they become part of the routines of the organization. The feed-forward loop from the individual and group level to the organizational level allows exploration, the feedback loop allows exploitation of what is learned. An organization's deliberate learning efforts allow codification of collective knowledge, and improving managerial skills, through which the organization can improve its strategic and operating routines (Zollo and Winter 2002; Agarwal and Selen 2009). To support the four socio-psychological processes of organizational learning it is helpful to apply routines that enable them and to mitigate the barriers that hinder them (Lawrence et al. 2005; Schilling and Kluge 2009; Berends and Lammers 2010). Idea generation of individuals can be supported by stimulating creativity (Amabile et al. 1996, 2005) and supporting the absorption of new knowledge (Cohen and Levintal 1990). The interpretation and integration of new ideas, concepts, technologies, etc. is stimulated by the informal and formal sharing of knowledge and experiences by socialization and coordination tactics (Jansen et al. 2005) and by experimentation. Codification efforts through formalization support institutionalization as they enhance the ability to transform and exploit knowledge (Jansen et al. 2005) and the adaptation of incumbent policies and practices. In addition, reflection on the continuity or discontinuity of the organizational learning process should be a regular organizational routine (o.a. Merkx 2012; Duijn 2009; Hilden et al. 2014).

The main attributes of organizational learning ability are therefore:

1. Provisions supporting organizational learning processes related to exploration and exploitation by deliberate learning efforts, i.e.:
    a. The idea generation of individuals, by stimulating creativity and supporting the absorption of new knowledge.
    b. Sharing and improving ideas at the group level by coordination and

socialization tactics.
   c. Experimentation for the integration (implementation) of innovations.
   d. Support adaptation and institutionalization by codification of new knowledge and adaptations of routines and regular reflection on the organizational learning process.
2. Support reflection on the continuity or discontinuity of organizational learning.

Network level

For innovation at the network level inter-organizational or social learning is needed (Benz and Fürst 2002; Hagedoorn and Duysters 2002; Hall 1993). Reed et al. (2010) define social learning as a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within social networks. Learning in networks is defined by Klijn et al. (as quoted in Duijn 2009, 100) as the sustainable increase in knowledge, insights and methods, shared by the actors involved. Innes and Booher (2003) state that learning is central to governance capacity: an adaptive learning system is one which is well-networked and where authentic dialogue increases the quality and acceptance of information and the building of trust and social capital, where jointly developed objectives and solutions can emerge, and innovative approaches can be developed. Through learning how to collaborate, and in the flow of ongoing thinking, acting, and interacting, collective transformative approaches may emerge (Healey 1999). Collaborative governance networks need ways to examine experiments and strategies, and to test and evaluate them and select the most effective for a given purpose and context (Innes and Booher 2003).

Collaborative innovation thus is supported by flexible institutions (Healey 2004) that allow for experimenting and learning. Experimenting with innovations is fostered by temporary arrangements, such as 'niches' (Geels 2002), pilots, 'milieux of innovation' (Castells and Hall 1994), etc. Informal networks, in the shadow of formal hierarchies, play an important role (Nooteboom 2006). Through informal networks tacit knowledge can be distributed across different institutions and disciplines. In these 'third spaces' innovation can flourish, because agents feel free to exchange knowledge and ideas, between disciplines and organizations, without the correction mechanisms of formal hierarchies and organizational mandates. Rijke et al. (2013) have shown that, while informal networks and decentralized and informal governance approaches are favorable during early stages of the innovation process, centralized policy decisions can stimulate the acceptance of innovations and enhance the efficient use of resources by creating synergies through sharing relevant knowledge. At the final stages centralized and formal approaches are also effective to adjust or establish legislative frameworks and coordinate capacity building. Thus, arrangements for experimentation and learning should be embedded in the incumbent formal institutions (Bekkers et al. 2011), and be connected to learning

processes at the organizational level (Gieske and Van Buuren 2015; Vreugdenhil et al. 2010; Camison and Fores 2010).

Main attributes of learning at the regime level are conditions allowing a diversity of actors with different knowledge, perspectives and interests to increase the understanding of the others' viewpoints, engage in a dialogue on problems and experiment with possible solutions, by inter-organizational coordination and arrangements to collaborate during the entire innovation cycle, e.g. via joint innovation programs, dedicated networks, etc., thereby anticipating on the implementation and institutionalization by the relevant actors in their incumbent policies and routines:

1. Collaborative innovation arrangements for experimentation and learning, e.g. pilots, niches, 'milieux of innovation'.
2. Connecting and embedding these localized learning processes in organizational learning processes, policies and routines.

3.3 Towards a comprehensive framework

In the sections above we described innovative capacity as composed of connective capacity, ambidextrous capacity and learning capacity. These three dimensions are present at three levels: the individual, the organizational and the network level. In table 3.2 we summarize the indicators per dimension and level as presented in the sections above.

Table 3.2: Overview of the attributes of innovative capacity in the public sector

Capacity *Level*	**Connective capacity**	**Ambidextrous capacity**	**Learning capacity**
Individual	Linking capabilities: (mainly administrators and politicians) 1. Linking of content (idea generation – new combinations) 2. Linking of actors within and between organizations 3. Establishing and connecting complementary roles	Managing exploration and exploitation processes : (mainly managers) 1. Balancing autonomy and experimentation, and control and efficiency, i.e. applying transformative and transactional styles 2. Linking innovation process to regular organizational routines	Transformative learning capability: (all actors) 1. Reflective attitude 2. Tolerant to ambiguity and uncertainty 3. Open to diversity of ideas, new knowledge and expertise and contexts

table continues

Organization	Organizational provisions for collaboration: 1. Supporting internal networks by socialization and coordination tactics 2. Supporting external networks, by improving network skills, assigning roles, supportive policies.	Provision for balancing innovation and improvement: 1. Balanced strategies, policies and routines 2. Balanced resource allocation	Provisions for organizational learning: 1. Support organizational learning processes related to exploration and exploitation 2. Support reflection on organizational learning
Network	Inter-organizational capacity to: 1. Create and sustain networks, alliances, cooperative programs, etc, i.e. the *reticulation* of networks 2. Create and sustain social capital, by collaborative dialogue, trust-building, and reciprocity	Inter-organizational capacity to establish and maintain: 1. Dual structure of networks 2. Dual content of networks	Inter-organizational capacity to establish and maintain: 1. Collaborative arrangements for learning and experimentation 2. Connecting and embedding localized learning with organizational learning processes

3.4 Innovative capacity: discussion and conclusion

In the former sections we have formulated attributes and indicators for three dimensions of innovative capacity on three levels, based upon an extensive literature review. The issue of innovative capacity is studied in rather different bodies of knowledge, which all have their own focus and locus. In this article we have tried to bring together building blocks from the broad literature on innovation in public administration as well as the private sector, from governance studies, organizational sciences and (regional) innovation studies. By bringing together these different bodies of knowledge, we were able to present a rather comprehensive framework to assess the concept of innovative capacity. In addition, by distinguishing three levels on which innovative capacity can be postulated, we do justice to the multi-level characteristics of innovation processes (Gieske and Van Buuren 2015).

As such, the framework can help to come to more comprehensive, but also more nuanced assessments of what makes public sector organizations innovative. Public sector innovativeness not only has to do with the ability to make 'neue Kombinationen' or to facilitate second order learning among diverse people. It is also about balancing between exploration and exploitation, i.e. innovation and improvement, within and between organizations. Improving the innovative capacity of public organizations thus requires a multifaceted approach that takes into account the different appearances and building blocks of public innovation processes. Such an approach has to acknowledge that – for example – collaborating and learning has to be accompanied with provisions to connect exploring activities with the normal or standard operating procedures.

Within the different bodies of literature there is mutual borrowing of concepts and ideas are used in more or less the same way, or similar concepts are used by different authors in quite different ways. By distinguishing between the three categories of connective, ambidextrous and learning capacity we were able to unravel this conceptual diffusion and to bring them together in a framework that is both concise and comprehensive.

At the same time, it is important to notice that the concepts we use are linked to each other. For example, when we treat inter-organizational networks at the regime level we describe connective capacity in terms of constructing the actual links between actors – 'reticulation'– as well as building relationships, while the ambidextrous dimension adds to this the aspect of balancing between openness (for innovation) and closeness (for improvement) and the learning dimension adds specifically the aspect of arranging experimentation. Obviously also the levels are interrelated, ultimately it is the individual that acts, embedded in the context of his or her organization which is embedded in the regime the organization is part of. The levels are thus nested and cannot be separated from each other. However, the capacity of organizations to develop routines to enable their members to establish meaningful connections, to balance improvement and innovation and to learn, is a specific and distinguishable ability of organizations. And the ability of collective actors to establish inter-organizational networks or alliances, to select more familiar or more unusual partners and to create space for experimentation is a capacity at the inter-organizational level.

Our framework shows that enabling and stimulating innovative public organizations is a multifaceted challenge, which requires that on multiple levels provisions are made and actions are taken that together build up innovative capacity. It also shows that public organizations have to take into account that innovation does have both an internal and an external component. Further research is necessary to see to what extent these factors actually explain the innovative performance of public organizations and how these factors also influence each other. That can help to find

out what the crucial parameters are that can be influenced to strengthen public innovative capacity.

The reverse side of the coin (of having a comprehensive framework) thus is that concepts are related and that not only the relationships between the independent variable, innovative performance, but also the mutual relationships between the various building blocks have to be singled out. Do they reinforce each other for example, or does one mediate or moderate the others, and can we assess their relative importance or contribution of innovation versus gradual improvement to performance? Answering these questions is important to come to prescriptions how to purposefully improve the innovative capacity of public sector organizations. The next step in our research will be the validation of the framework and investigating the relationship between the dimensions, and the contribution of the different levels and dimensions to innovation and improvement of public performance.

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Chapter 4

The impact of innovation and optimization on public sector performance. Testing the contribution of connective, ambidextrous and learning capabilities

This chapter is published as:

Gieske, H., I. Van Meerkerk, and A. Van Buuren. 2018. "The impact of innovation and optimization on public sector performance. Testing the contribution of connective, ambidextrous and learning capabilities."

Public Performance and Management Review. https://doi.org/10.1080/15309576.2018.1470014

Abstract

This article makes two contributions to the literature: it tests the impact of innovating and optimizing on perceived public performance. Secondly, it examines the contribution of connective, ambidextrous and learning capacity to both innovation and optimization in public organizations. Building on previous research we single out the relevant attributes of connective, ambidextrous and learning capacity at the individual, organizational and network level. Based on the literature, we expect these capacities to relate stronger to either optimizing or innovating. We test this multi-dimensional framework in a survey among the 22 regional water authorities in the Netherlands using SEM. The results show that optimizing and innovation both contribute to performance. However, optimizing shows a stronger relationship. Furthermore, all three capacities are related to innovation and optimization, but in different degrees at different levels. In line with our hypotheses, we found connective capacity to relate more strongly to optimizing, whereas learning capacity relates stronger to innovating and ambidextrous capacity to both. These results indicate that public organizations will benefit from a deliberate evaluation whether public performance is best served with optimization or innovation, and from a focussed approach in developing and employing these capacities that enables a balanced approach to innovating and optimizing.

4.1 Introduction

Public organizations are in a constant process of adapting to changing circumstances to maintain their legitimacy, enhance their performance and create public value (Hartley 2005; Damanpour, Walker and Avellaneda 2009). These adaptive processes may be continuous, improving existing practices, building on existing skills and knowledge, but a discontinuous approach, that breaks with established practices and mind sets, may also be needed to maintain or improve public performance (Moore 2005; Osborne and Brown 2011; Hartley, Sørensen and Torfing 2013). In this article we will use optimization and innovation as synonyms to respectively continuous improvement and discontinuous renewal, as we will further elaborate below. We use optimization rather than improvement as innovation is often assumed to be synonymous to improvement (Hartley 2005; Osborne and Brown 2011). March (1991) already argued that both processes are essential for organizations, and organizations make explicit and implicit choices between the two. Understanding the choices and improving the balance between the two are essential to improve organizational performance.

A recent literature review of empirical research on innovation in the public sector shows that many studies focus on the antecedents of innovation (De Vries, Bekkers and Tummers 2016). Less attention has been paid to the actual outcome of innovation, and more specifically its relation with public sector performance (de Vries et al. 2016). Simultaneous empirical research on optimization and innovation processes in relation to the performance of public organizations is scarce (see e.g. , Choi and Chandler 2015; Smith and Umans 2015; Cannaerts, Segers and Henderickx 2016). Furthermore, capabilities enabling innovation *and* optimization have received relatively little attention (Moore 2005; Pienings 2013). This study aims to fill this lacuna by examining 1) the impact of different capacities on innovation and optimization and 2) the effects of innovation and optimization on performance of public organizations. We build on a theoretical framework by Gieske, van Buuren and Bekkers (2016). They conciliate insights from public as well as private sector literature and identify connective, ambidextrous and learning capacities as crucial capacities for optimizing and innovating, postulating that these capacities should be present at the individual, organizational and network level (Osborne and Brown 2011).

This study aims to put their framework to the test, by translating it into specific hypotheses. In order to test these hypotheses we have conducted a survey among 22 regional water authorities in the Netherlands. These institutions, dating back to the 13th century, are often seen as conservative and risk-averse bodies (Toonen, Dijkstra, and Van der Meer 2006), supposedly due to their task of keeping the one third of the Netherlands that is below sea level safe and dry. However during their long history these organizations have shown amazing innovations as well as

a continuous adaptation to changing circumstances. They thus provide a good case for studying what enables public organizations to optimize as well as innovate their policies, processes, technologies and services to enhance their performance. In the method section we will discuss the measurement of the theoretical constructs, data collection, and statistical analysis, for which we used structural equation modelling. After the discussion of the findings, we will discuss the contribution to the existing literature and pose further questions for the research agenda on innovation in the public sector. In the next section, we summarize the framework of Gieske et al. (2016), elaborate the relation between the different capacities and innovation and optimization and formulate hypotheses.

4.2 Multi-dimensional framework

Innovating, optimizing and performance

Public performance is a multidimensional construct (Andrews et al. 2010). Central to the concept is the creation of public value (Moore, 2005; Van Dooren, De Caluwe, and Lonti, 2012). Desired outcomes are often defined in terms of efficiency, effectiveness, quality, future proofing, and responsiveness and legitimacy towards stakeholders (Boyne 2002a; Yang and Panday 2007). Public performance can thus be conceptualized as achieving public goals in a legitimate, effective and efficient manner, preserving present and future quality of public services (Verbeeten 2008).

The public sector is challenged to innovate to enhance performance (see e.g., Osborne and Brown 2011), while at the same time improving current operations in order to enhance efficiency and lower cost (see e.g., Pollitt and Bouckaert 2004, p.8). Innovation is generally defined as the implementation of a new (technical, organizational, policy, service or other) concept that changes and improves the functioning and outcomes of the public sector (Hartley 2005; Damanpour et al. 2009), thereby creating public value (Moore 2005; Moore and Hartley 2008). This concept is perceived as new by an individual or other unit of adoption (Rogers 1995, xvii), and represents a discontinuity with the past (Osborne and Brown 2011).

However, performance can also be enhanced by gradual improvement, in continuity with the past (Moore 2005). It is important to distinguish gradual improvement from innovation, as both processes demand different approaches (March 1991). This distinction may get blurred in public innovation policy (Osborne and Brown 2011) and innovation and improvement are often assumed to be synonymous (Hartley 2005). To enhance clarity we will refer to continuous, gradual, intentional improvement as optimization. *Innovation* thus concerns the implementation of new policies, processes, technologies and services, in discontinuity with the past, whereas *optimization* concerns the improvement of existing policies, processes, technologies and services, in continuity with the past (Damanpour et al. 2009; Osborne and Brown

2011). Literature underlines that both are essential for enhancing performance (March 1991; Jansen et al. 2006; Damanpour et al. 2009; Junni et al. 2013):

H1a Optimization contributes to enhancing performance.
H1b Innovation contributes to enhancing performance.

Capacities supporting innovation and optimization

Literature on capabilities that are needed for innovation and optimization processes in public organizations is scarce (Piening 2013; Choi and Chandler 2015). Based on a review of public administration, business administration and organizational sciences literature Gieske et al. (2016) single out three complementary capacities important for innovating and optimizing in public organizations: connective capacity, ambidextrous capacity and learning capacity. In the following sections we elaborate these three types of capacities and generate hypotheses in relation to innovation and optimization based on the literature. To grasp the innovating and optimizing abilities of public sector organizations Gieske et al. (2016) identified the attributes of these capacities at the levels of individuals, the organization and the wider network of the organization. That is, at the characteristics and capabilities of involved individuals; at characteristics of organizational strategies, policies and processes that structure (intra- and inter-)organizational behaviour; and at characteristics of inter-organizational arrangements that structure interaction between actors. The different capacities at the different levels are summarized in Table 1 (Gieske et al. 2016).

Connective capacity

In the field of public administration, connective capacity of actors and networks is considered a key capacity for generating effective governance and arriving at consensual and innovative solutions (Williams 2002; Van Meerkerk and Edelenbos 2014; Klijn, Edelenbos, and Steijn 2010). Literature on innovation emphasizes that new ideas, knowledge and actors that share their resources and risks, need to become connected in order to generate innovation (Von Hippel 2005; Hartley, Sørensen and Torfing 2013; Bekkers, Edelenbos, and Steijn 2011). Connective capacity in the context of innovation and optimization can be described as the capabilities of individuals, organizations and networks to counter fragmentation by crossing boundaries and establishing linkages between different actors at various levels, scales and domains (cf. Edelenbos, Bressers and Scholten 2013, p.7).

At the *individual* level connective capacity is an important attribute of policy entrepreneurs (Kingdon 1995), or organizational entrepreneurs (Hartley et al. 2013), and boundary spanners (Williams 2002), who have long been recognized as instrumental for effective collaboration and innovation. Their strategies have in common that they link content (ideas, insights), actors (within and between

organizations), and/or processes (Van Meerkerk and Edelenbos 2014). Also literature on bridging ties stresses the central role of connective individuals, who span and connect different structural holes in networks, and make new ideas available for the network or organization, thereby contributing to innovation (Granovetter 1985; Burt 2004). Individuals who span boundaries within and between organizations and smoothen collaboration across these boundaries contribute to optimization and innovation.

At the *organizational* level dense intra-organizational networks support trust and cooperation (Adler and Kwon 2002), learning (Lin 2007) and the exchange and refining of existing knowledge, which supports improvement of existing qualities (Jansen et al. 2006). Dense networks may also diffuse strong norms and behavioural expectations, and limit the flow of new ideas and information, and thus may have adverse effects on innovation (Adler and Kwon 2002). Nevertheless, Jansen et al. (2006) found a positive effect of connectedness on both optimizing and innovating. Thus internal connectedness supports optimizing, and may also support innovation, if networks are not too dense. Coordination and socialization efforts enhance internal connectivity (Jansen et al. 2006). Supporting connectivity at the network level (see below) requires dedicated efforts at the organizational level to develop network management policies, assign networking roles and enhance networking skill of employees (Klijn et al. 2010).

At the *network* level connective capacity is needed for effective network governance and arriving at consensual, effective, robust, integrative and innovative outcomes (Klijn et al. 2010; Van Meerkerk, Edelenbos, and Klijn 2015; Agranoff 2008). Densely connected organizations are reported to efficiently exchange knowledge and skills (Uzzi 1997), but too strong relationships may also support similarity, limited search and a focus on optimization (Jacob and Duysters 2017; Considine and Lewis 2007). Literature thus is consistent in underlining the importance of connectedness for optimization, but the relationship with innovation is not straight forward. However, based on the literature we do expect a positive contribution, but probably less strong than its contribution to optimization. The various literature on connective capacity generates the following hypothesis:

H2a Connective capacity supports optimizing.
H2b Connective capacity supports innovating.
H2c Connective capacity supports optimizing more than innovating.

Ambidextrous capacity

In the organizational sciences literature the ability to be both explorative and at the same time exploit existing products or services is studied extensively (see e.g., March 1991; Gibson and Birkinshaw 2004; Junni et al. 2013), while studies in the public

sector begin to emerge (Choi and Chandler 2015; Smith and Umans 2015; Cannaerts et al. 2016; Boukamel and Emery 2017). This ability is referred to as ambidextrous capacity: the ability to combine exploratory and exploitatory processes and activities, exploring new opportunities and at the same time enhancing the efficiency of current operation (March 1991; Jansen et al. 2006; Choi and Chandler 2015). Innovating is associated with exploration, risk taking, generating new knowledge and skills, and experimentation, while optimizing is associated with exploitation, building on existing knowledge, efficiency and refinement (cf. March 1991).

At the *individual level* transformative leadership is generally related to innovation, while transactional leadership is considered to enhance optimization (Rosing, Frese, and Bausch 2001; Jansen, Vera, and Crossan 2009). Transformational leadership emphasizes experimentation, risk taking, punctuated change and multiple alternatives, whereas transactional leadership is aimed at incremental change, efficiency and continuity (Vera and Crossan 2004). Transformative leadership is more supportive during the idea generation and selection phases of innovation processes and transactional leadership is more suitable during implementation and institutionalization (Vera and Crossan 2004). An ambidextrous manager has the skills to combine innovation and optimization related activities and to come up with creative solutions that contain elements of both ends (Mom, Fourné, and Jansen 2015). An ambidextrous management style, that combines a transformational with a more transactional style, supports the adoption of new ideas but also the linkage to existing knowledge and routines, embedding innovation in regular processes.

Ambidextrous *organisations* develop strategies and assign resources to connect, support and balance optimizing and innovating, and to embed them in regular processes (March 1991; Gibson and Birkinsaw 2004; Prieto and Pérez Santana 2012). Raisch and Birkinsaw (2009) review different approaches to organizational ambidexterity. Structural approaches include dual structures to separate exploration and exploitation, e.g. in time or organizational units, or in secondary structures, such as project teams or networks. Contextual approaches advocate a supportive organizational context to shape individual-level behaviour with a set of processes, systems and believes that enable simultaneous exploring and exploiting, and encourage individuals to divide their time between the two (Birkinsaw and Gibson 2004).

Ambidextrous *networks,* featuring weak ties for the creation of novel combinations as well as strong ties to validate and exploit the new knowledge, have shown to be effective (Gilsing and Duysters 2008). For optimizing a strong familiarity and mutual understanding between organizations is needed, while for innovating less embeddedness (Uzzi 1997) and a larger cognitive distance is favourable (Nooteboom et al. 2007). Ambidexterity, i.e. networking with new parties with new ideas and perspectives as well as with usual, similar partners, is important for innovation

(Gilsing and Duysters 2008).
Ambidextrous capacity by definition indicates the ability to deal with both innovation and optimization, and therefor supports both. It demands an extra ability, over and above connective ability, to deal with the different demands of combining improvement and renewal of processes, technologies and services:

H3a Ambidextrous capacity supports optimizing.
H3b Ambidextrous capacity supports innovating.

Learning capacity

In literature on learning the importance of individual, organizational and social learning (Argyris 1976; Mezirow 1990; Crossan, Lane, and White 1999; Rashman, Withers, and Hartley 2009; Kinder 2012) is stressed for continuous improvement as well as for innovation. Learning is an individual and cognitive process, in the minds of people, where knowledge and experiences are internalized and ideas originate. It is also a social and interactive process of interpretation and sense-making between people. Learning that takes place within existing mind sets, assumptions and norms, i.e. 'single loop' or first order learning, supports exploitation. Transformative 'double-loop', or second order learning involves reflecting on and possibly changing of underlying assumptions (Argyris 1976; Easterby-Smith et al. 2004) and supports exploration.

Important characteristics of *individual* learning capacity are tolerance of ambiguity and change, openness to experience and unconventionality and self-reflectiveness (Crossan and Apaydin 2010). While first order learning supports optimizing, for transformative second order learning a reflective attitude towards one's own norms, values and practices and those of the organization is necessary (Mezirow 1990). Reflection can be seen as a mental tool for transforming individual and collective experience into new thinking and acting (Mezirow 1990; Hildén, Pekkola and Rämö 2014). Learning is important for optimizing (first order learning) as well as for innovating (second order learning).

An *organization's* capability to learn is closely tied to its ability to utilize its knowledge resources. Organizational learning is a mutual process in which organizations learn from their members and vice versa (Crossan et al. 1999). Organizations store knowledge they learn from their members in their strategies, procedures and structure. Organizational learning includes stimulating idea generation, experimentation, absorption of new knowledge and knowledge sharing (Harvey et al. 2010), and codification and institutionalization of what is learned in strategies, policies and routines, as well as reflection on the continuity of organizational learning (Hildén et al. 2014). We expect that for innovation organizational learning is more important than for optimizing, as innovation

demands the generation of new ideas as well as adjusting organizational policies and practices for implementation, rather than refining existing ones (Crossan et al. 1999). Collaborative innovation at the *network* level is supported by flexible institutions and temporary arrangements that allow for experimenting and learning (Van Buuren and Loorbach 2009). These arrangements should be embedded in the incumbent formal institutions (Bekkers et al. 2011), and be connected to learning processes at the organizational level (Camisón and Fores 2010; Holmquist 2003). Joint experimenting and learning in informal networks is important for optimization, but especially considered to be important for innovation (Gilsing and Duysters 2008).
Based on the literature, we conclude that learning supports both innovation and optimization, but we expect a stronger relationship with innovation as the learning process is especially important for internalizing new ideas, and reflection on and changing of existing assumptions, practices and policies:

H4a Learning supports optimizing.
H4b Learning support innovating.
H4c Learning supports innovating more than optimizing.

In their multidimensional conceptual framework Gieske et al. (2016) included the main attributes for connecting, ambidextrous and learning capacity for the individual, organizational and network levels. The conceptual model is presented in figure 4.1. The main attributes are summarized in Table 4.1.

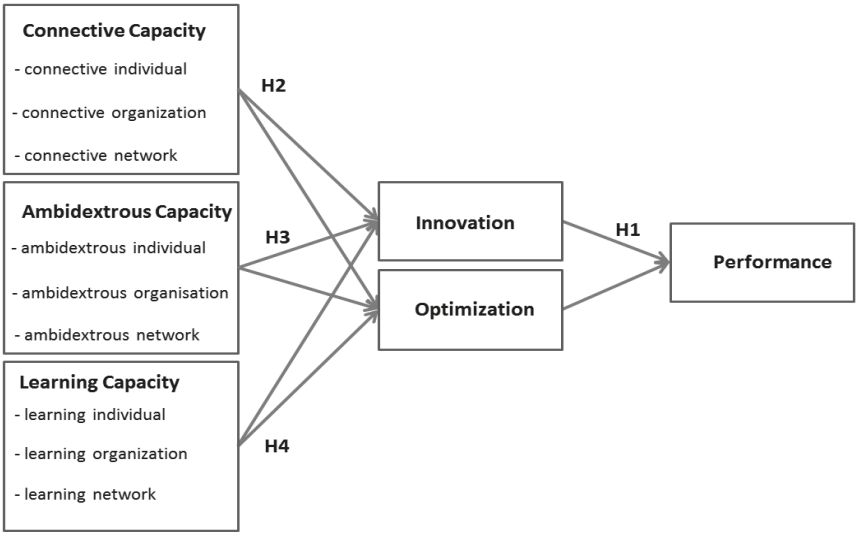

Figure 4.1: Conceptual model: connective, ambidextrous and learning capacities contribute to innovating and optimizing, and innovating and optimizing contribute to enhancing performance.

Table 4.1: Overview of main attributes of innovating and optimizing capacity (Gieske et al. 2016)

Capacity	**Connective capacity**	**Ambidextrous capacity**	**Learning capacity**
Level			
Individual	Linking capability: (mainly project/process leaders and politicians) 1. Linking of content (idea generation – new combinations) 2. Linking of actors within and between organizations	Capability to manage exploration and exploitation processes: (mainly managers) 1. Applying transformative and transactional leadership styles 2. Embedding innovation in regular organizational routines	Transformative learning capability: (project leaders, managers, politicians) 1. Reflective attitude 2. Tolerant to ambiguity and uncertainty 3. Open to diversity of ideas, knowledge and contexts
Organi-zation	Provisions for intra- en inter-organizational collaboration: 1. Supporting internal networks by socialization and coordination tactics 2. Supporting external networks, by improving networking skills, assigning networking roles, supportive policies	Provisions for balancing innovating and optimizing: 1. Balanced strategies, policies and routines 2. Balanced resource allocation	Provisions for organizational learning: 1. Support organizational learning processes related to exploration and exploitation 2. Support reflection on organizational learning
Network	Inter-organizational capacity to create and maintain: 1. Networks, alliances, cooperative programs, etc, i.e. the *reticulation* of networks 2. Social capital, by collaborative dialogue, trust-building, and reciprocity	Inter-organizational capacity to create and maintain: 1. Dual structure of networks, including strong and weak ties 2. Dual content of networks, balancing openness and closeness for new content	Inter-organizational capacity to create and maintain: 1. Collaborative arrangements for learning and experimentation 2. Connecting localized learning to organizational learning processes

The conceptual model presented in Figure 4.1 shows the various relationships discussed. We expect these capacities to enhance both optimization and innovation, which subsequently enhance the performance of public sector organizations. In the next section we elaborate the data collection and the methods we used to test the integral framework.

4.3 Testing the multi-dimensional framework

Dutch water authorities

Dutch water authorities are regional governments responsible for water management, flood protection and sewage treatment. As functional – special purpose – democracies they have an elected board and regulatory and taxing powers. They are often perceived as inward looking and technocratic organizations (Toonen et al. 2006). However, the transition in the Dutch water sector from a technocratic top-down governmental approach towards a more open, network-oriented mode of governance also affected the water authorities (Edelenbos et al. 2013; Van Meerkerk et al. 2015). They have been adapting to changing societal demands during their long history, and have shown renowned innovations, from the 16th century wind mills to present day fully automated water management, and from sewage treatment works to energy and nutrients producing plants.

Survey design and data collection

We designed a web-based survey to measure the concepts in Table 4.1. The survey was pre-tested by and discussed with senior employees of 12 water authorities participating in an innovation platform of the Dutch Association of Water Authorities. We used their comments to improve the formulation of the items and to shorten the length of the survey. We collected data in February 2016 among the staff of the 22 Dutch Water Authorities involved in primary tasks in the fields of regional water management and sewage treatment (that is policy and planning, regulation and enforcement, and construction and maintenance; in dike safety, surface water quality and quantity management, and waste water treatment). The organizational top management (CEO's) organized the e-mailing to the staff and encouraged them to participate in the survey.

In total 667 surveys were completed. The overall response rate is 33%. Half of the CEO's sent the questionnaire to all personnel in the primary sections, as we requested. Depending on the size of the water authority these are between 200 and 400 persons. In these cases response rates are in the order of 15%. The other half of the water authorities decided to forward the questionnaire to a smaller selection of people (between 30 and 60 people) that represents the primary sections best. As researchers we were not in the position to influence this. In those cases the response

rate was significantly higher and ranged from 29% to 94%. The overall response rate of 33% is about average for an e-mail survey (Sheehan 2001). The response groups per water authority are similar with respect to their work fields, functions, education, age and gender. We therefore believe the respondents are representative for the population of people working in the primary tasks of regional water authorities.

Measures

We operationalized the concepts in Table 4.1 and Figure 4.1 to 16 constructs. Each capacity is measured in relation to the three different levels: individual, organizational and network. In Table 2 measurement items are given for all constructs. In our operationalisation we took care to clearly distinguish between the concepts of connectivity, ambidexterity and learning. We measured the performance, innovation, optimization and the different capacities by the perceptions of individual respondents. To be clear, we use a multi-dimensional and multi-level conceptual model, but not a multi-level statistical analysis as we are not focusing on the effects of organizational (or network) characteristics on individual level characteristics. Moreover, as our goal is to examine an integrative model with this amount of variables, a multi-level statistical analysis with 22 organizations is not possible.

We used existing scales, that we adapted to the context of Dutch water authorities and the phrasing commonly understood in this context. Given the aim of measuring an integral model including many constructs, in some cases the amount of items in existing scales have been reduced. For instance, the items for transformative and transactional leadership in the 'ambidextrous manager' scale were reduced to 10 (De Hoogh, Den Hartog, and Koopman 2004). In these cases careful selection of items has been applied. In most cases scales have been based on several sources, e.g. the scale for 'ambidextrous procedures' and for 'learning organization'. For three scales new items were formulated, i.e. for 'embedding manager', 'inter-organizational connective capacity', and 'ambidextrous resource allocation'. On the individual level, the capacities (connective, learning, and ambidexterity) were measured for key individuals in the context of the water authorities in relation to innovating and optimizing, i.e. the politicians (aldermen), the project or process leaders and the managers (Table 2).

In the scale for innovating we added explanations to all items to ensure that respondents could clearly distinguish innovating from optimizing, including phrases like 'really new for the water authority', 'the water authority has taken a new path', 'really different from existing techniques', 'not just improved'. In the performance scale we included items on efficiency and effectiveness as well as items on goal attainment with stakeholders, legitimacy, quality and future-proofing, again with explanations.

Respondents were asked to answer the questions for their own work field (water safety, water quantity, water quality, sewage treatment). All items were measured using a 7-point Likert scale ranging from totally disagree to totally agree. All measures are thus based on perceptions of organizational staff, including the measure for performance. The main reason for this is that there are no reliable archival data available for measuring performance, innovation and optimization. In the benchmark of the water authorities performance data is expressed in extent of compliance against national norms for e.g. dike safety or water quality, which is difficult to relate to an objective measure for effectiveness and efficiency (Tillema 2007). Moreover, measuring individual perceptions allows a broader assessment of performance, including items on legitimacy, alignment with stakeholders and future-proofing. A disadvantage of this method are risks of common method biases (see below). The scales show good internal consistency and reliability, as will be further discussed in the next section. We included several control variables to test whether the measured effects on our dependent variables are not influenced by certain characteristics of the respondents. We included the function of the respondent (manager, project/process leader, project/process member, or other), the work field in which the respondent is active, the level of education and gender. We constructed dummy variables for these control variables to include them in the analysis.

Table 4.2: Scales and construct reliabilities, means and standard deviations, items and factor loadings.

Scales: reliability measures, mean, standard deviation	**Items (**factor loadings in parenthesis)
PERFORMANCE	*Adapted from Gibson and Birkinshaw 2004; Prieto and Pérez Santana 2012; Klijn et al. 2010; Bontis, Crossan and Hulland 2002*
Performance AVE=0.504, CR=0.858 Cronbach's alpha 0.856 m=4.75, s.d.=0.93	My organization has improved performance over the last five years for my work field on: efficiency (same results against lower costs or faster) (0.742); quality (we deliver more quality against similar costs and time) (0.781); effectiveness (we reach our goals better) (0.741); collaboration (we reach
	our goals better combining those with the goals of others) (0.709); legitimacy (stakeholders are satisfied with the water authority) (0.602); future proofing (we can face the future with trust, expected future developments are included in policies and plans) (0.669)
INNOVATING	*Adapted from: Jansen et al. 2006; Popadiuk 2012; Prieto and Pérez Santana 2012*
Innovating AVE=0,606, CR=0,824 Cronbach's alpha 0,825 m=4.7, s.d.=1.14	To improve performance for my work field my organization has during the last five years: Implemented really new policies (0.7); implemented really new technology (0,704); offered really new services (0.667); implemented really new processes (0,659); experimented with really new policies or techniques(0.748)

table continues

OPTIMIZING	*Adapted from Jansen et al. 2006, and aligned with scale for innovating*
Optimizing AVE=0.597, CR=0.856 Cronbach's alpha 0.848 m=4,87, s.d.=1.09	To improve performance for my work field my organization has during the last five years; Improved existing policies (0.767); improved existing techniques (0.755); improved existing services (0.821); improved existing processes (0.746)
CONNECTIVE CAPACTIY	
Individual connective capacity	*Adapted from: Van Meerkerk and Edelenbos 2014; Klijn et al. 2010*
Connective aldermen: AVE=0.707, CR=0.935 Cronbach's alpha 0.934 m=4.59, s.d.=1.01 **Connective project leaders**: AVE=0.709, CR=0.936 Cronbach's alpha 0.937 m=4.82, s.d.=0.99	Aldermen/project leaders (respectively): connect different ideas, policy areas and disciplines (0.821/0.853); build and maintain sustainable relations with other organizations (0.865/0.833); build trust (0.886/0.883); connect interests of different parties (0.903/0.884); manage exchange between network and own organization (0.79/0.808); span boundaries within organization (0.773/0.786)
Organizational connective capacity	*Intra-organizational connective capacity: adapted from Jansen et al. 2006; Inter-organizational connective capacity: new scale*
Connecting intra-organizational: AVE=0.435, CR=0.754 Cronbach's alpha 0.756 m=4.5, s.d.=1.01	We have regular social activities (0.608); there is sufficient opportunity for informal information exchange (0.622); new colleagues are coached intensively (0.684); collaboration between different teams is stimulated (0.717)
Connecting inter-organizational: AVE=0.528, CR=0.770 Cronbach's alpha 0.775 m=3.85, s.d.=1.22	There are policies and routines for network management (0.764); there are roles or functions for network management (0.671); there is training in network management and networking skills (0.741)
Network connective capacity	*Adapted from Thomson, Perry and Miller 2009; Klijn et al. 2010; Agarwal and Selen 2009*
Connecting network AVE=0.510, CR=0.805 Cronbach's alpha 0.794 m=4.93, s.d.=0.85	We have effective collaborations with other parties (0.728); we use many different forms of collaboration (0.76 ; parties trust that all live up to agreements (0.735); all parties always look for solutions in open dialogue (0.626)
AMBIDEXTROUS CAPACITY	
Individual ambidextrous capacity	*Ambidextrous leadership: Abbreviated from De Hoog et al. 2004 (after Bass and Aviolo 1993, adapted for Dutch situation)* *Embedding manager: new scale*

table continues

Ambidextrous manager: AVE= 0.601, CR=0.938 Cronbach's alpha 0.937 m=4.57, s.d.=1.05	Managers: stimulate employees to think in new ways (0.777); have vision (0.821); look for new opportunities for the organization (0.766); coach employees to develop their talents (0.814); motivate employees to contribute jointly to the goals of the organization(0.848); delegate challenging responsibilities to employees (0.742); arrange good working conditions for employees (0.776); make agreements on results and rewards (0.702); see that agreements are met (0.738); live up to agreements (0.759)
Embedding manager: AVE=0.760, CR=0.927 Cronbach's alpha 0.926 m=4.36, s.d.=1.16	Managers: connect innovation with regular work processes (0.863); see that innovation contributes to organizational goals (0.852); arrange conditions for the implementation of innovation (0.899); see that polies and work processes are adapted if necessary for the implementation of an innovation (0.873)
Organizational ambidextrous capacity	*Ambidextrous procedures: based on Gibson and Birkinshaw, 2004; Bontis et al. 2002; Ambidextrous resource allocation: new scale, partly based on Prieto and Pérez Santana 2012*
Ambidextrous procedures: AVE=0.652, CR=0.918 Cronbach's alpha 0.916 m=3.98, s.d.=1.17	We have a strategy or plan that addresses both innovation ánd optimization (0.823); we systematically evaluate if innovation ór optimization is required to improve performance (0.844); innovation is part of our year plan and team plan (0.676); our innovation policy contributes to good innovation processes (0.867); we have clear innovation procedures for innovation (0.825); regular and innovation processes are well connected (0.796)
Ambidextrous resource allocation: AVE=0.648, CR=0.804 Cronbach's alpha 0.834 m=3.85, s.d.=1.21	Our HRM takes innovation into account (in selection, training, career support, personnel evaluation) (0.731); resources (money/time) are allocated well to regular tasks ánd innovation (0.876); there are enough resources (money/time) for innovation (0.801)
Network ambidextrous capacity	*Network existing parties: Based on Gilsing and Nooteboom 2006* *Network new parties: Based on Gilsing and Nooteboom 2006*
Network existing parties: AVE=0.539, CR=0.824 Cronbach's alpha 0.821 m=4.98, s.d.=0.83	My organization collaborates: with existing, usual parties (0.719); in long-lasting, formal arrangements (0.696); to develop solutions based on existing knowledge and technology (0.739); with parties with known standpoints and visions (0.781)
Network new parties: AVE=0.529, CR=0.813 Cronbach's alpha 0.809 m=4.01, s.d.=1.07	My organization collaborates: with new, unusual parties (0.765); in loose, brief, informal arrangements (0.493); to develop solutions based on new knowledge and technology (0.772); with parties with unusual, unexpected standpoints and visions (0.831)
LEARNING CAPACITY	
Individual learning capacity	*Adapted from Bontis et al. 2002; Hilden et al. 2014*

table continues

Learning aldermen: AVE=0.573, CR=0.842 Cronbach's alpha 0.834 m=4.54, s.d.=0.94 **Learning managers:** AVE=0.586 CR=0.848 Cronbach's alpha 0.84 m=4.51, s.d.=0.99 **Learning project leaders**: AVE=0.634, CR =0.873 Cronbach's alpha 0.87 m=4.76, s.d.=0.96	Aldermen/Managers/Projectleaders (respectively): reflect on their assumptions (0.639/0.614/0.717); learn by doing and adapt their action (0.84/0.848/0.837); deal well with uncertainty (0.792/0.762/0.804); are open for new ideas, situations and parties (0.743/0.818/0.821)
Organizational learning capacity	*Adapted from: Bontis et al. 2002; Kostoupolis, Spanos and Prastacos e al. 2013; Lin and McDonough 2014; Hilden et al. 2014*
Learning organization AVE=0.577, CR=0.845 Cronbach's alpha 0.844 m=3.91, s.d.=1.07	We use knowledge and expertise of colleagues well (0.695); our policies and routines are regularly adjusted to new insights or techniques (0.777); there are routines to reflect on the relevance of new insights for the organization (0.755); my organization learns from my experiences (0.808)
Network learning capacity	*Adapted from Agarwal and Selen 2009.*
Learning network AVE=0.582, CR=0.847 Cronbach's alpha 0.847 m=5.04, s.d.=0.99	My organization: uses pilots and experiments to test new solutions with other parties (0.783); collaborating with other parties results in new knowledge and solutions (0.669); stimulates joint learning with other parties (0.796); learns from the collaboration with other parties (0.795)

Reliability and validity

The measurement model was first examined for convergent and discriminant validity, based on confirmatory factor analyses. For all constructs factor loadings are larger than 0.50 (except for one item in the 'network new parties' scale), a very conservative cut-off level (Hair et al. 1995), which is a first important indicator demonstrating convergent validity (Table 4.2). Furthermore, the composite reliability indexes of all constructs are above 0.70, most above 0.80, thus exceeding the 0.60 threshold (Fornell and Larcker 1981). Moreover, all constructs have an Average Variance Extracted (AVE) above 0.50, further demonstrating convergent validity. Intra-organizational connective capacity (AVE=0,435) is one exception to this. However, the factor loadings and the composite reliability are more than acceptable for this construct, which indicates sufficient internal consistency and reliability (Peterson and Kim 2013). To further assess the reliability of the measures we computed corrected item-to-total correlations and Cronbach's alphas. All items had corrected item-to-total correlations that were greater than 0.40, which represents a general threshold (Field 2005). All Cronbach's alphas exceeded the widely accepted cutoff value of 0.70.

To establish discriminant validity, we compared the average variance extracted (AVE) with the squared inter-construct correlation estimates (SIC). By far, the AVE of most constructs are larger than the corresponding squared inter-construct correlations, revealing the distinctiveness of each construct and thus discriminant validity. However, there are some constructs for which the SIC is higher than the AVE of one of the constructs. In those cases we considered the construct valid when explorative factor analysis confirmed that constructs were separate factors. Two exceptions concern the learning and connecting constructs at the individual level and at the network level. Exploratory factor analysis confirmed that the items of the constructs loaded on one factor. For methodological reasons, we decided to focus on connecting at the individual level, as connecting activities of project leaders and aldermen are better perceivable by others than learning of these actors, and the construct's items thus form a more robust scale than those of individual learning, which is in line with the higher value of the AVE of this construct. For theoretical reasons, we decided to focus on learning at the network level, as we deem deliberate network learning of potential greater contribution to innovating and optimizing than effective, trustful, open collaborations, the latter being a requisite for the former. Moreover, the AVE of this construct is also better.

Mitigating risks of common method bias

The data collection process used in this study could induce a common-method bias, as the data are based on single informants and self-reported (Podsakoff, MacKenzie, and Podsakoff 2003). Several steps were therefore taken to reduce risks of common method biases (Podsakoff et al. 2012). First, we reduced item ambiguity by pretesting the survey among staff members from the participating organizations as discussed before. Next, we used separate sections of the survey using clear labels for measuring the different variables. In this respect the different capacities (independent variables) and the dependent variables were also clearly separated at different webpages enhancing the distance between these variables. Furthermore, we did not mention the academic purpose (save the general topic of the survey) in order to prevent hypothesis guessing by respondents. In addition the survey stressed anonymity to reduce social desirability bias.

Statistically, we used a Harman one-factor test to evaluate the extent to which common method variance was a concern (Podsakoff et al. 2003; George and Pandey 2017). A factor analysis was conducted on all 110 items used to measure the core variables covered by the model. No single factor accounted for the majority of the explained variance, i.e. the first factor accounted for 33.5%. Although the above analysis and procedures do not totally rule out the possibility of same-source, self-report biases, it does suggest that general method variance is probably not an adequate explanation for the findings obtained in this study.

Analysis

Table 4.2 presents standard deviations and means. Correlations for all model constructs and control variables are presented in the Appendix, due to the size of the table. Means for all variables are between 3.85 and 5.04 and are generally around the mid-range of the scales. The mean for optimizing (4.87) is only slightly higher than for innovating (4.70), indicating that respondents agree slightly more with statements indicating that their organization engaged in optimizing than in innovating. For the variables measuring capacities at the organizational level, the means are a bit below the mid-range: respondents slightly disagree with statements on provisions for inter-organizational connectivity, on the presence of ambidextrous procedures and ambidextrous resource allocation, and on organizational learning. The mean scores are highest for the network level characteristics: connectivity, collaboration with usual, existing parties, and learning in networks all score around 5.

At the organizational level the correlation between ambidextrous procedures and organizational learning is high (>0.6). This may partly be due to our operationalization of organizational learning: a.o. as adapting existing procedures according to new insights (though the constructs show sufficient convergent and discriminant validity). Correlations between control and model variables are low (<0.2).

Structural model

We used structural equation modelling (SEM) for conducting data analysis and to test the conceptual model. This has several advantages compared to regression analysis (Byrne 2010). First, SEM allows simultaneous analysis of all the variables in the model instead of separately and it enables measurement of direct and indirect effects. Secondly, SEM has the capability to deal with latent variables, by using separate factor loadings for the observed indicators (the survey items), thereby incorporating both unobserved constructs and observed indicators in the model. Thirdly, whereas traditional multivariate procedures are incapable of either assessing or correcting for measurement error, SEM provides explicit estimates of these error variance parameters, thereby improving the accuracy of the data analysis (Byrne 2010).

Figure 4.2 depicts the results of the SEM analysis. The significant relationships ($p < 0.05$) are presented (the standardized regression coefficients are reported) and the explained variance is noted in the boxes. The presented model had the best fit. The following fit indices indicate a good fit of the structural model to the data: CMIN/DF=2,526, CFI=0.910, RSMEA=0.048 (Byrne 2010). Respectively 66%, 55% and 48% of the variance of the dependent variables perceived performance, innovating and optimizing is explained by the model. Most of the hypotheses in our conceptual model are confirmed, but not all, as we will discuss more in depth in the next section.

Control variables

We omitted the control variables that had no significant effects on the dependent variables. These were respondent's function and gender. The educational level did show a small significant relationship with performance: people with a lower level of education generally scored the performance of the organization a bit lower than people with a higher level of education ($\beta = -0.096$, $p < 0.01$ and $\beta = -0.067$, $p < 0.05$) (i.e. secondary vocational education and other lower levels of education as compared to academic and higher professional education). Furthermore, people working in the task field 'waste water treatment' scored the performance a bit higher ($\beta = 0.068$, $p < 0.05$). This may reflect the effect of national policy, demanding a better performance of waste water treatment management of municipalities and water authorities. In the next section we will discuss these findings and confront them with the hypotheses as formulated in the theoretical framework.

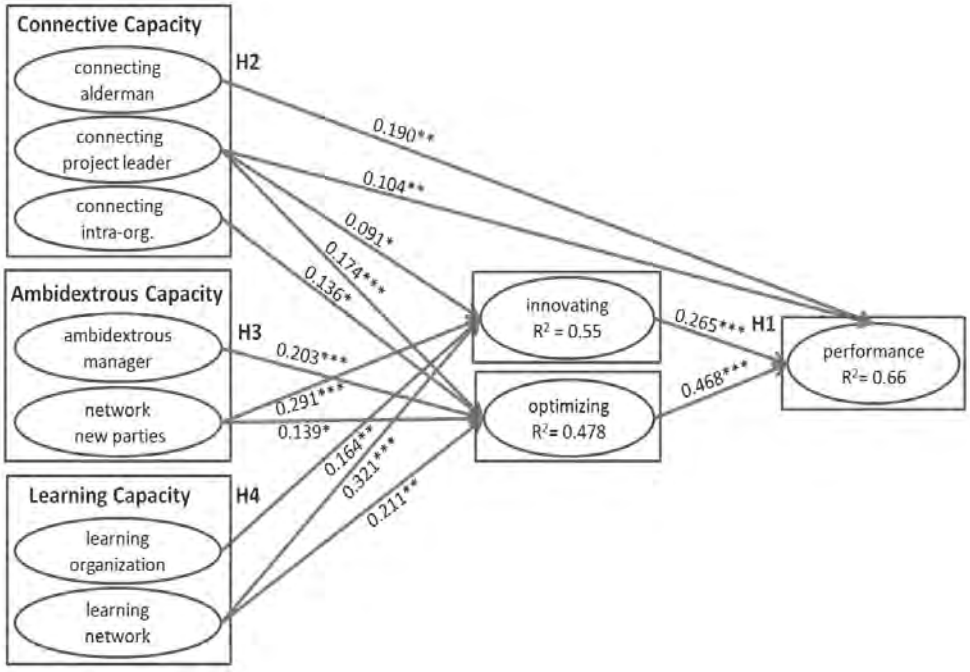

Figure 4.2: Structural model

Notes: The significant relationships between the independent and dependent variables are displayed. (β***: $p < 0.001$, β**: $p < 0.01$, β*: $p < 0.05$). Correlations between the independent variables and control variables are modelled, but not depicted for expositional clarity. The function 'estimate means and intercepts' was used to deal with some missing values. N = 667.

4.4 Results

Relationships between perceived levels of optimizing, innovating and performance

As we expected, both optimizing and innovating contribute to a higher level of perceived performance (H1a and H1b). This is in line with previous findings showing a positive effect of innovation and optimization on performance (e.g. Damanpour et al. 2009; Jansen et al. 2006). Furthermore, optimizing shows a stronger relation with performance than innovation. This seems a plausible finding as public sector organisations – in our case the water authorities – are more likely to incrementally improve their processes, techniques and services in their regular operations, than to engage in innovation with its perceived risks and higher transaction costs, to enhance performance (Damanpour et al. 2009; Osborne and Brown 2011). Especially for functional public organizations like water authorities this seems quite reasonable, given their clearly defined legal tasks and strict framework within which these tasks have to be executed. At the same time, we found a strong correlation between perceived levels of optimization and innovation (Appendix). The relationship is a bit stronger compared to private sector findings (see e.g. Gibson and Birkinsaw 2004; Cao, Gedajlovic, and Zhang 2009).

Connective capacity

We found a contribution of connective capacity to optimizing at the individual and organizational level (H2a). The strongest relation (β = 0,177***) is found for connective project leaders. As expected, *intra*-organizational connectivity contributes to optimizing (β = 0,136***). We didn't find a significant relation between *inter*-organizational connective capacity and optimization. For innovation we found that connective project leaders contribute to innovating (β = 0,091*) (H2b). Hence, in general we found a stronger relationship between connective capacity and optimization as compared to innovation, confirming H2c. In addition, connecting aldermen contribute to enhancing performance (β = 0,190***) as well as connective project leaders (β = 0,104***).

The finding that connective project leaders contribute to optimizing, innovating and enhancing performance is in line with growing empirical evidence for the importance of boundary spanners and policy entrepreneurs in water management performance (Brouwer 2013; Huitema and Meijerink 2010; Van Meerkerk et al. 2015).

We didn't expect connective aldermen and project leaders to contribute to performance directly. However, in the context of the water authorities, project leaders and aldermen usually connect to stakeholders (Brouwer 2013; Van Meerkerk et al. 2015), and span the boundaries between the stakeholder environment and their

own organizations. Moreover, aldermen steer on outcomes and performance of their organizations in relation to their policy ambitions rather than on how to reach these outcomes.

Ambidextrous capacity

Our results show a contribution of ambidextrous capacity to optimizing at the individual level and at the network level (H3a). The strongest relation is found for ambidextrous managers (β = 0,203***). Building and sustaining networks with new parties also contributes to optimizing (β = 0,139*) (H3a) and, more strongly, to innovation (β = 0,291***) (H3b).

We expected, in line with previous literature (Jansen et al. 2009) that ambidextrous managers, applying both transformational and transaction leadership styles, would also contribute to innovating. Our result may reflect the different role of managers in public organizations, as discussed below, which may even hold more strongly for water authorities, with their strict focus on water tasks.
Unexpectedly, we didn't find a significant relation between ambidextrous capacity at the organizational level and innovating and optimizing. The means for the variables 'ambidexter procedures' and 'ambidexter resources' and their constituting items are almost all below mid-range, indicating that these routines are not strongly developed in the water authorities. This may be indicative of a more emergent adaptation (Fuglsang 2010) to either the need for innovation or optimization, and a more improvised (Vera and Crossan 2005) rather than a planned approach.

Water authorities indicate that they mainly collaborate in long, formal relationships with usual parties employing existing knowledge. However they also do engage with new, unusual parties to develop solutions based on new knowledge and techniques (m=4,43 for this item). This contributes to both innovating and optimizing as is shown by the significant relations with ambidexterity at the network level.

Learning capacity

We found a significant and positive relation between optimizing and learning at the network level (β = 0,211***) (H4a). For innovation the results show relations between learning at the organizational (β= 0,164***) and network level (β = 0,311***) (H4b). Learning with external parties thus contributes to both optimization and innovation. As we expected, the relation with innovation is stronger (H4c). Innovating requires a more demanding type of learning, bridging the cognitive distance between parties (Van Buuren and Loorbach 2009) and institutionalizing what has been learnt (Crossan et al. 1999). The significant relation between organizational learning and innovation is in line with the extensive literature on organizational learning and innovation (see e.g., Crossan et al. 1999). Organizational learning is about developing and employing

knowledge of employees and adapting organizational policies and routines to new insights and technology, and as such innovation is an outcome of organizational learning (March 1991; Jansen et al. 2009).

Although respondents generally slightly disagree with statements on organizational learning (m=3,94), they do indicate that the water authorities engage in deliberate learning with other parties (m=5,07), i.e. piloting and experimenting to test new solutions, collaborating to develop new knowledge and solutions and stimulating joint learning. However, organizational routines for learning are not strongly developed.

4.5 Discussion and conclusions

Our results show that both optimization ánd innovation contribute to enhancing performance, which underpins the importance of a comprehensive and integrative perspective to get a more nuanced understanding of what contributes to public sector performance. Our research contributes to putting the call for enhancing public sector innovative capacity (a.o. OECD 2015; Albury 2005) into a broader perspective. Both in practice as in the literature the expected benefit of innovation is often disproportionately emphasized while the potential cost or risks are underestimated (Choi and Chandler 2015; see also Jordan 2014). However, a key finding of our study is that the relationship between optimization and performance is stronger than between innovating and performance. This implies that enhancing public sector performance can for a large part be achieved by continuous improvements of policies, processes, techniques and services (Damanpour et al. 2009), which receives little attention in the current innovation discourse (Choi and Chandler 2015; Osborne and Brown 2011; Jordan 2014). Further research should clarify whether this also holds for other sectors.

At the same time, we want to stress that the positive relationship between innovating and performance is substantial: innovation is important to enhance public performance. This indicates that it is beneficial for public sector organizations to acquire and strengthen capabilities that allow them to be effective in both optimizing and innovating, and be proficient in dealing with the tensions between them. A combined approach has shown to be beneficial for enhancing performance in private organizations (Junni et al. 2013) and innovating and optimizing may be mutually enhancing (Cao et al. 2009; Andriopoulos and Lewis 2009). However, a high level of both innovating and optimizing activities requires significant resources (Junni et al. 2013; Cao et al. 2009). The optimal balance between both requires careful consideration and may be different over different sectors and domains.

The second main contribution of this study is based on the integrative and multi-dimensional framework of the different types of capacities for innovation and optimization (Gieske et al. 2016). As Osborne and Brown (2011) argue, guidance

on how to manage innovation in public services is lacking. The operationalisation of the framework of Gieske et al. (2016) allowed us to single out the capacities that contribute to the continuous improvement and renewal of public organizations and their characteristics on the individual, organizational and network levels. The empirical findings demonstrate that all capacities matter, but differences in impact exist. For innovation the importance of engaging (with new actors) in a learning network and the capacity to learn as an organization stand out. This finding underlines insights about the potential of collaborative innovation (Hartley et al. 2013) and the importance of participating in external networks for innovation (Lewis, Considine, and Alexander 2011). It specifically adds to these insights that deliberate efforts to engage new, unusual actors for building ambidextrous networks is beneficial especially for innovation, but also for optimization. Furthermore, the results underline the importance of carefully connecting inter-organizational learning with intra-organizational learning (Holmquist 2003).

The importance of intra-organizational connectivity for optimizing is in line with our theoretical expectations. Opportunity for informal information exchange, coordination between different teams and social activities contribute to the exchange of ideas and knowledge needed for improving current policies, practices and routines. We did not find significant impact of intra-organizational connectivity on innovation, which might be explained by the fact that too close ties reduce the flow of new ideas and deviant views, hampering innovation (Adler and Kwon 2002; Burt 2004; Granovetter 1985).

The finding that an ambidextrous leadership style is related to optimizing, but not to innovating, may be due to the roles of public managers. Public managers often have a more facilitating and internally oriented role and generally have less managerial autonomy than private sector managers, while resolving ambiguous political objectives and managing political risks (Boyne 2002b). They are often hesitant to engage in innovation (Moore 2005). Thus, although public managers can and do initiate innovations (Borins 2002), their main focus is probably on incremental improvement rather than on innovation (Moore 2005). However, this requires further research, comparing private sector with public sector leadership (Boyne 2002b) and its effect on innovation and optimization. The result that ambidextrous procedures and resource allocation do not show a significant relation with either optimizing or innovating may indicate that organizational connectivity and learning compensate for a lack of a formalized, integrative approach. However, additional research is needed to understand how public organizations utilize procedures and resources to support both innovation and optimization, and conciliate the inherent tensions between them.

Next to the impact of the different capacities on innovation and performance, we also found moderate to strong correlations between elements of the different capacities

(like learning and the other capabilities). This confirms our point of departure that different capacities are needed for innovation and optimization and that the different capacities relate to each other. Further research is needed to go deeper into their mutual relationship.

To wrap up, this study contributes to existing insights in showing that a comprehensive approach to innovation and optimizations is important for enhancing public performance, ánd it has identified the capacities and their relative impact needed for both processes. Public organizations will benefit from a deliberate evaluation whether public performance is best served with optimization or innovation, and from developing and employing connective, ambidextrous and learning capabilities that enable a balanced approach of both innovating and optimizing. Our study confirms that these capabilities have to be addressed at the individual, organizational and network levels (Osborne and Brown 2011). Hence, a comprehensive but focussed approach will be beneficial, as each capacity shows a different relative contribution to optimization and/or innovation. Strengthening the connectivity within the organisation is important for optimizing. Developing the skills of public professionals to span boundaries and to develop connections between people, content and organisations, including new parties, is important for both optimizing and innovating. Arrangements for learning in networks and engaging unusual actors support both. Finally, enhancing the learning capabilities of organizations is especially important for innovating.

Limitations and further research

Although we tried to minimize the risks of common method bias with the methods as discussed, we have to be careful in making generalizations. Next, our data is cross-sectional and causal inferences concerning the relations in our structural model are based on theory. Longitudinal and multiple source data on innovating, optimizing and performance could provide more evidence on the feedback mechanisms between the various capacities studied. Furthermore, we collected our data from regional water authorities in the Netherlands, which pose limits to the generalizability of our outcomes.

Our study is a first empirical and quantitative attempt to deepen our understanding of the relation between optimizing, innovating and performance, and the capacities needed to support these. More research on the relation between optimization and innovation in public organizations is needed (Cannaerts et al. 2016; Choi and Chandler 2015). This should also include research on the strategies and practices that public sector organizations use to combine innovation and optimization and how they deal with the tensions between the two. Further research is also needed to unravel how the various capacities impact on each other and how the different levels relate to each other, using multi-level statistical analysis.

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APPENDIX. CORRELATIONS VARIABELS AND CONTROL VARIABELS

Correlations

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	performing																													
2	innovating	,590**																												
3	optimizing	,663**	,658**																											
4	connecting alderman	,505**	,373**	,385**																										
5	learning alderman	,436**	,339**	,332**	,734**																									
6	connecting projectleader	,497**	,407**	,476**	,451**	,425**																								
7	learning projectleader	,435**	,350**	,433**	,397**	,423**	,769**																							
8	ambidexter manager	,507**	,441**	,522**	,482**	,468**	,487**	,457**																						
9	embedding manager	,483**	,452**	,433**	,398**	,359**	,417**	,396**	,723**																					
10	learning manager	,488**	,430**	,470**	,431**	,471**	,486**	,500**	,808**	,700**																				
11	connecting intraorg	,378**	,356**	,419**	,376**	,370**	,343**	,321**	,551**	,411**	,491**																			
12	connecting_interorg	,287**	,305**	,319**	,358**	,302**	,279**	,224**	,379**	,373**	,358**	,488**																		
13	ambidexter procedures	,406**	,460**	,388**	,356**	,315**	,351**	,339**	,502**	,571**	,498**	,435**	,533**																	
14	ambidexter means	,338**	,404**	,342**	,329**	,309**	,296**	,264**	,414**	,493**	,437**	,393**	,527**	,631**																
15	learning org	,444**	,514**	,457**	,343**	,336**	,401**	,366**	,560**	,575**	,559**	,523**	,506**	,678**	,589**															
16	connecting network	,484**	,436**	,443**	,487**	,445**	,481**	,469**	,482**	,430**	,466**	,427**	,366**	,430**	,392**	,431**														
17	network new parties	,430**	,525**	,405**	,380**	,329**	,350**	,331**	,418**	,465**	,397**	,388**	,445**	,540**	,540**	,548**	,435**													
18	network existing parties	,286**	,233**	,318**	,327**	,316**	,301**	,304**	,302**	,197**	,290**	,278**	,205**	,220**	,142**	,222**	,493**	,181**												
19	learning network	,517**	,544**	,508**	,426**	,399**	,505**	,488**	,514**	,500**	,517**	,449**	,403**	,542**	,496**	,542**	,635**	,531**	,452**											
20	dummy_projectleader	-,015	-,032	,004	,001	,043	,133**	,162**	-,072	-,077	-,051	-,099*	-,023	-,076	-,048	-,111**	,070	-,019	,065	,065										
21	dummy_project member	-,118**	-,104**	-,116**	-,095*	-,105**	-,188**	-,187**	-,057	-,019	-,088*	-,016	-,020	,003	-,025	,027	-,133**	-,039	-,120**	-,139**	-,424**									
22	dummy_function_other	-,048	,016	-,027	-,036	-,052	-,034	-,002	-,027	-,033	-,033	-,042	,027	,006	,027	-,005	-,003	,024	,007	-,007	-,364**	-,355**								
23	dummy_hbo	,052	-,070	-,001	,023	,016	,024	,000	-,002	,014	-,007	-,039	-,024	-,021	-,041	-,061	,028	-,043	-,041	-,040	,030	-,088*	-,005							
24	dummy_mbo	-,183**	-,066	-,121**	-,121**	-,116**	-,194**	-,168**	-,004	,070	-,036	,019	,074	,126**	,125**	,104**	-,142**	,059	-,181**	-,126**	-,210**	,363**	-,040	-,451**						
25	dummy_educ_other	-,064	-,018	-,026	-,048	-,022	,028	-,006	-,024	,002	,028	-,015	-,004	,044	-,012	-,002	,062	-,069	,019	,014	-,004	-,002	,049	-,093*	-,052					
26	dummy_waterquantity	-,007	-,071	,007	,056	-,015	,005	-,023	,028	,015	,060	,077	,030	-,006	,000	,011	,023	-,006	-,024	-,060	,012	,078*	-,085*	,056	,115**	-,032				
27	dummy_waterquality	-,045	-,117**	-,104**	-,084*	-,023	-,012	-,009	-,003	-,036	-,043	-,110**	-,064	-,078*	-,067	-,121**	-,010	-,031	-,044	-,052	,009	,071	-,004	,017	-,039	-,037	-,214**			
28	dummy_wastewater	,044	,033	-,028	-,017	,018	-,025	,010	,035	,094*	,019	,049	-,043	,191**	,106**	,048	-,010	,032	-,035	,065	-,016	,019	-,004	,010	,143**	-,019	-,322**	-,183**		
29	dummy_crossboundary	,051	,103**	,092*	,058	-,013	,036	,036	-,056	-,058	-,039	-,028	,081*	-,065	-,021	,001	,067	,016	,086*	,064	,024	-,121**	,043	-,059	-,200**	-,026	-,355**	-,201**	-,304**	
30	dummy_manager	,002	-,007	-,002	-,044	,008	-,047	-,048	,043	,024	,012	,065	,072	,083*	,108**	,029	-,039	,014	-,124**	-,002	-,044	,078*	-,105**	-,011	,174**	-,067	,044	,020	,127**	-,158**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Chapter 5

Ambidextrous practices in public service organizations: innovation and optimization tensions in Dutch water authorities

This chapter is published as:

Gieske, H., M. Duijn and A. van Buuren. 2019
Ambidextrous practices in public service organizations:
innovation and optimization tensions in Dutch Water Authorities.

Public Management Review.
https://doi.org/10.1080/14719037.2019.1588354

Abstract

For public service organizations (PSOs) it is essential to be able to simultaneously optimize and innovate policies, processes and services. This article explores how PSOs shape these dual practices by examining optimization and innovation practices in eight Dutch regional water authorities (RWAs) using focus groups. It uncovers mutually reinforcing differences in culture, strategy and management leading to different ambidextrous configurations. In low ambidextrous RWAs a legalistic task-orientation goes along with a transactional management style and focus on optimization only. In high ambidextrous RWAs a societal value-orientation, integrative strategies, and a more transformational management style lead to more embedded innovation practices.

5.1 Introduction

The public sector is urged to innovate and at the same time enhance efficiency and lower cost (e.g. Osborne and Brown 2011; Pollitt and Bouckaert 2004, 8). March (1991) already argued that finding the optimal balance between exploitation and exploration is essential to improve the performance of organizations: i.e. balance optimizing existing practices, building on existing skills and knowledge, with innovation, breaking with established practices and mind sets. The ability to be both explorative and at the same time exploit existing competences, is called ambidextrous ability (e.g. Duncan 1976; Tushman and O'Reilly 1996; Bressant 2005).

Ambidexterity is studied extensively in the private sector (e.g. O'Reilly and Tushman 2013; Gibson and Birkinshaw 2004; Junni et al. 2015), but is also highly relevant to public service organizations (PSOs), that experience tensions to accommodate innovation due to their formal processes (Plimmer, Bryson and Teo 2017) and a strong focus on efficiency and accountability (e.g. Hartley, Sørensen and Torfing 2013). Although research into ambidexterity and its antecedents in PSOs is emerging (e.g. Smith and Umans 2015; Choi and Chandler 2015; Gieske, van Buuren and Bekkers 2016; Boukamel and Emery 2017; Kobarg et al. 2017; Plimmer et al. 2017), still a lot remains unknown on ambidextrous practices of PSOs and on how organizational antecedents shape these practices (Palm and Lilja 2017; Bryson, Boal and Rainey 2008). Ambidextrous practices of similar PSOs can differ widely due to a different strategic intent, culture, managerial focus and informal routines (Cannaerts, Segers and Henderickx 2016; Smith and Umans 2015).

In this article we contribute to the insights on organizational antecedents of ambidexterity in PSOs by empirically analysing the organizational strategies and practices that PSOs apply to combine innovation and optimization and how they deal with the tensions between both - we use optimization rather than exploitation as the former more explicitly implies incremental continuous improvement. We elaborate on how organizational antecedents like strategies and procedures, leadership style, culture and informal routines shape ambidextrous practices of PSOs. To elicit how these antecedents impact on practices and mutually interact we compare their configurations among similar PSOs, that are relatively lesser or more ambidextrous. We study the practices of eight Dutch regional water authorities (RWAs) following a focus group design. RWAs are functional democracies tasked with water management, flood protection and sewage treatment. We build on the outcomes of a survey under the 22 RWAs (Gieske, van Meerkerk and van Buuren 2018), that quantitatively tested the impact of innovating and optimizing on performance, and the contribution of connective, learning and ambidextrous capabilities. The survey results revealed differences in the extent RWAs engage in innovation and optimization, as we will elaborate below. This paper aims to elicit drivers underlying these differences. We compare two highly ambidextrous, three moderately and three low ambidextrous RWAs.

This paper is structured as follows. First of all we elaborate on the concept of ambidexterity. We discuss antecedents of organizational ambidexterity identified in previous research (e.g. Junni et al. 2015; Smith and Umans 2015; Plimmer et al. 2017; Cannaerts et al. 2016; Bryson et al. 2008; Palm and Lilja 2017). We than present the results of the focus group discussions, and discuss the ambidextrous configurations that surfaced when we confronted the different practices of the low, moderate and high ambidextrous RWAs, and the interrelation and mutual reinforcement of organizational antecedents. We conclude this paper by highlighting the relevance of our findings for research and practice, describing the limitations of our study and formulating suggestions for further research.

5.2 Theoretical background

PSOs experience tensions between – on the one hand – increasing demands to innovate, and – on the other hand – be more transparent, accountable and efficient in reaching their goals (Plimmer et al. 2017). It is highly relevant to explore how PSOs deal with these tensions and can improve their ability in simultaneously innovating and optimizing processes and services. Exploration or innovation is usually associated with adaptation to a changing environment and anticipating future performance, by pursuing new knowledge and developing new products and services to new clients. Exploitation or optimization is associated with enhancing efficiency and alignment of current operations to maintain or enhance short-term performance, by incremental improvement of existing designs, products and services for existing clients (e.g. Gupta, Smith and Shalley 2006; Jansen, Van den Bosch and Volberda 2006; Cannaerts et al. 2016; Plimmer et al. 2017). In public sector research innovation is generally conceptualized as the implementation of a new concept, breaking with existing mind sets, generating new knowledge, risk-taking and experimentation, in discontinuity with the past, in order to create public value (e.g. Rogers 2003; Moore 2005; Osborne and Brown 2011; Hartley, Sørensen and Torfing 2013). This in contrast with optimization, i.e. gradual, incremental improvement of current practices, products and services, exploiting existing knowledge and skills, within current mind sets, and representing continuity with the past (e.g. Moore 2005; Osborne and Brown 2011; De Vries, Bekkers and Tummers 2015).

Organizational ambidexterity, i.e. the ability to balance and reconcile the interdependent processes of innovation and optimization, is essential for enhancing performance, and has shown a significant and positive relationship with performance (March 1991; Cao, Gedajlovic and Zhang 2009; Junni et al. 2013; Plimmer et al. 2017). The way in which organizations organize this duality can differ significantly. Raisch and Birkinsaw (2009) review different approaches to organizational ambidexterity. *Sequential* approaches separate exploration and exploitation in time. *Structural* approaches include dual structures to separate exploration and exploitation, in organizational units or in secondary structures such as project teams or networks.

The latter can also be described as *temporal ambidexterity*. *Contextual* approaches advocate a supportive organizational context to shape individual-level ambidextrous behaviour with a set of processes, systems and believes that enable simultaneous exploring and exploiting, and encourage individuals to divide their time between the two (Gibson and Birkinsaw 2004).

Organizational antecedents that have an impact on ambidexterity are organizational strategy and vision, structure (including formalization, specialization and centralization), organizational culture and leadership (O'Reilly and Tushman 2013; Junni et al. 2015; Boyne 2003; Bryson at al. 2008). In addition, informal routines of organizational members are needed to cope with 'eventualities' that are not pre-described in organizational policies and procedures or by management (Brown and Duguid 1991). If formal and informal systems are congruent they are mutually reinforcing and beneficial for organizational ambidexterity (Plimmer et al. 2017). We will elaborate on these determinants below.

Organizational strategies, policies and procedures

Innovation and optimization should be strategically integrated (O'Reilly and Tushman 2013), and supportive procedures are needed to conciliate the tensions between different demands, aiming at using the organization's resources in such a way that both innovation and optimization are achieved (e.g. Sarkees and Hulland 2009; Plimmer et al. 2017). High levels of centralization, formalization, and specialization stimulate optimization, whereas low levels of centralization, formalization, and specialization foster innovative environments (O'Reilly and Tushman 2013; Cannaerts et al. 2016). Andrews, Boyne, Law and Walker (2009) analyse organizational strategies of PSOs and find that 'prospecting organizations' (Miles and Snow 1978), that continually search for new opportunities and experiment with responses to emerging trends, are positively correlated with decentralization, while 'defenders' (Miles and Snow 1978), that take a conservative view on new developments and focus on improving the efficiency of their existing operations, are positively correlated with hierarchical authority. Prior research has not shown a direct relationship between formalization and ambidexterity (Junni et al. 2015). E.g. Jansen, Van Den Bosch and Volberda (2006) found that formalization positively affects optimization, and does not influence innovation. Public organizations are usually highly formalized, and often associated with substantive amounts of 'red tape' (Bozeman 1993). Well-designed enabling procedures facilitate task performance, enhance commitment and reduce role conflict and ambiguity (Adler and Borys 1996). In PSOs good formal systems can be effective 'green tape' that clarity responsibilities and allow for effective discretion (Plimmer et al. 2017).

Managerial style

Ambidextrous managers have the skills to deal with the tensions between innovation and optimization, by using differentiation and integration tactics (Andriopoulos and Lewis 2009), combining innovation and optimization related activities (Mom, Fourné, and Jansen 2015) and ensuring connectedness between different organizational units (Taylor and Helfat 2009). Managers should support contextual ambidexterity (Gibson and Birkinsaw 2004), and be able to orchestrate the allocation of resources between regular and new activities (O'Reilly and Tushman 2013). A management style that combines a transformational with a transactional style, is viewed as an antecedent for organizational ambidexterity (Raisch and Birkinsaw 2009; Junni et al. 2015). A transformational style, that encourages employees to move beyond self-interests through inspiration, intellectual stimulation and individualized consideration, is generally related to innovation (e.g. Ricard et al. 2017); whereas a transactional style, that establishes an exchange-based relationship by clarifying goals, rewarding goal achievement and by intervening only when necessary, is generally related to optimizing (Bass 1999, 11; Rosing, Frese and Bausch 2011; Jansen, Vera and Crossan 2009).

Culture and organizational identity

Organizational identity and culture are important for implementing and sustaining ambidextrous designs over time (O'Reilly and Tushman 2013). Schein (1984) defines organizational culture as "the pattern of shared basic assumptions—invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration—that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems." These basic assumptions and beliefs operate unconsciously, and define an organization's view of itself and its environment (Schein 1984). An organizational culture that supports ambidexterity promotes seemingly paradoxical values, such as flexibility and control, creativity and discipline (O'Reilly and Tushman 2013) and balances cohesiveness and diversity (Andriopoulos and Lewis 2009). Knowledge-sharing, openness to diverse opinions, tolerance to uncertainty, psychological safety and trust were also found to contribute to ambidexterity (Nemanich and Vera 2009; Lin and McDonough 2011). Junni et al. (2015) propose that a culture that fosters ambidexterity supports differences and unity simultaneously, emphasizing both creativity and implementation. Different subcultures could be allowed while at the same time unity at the organizational level is emphasized (Junni et al. 2015).

Informal routines

However, even if ambidextrous strategies and procedures are in place, actual practices may deviate. As mentioned above, relying solely on formal organizational routines is not enough for organizations to perform well (Brown and Duguid 1991). Brown and Duguid (1991) state that "it is the actual practices, however, that determine the success or failure of organizations", in dealing with continuously changing external demands. Ellström (2010) refers to the explicit, formal dimension of innovation practices that concerns how work processes are codified, prescribed and organised, versus the implicit, informal dimension that concerns how work processes are perceived by different actors and performed in practice. In similar vein Ferguson, Burford and Kennedy (2013) stress the importance to better understand the impact of informal routines to understand the emergence of innovation and innovative practices, knowledge sharing and the degree of alignment between strategic intent and practice, including the extent - if any - to which emergent knowledge and innovation feeds into corporate knowledge and strategies.

5.3 Methods

Our case study concerns Dutch RWAs. These are regional governments responsible for water management, flood protection and sewage treatment. Since medieval times they are tasked with keeping the Netherlands safe and dry (Lazaroms and Poos 2004; Kaijser 2002). As functional – special purpose – democracies they have an elected board and regulatory and taxing powers (Mostert 2017). They are hierarchical, centralized, professional organizations with clear goals (O'Toole and Meier 2014), which are measured against norms set by a higher tier of government. However, as democratic organizations they have considerable freedom in defining how to reach those goals, which is laid down in obligatory six-year strategic plans. They are often portrayed as inward looking and technocratic (Toonen, Dijkstra and Van der Meer 2006). However, in recent years they have been become more open and responsive to society (Edelenbos and Van Meerkerk 2015), and have increasingly engaged in innovation of all sorts, from technical innovations like fully automated water level control to co-designing rain water storage solutions with citizens to improve their neighbourhoods (Unie van Waterschappen 2011; Unie van Waterschappen and Rijkswaterstaat 2016). They thus provide a good empirical setting to study how PSOs deal with the tensions between innovation and optimization.

We build on the results of a survey under the 22 Dutch RWAs (Gieske, van Meerkerk and van Buuren 2018). The survey yielded insight in the extent of optimization and innovation of the RWAs, which were operationalized as outcomes. Typical items for innovation were: 'To improve performance for my work field my organization has during the last five years: Implemented really new policies; [..]technology; [..]services; [..]processes; experimented with really new policies or techniques. Typical items for

optimization were: 'To improve performance for my work field my organization has during the last five years: Improved existing policies; [..]techniques; [..]services; [..] processes. It also measured ambidextrous management, procedures and resource allocation. The ambidextrous managers scale included items on transformational and transactional leadership. The ambidextrous procedures scales contained items on the presence of supporting policies and procedures. The ambidextrous resource scale contained items on HRM and resource allocation. See table 1 in the Appendix for measurement scales.

Focus groups

To gain a more detailed insight in the ambidextrous practices of water authorities with different scores on innovation and optimization we designed a focus group approach (Morgan 1996; Robinson 1999; Tong et al. 2007). Focus groups discussion is an efficient technique for qualitative data collection through group interaction (Morgan 1996; Robson 2002; Robinson 1999), eliciting collective views about a specific topic and providing insights into the sources of complex behaviours and motivations, that would be less accessible without this interaction (Morgan 1996; Ryan et al. 2014). They allow for natural quality controls on data collection as participants interact and thereby tend to provide checks and balances on each other, and group dynamics help in focusing on the most important topics, and to assess the extent to which there is a consistent and shared view (Robson 2002; Robinson 1999). A focus group design that generates data on individual as well as collective opinions and experiences is best suited for theory building (Ryan et al. 2014). We aimed to take stock of opinions and experiences of two target groups within the RWAs, i.e. employees and managers, because of their different roles in the organization and the survey scores of managers and employees differ (Gieske et al. 2018). We convened two separate focus groups per RWA because this approach enhances safety for employees in expressing concerns and reduces the risk of influence of hierarchy and power dynamics (Robson 2002).
We invited the RWAs by e-mail to the CEOs to participate in a focus group that would elaborate on the results from the survey for their own organizations. Ten RWAs showed an interest and were included in the research. We did a test workshop in one of the RWAs to test the design of the focus groups. Another RWA had recently merged, thus the survey results were no longer representative of the new organisation. We excluded these results from our analysis, which left us with eight focus groups. This selection resulted in quite a good sample, with three RWAs that score below the means for optimizing and innovating, three that score around the means, and two above the means, thus we decided that there was no need to invite additional RWAs. The selection of the participants was done by a contact person assigned by the CEO, usually an innovation coordinator. In absence of such a role a manager or senior employee took care of the selection. In most focus groups this resulted in employees mainly from primary task fields, whereas in the managers sessions also managers from supportive teams were present (e.g. HRM, finance, communication).

In each parallel session in average six people participated, resulting in in total about 95 participants. The focus groups took place from December 2016 to May 2017. To collect data on the ambidextrous practices of the RWAs we followed a semi-open design that allowed participants to formulate individual opinions and experiences as well as explore and express collective experiences (Ryan et al. 2014). After a brief introduction on the survey results for their RWA, we initiated parallel group dialogues following two guiding open questions:

- We invited them to start a dialogue on "what works well" in their organization in relation to innovation and optimization, explaining that this would enable them to share their views on actual practices and describe best practices.
- We continued the dialogue asking "what could be improved", in order to help them reflect on their current practices, and to identify barriers and enablers.

This approach led to a dialogue in which current optimizing and innovation practices and tensions between the two were mentioned and discussed. We summarized the comments of both employees and managers on flip charts, occasionally asking clarifying questions and encouraging to elaborate on a topic. The dialogues were recorded, and reports summarizing the findings were sent to the contact persons of each organization for feedback (Tong et al. 2007). Transcripts of the dialogues were coded according to the organizational antecedents described above, i.e. organizational strategies, policies and procedures; managerial style; culture and organizational identity; and informal routines. We used a combination of a theory-driven deductive approach and a data-driven inductive approach (e.g. DeCuir-Gunby et al. 2011). For the two constructs that were addressed in the survey (Gieske et al. 2018), i.e. 'Organizational strategies, policies and procedures' and 'Managerial style' we sub-coded following the themes addressed in the survey items (Fereday and Muir-Cochrane 2006), which we inductively adapted as new themes emerged from our data (Ryan and Barnard 2003), and other categories remained unfilled. For 'culture' we initially identified two themes ('identity' and 'norms and values'), building on our conceptualization above, and added codes as the themes relevant for the RWAs gradually became clear reading and re-reading our data (Ryan and Bernard 2003). These included themes like 'task-orientation' and 'communication' (i.e. rhetoric and framing). For 'informal routines' we looked for statements in our data that describe informal actual practices (Ellström 2010). Themes describe how things are actually or normally done in practice, e.g. 'on the job', by 'entrepreneurial employees', 'under the radar' and a rest category 'other informal routines' (e.g. "using the informal network"). In fact our analysis indicates that the survey scales for ambidextrous procedures and leadership (table 1 in Appendix) could be further improved, e.g. adding an item on 'optimization procedures'. Vice versa, the qualitative themes for culture and informal routines could be further developed into new scales, building on existing scales in literature. After establishing the coding strategy within our team, the transcripts were coded by the first author, thereafter test samples were cross checked by the other authors.

To allow for comparative analysis we divided the RWAs in a 'low ambidextrous', a 'moderate ambidextrous' and a 'high ambidextrous' group, and subsequently grouped the statements according to these categories. We used the strategic plans of the RWAs and the survey results to cross-check patterns emerging for the plans and survey results with the focus group outcomes (see Table 2 in the Appendix). Statements about organizational culture and informal routines were more difficult to triangulate given our data and resources. These data supplemented the quantitative survey results and the document analysis.

5.4 Results

We grouped the 22 RWAs in three groups: those that score below average on both optimization and innovation in a 'low ambidextrous' group (innovation < 4.6, optimization < 4.8), those that score average in a 'moderate ambidextrous' group (innovation 4.6 – 5.0, optimization 4.8 – 5.0), and those that score above average in a 'high ambidextrous' group (innovation and optimization > 5.0), as illustrated in figure 5.1. RWAs participating in the focus groups are numbered. Assignment of RWAs at the boundary of the groups was done on the basis of the focus groups results.

Ambidextrous practices

As we will elaborate further below the practices of the three categories of RWAs participating in the focus groups can be summarized as follows (Table 5.1).

The *highly ambidextrous RWAs* want to contribute to societal goals. Innovation is needed to attain those goals, in conjunction with optimization. Innovation is embedded in strategies and policies and connected to regular operation. Managers steer on attaining organizational goals, by inspiring employees, connection, cohesion and learning. Small scale innovation is done 'on the job', larger scale optimizations and innovations get organized as projects.

The *moderately ambidextrous RWAs* consider innovation necessary to remain efficient and effective in the future, and as way to stand out in society, they want to be seen as innovative. Strategic plans and innovation policies supports the invention phase of innovation. Implementation takes place within regular procedures. Much effort is put in optimization, e.g. by lean approaches (Radnor and Walley 2008). Managers steer on goals attainment within strict time frames and procedures. Small scale innovations are 'just done', besides regular work. Bigger innovations are taken up as projects.

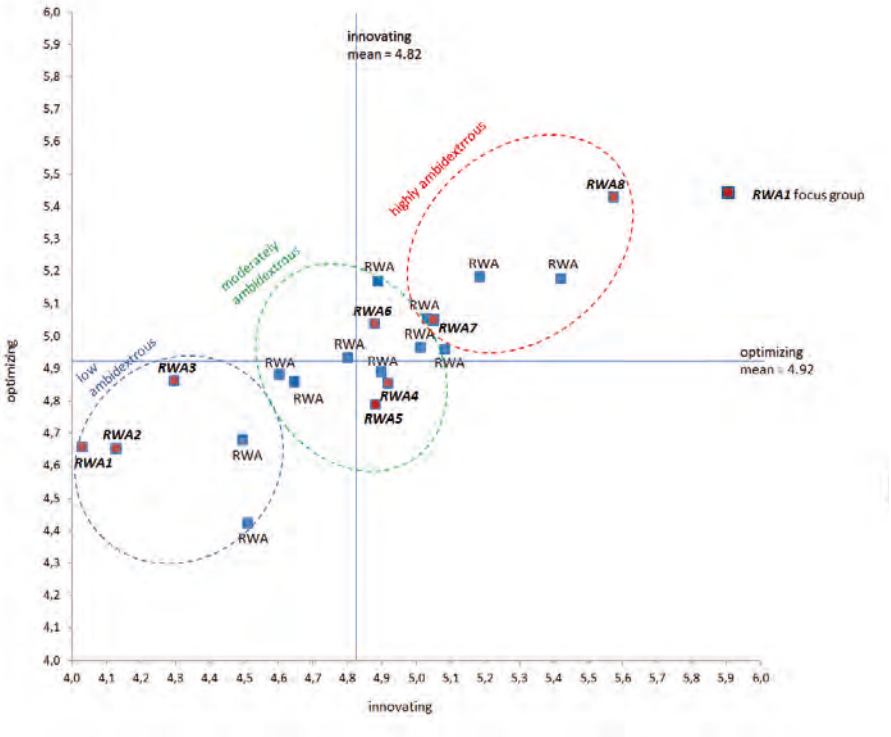

Figure 5.1. Grouping of RWAs on the basis of their scores on innovation and optimization.

The *low ambidextrous RWAs* embrace a strict interpretation of their legal tasks and consider innovation as a high risk activity that in general is not part of their mandate. Important organizational values are cost-reduction and result-orientation. They have no innovation policy. Managers steer on results and costs-reduction, and do not support innovation. In practice innovation is not planned for, taken up when a need is felt, and often kept invisible. There is relatively little attention for optimization.

These results are in line with the survey results for the RWAs in our sample (Gieske et al. 2018; Table 2 in Appendix), that show that high ambidextrous RWAs in their strategic plans and policies systematically analyse the need to either innovate or optimize to enhance performance, and that resources are well divided over the two. With respect to leadership styles the survey results show higher scores on transactional management than on transformational management for low ambidextrous RWAs, and vice versa for high ambidextrous RWAs. The survey results further indicated that in none of these RWAs regular processes and innovation processes are well connected.

Below we will expand the results per organizational antecedent for the three groups.

Table 5.1. Ambidextrous configurations in low, moderate and high ambidextrous RWAs. Overview of the results of the focus groups.

	Low	**Moderate**	**High**
Organizational strategies, policies and procedures	Innovation hardly mentioned in strategic plans, no innovation policy. Some optimization. No ambidextrous design.	Innovation emphasized, sometimes as a goal in itself. Procedures support invention phase of innovation, limited connection with regular operation and implementation. Focus on optimization, e.g. by lean approaches. Structural ambidextrous design.	More integrative strategies that conciliate optimization and innovation activities. Procedures support both innovation and optimization, and connection to organizational goals and regular operation. Contextual ambidextrous design in addition to structural design.
Managerial style	Strong orientation on results and cost-control. Mainly transactional.	Strong result-orientation. Mainly transactional, some transformational.	Orientation on goal attainment, connection, cohesion and learning. More transformational than transactional.
Culture / organizational identity	Strict, legal interpretation of tasks, important values are cost reduction and results attainment.	Future-oriented task orientation. Want to be seen as "innovative". Result-orientation.	Societal value-oriented task orientation. Innovation and optimization both valued.
Informal routines	Innovation takes place, initiated by entrepreneurial employees, but is (kept) invisible.	Innovation on the job and/or as a project. Strategic innovative intent hardly inculcated in practices.	Innovation on the job and/or as a project. Strategic intents and practices more aligned.

Highly ambidextrous water authorities

Strategic plans, policies and formal procedures. These RWAs have embedded innovation in their strategy, policies, work processes and internal and external communication. In their view innovation is necessary to create societal value. Ambitions and visions give direction and focus, in conjunction with other focal areas such as service provision, organizational development and information technology. They involve a wide range of external stakeholders when developing their visions and policies, including unusual parties. An employee of RWA7 explains: '*We have*

our visions, our Delta vision. [..] We formulated that vision with all stakeholders. [..] We asked very different parties, not the usual suspects, [..] from companies, education, culture, care, ..: "What do you expect from us?" If you incorporate the outside world you create urgency.[..] You create connection [..] and acceleration.' They have been optimizing processes through improvement programs, such as lean management, process certification and computerization. A RWA7 manager says: *'We have been focussing a lot on the quality of processes. Those are all certified. [..] You must put things in your organization in order before you can think of innovation. If you are worried about the datasets you have, or deficient systems..'* Most projects are evaluated systematically. There is systematic attention for organizational development and continuous improvement. Feedback on client processes is used for organizational learning. This is illustrated by a statement of a RWA8 manager*:*
'We consider new service concepts. [..] Make things easier for license applicants or others who deal with us. I think it was a step forward to not only look for innovation of technology but also in client processes. Client processes also support organizational learning because feedback is very quick.'
However, they experience that it is easy to formulate new ideas, but more difficult to bring ideas further into implementation. Evaluating innovations using a business case approach hampers innovation as it does not account for societal values. They feel they created too many internal rules, mainly to avoid risks. And according to a RWA8 manager organizational learning is still fragmented, comprehensive evaluation of the entire policy cycle, or along different organizational levels – from the work floor to top executives and board –, and adapting to what is learned is not well arranged.

Managerial style. These RWAs pay structural attention to leadership development. Mobility of managers is encouraged. New leadership styles are incurred, aiming at inspiring and empowering employees. Managers state that they steer on continuous improvement, connection, cohesion and learning. They mention that they must indicate which way to go, inspire, encourage, deal with resistance, facilitate connections, coach employees and help them establish and use their network. They try to adjust to the individual needs of employees and stimulate them to think of what could be done better or different. They take care that basic processes, data, etc., are in order. However they struggle with the pressure for performance and results. *A RWA7 manager says: I recognize the pressure for performance and tangible results [..]. And that we as managers find it difficult to value non-tangible results. While this is in fact most of our work.*' And in relation to innovation another RWA7 manager says: *'For me the struggle is..we say there is space, there is money, and if you have a good idea, it can always be done. That is the story we tell, and that is what we believe in. However, in practice, people have a planning for the year in which things must be realised, dikes must be built, treatment plants designed. If they then say they want time for innovation. [..] What do we do then? How flexible are we?'*

Culture and organizational identity. These RWAs want to be externally oriented organisations. They value performance, they feel the urge to get things done. However, they decided to no longer focus solely on austerity and core tasks. The RWAs identify with innovation and consider it as a core value. Innovation is considered as a means to an end, i.e. enhancing (future) performance. The employees are encouraged to bring up new ideas and innovations are put on display. They advocate the necessity of continuous improvement as well as renewal, and stimulate employees to contribute. Adagios like *'think different'* are promoted to get the message across that everybody can contribute. As a RWA8 employee explains: *'Our motto "every day a little better" makes it so easy to join in for everybody. You can apply it to big, radical innovations, but also to "I print a little less". [..] It is good that you are working on optimizing and innovation, but one is not more holy than the other.'*

Informal routines. These RWAs prefer embedding innovation in the organisation rather than assigning special teams, such teams should rather help others than carry out innovative project themselves. Small scale innovation get done 'on the job', and large scale innovations get organized as projects. The RWAs also pay attention to mid-range optimizations. A RWA7 employee: *'You see that we have the people, means and competences to do large scale innovations. But the mid-range, the larger optimizations, we were not picking up. [..] Now we score also the mid-range optimizations, they have the biggest impacts, so we decided to include those too.'* Nevertheless, RWA7 managers feel that they often focus too much on *'doing things'* and too little on reflection. And '*shaking the idea-tree*', as a RWA7 employee puts it, is easier than putting it all into action. Implementation would benefit from involving operational and maintenance units earlier. RWA8 managers see disadvantages in their perceived '*brain power'* and '*high critical mass'*, they perceive that sometimes they keep searching for new knowledge and analysing information, and could benefit from faster decision making.

Moderate ambidextrous water authorities

Strategic plans, policies and formal procedures. The strategic plans of these RWAs include long-term goals that take future technological and societal developments into account. Innovation is deemed necessary to achieve those long-term goals. The RWAs have an innovation policy, and allocate budget for pilots. An innovation coordinator or a small group of employees helps initiatives get off the ground. However, as RWA4 and 6 bring forward, strategic plans hardly trickle down to actual practice. Typically in every focus group there were participants indicating that they had not heard about the innovation policy and budget, or were not involved, as this quote of a RWA6 employee illustrates: *'There is an innovation policy and budget, you say? Where can I find that policy?'* Furthermore, innovation is perceived as invention, and implementation is not well arranged and carried out under regular project management regimes.

There is much focus on internal processes and procedures, and effort is put in optimizing these, e.g. by lean approaches. Some state that formalisation has increased in recent years, due to a professionalization of the organisation and increased pressure for accountability. Supportive procedures, for innovation management, but also for knowledge management, evaluation and learning, are often not in place, not known, or felt as '*extra work load*'. A RWA4 manager comments: '*I think we have arranged our processes for an organization that is fully geared to optimizing. And we use those processes for innovation. But they are not designed for that, so you get bottlenecks.'* Another RWA4 manager agrees: '*We want to be innovative, but we treat it as regular work'*. Despite the RWAs efforts to capture everything in policies and procedures some still feel their data and systems are not sufficiently in order to make good innovation decisions.

Managerial style. Most managers steer on goals attainment and delivering on time, within budget and with agreed quality, imposing strict time frames and structures on themselves, their employees and the organization. A RWA6 manager says: *'We create time pressure ourselves, we present a planning to the board that is too optimistic, eliminating other possibilities, [..] we pose structures on ourselves that are too tight. For 80 % we are causing this ourselves. [..] We want to show how well we are in control.'* They value optimization of processes, also because it reduces work pressure and costs. Although some managers promote the concept of the learning organisation and encourage employees to learn from mistakes, most managers acknowledge that they sometimes lack courage and fear the risks of innovation, as the following quote of a RWA6 manager illustrates*: 'There is a fear..[..] we should start showing courage and give space...and accept to fail sometimes.'* They are thus hesitant to encourage and support new initiatives, according to an employee of RWA5 even if the board has a positive attitude to innovation.

Culture and organizational identity. These RWAs value their culture of performance. A RWA4 manager says: *'The RWA has aspects of the public service provider I worked for before. Time, performance, quality, accountability, that is a valuable culture.'* A RWA6 manager states: *'We impose strict structures on ourselves. It is our culture, really. We want it somehow.'* All recognise a risk-averse attitude. Some plea for more safety and trust. A RWA6 employee mentions that they '*prefer certainty over adventure*'. However, as stated above, they do have a positive attitude to innovation. The positive rhetoric about innovation helps in creating energy around the topic. And employees feel encouraged to do things different and to come forward with their ideas and be proud of their successes. However, this positive attitude towards innovation is not felt by the whole organization, as a RWA5 employee explains: *'When we started the [innovation] program [five years ago] the board already said: "We want that everybody in the entire organisation is working on innovation in his or her own way.[...] Think different, act different."[..]But I think we had a separation. We [the innovation team] have regular meetings, and around us there is a small*

group of others, who also take part. We have to change our approach..[to involve more people].' And in RWA4 some feel innovation is over-emphasized and favoured over optimization, hampering the latter.

Informal routines. Small scale innovations are 'just done', besides the regular work, often triggered by a practical problem. Some think this is the case for most innovations, e.g. this RWA6 manager: *'There are a lot of practical problems where colleagues find each other, and find a solution. [...] people were just working on it and then realised: "Hey, wait...this is actually innovation". That is the largest category.'* Bigger innovations are taken up as a project. This differs per task field: large scale innovations are possible in sewage treatment plants because RWAs are in charge. In regional water management innovation is more incremental, as the interaction with the external network is more decisive. Innovation in the field of flood protection is even harder, as dike safety norms set by the national government are strict.

However, general experience is that for a good idea that is well-motivated, i.e. besides efficiency and effectiveness also addressing more immaterial board level interests such as image and publicity, time and money are made available. The informal organisation plays an important role, according to managers and employees of RWA6. If an innovation fits in an existing internal network, it gets done far more easily. A RWA6 *manager says: 'You see that systematic organising and facilitating, we do that very little. I don't know if we have to start doing that. [..] It is also a strength of the organisation, in the informal routes beautiful things can happen very quickly.[..] Systemizing also provokes resistance and power games.'* And entrepreneurial employees get things done, as a RW5 employee says: *'First you have to take some hurdles yourself, not bother too much about the resistance of management. [..] You need to arrange support from a board member [..] You must create room for yourself. [..] Don't ask for permission beforehand.'*

Implementation of innovation is not well arranged, little resources are made available for adapting the innovation and existing processes and regulations. Policy innovations are often not well translated into work processes and regulations. Often organizational units that have to implement the innovation have not been involved or consulted beforehand.

Low ambidextrous water authorities

Strategy, policies and formal procedures. The strategic plans of the low ambidextrous RWAs do not include innovation, although RWA3 has an innovation policy for the sewage treatment section. The RWAs monitor and may adopt innovations that have proven effective in other RWAs. In that case, innovations have to be immediately relevant for the core tasks or actual problems, preferably result in cost-reduction,

and involve proven technology, which fits with existing techniques and procedures. These RWAs focus on the efficient execution of core tasks, on short-term performance and cost control. In the opinion of the focus group participants the RWAs stick to optimizing current processes and techniques as a result of a lack of a longer term vision. An RWA1 employee feels that their cost reduction policy also hampers optimization. The RWAs indicate that they are very conservative related to risks. A RWA3 employee states: *'We don't manage risks, we try to eliminate every possible risk'.*

Managerial style. Managers steer on productivity, on goals attainment and achieving results within agreed time and budget. They do so from a risk averse perspective and a focus on control. As a RWA3 manager says: *'We have an enormous focus on achieving results, on what we have to realise now, and on cost reduction. And we are afraid to take risks. We know we will be held accountable. [..] We do not include innovation in the performance plans of the employees. [...] Thus both [employee and manager] say to each other that there is no time for innovation.'* Managers rather tolerate than stimulate innovation. They indicate that they need commitment and support from the CEO or board level to take up a more initiating and stimulating role. Managers state that (their) previous rejection of innovative initiatives may have discouraged employees. They acknowledge that they focus on optimization, sometimes too long, where an innovation strategy would have been more effective. Employees mention that they would favour more support from management, and a less directive and more coaching leadership style, based on more autonomy and trust.

Culture and organizational identity. These RWAs characterize their cultures as '*conservative*', '*basic*', '*straight-forward*', '*down-to-earth*', '*modest*' or '*inward-looking*'. Dominant values are result-orientation and cost-control. As a RWA2 manager says: *'What you see here is that the values of result-orientation and cost-reduction get accentuated.'* Innovation is perceived as a '*luxury*', or even as a '*hobby*', something that should happen '*on the side*', that is tolerated, additional to the regular work load. A RWA3 employee mentions: *'Innovation is seen as something extra, not as part of how to do your job.'* It is certainly not something to draw attention to or to be proud of. In the words of a RWA1 employee*: '[...] this is not an organisation where you should put the spotlight on it [an innovation], you will just get questions and critique. You better just start. This is the atmosphere, the culture around here.'* Employees and managers expect that they will be held accountable for failure. Market parties (private sector firms) are rather approached with suspicion than with a positive attitude towards collaboration.

Informal routines. There is not a lack of ideas; small innovations take place all the time, especially if they fit within regular budgets. Larger scale innovations also take place but are - often deliberately - not labelled as such. Innovative employees tend

to prefer to '*stay under the radar*'. For a large part innovation 'just happens', is not planned for, but taken up when a need is felt, e.g. following an incident or calamity, on the initiative of an entrepreneurial employee, or after pressure from an external party. Entrepreneurial employees who create support, span boundaries, frame the issue in the right terms, use opportunities, such as national or international programmes that subsidise innovation, can get large scale innovation projects off the ground. *A RWA2 employee says: 'At a certain moment you feel a strong conviction that things can be done much better and newer [...], you think: "what can we do to achieve that", no matter how hard that road can be.'* And when the benefits of an innovation for the core tasks are clear, and it fits in the culture of the RWA, things can go really swift, as a RWA2 employee explains: *'If it fits with the gut feeling of the board, - like we stand for safety, and the story sounds logical -, we don't have to substantiate it all with figures. [..] But for sustainability it is more difficult. We have to calculate [the business case] to the decimal point.'*

5.5 Discussion

The attitude of the RWAs towards innovation is strongly related to their organizational identity. Although the legal tasks of the RWAs are the same, their perspectives on their role in society range from strictly core task-oriented to societal value-oriented. Nevertheless, a strong results-orientation characterises all RWAs. As RWAs are fully funded by the taxes they levy, the relation between performance and costs is quite direct, and transparent by bench marking (Admiraal and Van Helden 2003). Consequently, result-orientation is a very powerful and valued logic in the RWAs, and causes a bias towards optimization.

In low ambidextrous RWA no ambidextrous design (Cannaerts et al. 2016) is in place at all. Moderately ambidextrous RWAs apply a structural and temporal approach (Raisch and Birkinsaw 2009), installing an innovation unit or team and an innovation policy that support the invention phase of innovation, and carrying out innovation as separate projects. As a result of this design implementation of innovations is not well arranged, which causes tensions between innovation teams and operational units. The high ambidextrous RWAs show more contextual ambidexterity (Gibson and Birkinsaw 2004), formulating cohesive strategic visions and plans, encouraging employees to both optimize and innovate, and putting processes in place that support connection to organizational goals and current operation. Implementing innovations also takes place under regular operational regimes, but is legitimized by the cohesive visions, and supported by intra-organizational connectedness and less fragmented organizational learning processes.

Managers struggle with the strong focus on results. They discern that their organizations are burdened with often self-imposed rules, designed to enhance accountability and avoid risk (cf. Hartley et al. 2013; Brown and Osborne 2013).

Managers and employees in the low and moderately RWAs frequently express a fear of being held accountable for failure, whereas managers in the high ambidextrous RWAs seem more tolerant of uncertainty and risk. Managers in low and moderate ambidextrous RWAs adopt a more transactional management style, whereas in the more ambidextrous water authorities managers embrace more transformational management styles, in addition to transactional styles.

In practice small scale innovations take place all the time, if problems call for innovative solutions or employees perceive opportunities for improving their work. This indicates ambidextrous behaviour of employees (Caniëls and Veld 2016) and synergetic effects between optimizing and innovating (Bledow et al. 2009). For larger scale innovations the informal leadership of entrepreneurial employees is important. They are driven by a passion to optimize or innovate their professional practice and to contribute to enhancing public value (Perry 1996; Miao et al. 2018), and either utilize procedures or find their ways around them to bring innovations forward. Reference to the role of entrepreneurial employees was made more often in low ambidextrous RWAs, possibly indicating that innovation in those RWAs is more dependent on individual entrepreneurial activity than in more ambidextrous RWAs. The constituting elements of these practices appear to be mutually reinforcing. A strict legalistic task orientation and risk-averse culture goes along with a transactional, results- and cost-oriented management style and little attention for innovation in strategic plans and policies, which leaves no room for embedding innovation in the daily routines of the organization. As a result informal innovation routines are not connected to formal strategies and organizational goals and the managerial style prevents rather than stimulates innovation. In moderately ambidextrous RWAs future goals-oriented strategies and formal innovation policies allow for and reward formal, legitimate innovation routines within the formal innovation programme, but do not stimulate innovation efforts nor ambidextrous behaviour in regular operations. A different pattern can be observed for high ambidextrous RWAs in which a more open, societal value-oriented perception of responsibilities is reflected in more integrative strategies and intra-organizational alignment, a more transformational management style and more embedded innovation practices. As this context and management style supports ambidextrous behaviour there seems to be less necessity to resort to informal routines. In the high ambidextrous RWAs a positive feedback relation seems to exist between a more ambidextrous strategy, culture, managerial style and formal and informal routines.

5.6 Conclusions

From our analysis of optimizing and innovating practices we have seen that different strategies, procedures, managerial activities and informal routines shape different practices, and that the organization's perspective on its tasks and role in society is decisive for the specific configuration that emerges (Andrews et al. 2009). This

perspective on the organization's identity is grounded in underlying values and norms and results in a different perception of the legitimacy and contribution of innovation. As a result PSOs in a similar context, with similar legal tasks, democratic structures, knowledge and skills (O'Toole and Meier 2014), show very different ambidextrous configurations (Cannaerts et al. 2016) of mutually reinforcing organizational antecedents.

Tensions between innovation and optimization exist and will persist. We have seen several informal 'coping' routines to deal with these tensions, ranging from rather subversive 'under the radar' routines in low ambidextrous RWAs, to 'using the informal network' routines in moderately ambidextrous RWAs, and entrepreneurial strategies of employees in both low and moderate ambidextrous RWAs. However, a more solid approach appears to be the one embraced by the high ambidextrous RWAs. Their external societal value-orientation is reflected in more integrative strategies and procedures that support interaction and mutual reinforcement of innovation and optimization or an informed choice between the two, and the more ambidextrous leadership style of their managers supports ambidextrous behaviour of employees.

Although literature emphasizes the important role of managers in organizing ambidexterity (e.g. Smith and Umans 2015; Trong Tuan 2017), public managers experience considerable tension in fulfilling this role. They are strait-jacketed in result-oriented performance management systems (Wynen et al. 2014) and the abundant rules and procedures installed to safeguard accountability and reduce risks (Brown and Osborne 2013). And they are often not tasked to support innovation, indicating that political and upper echelon support for innovation is important (Bartlett and Dibben 2002).

Dedicated organizational innovation policies and procedures are helpful to support the invention and selection phase of the innovation cycle (Bressant 2005), but the intricacies of implementation and institutionalization in the organization's policies and routines are often overlooked, indicating the need of procedures and allocation of resources that support also the implementation phase (Plimmer et al. 2017; Palm and Lilja 2017). Our study shows that PSOs benefit from contextual ambidextrous designs (Gibson and Birkinshaw 2004) that support ambidextrous behaviour of employees (Caniëls and Veld 2016), in addition to structural and temporal designs.
Our research contributes to the emerging body of literature on ambidexterity in PSOs in several ways. We identified determinants of organizational ambidexterity in PSOs. By comparative analysis of fine-grained empirical accounts of actual ambidextrous practices of similar PSOs we were able to identify different configurations of culture, strategy, management and informal routines related to different levels of ambidexterity. Furthermore our research enhances insights from previous literature that focusses on the contributions of a single antecedent (e.g. the role of managers)

to organizational ambidexterity, as it revealed a close, mutually reinforcing interrelation between those determinants (Boyne 2003). Finally it indicates that contextual designs support the integration of innovation and optimization practices in PSOs.

Ambidexterity is an academic construction that practitioners do not use, as Birkinsaw and Gupta (2013) note. Nevertheless, practitioners in PSOs clearly experience tensions between innovating and optimizing, and struggle with the integration of innovation within their performance management routines as well as in their operational routines. Our findings imply that it is important to strengthen the capacity to deal with these tensions, as innovation and optimization are both needed to enhance public service performance. To strengthen ambidextrous capacity it is important to formulate and communicate an integrative vision and strategy that stimulate the creation of societal value, and to engage in a recurring dialogue at the strategic as well as operational level on the need for optimization or innovation to reach both short-term and long-term goals and enhance performance. Given the impact of the perceptions of organizational identity and role in society, strategic planning and visioning processes can be used as a leverage to support reflection on these perceptions.

To support an ambidextrous context our empirical findings confirm that an ambidextrous leadership style is needed that combines transformational and transactional elements: stimulating new ways of thinking, coaching and motivating employees, ensuring connection and cohesion, and stimulating learning, needs to be combined with steering on results, making performance agreements with employees and facilitating regular work processes. Supporting organizational learning, allowing for learning from mistakes, and developing risk management procedures and competences (Brown and Osborne 2013) are also needed.

Policies and procedures at the organizational level should not only support the invention phase of innovation but should also anticipate and support implementation by ensuring connection to organizational goals as well as to regular operation. Performance management systems should include measures for innovation as well as for optimization and support ambidextrous behaviour and learning both at the individual and unit level, as well as dialogue and comprehensive evaluation on how public performance is best served (Bedford et al. 2018).

This implies that public organizations should not focus on a specific determinant to enhance ambidexterity, but rather pursue a comprehensive approach, by jointly addressing strategy and leadership style, culture and identity, and create a ambidextrous context that empowers managers and encourages and supports employees.

Limitations and further research

Our research concerns a rather specific type of PSOs. Further research is needed to elicit ambidextrous configurations in different contexts, and refine our understanding of the interrelation between the different determinants. A longitudinal design may also reveal how ambidextrous configurations of organizational determinants evolve in time. Furthermore, PSOs operate more and more in networks which are important drivers and sources for continuous improvement as well as for innovation, and thus call for - as well as impact - organizational ambidexterity (Plimmer et al. 2017). Further research may contribute to our understanding of this interrelation. Our research also revealed ambidextrous behaviour of employees. Further research is needed to elicit how their ambidextrous behaviour is influenced by the organizational context, and can be supported by managers (Trong Tuan 2017). Future research could also broaden our insights on the contribution of leadership style to ambidexterity, e.g. considering aspects of distributive styles.

Appendix

Table 1. Measurement scales for innovating, optimizing, ambidextrous procedures and ambidextrous manager (Gieske et al. 2018).

INNOVATING
To improve performance for my work field my organization has during the last five years: Implemented really new policies; implemented really new technology; offered really new services; implemented really new processes; experimented with really new policies or techniques
OPTIMIZING
To improve performance for my work field my organization has during the last five years; Improved existing policies; improved existing techniques; improved existing services; improved existing processes
AMBIDEXTROUS PROCEDURES
We have a strategy or plan that addresses both innovation as well as optimization; we systematically evaluate if either innovation or optimization is required to improve performance; innovation is part of our strategic plan, year plan and team plan; our innovation policy contributes to good innovation processes; we have clear procedures for innovation; regular and innovation processes are well connected
AMBIDEXTROUS MANAGER
Managers: stimulate employees to think in new ways; have vision; look for new opportunities for the organization; coach employees to develop their talents; motivate employees to contribute jointly to the goals of the organization; delegate challenging responsibilities to employees; arrange good working conditions for employees; make agreements on results and rewards; see that agreements are met; live up to agreements
AMBIDEXTROUS RESOURCE ALLOCATION
Our HRM takes innovation into account (in selection, training, career support, personnel evaluation); resources (money/time) are allocated well to regular tasks as well as to innovation; there are enough resources (money/time) for innovation

Table 2. Survey results (Gieske et al. 2018) for the scales (in bold) and items discussed in this article. Items were measured using a 7 points Likert scale.

ambidexterity	**low**				**moderate**				**high**			**all**
RWA	RWA1	RWA2	RWA3	ALL	RWA4	RWA5	RWA6	ALL	RWA7	RWA8	ALL	TOTAL
n	18	33	82	178	52	34	22	284	90	25	134	596
INNOVATING	4,03	4,12	4,30	4,29	4,91	4,86	4,88	4,83	5,08	5,54	5,22	4,74
OPTIMIZING	4,53	4,67	4,86	4,66	4,87	4,86	5,05	4,94	5,10	5,35	5,17	4,91
AMBIDEXTROUS MANAGER	4,19	4,53	4,67	4,49	4,48	4,83	4,58	4,51	4,69	4,52	4,72	4,83
Transformational leadership style	3,91	4,35	4,72	4,48	4,62	4,85	4,84	4,57	4,85	4,54	4,83	4,69
Transactional leadership style	4,47	4,72	4,63	4,50	4,33	4,81	4,31	4,45	4,54	4,50	4,61	4,52
AMBIDEXTROUS PROCEDURES	3,42	3,30	3,93	3,70	4,03	4,23	4,50	3,90	4,25	4,81	4,37	4,00
we have a strategy that addresses both innovation and optimization	3,70	3,23	4,02	3,84	4,03	4,36	4,69	3,95	4,24	5,48	4,55	4,07
we systematically evaluate if innovation **or** optimization is required to improve performance	3,52	3,29	4,04	3,67	3,58	4,06	4,25	3,72	4,20	4,78	4,30	3,88
innovation is part of our strategic plan, year plan and/or team plan	3,48	4,07	4,57	4,38	5,08	4,95	5,77	4,88	5,13	5,44	5,25	4,90
our innovation policy contributes to good innovation processes	3,22	3,17	3,92	3,71	4,27	4,50	4,35	4,00	4,50	5,33	4,75	4,13
we have clear procedures for innovation	3,12	2,79	3,48	3,23	3,63	3,64	3,88	3,36	3,59	4,29	3,68	3,44
regular and innovation processes are well connected	3,46	3,26	3,58	3,36	3,59	3,88	4,08	3,46	3,84	3,53	3,65	3,58
AMBIDEXTROUS RESOURCE ALLOCATION	3,12	3,32	3,42	3,43	3,86	4,15	3,56	3,85	4,27	4,34	4,41	3,87

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Chapter 6

Innovating and optimizing in public organizations: does more become less?

This chapter is published as:

Gieske, H., B. George, I. van Meerkerk and A. van Buuren. 2019. "Innovating and optimizing in public organizations: does more become less?"

Public Management Review.
https://doi.org/10.1080/14719037.2019.1588356

Abstract

To enhance public service performance (PSP), public organizations are challenged to optimize and innovate their processes, techniques, policies and services. But can public organizations go too far when innovating and optimizing? Based on survey data from Dutch water authorities, we show that optimization initially contributes more to PSP than innovation, but its contribution is curvilinear: the impact of optimization becomes smaller the more optimization is conducted. The relation between innovation and PSP is, however, linear. Based on additional qualitative data, we show that ambidextrous water authorities run less risk of over-optimizing and use integrative strategies to deal with innovation-optimization tensions.

6.1 Introduction

The public sector is urged to innovate to enhance public service performance (PSP) and at the same time to continuously optimize current operations in order to enhance efficiency (e.g. Osborne and Brown 2011; Hartley, Sørensen and Torfing 2013). In the last decades the effort from public service organizations (PSOs) to improve quality, efficiency and effectiveness of public services has been influenced strongly by New Public Management (NPM) principles of economic rationalization and business-like thinking. PSOs have imported many business-like concepts, practices and instruments such as performance and strategic management, quality management, more managerial autonomy, a more entrepreneurial and innovative culture, and enhanced 'customer' orientation (George and Desmidt 2014; Pollitt and Dan 2013; Pollitt and Bouckaert 2017). There is indeed evidence that management reforms and performance management practices – on average – contribute to PSP (e.g. Walker, Damanpour and Devece 2010a; Gerrish 2016), although critiques on these reforms and practices remain potent. However, an incessant focus on efficiency and performance measurement can also result in efforts to optimize processes to achieve short term performance targets efficiently, but introduce barriers to innovation, with an inherent risk for the organization's long term results (e.g. Hartley et al. 2013; Bruijn 2002). Scholars argue that PSOs thus face a trade-off between achieving short-term performance goals such as efficiency and effectiveness, and long-term or strategic goals centred more on societal outcomes (Verbeeten 2008).

In this article we enhance our understanding of the improvement of PSP by studying the contribution of discontinuous innovation and of continuous incremental improvement to PSP, and also address the tension between the two. We introduce the term 'optimization' for continuous incremental improvement (Gieske, Van Meerkerk and Van Buuren 2018) to avoid confusion related to the term 'improvement' and its conflation with innovation (Osborne and Brown 2011). Moreover, it is also important to emphasize that optimization in our paper should not be conflated with a sole focus on efficiency, i.e. the constant reproduction of the existing against lower costs or in a shorter time (Behn and Kant 1999), – rather, optimization implies a continuous focus on improving existing services, polices, process and techniques.

The ability to pursue innovation and, at the same time, optimize existing processes, products or services is referred to as ambidextrous capacity (Duncan 1976; Tushman and O'Reilly 1996). Organizational ambidexterity is important because even though innovation and optimization compete for resources in the short term, they are both argued to be necessary (and mutually reinforcing) to enable long-term success (He and Wong 2004; Smith and Lewis 2011). Organizational ambidexterity of private organizations has been studied extensively (e.g. March 1991; Gibson and Birkinshaw 2004; Junni, Sarala and Taras 2013). Studies in the public sector have more recently begun to emerge (e.g. Choi and Chandler 2015; Smith and Umans 2015; Cannaerts,

Segers and Henderickx 2016; Gieske, Van Buuren and Bekkers 2016; Boukamel and Emery 2017).

However, ambidexterity is difficult to achieve. Organizations that are good in either innovating or optimizing run the risk of over-innovating or over-optimizing, which can undermine their performance. If they engage too hastily in innovation at the expense of optimization they may suffer the costs of experimentation and take too many risks without gaining many benefits (March 1991). This can trap an organization in an endless cycle of failure and unrewarding change, the so-called failure trap (Levinthal and March 1993; Gupta, Smith and Shalley 2006) or innovation trap. Over-optimizing organizations stick too long to an optimization strategy where innovation is needed, because of its short-term success and limited risk (March 1991; Levinthal and March 1993; Cannaerts et al. 2017; Sirén, Kohtamäki and Kuckertz 2012; Uotila et al. 2009). The risk of this so-called success trap (Levinthal and March 1993; Gupta et al. 2006) or optimization trap is that organizations may be content to stay on an inferior path and ignore a more promising path (Choi and Chandler 2015). Thus, although optimization activities may initially enhance performance, continuously and consistently optimizing might, in the longer run, diminish it (Uotila et al. 2009). Innovation and optimization traps are indications of the so-called "too much of a good thing effect" (TMGT) (Pierce and Aguinis 2013). As Pierce and Aguinis (2013) point out, the TMGT effect occurs when management practices are taken too far and their initial contribution to performance diminishes the more these practices are used and, eventually, a negative performance impact can even emerge. Relations of this kind typically are curvilinear and follow an inverted U-shape. Škerlavaj et al. (2017), for example, find a curvilinear relation between idea generation and implementation; too much novel and creative ideas lead to fewer ideas actually being implemented.

Quantitative research on the relation between innovation, optimization and PSP is still relatively scarce (De Vries, Bekkers and Tummers 2015; Gieske, Van Meerkerk and Van Buuren 2018). This holds in particular for possible non-linear relationships (Walker, Berry and Avellaneda 2015). This is an important gap as strong pressures on PSOs to enhance efficiency and accountability, and an extensive use of performance measurement systems with their inherent pitfalls of focussing on short term goals and quantifiable results (Verbeeten 2008) may have resulted in a bias towards optimization (De Bruijn 2002; Hartley et al. 2013). It thus seems quite likely that PSOs risk over-optimizing, whereby more optimization no longer contributes significantly to PSP, and innovation might be a more beneficial strategy. Over-innovation in PSOs may seem less likely, however, innovation has long been hailed as the panacea to many maladies of PSOs (Osborne and Brown 2011), and many organizational and management innovations have been introduced under NPM and post-NPM reforms (Hartley 2005; Hartley et al. 2013). Some of the mixed outcomes may be attributed to a too hastily and frequent introduction (Choi and Chandler

2015). For instance, Wynen, Verhoest and Kleizen (2017) find that PSOs with a more turbulent history of reforms are less likely to develop an innovation-oriented culture. Furthermore, evidence of an inverted U-shape relationship between innovation activities and (financial) performance has been reported in private sector literature (e.g. Uotila et al. 2009).

This article contributes to public management research by examining the potentially non-linear relationships between optimization, innovation and PSP, and the tensions between the two, using both quantitative and qualitative data. We study these relationships in Dutch regional water authorities (RWAs), which are functional democracies responsible for regional water management, flood protection and sewage treatment in The Netherlands. The Dutch governance context of a decentralized structure with strong local and regional governments, corporatist tradition and civic society is potentially favourable for public innovation (Bekkers, Tummers and Voorberg 2013). At the same time, NPM-like measures have been implemented extensively in Dutch PSOs over the last three decades, including planning and control, service management, competence management, quality management and performance management (Ter Bogt 2008; Verbeeten 2008; Speklé and Verbeeten 2014). The RWAs in our sample are professional organizations with clear goals and well-defined tasks and are fully financed by the taxes they levy themselves. Their performance is benchmarked yearly. The transparent relation between tasks and taxes allows for well specified performance measurement but may also lure them into the pitfall of focussing too much on optimization. The RWAs have undergone few structural reforms, besides a long history of merging; their number reduced from 125 in 1990 to 21 in 2018. In recent years, they increasingly embrace New Public Governance approaches (Osborne 2006), connecting their goals with those of other governments and stakeholders, with whom they build long-term and trustful relations (e.g. Edelenbos and Van Meerkerk 2015). They have been strongly urged to innovate more (Unie van Waterschappen 2011). They thus provide a good empirical setting to study how PSOs deal with the pressure to both optimize and innovate. In line with the TMGT effect stipulated by Pierce and Aguinis (2013), we expect that, initially, innovation and optimization contribute to PSP. However, this contribution may start to diminish when too much innovation and optimization takes place. By using a mixed method design we (a) quantitatively test these relationships and (b) qualitatively go deeper into the mechanisms behind potential over-optimization or over-innovation. We will test statistically – based on survey data - whether the relationships between optimizing, innovating and PSP are curvilinear, and thus indicate whether optimization and innovation have diminishing returns for PSP. We are interested in "total" or "overall" innovation and optimization – including policies, services, processes and techniques -, and their impact on overall PSP, rather than in the impact of specific types of innovation or optimization carried out at one point in time (Yang and Pandey 2007; Walker et al. 2010a; Walker et al. 2015; Damanpour, Walker and Avellaneda 2009). In the qualitative part of the analysis we conducted

focus groups to research practices that may cause a bias towards optimization or innovation and thus pose a risk of getting trapped in too much optimization or innovation.

This article is structured as follows: We will first review public and private sector literature describing adverse effects of too much innovating and optimizing activities on performance and formulate hypotheses on curvilinearity. Next, we will describe our mixed-methods approach and results. Finally, we will discuss the potential drivers that underlay these results, and describe the implications for public management theory, research and practice.

6.2 Theoretical background

Public service performance can be conceptualized as achieving public goals in an effective and efficient manner, preserving present and future quality of public services as well as legitimacy among stakeholders (Verbeeten 2008). It thus is a multidimensional construct (Andrews et al. 2010; Walker, Boyne and Brewer 2010b), often measured in terms of efficiency, effectiveness, quality, future proofing, responsiveness and legitimacy towards stakeholders (Boyne 2002; Boyne 2003; Yang and Pandey 2007).

Innovation and optimization are both argued to be essential for enhancing performance (March 1991; Damanpour et al.2009; Junni et al. 2013; Uotila et al. 2009; He and Wong 2004). Innovation is generally defined as the implementation of a new – technical, organizational, policy, service or other – concept that changes and improves the functioning and outcomes of the public sector (Hartley 2005; Walker 2007; Damanpour et al. 2009). This concept is perceived as new by an individual or other unit of adoption (Rogers 2003). Innovation is associated with explorative activities, discontinuous renewal of processes, techniques and services, breaking with current mindsets, generating new knowledge and learning new competences, flexibility and experimentation, risk taking and the possibility of failure (March 1991; Hartley et al. 2013; Choi and Chandler 2015). Optimization can be defined as gradual improvement of current policies, processes, techniques, and services, in continuity with the past (Osborne and Brown 2011; Moore 2005). Optimization is associated with exploitative activities, incremental improvement, refining current practices, exploiting existing knowledge and competences, within current mindsets (March 1991; Jansen, Van den Bosch and Volberda 2006; Hartley et al. 2013; Choi and Chandler 2015).

Organizations may have a preference for either innovating or optimizing, which – following the Miles and Snow (1978) model – can also be labelled as a more prospecting (i.e. innovation) or a more defending (i.e. optimization) strategy, or not develop a coherent strategy at all and mainly take a reactive stance (Boyne

and Walker 2004; Andrews et al. 2009). However, the Miles and Snow typology includes another strategic approach, that of 'analysers' that balance prospective as well as defensive elements, and create structures and processes that both allow innovation as well as optimization (Miles et al. 1978). These analysers, which are equally dextrous in continuously optimizing current processes, products and services and developing and implementing new ones, are also generally referred to as ambidextrous organizations (Duncan 1976; Tushman and O'Reilly 1996; Bryson, Boal and Rainey 2008; Smith and Umans 2015).

However, ambidexterity is hard to achieve, as patterns of learning associated with innovation and optimization tend to be self-reinforcing often to the exclusion of one another (Bedford, Bisbe and Sweeney 2018). In private sector literature approaches to deal with the tension between innovation and optimization are well studied. Dual approaches aim at separating the two in time or space, whereas trade-off approaches treat this tension as a dilemma and advocate finding an optimal comprise or balance, and dialectic approaches seek to identify synergies and integration (Smith and Lewis 2011; Lövstål and Jontoft 2017). Paradoxical 'both-and' approaches assume that tensions persist and are beneficial, and aim at dealing with competing interrelated demands simultaneously, accepting as well as resolving the tensions (Smith and Lewis 2011; Lövstål and Jontoft 2017), and are widely advocated (e.g. Gibson and Birkinsaw 2004; Andriopoulos and Lewis 2009). Private sector research has provided evidence of positive performance impacts of ambidexterity (Gibson and Birkinshaw, 2004; He and Wong, 2004; Jansen et al. 2006). However, relations between innovation, optimization and performance are complex and contingent upon factors such as environmental dynamism (Jansen et al. 2006), are mediated by organizational factors such as strategic learning (Sirén et al. 2012), and may be curvilinear (Uotila et al. 2009). Below we will formulate hypotheses on the nature of the optimization and innovation relationships with PSP. As there is not much quantitative research on these relationships in public sector research we will partly build on private sector research.

PSOs have imported a range of performance management techniques and instruments to enhance efficiency and quality of processes and services, and transparency of outcomes, including rational planning, target setting and budgetary control, lean management, and performance measurement (Arnaboldi, Lapsley and Steccolini 2015; George et al. 2017). In a meta-analysis of the impact of performance management, Gerrish (2016) finds a (small) positive impact on PSP for a wide range of policy fields. Nevertheless, longitudinal studies are almost absent, and performance management in PSOs is inherently complex, the effectiveness of the imported business-like management systems is contested (e.g. Radnor and Osborne 2013) and authors have warned for the potentially negative impact on innovation (Arnaboldi et al. 2015; De Bruijn 2002; Hartley et al. 2013). As stated above, short term benefits of optimization strategies, emphasizing short term results and efficiency of work

processes, may lead to over-optimization and prioritizing efficiency over effectiveness of public services, and could hamper long term performance (e.g. Hartley et al. 2013). Adverse effects of 'too much' results-based management were found by Yang and Pandey (2007), who show for American state health and human service agencies that results-based management changes, including strategic management, customer orientation, quality improvement and benchmarking, initially have a positive relationship with public responsiveness, but that this relationship has an inverted U-shape, i.e. with diminishing returns and eventually even having a negative impact. Furthermore, Andrews and Boyne (2011) find for English local authorities that the impact of their corporate capacity, i.e. the administrative capacity to manage financial and human resources, on PSP follows an inverted U-shaped pattern: the initially positive impact becomes weaker and, eventually, turns negative around the mean for effectiveness and cost-effectiveness. Andrews, Boyne and Mostafa (2017) find that administrative intensity has an inverted U-shaped relationship with PSP in UK universities, with a tipping point of one standard deviation above the mean. Private sector research indicates that large companies also run the risk of overemphasizing optimization. For instance, Uotila et al. (2009) show that large companies over-engage in optimization and that approximately 80% of the 279 firms in their sample engage in suboptimal levels of innovation.

Taking stock of the theoretical and empirical insights on potential optimization traps we conclude that these traps do occur in public as well as private organizations. We thus hypothesize:

H1: The association between optimization and PSP is curvilinear – implying that the positive impact of optimization on PSP diminishes the more optimization is conducted.

Scholars and practitioners (e.g. Alburry 2005; Hartley et al. 2013; Torfing and Triantafillou 2016) as well as national governments and international institutions like the EU and OECD (Bason 2018; Arundel, Casali and Hollanders 2015) underscore the need, urgency and benefits of innovation to enhance PSP. Innovation is often portrayed as inherently good (Osborne and Brown 2011), something PSOs and public servants ought to do, thus constituting a moral 'imperative' to innovate (Jordan 2014). Several quantitative studies on the relation between innovation and PSP provide evidence for innovation's positive impact. For instance, Damanpour et al. (2009) find a positive relation between a combination of innovation types (service, technological and administrative) and PSP of local governments (see also Naranjo-Gil 2009). Walker et al. (2010a) find a positive relation between management innovation and PSP, with a mediating effect from performance management. However, the extensive positive overtones, pressures by higher tiers of government, and desire to stand out as 'innovative' PSO may draw necessary resources away from other government services (Jordan 2014), lead to rhetoric reframing of

improvements as 'innovations' (Osborne and Brown 2011), and disregard the costs of failure (Choi and Chandler 2015). Studies that report negative results of innovations are extremely rare, and mainly report on the negative impact of too frequently or too hastily introduced structural reforms on innovativeness (Wynen et al. 2017). For evidence of a potential innovation trap, i.e. non-linear relations between innovation and performance, we thus turn to private sector literature. Uotila et al. (2009) find an inverted U-shaped relationship between innovation and financial performance of 279 firms in a longitudinal analysis over a 14 year time period, analysing the relative share of reported innovation versus optimization activities. Similar results are found for SMEs (Kim and Huh 2015; Kreiser et al. 2013).

Private sector literature thus points to a potential negative impact of "too much" innovation on performance. For the public sector we found no quantitative study indicating such an impact. However, given the findings that innovation does contribute to PSP, but that the high expectations concerning the impact of innovation on the functioning and outcome of PSOs are often accompanied by a strong and moral appeal to innovate and induce risks of over-innovation, we hypothesize:

H2: The association between innovation and PSP is curvilinear – implying that the positive impact of innovation on PSP diminishes the more innovation is conducted.

6.3 Methods

We have applied a mixed-method approach to answer our research question. We followed a two-step approach. Firstly, we conducted a survey among 667 respondents in 22 RWAs in the Netherlands, measuring innovation, optimization and PSP, based on the perceptions of organizational staff. We used staff perceptions as secondary data on the water authorities do not provide information concerning optimizing and innovating, and performance is expressed as compliance against policy norms of higher tiers of government, which shows little variation between RWAs and is also a rather technical and unidimensional measurement of PSP (Unie van Waterschappen 2018; Tillema 2007). Measuring individual perceptions thus allows for a broader assessment of our constructs, e.g. by including items on legitimacy, alignment with stakeholders and future-proofing in the performance scale. We analysed the quantitative data and investigated possible curvilinear relationships using OLS regression analysis in Stata. In the next step, we discussed actual innovation and optimization practices in focus groups in 10 RWAs, with in total approximately 120 participants, and evaluated the qualitative data to find information that may indicate innovation or optimization traps, and help understand underlying causes. As such, we applied a sequential explanatory mixed method design where we first sought to identify broader relationships using quantitative data and then more strongly contextualize these relationships using qualitative data (Creswell 2014).

Phase 1 Quantitative analysis

Data collection

We collected data in February 2016 through an e-mail survey among the staff of the 22 RWAs involved in primary tasks in the fields of regional water management and sewage treatment. The survey was distributed by the top management to organizational units responsible for activities within the primary task fields, i.e. flood risk management, surface water quality and quantity management, and waste water treatment; activities include policy and planning, regulation and enforcement, and construction and maintenance. Supportive services, such as administrative or financial units were not included. In total 667 surveys were completed. The overall response rate is 33%. Respondents were asked to indicate whether they were a manager (18%), process- or project leader (34%), process- or project employee (44%), or 'other' (4%). Furthermore they were asked to indicate their task field: flood protection (15%), water quantity management (27%), water quality management (11%), sewage treatment (22%), or overarching (25%). Eighteen percent of the respondents was female. The average age was 47.

Measures

We built on existing scales that we adapted to the context of Dutch water authorities and the phrasing commonly understood in this context (see Table 6.1). In line with earlier research, we used comprehensive scales that aggregate different constituting elements of our constructs to measure innovation (5 items), optimization (4 items) and PSP (6 items) (Yang and Pandey 2007; Walker et al. 2010a; Walker et al. 2015; Damanpour et al. 2009). See Table 6.1 for the items as well as reliability and validity measures. All items were measured using a 7-point Likert scale ranging from totally disagree to totally agree.

Table 6.1. Measurement scale for innovating, optimizing and public service performance, including factor loadings and reliability coefficients.

Innovating (adapted from: Jansen et al. 2006; Popadiuk 2012; Prieto and Pérez Santana 2012)
To improve performance for my work field my organization has during the last five years: implemented really new policies (0.7); implemented really new technology (0,704); offered really new services (0.667); implemented really new processes (0,659); experimented with really new policies or techniques (0.748) (AVE=0,606, CR=0,824, Cronbach's alpha 0,825)
Optimizing (adapted from Jansen et al. 2006, and aligned with scale for innovating)
To improve performance for my work field my organization has during the last five years: Improved existing policies (0.767); improved existing techniques (0.755); improved existing services (0.821); improved existing processes (0.746) (AVE=0.597, CR=0.856, Cronbach's alpha 0.848)

table continues

Public service performance (adapted from Gibson and Birkinshaw 2004; Prieto and Pérez Santana, 2012; Klijn, Edelenbos and Steijn et al. 2010; Bontis, Crossan and Hulland 2002)
My organization has improved performance over the last five years for my work field on: efficiency (same results against lower costs or faster) (0.742); quality (we deliver more quality against similar costs and time) (0.781); effectiveness (we reach our goals better) (0.741); collaboration (we reach our goals better combining those with the goals of others) (0.709); legitimacy (stakeholders are satisfied with the water authority) (0.602); future proofing (we can face the future with trust, expected future developments are included in policies and plans) (0.669) (AVE=0.504, CR=0.858, Cronbach's alpha 0.856)

Reliability and validity

Convergent and discriminant validity of the measurement scales were examined, based on confirmatory factor analysis. Factor loadings were larger than 0.60, above the conservative cut-off level of 0.5 (Hair et al. 1995), which demonstrates convergent validity (Table 6.1). Furthermore, the composite reliability indexes of the constructs were above 0.80, exceeding the 0.60 threshold (Fornell and Larcker 1981). Average Variance Extracted (AVE) was above 0.50, further demonstrating convergent validity. Corrected item-to-total correlations were greater than the general threshold of 0.40 (Field 2005). Cronbach's alphas were above 0.8, exceeding the widely accepted cut-off value of 0.70. The AVE of the constructs were larger than the corresponding squared inter-construct correlations (SIC), revealing the distinctiveness of each construct and thus discriminant validity. Finally, we calculated the Heterotrait-Monotrait ratio (HTMT) of correlations, which has been argued to be a more robust method to assess discriminant validity and requires looking at the average of the heterotrait-heteromethod correlations (i.e. correlations of items across all variables) relative to the average of the monotrait-heteromethod correlations (i.e. correlations of items within the same variables) (Henseler, Ringle and Sarstedt 2015). All HTMT ratios were below the proposed cut-off of .90 (Teo, Srivastava and Jiang 2008), with values of .88 (innovation), .72 (optimization) and .85 (PSP) respectively.

Common source bias

There are two important reasons why common source bias is not of concern to our analysis. First, in this study, we hypothesize and test nonlinear relationships between innovation, optimization and PSP. Finding significant nonlinear relationships cannot be the result of common source bias – as was demonstrated by Siemsen, Roth and Oliveira (2010). Indeed, if anything such bias would work against our hypotheses, not for them. Second, we complement our survey data with qualitative data. This allows us to cross-validate the reliability of the uncovered statistical results while simultaneously providing further clarification and deepening of the findings (George and Pandey 2017).

Descriptive statistics and correlations

Descriptives and correlations between variables are reported in Table 6.2. There is a strong correlation between perceived levels of optimization and innovation. The relationship is a bit stronger compared to private sector findings (e.g. Gibson and Birkinsaw 2004; Cao et al. 2009). The mean for optimization is higher than that for innovation, indicating that respondents agree more with the statements that their RWA has engaged in optimizing activities in the last five years.

Table 6.2: Means, standard deviations and correlations.

		SD	Mean	1	2
1	Public service performance	0.93	4.75		
2	Innovating	1.14	4.7	.590**	
3	Optimizing	1.09	4.87	.663**	.658**

**. Correlation is significant at the 0.01 level.

Statistical analysis

In order to test H1 and H2, we employ OLS regression analysis using Stata. First, we construct a linear model where PSP is the dependent variable and innovating, optimizing as well as the controls are the independent variables. Second, we construct a non-linear model by adding the squared terms of innovating and optimizing. Such an approach is typically used to assess non-linear relationships (see, for instance, Andrews and Boyne 2011). Before constructing the model we need to make sure that we adhere to the assumptions of OLS regression modelling (Lee, Benoit-Bryan and Johnson 2011). Our respondents are clustered in different organizations and are thus not independent – we account for this issue by using clustered standard errors at the organizational level. Our dependent variable is an aggregation of separate survey items which means that the variable is continuous; linear regression modelling is preferred. Heteroscedasticity can be a problem when using OLS. We controlled for this issue by using the robust standard errors option in Stata. Another potential issue is multicollinearity. The variance inflation factors (VIFs) of the independent variables are, however, all below 5 thus suggesting the absence of multicollinearity.

Phase 2: Qualitative analysis

Data collection

Following this quantitative research we did qualitative research on the innovation and optimization practices of the RWAs using focus groups. Focus group discussion is an efficient technique for qualitative data collection on personal as well as collective opinions and experiences (Robson 2002; Robinson 1999; Ryan et al. 2014). They

allow for natural quality controls on data collection as participants interact and discuss and thereby tend to provide checks and balances on each other and extreme views tend to be weeded out. Furthermore, group dynamics help in focusing on the most important topics and it is more easy to assess the extent to which there is a consistent and shared view (Robson 2002; Robinson 1999).

We sent an invitation to all RWAs, ten RWAs were willing to participate. The participating RWAs are well distributed geographically, as well as over the score range (means per RWA for innovating, optimizing and PSP range respectively between 3.94 and 5.8, 4.62 and 5.8, 3.86 and 5.26) and include the RWAs with the lowest (RWA1) and highest mean scores (RWA10) of the 22 water authorities. Per RWA we convened two focus groups: one with managers and one with employees. This design was chosen because the responses of the different functional groups differ significantly (managers score higher compared to process- or project leaders, and even more so compared to process- or project employees) and because of the different roles of managers and employees. This design enhances safety for employees in expressing conflicts and concerns and reduces the risk of influence of hierarchy and power dynamics (Robson, 2002). Group sizes ranged from 4 to 8, resulting in approximately 120 participants in total.

We followed a semi-open design that allowed participants to formulate personal opinions and experiences as well as explore and express collective experiences (Ryan et al. 2014) guided by the following questions: 'In relation to innovation and optimization: what characterizes the current practice within the RWA, what works well in this water authority and what could be improved?' We expected that discussion on the first questions would reveal formal and informal routines that are helpful for innovation and optimization, and the reverse for the third question. We did not question 'over-optimization' or 'over-innovation' directly, but let discussions evolve naturally around the practices of innovation and optimization in order to get a broad perspective of these practices.

We coded the transcripts of the group discussions in two steps. First, we focussed on formal and informal practices, to obtain an understanding of espoused and actual practices of innovation and optimization (Brown and Duguid 2000). Understanding the actual, non-canonical practices may help to reveal clues on the underlying mechanisms or causes for a stronger focus on optimization or innovation. We thus coded for formal strategies, policies and procedures for innovation and optimization and for informal routines, the latter including remarks on actual practices as well as remarks that reflect perceptions of norms, values and identity. The second step in our coding consisted of identifying remarks that describe something that occurs "very much" or "too much", or that indicates an optimization trap or an innovation trap.

6.4 Results

Phase 1: Quantitative analysis

Table 6.3 presents the results of both the linear and non-linear model. First, we discuss the linear model. This model explains about 51% of variation in PSP and is statistically significant. Both innovating and optimizing have a significant positive association with PSP, with optimizing having a seemingly stronger association (i.e. higher coefficient). Second, we discuss the non-linear model. This model slightly outperforms the linear model by explaining 52% of variation in PSP. It is also statistically significant. Although the difference in R Square between the linear and nonlinear model is seemingly small, the change in F-value does signal that the nonlinear model fits the data better than the linear model. The model indicates that

Table 6.3: Linear and nonlinear models predicting public service performance.

Variables	Linear model		Nonlinear model	
	B	s.e.	B	s.e.
Constant	1.915***	.202	1.346**	.403
Innovating	.225***	.042	-.135	.208
Innovating^2			.041$^+$	.021
Optimizing	.386***	.049	.996***	.181
Optimizing^2			-.067**	.017
Function (manager is reference)				
Project leader	-.216	.142	-.236$^+$	.134
Project employee	-.154	.113	-.157	.102
Other	-.215*	.096	-.220*	.084
Education (university is reference)				
HBO (higher vocational education)	.031	.065	.021	.066
MBO (secondary vocational education)	-.268**	.074	-.271***	.060
Other	-.700**	.206	-.576***	.107
Task field (flood risk management is reference)				
Water quantity management	.149$^+$	.084	.183*	.081
Water quality management	.191$^+$	.094	.218*	.095
Sewage treatment	.248*	.101	.272*	.100
More than one	.072	.061	.094	.056
N	571		571	
F-value	174.73***		198.39***	
R^2	.513		.524	

there is a curvilinear association between optimizing and PSP (i.e. we accept H1) but not between innovating and PSP (i.e. we reject H2). Specifically, the coefficient for optimizing is significant and positive whereas the coefficient for its squared term is significant and negative. This indicates an initially positive association between optimizing and PSP that starts to diminish the more optimization is conducted. In both the linear and nonlinear model, the control variables show similar results – which indicates model stability. In Figure 1, we visualize the significant nonlinear association between optimizing and PSP including the accompanying 95% confidence interval. This figure clearly shows a "flattening-out" of the contribution of optimizing, indicating that optimizing initially helps enhance PSP, but the more optimization is being conducted, the weaker the performance impact becomes.

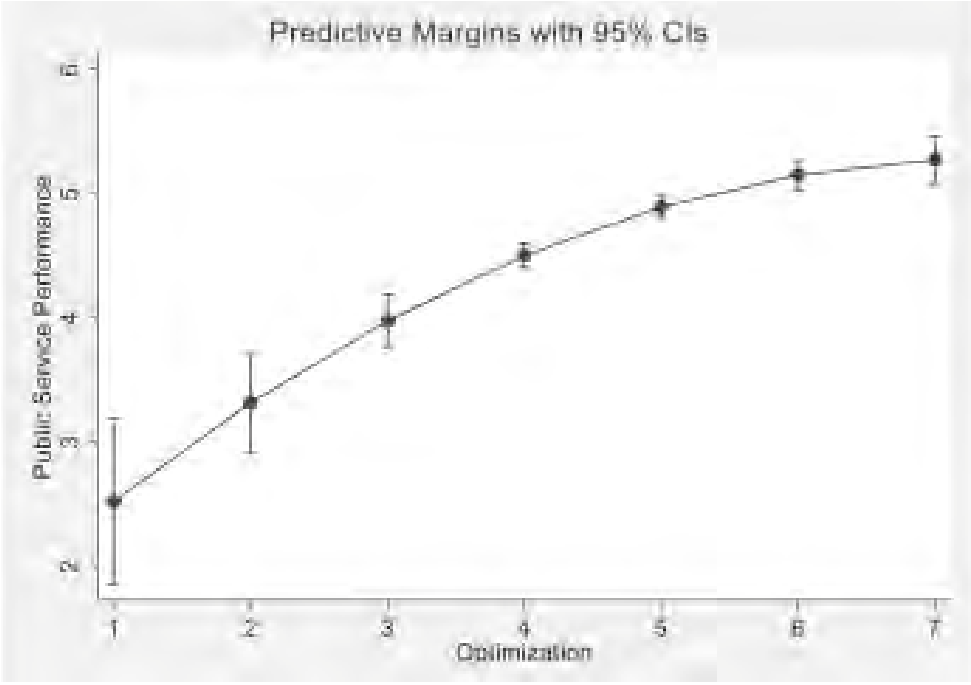

Figure 6.1: Nonlinear relationship between optimization and public service performance

To quantify these diminishing returns of optimization, we have added the predicted values of PSP for different values of optimization in Table 6.4. When optimization moves from 1 to 2 on a 7 point scale, performance increases with about 11%. However, when optimization moves from 6 to 7 on a 7 point scale, performance increases with only about 2%. Clearly, these diminishing returns are significant.

Table 6.4: Diminishing returns on public service performance (PSP) of more optimization.

Optimization value	PSP value	Delta-method s.e.	delta PSP (%)	t	95% confidence interval
1	2.524	.322		7.85	[1.855, 3.193]
2	3.319	.195	11.4	17.04	[2.914, 3.723]
3	3.979	.102	9.4	39.13	[3.767, 4.190]
4	4.504	.047	7.5	96.11	[4.407, 4.602]
5	4.895	.040	5.6	123.85	[4.813, 4.978]
6	5.152	.056	3.7	91.66	[5.035, 5.269]
7	5.274	.091	1.7	57.70	[5.084, 5.464]

Controls

To control for potentially confounding variables, several respondent characteristics were added as controls in the model (see Table 6.3). We included characteristics that could potentially associate with perceived PSP (Choi and Rainey 2010), i.e. the function of the respondent (manager, project/process leader, project/process member, or other), the work field in which the respondent is active and the level of education. We constructed dummy variables for these controls to include them in the analysis. There are significant relationships with PSP for education, function and task field. Respondents with a lower level of education generally scored PSP a bit lower than those with a higher level of education, as do respondents with function "other", i.e. administrative roles. A possible explanation may be that being in lower level functions, for which a lower level of education is required, or in administrative roles, makes it harder to overview the overall innovating and optimizing efforts as well as performance gains in a task field. Respondents from the field of flood risk management judge PSP significantly lower than respondents from other fields. This is not surprising as this is the most strongly regulated task field, with legally prescribed procedures of testing against national norms and high standards for construction and maintenance. Thus for this task field enhancing PSP is inherently less easy and presumably least necessary.

Phase 2: Qualitative analysis

Optimization

In this section, we investigate why optimization does – as expected – have a curvilinear relationship with PSP in the RWAs. Our qualitative results support and refine our quantitative findings, as we will elaborate below. The RWAs apply results-based management, draft obligatory strategic plans, and engage in different types of formal improvement processes. They apply lean techniques, standardized and ISO-

certified work processes, implemented Plan-Do-Check-Act approaches to evaluate policies and projects, and encourage improvement proposals from the work floor. The following quote of a RWA7 employee illustrates this: '*I think we have arranged our processes for an organization that is fully geared to optimizing.*' Some RWAs focus predominantly on optimizing current processes, e.g. this RWA1 manager says: '*Let us take care that the things we do now are within time and budget first, before we start to think about innovation*'. Some RWAs realize in hindsight that they have been focussing on optimization too long, e.g. a RWA2 manager states: *'Now we take another route, but that took a long time, had there been someone with an innovative mind five years ago [...], it could have started five years earlier*. Others are conscious of the risks of over-optimization: a RWA9 manager remarks: '*But we must think of something new [..]. we are still fine-tuning our system, but that knob cannot be turned any further*.'

Underlying causes may be inferred from statements that indicate that RWAs focus too much on optimization: In RWA1 and 2 there is a strong focus on cost control. In RWA1 budgeting of resources is strict, detailed and austere. A manager of RWA1 remarks: '*Financially we have locked ourselves in*'. An employee of RWA1 thinks that this hampers optimization: '*You steer very much on costs, so your performance is the same against lower costs. But, as a result there is less and less space for optimization in your performance*.' In RWA2 the response to the obligatory strategic plan is one of disinterest, it is: '*just another plan, but we will keep controlling on costs as usual*.' RWA1, 2, and 3 also feel there is too much focus on short term results. A lack of urgency is perceived related to future challenges. Some state that they would need a long term vision or a strategic agenda, and mention they tend to get caught in the '*delusion of the day*'. There is a strong inward focus, e.g. managers of RWA3 mention they do not feel encouraged to explore new knowledge or developments, that joining external events is '*not done*', and market parties are viewed with suspicion.
In all RWAs (except RWA10) managers and employees mention a high pressure to deliver results within time and budget. They value their results-based approach, a manager of RWA8 says: '*We all value the perspective of the performing government. [...] Hours, performance, quality, accountability*.' This shared value creates a high work pressure, a manager of RWA7 states that '*work pressure is huge, prohibitive [of innovation]*'. Others mention it inhibits reflection and learning. However, managers are self-reflective of their roles: '*We create time pressure ourselves, we present a planning to the board that is too optimistic, eliminating other possibilities, [...] we pose structures on ourselves that are too tight. [..] we want to show how well we are in control*' (manager RWA6).

There is a general understanding that there are (too) many procedures, reinforcing familiar routines and fixed patterns. An employee of RWA6 states: *'I can't think of anything that we don't have a process or procedure for'*. Procedures are often installed to avoid risks: '*We create a lot of superfluous rules, out of fear something*

goes wrong' (manager RWA10). The strong focus on risk avoidance and scrutinizing mistakes reinforces the focus on optimization. A RWA3 employee states: *'We don't manage risks, we try to eliminate every possible risk'*. Finally, participants address a tendency to adhere to fixed patterns, by themselves: '*You often think in the same patterns*' (RWA5 manager), or by their colleagues: '*the operational team is a bastion of traditional morals*' (RWA3 employee).

Thus, mechanisms that induce a bias towards optimization and a risk of over-optimization in the RWAs are (a) a strong focus on cost control and short term results, (b) the pressure to perform and the role of managers therein, (c) a primarily inward focus and abounding procedures that enforce fixed patterns in thinking and behaviour, and (d) risk avoidance and scrutiny of failure and limited learning.

Innovation

In this section, we investigate why the relation between innovation and PSP in the RWAs – counter to our expectation - is not curvilinear.

There are some indications in our qualitative data that RWAs may occasionally engage too much in innovation, or find it hard to implement their innovative ideas. Some board members and upper echelon managers have explicit ambitions, e.g. to belong to the top 5 of the most innovative water authorities. In RWA7 an employee notes that this ambition hampers optimization: '*Small optimizations are part of the job. They are seen as self-evident. But bigger optimizations, that we cannot do ourselves, that we need money for, become projects. And then often priority is given to innovative projects.*' In RWA9 innovation is stimulated from an organisational learning perspective, but a RWA9 employee remarks: '*We are very good in shaking the idea tree. You get a lot of ideas. But how to bring them further?*' And a RWA10 manager says: '*You see that other RWAs have faster implementation times. We have so much brain power. We are super strong in thinking, making plans, but implementation lags behind.*'

However, when referring to their innovation practices participants more often mention that optimization and short term results are prioritized over innovation and that managers are hesitant to engage in innovation or to allow employees to do so. Innovation takes place in a cautious and rational approach, e.g. piloting and upscaling of innovative concepts has to be supported by business cases in all RWAs. In line with the findings on optimizing practices, that show a strong focus on results, optimizing current work processes and risk avoidance, over-innovation does not seem a big risk within the RWAs.

Differences in strategic orientation

However, there are differences between the RWAs. RWA1, 2 and 3 focus on short term results and cost efficiency is mirrored by a restrained attitude to innovation, which is not considered part of their mandate and is not included in formal policies. In the Miles and Snow (1978) categories for strategic orientations they could be classified as 'defenders', i.e. organizations that take a conservative view on new developments and focus on improving the efficiency of their existing operations (Andrews et al. 2009). This is in line with the quantitative results: the mean scores for innovating, optimizing and PSP for these RWAs are below average (i.e. respectively 3.94 - 4.38; 4.62 - 4.95; 3.86 - 4.79).

RWA4-8 engage in all kinds of optimizing processes, recently mostly applying lean methods (Radnor and Walley 2008), as well as in formalized innovation policies. They thus show, in terms of Miles and Snow (1978), defending as well as prospecting activities. However, they encounter difficulties synchronizing innovation and optimization, due to their results-based approach and huge work pressure that leads to considerable tension between innovation and optimization processes and to prioritizing regular activities, which induces a bias towards optimization. Besides, separating innovation in dedicated teams, projects and programs hampers integration in regular work processes, policies and regulations. Their scores for innovating, optimizing and PSP range around average (i.e. respectively 4.57 - 4.99; 4.85 - 5.11; 4.58 - 5.03). RWA9 and 10 embrace a more societal value oriented perspective on PSP, and see optimization as a prerequisite for innovation. In their view stimulating innovation also contributes to avoiding fixed patterns in thinking and behaviour. These are the most ambidextrous organizations, 'analysers' in the Miles and Snow-typology, they continuously search for new opportunities and experiment with responses to emerging trends, as well as improve their incumbent policies, processes and services, in order to enhance their contribution to societal value. Their scores for innovating, optimizing and PSP are above average (i.e. respectively 5.04 - 5.8; 5.05 - 5.8; 5.01 - 5.26).

Dealing with tensions

When asked what could be improved, managers and employees mention: developing a long term vision (RWAs 1 - 3), embracing a more integrative approach to innovation and optimization and ensuring better internal (RWAs 4 - 8) and external connections (RWA 3). They also mention that they should ask themselves and each other '*the innovation-or-optimization question*' on a regular basis (RWAs 1 - 8). Furthermore, all RWAs call for more comprehensive performance management systems that include measures for innovation as well as for optimization. They acknowledge that they should improve their proficiency in risk management. The RWAs also see room for improving organizational learning, ranging from merely '*closing the PDCA-cycle*'

(RWAs 1 - 3) to improve learning '*over the policy cycle and between work floor, management and board*' (RWA 10). Finally, they mention that support of board or upper-echelon members for innovation is needed (especially RWAs 1 - 3).

6.5 Discussion

Our quantitative analysis revealed that optimization initially contributes more to PSP than innovation. However, the relation between optimizing and PSP is curvilinear, as we hypothesized, indicating that at high levels of optimization the impact of even more optimization on PSP is limited. Our qualitative analysis indicates an over-engagement in optimization. Mechanisms behind over-optimization are a focus on predictable short-term results, cost-efficiency and limiting risk (Levinthal and March 1993; Uotila et al. 2009; De Bruijn 2002; Arnaboldi et al. 2015). In line with these findings the focus group discussions revealed a strong results-based approach and focus on risk avoidance, whereby current performance is mainly enhanced by optimizing existing policies, processes, technologies and services. However, our qualitative analysis also allowed us to refine this finding, revealing differences between the RWAs. RWAs that embrace a more defending strategy score below average on optimizing, mainly due to their strong focus on cost-efficiency, indicating that increasing their optimization efforts is still beneficial for them (Boyne and Chen 2006). As they mainly engage in optimizing they nevertheless run the risk of over-optimization, when innovation would have been more beneficial. Examples of over-optimization were mentioned by participants of these RWAs. RWAs that embrace a combination of prospecting and defending strategies encounter difficulties synchronizing innovation and optimization, as their results-based approach and huge work pressure lead to prioritizing regular activities and following existing routines, which induces a bias towards optimization, whereas the returns on their optimizing efforts already start to diminish. As such, these RWAs also run a risk of over-optimization. The scores of the more ambidextrous RWAs – 'analysers' in the Miles and Snow-typology – are already within the realm of diminished returns on PSP. However, they are aware that further optimization efforts of existing policies, processes and services are hardly beneficial and insufficient to answer future challenges. Because of their greater ability to combine innovation and optimization they run less risk of over-optimization.

We hypothesized a nonlinear relationship between innovation and PSP, mainly based on theoretical arguments (Choi and Chandler 2015) and private sector findings (e.g. Uotila et al. 2013; Kreiser et al. 2013). Our quantitative results indicate that the contribution of innovation to PSP is linear, which is in line with previous public sector findings (Walker et al. 2010a; Damanpour et al. 2009). However, the extent of innovating activities in the RWAs is relatively low. Thus, it is possible that a linear relation is found due to a range effect, which occurs if the full range of scores of the predictor variable is not included (Pierce and Aguinis 2013). Our focus group results

indicate an occasional emphasis on explorative activities in the invention phase of the innovation cycle, e.g. due to ambitions of board or upper-echelon members. However, because innovation in the RWAs is carried out within the regular decision-making and operational processes, and within strong restraints on risk-taking, over-innovation is unlikely. This confirms previous findings that PSOs tend to innovate incrementally (Damanpour et al. 2009).

Given the strong results-orientation and restraints on risk taking, as well as the potential improvements mentioned in the focus groups we assume that there is room for enhancing PSP by enhancing innovation efforts, especially in the less ambidextrous PSOs. More ambidextrous RWAs show more integrative strategies, embracing a 'both-and' approach (Smith and Lewis 2011; Lövstål and Jontoft 2017) to optimization and innovation. Our empirical data nevertheless revealed 'ambidextrous behaviour' at the work floor in all RWAs, i.e. an employee or project team will choose for optimization or innovation, depending on their judgement of the problem or an opportunity at hand. However, the more ambidextrous the organization is, the easier this iteration between optimization and innovation becomes.

6.6 Conclusions

This article yields important insights for public management research, theory and practice. We showed that optimization initially is more strongly associated with PSP than innovation, but that at high levels of optimization its contribution to PSP diminishes. We were also able to refine this finding in our qualitative analysis, indicating that, whereas defending or low ambidextrous PSOs benefit most from optimization strategies to enhance PSP, these also run the largest risk of entering an optimization trap due to their neglect or even rejection of innovation. The reverse is true for more ambidextrous PSOs.

Innovation is initially less strongly associated with PSP, but its contribution in RWAs is significant and linear – thus no diminishing returns at high levels of innovation. As such, our results contribute to putting the 'innovation imperative' (Jordan 2014; Osborne and Brown 2011) - i.e. the high expectations of the benefits of more innovation in PSOs - in a broader perspective, indicating that both optimization and innovation contribute to PSP. More ambidextrous strategies help resolve the tensions between innovation and optimization, and therefore ambidexterity in PSOs deserves more research attention.

In addition, as prospecting RWAs score higher on PSP, our results are in line with previous findings (Andrews et al. 2006) that prospecting strategies are more strongly associated with PSP than defending strategies. However, RWAs that embrace an analysing or ambidextrous strategy show the highest scores for PSP. Our findings thus indicate that an analysing or ambidextrous strategy may be even more

beneficial. This category has previously been excluded from public management research (Boyne and Walker 2004; Andrews et al. 2006; Andrews et al. 2009) and we encourage future work to re-assess its relevance for PSOs.

Furthermore, non-linear relations are seldom reported in public management research. Our results should trigger scholars to test for non-linearity more often. Mixed methods research can be particularly valuable when doing so because it allows to identify potential nonlinear relationships between important public management constructs and, simultaneously, explain the underlying causes and mechanisms. This helps to better explain why potential nonlinearity might emerge.

Our study also yields relevant insights for practitioners. For PSOs our results indicate that although optimizing is initially more strongly associated with PSP than innovation, PSOs should prepare for the moment *'the knob cannot be turned any further'*, i.e. the moment that optimization no longer contributes to PSP. Moreover, the contribution of innovation to PSP remains substantial. Thus, PSOs would benefit from formulating more ambidextrous strategies, based on a comprehensive analysis of the need to either optimize or innovate, and design processes and procedures to support both. Public managers should be aware of the draw-backs of the natural inclination to emphasize optimization and ensure that their organization engages in innovating activities in congruence with their optimizing activities, embrace the tensions between the two as beneficial rather than trying to 'regulate' them. A well-designed performance management system, that includes measures for innovation as well as optimization, may support a more ambidextrous approach. Moreover, it can stimulate learning, iterating between innovation and optimization, and counteract biases in decision-making toward optimization (Bedford et al. 2018).

Limitations and future research

First, we conducted our research within Dutch RWAs. As functional democracies they are a rather specific type of government, being tasked with water management and sewage treatment only. We thus need to show modesty towards the generalizability of our findings and encourage future research to tests whether our findings hold in different contexts, e.g. multipurpose public organizations such as municipalities, or in other political and administrative contexts (O'Toole and Meier 2014). Second, our analysis could suffer from endogeneity: we use cross-sectional data, and we cannot infer causal relations, although our qualitative analyses partially mitigate this. Future research could seek to identify relationships over time and include a baseline performance variable to assess actual improvement in PSP (O'Toole and Meier 1999). Third, we based our analyses on the perceptions of organizational staff concerning the performance of their RWA. It may be interesting to test the relations between innovating, optimizing and more objective performance measures or stakeholder assessments because subjective performance assessment by managers

have been known to show some skewness (Meier and O'Toole 2013). Finally, we use a comprehensive scale for PSP, aggregating several dimensions of PSP, which does not allow us to identify whether relationships differ per PSP dimension. Our results indicate differences in the correlations between the different items of optimizing and innovating with those of performance. Future research can seek to tweak out which PSP dimensions are particularly impacted by innovation and optimization and how. To conclude, we encourage future scholars to engage – using both quantitative and qualitative data – with the debate on nonlinearity between optimizing, innovating and PSP to help better understand the conditions under which such non-linearity appears.

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Chapter 7

Conclusions

7.1 Introduction

National as well as local governments face higher demands on public service delivery. Increasing complexity of policy issues, stronger demands of responsiveness and quality of public services and shrinking public budgets are important factors that push governments to become more proficient, effective and efficient in enhancing public performance. There are two different processes to enhance public performance: public organizations may either optimize or innovate their processes and services (Moore 2005). Both processes are essential but may require different approaches to their facilitation and sustenance (Osborne and Brown 2011; Bryson, Boal and Rainey 2008). Despite these insights so far public sector research on the impact of both processes on performance, and their interdependency, has largely been lacking, nor have capabilities and antecedents that organizations need to be proficient in both processes been studied in coherence.

Rather, innovation studies in public management literature tend to focus on organizational barriers to innovation, such as red tape, risk-aversion and a strong focus on efficiency and short term results (Cinar, Trott and Sims 2018). In order to overcome those barriers scholars advocate leadership of public managers (e.g. Ricard, Lewis and Klijn 2017), point to the indispensable role of entrepreneurial employees (Kingdon 1995; Huitema and Meijerink 2010), or argue that collaborative or social innovation efforts are key (Hartley, Sørensen and Torfing, 2013; Voorberg, Tummers and Bekkers 2015). However, the focus on either individual, organizational or collective approaches to overcome barriers leads to a lack of attention for the interplay between these levels and portrays public organizations in general as deficient or at least ineffective. Moreover, it lauds innovation as essential to solve wicked societal problems and as panacea to all maladies of public organizations, while disregarding the contribution of continuous improvement of processes and services to public sector performance. Despite the high expectations of the impact of innovation on public sector performance, very few studies actually substantiate this claim quantitatively (see for exceptions e.g. Damanpour, Walker and Avellaneda 2009; Walker, Damanpour and Devecee 2010).

This thesis has taken a different approach. Firstly, rather than focussing on barriers, it identifies capabilities that public organizations need to both optimize and innovate policies, processes, technologies and services to enhance public performance. It does so from a multilevel perspective, including the individual, organizational and network level, and investigates the relative contribution of different capabilities to innovating and optimizing. Secondly it evaluates the relative contribution of innovation and optimizing to public performance, and explores preferences and potential biases of public organizations for innovation or optimization. Thirdly, it investigates how public organizations deal with the tensions between the different demands of innovating and optimizing, and examines organizational antecedents

that support a balanced and mutually enforcing approach to innovation and optimization in practice.

We thus aimed to explore, test and explain the contribution of innovation and optimization on performance, and which capabilities public organizations – and more specifically Dutch regional water authorities - and their employees need to be proficient in both innovating and optimizing. Our main research question is: What is the impact of innovating and optimizing on public performance and what capabilities and organizational antecedents contribute to innovation and optimization? We formulated the following research questions:

1. How do the individual, organizational and network levels interact?
2. What capabilities support innovating and optimizing?
3. What is the relative contribution of innovating and optimizing to performance?
4. How do public organizations deal with the tensions between optimizing and innovating?
5. How do organizational antecedents impact practices of innovation and optimization?

This thesis delivers insights on innovation and optimization that are relevant for public organizations. They are especially relevant for Dutch regional water authorities. The author's engagements with the topic stems from the puzzles she encounters as a practitioner and her drive to contribute to the regional water authorities' functioning. The regional water authorities are responsible for water management, flood protection and sewage treatment. They face increasing challenges related to climate change and a transition to a more circular economy, as well as societal developments demanding a more responsive government. Although regional water authorities as functional democracies are a rather specific type of government they show sufficient diversity in their tasks and sufficient similarity to other local governments to allow for some generalisability of the findings and substantiate their relevance for other public organizations, as we will elaborate below.

In this chapter we will integrate our quantitative and qualitative results to answer the research questions. We draw some conclusions on the methods we used. We formulate recommendations for public organizations (including water authorities) to strengthen organizational ambidexterity, as well as their capacities to support optimization and innovation. Finally we discuss the generalizability of our findings, our contribution to research and present topics for further research.

Definitions

We define innovation as the implementation of a new - technical, organizational, policy, service or other - concept that changes and improves the functioning and outcomes of the public sector (Hartley 2005; Walker 2007; Damanpour et al. 2009).

For public organizations to be effective in innovation at least a clear understanding of innovation is needed. However, there appears to be some confusion on the concept of innovation among the water authorities. Our definition of innovation evoked similar responses in focus group sessions: *'Is implementation part of innovation?!'* In the water authorities innovation is frequently understood as invention only, not linked with implementation, nor necessarily with 'creating public value' or enhancing performance. This is not unique to the water authorities, in the majority of the research reviewed by De Vries, Bekkers and Tummers (2015) a link with performance is missing. Also Osborne and Brown (2011) describe several misconceptions of innovation in public organizations, including the adoption of an product-oriented rather than a service-oriented model of innovation, a reconceptualization of innovation as continuous improvement and a positioning of innovation as a normative 'good', to be privileged above other types of organizational activity.

We introduced the term 'optimization' for continuous incremental improvement to avoid confusion related to the term 'improvement' and emphasize that optimization should not be equated with efficiency, i.e. achieving the same results against lower costs or in a shorter time, which is a dimension of performance. Rather, it implies a continuous focus on improving existing services, policies, processes and techniques. Public performance can be conceptualized as achieving public goals in an effective and efficient manner, preserving present and future quality of public services as well as legitimacy among stakeholders (Verbeeten 2008).

Methods

We used both qualitative and quantitative methods to answer our research questions. We used the Multi-level Perspective (MLP) framework developed in literature on socio-technical transitions (Schot and Geels 2008) in a case study to analyse a major policy innovation that resulted from co-evolving developments at multiple levels, and as an introduction to the context and challenges of regional water authorities.

Based on literature we identified capabilities that support both innovation and optimization. To test if these capacities contribute to innovating and optimizing we operationalized our constructs into measurement scales and sent out a survey to the then 22 water authorities (see Appendix A). We formulated hypotheses on their relative contribution to innovation and optimization, which we tested using structural equation modelling.

Our survey results revealed different levels of engagement in innovating and optimizing in the water authorities, i.e. different levels of ambidexterity. We grouped the water authorities in a low, moderate and high ambidextrous group for comparative analysis. In ten water authorities that were willing to participate we

convened separate focus groups of employees and managers. In the analysis we unravelled the different ambidextrous configurations of the low, moderate and high ambidextrous water authorities to understand how organizational antecedents shape the different practices, and the underlying causes of the different configurations.

Finally we analysed preferences of water authorities for innovating and optimizing, and looked for nonlinear relations indicating over-innovation or over-optimization and underlying causes.

7.2 Conclusions

In this paragraph we discuss our main conclusions and answer our research questions.

Conclusion 1. Policy innovation at the regime level requires experimenting and learning at the network level, and connecting network learning and organizational learning processes by connective individuals (RQ1)

We used the Multi-Level Perspective (MLP) (Rip and Kemp 1998; Geels 2002; Geels and Kemp 2007) to analyse a major policy innovation at the level of the strongly institutionalized regional water management regime. Developments at the 'macro level' of national water policy as well as increasing regional tensions as a result of the incumbent regional inundation protection policy triggered a collaborative innovation effort of regime actors aiming at the development of innovative solutions in selected experimental areas. Learning processes at the 'micro level' of the experimental areas were connected to organizational learning processes by deliberate interventions of connective individuals in different, complementary roles. Additional tensions at the organizational level gave rise to a paradigm shift in inundation protection policy. For implementation of the policy innovation again experimenting at the organizational and network levels was needed, as well as the optimization of existing procedures, knowledge and techniques. We will revisit our case study in the next paragraph, to include insights developed in this thesis.

Conclusion 2: Connecting, ambidextrous and learning capabilities contribute to innovating and optimizing, but to a different extent (RQ2)

Drawing on literature we singled out three main capacities and their main attributes at the individual, organizational and network level, i.e. connective, ambidextrous and learning capacity, and evaluated their contribution to optimizing and innovating (see table 7.1).

Connecting capacity

Connective individuals contribute to innovating, optimizing and performance
Our research sheds light upon the important role *individuals* play in processes of optimization and innovation. Connective individuals span boundaries within and between organizations and smoothen collaboration across these boundaries (Williams, 2002), span structural holes in networks, and make new ideas available for the network or organization (Granovetter 1985; Burt 2004). Connective strategies include linking content (ideas, insights), actors (within and between organizations), and/or processes (Van Meerkerk and Edelenbos 2014). Our quantitative findings underline the importance of connective project- or process leaders that are able to connect different content, build trustful relations, connect different interests and span boundaries between and inside organizations. By doing so they contribute to both innovation and optimization, as well as to performance. In the focus groups often reference was made to entrepreneurial activity of employees. However, as the case study showed, this is not just one 'policy entrepreneur' or 'hero-innovator' (Meijer 2013), but rather a range of connective employees with complementary roles, connecting ideas, influencing strategies and policies, and elaborating ideas further during implementation and institutionalisation. The notion of just a few entrepreneurial individuals per organisation – Brouwer (2013, 97) identified a total of 62 policy entrepreneurs for all water authorities – thus needs nuancing. The finding that both connective project/process leaders and aldermen (elected daily board members) contribute to performance directly is in line with their roles in the water authorities, i.e. connecting to stakeholders and spanning the boundaries between the stakeholder environment and their own organizations (Brouwer 2013; Van Meerkerk, Edelenbos and Klijn 2015). Moreover, aldermen steer on outcomes and performance of their organizations in relation to their policy ambitions rather than on how to reach these outcomes.

Intra-organizational connectivity contributes to optimization
At the *organizational* level dense intra-organizational networks support trust and cooperation, and exchange and refining of existing knowledge, which supports improvement of existing qualities (Adler and Kwon 2002; Jansen, van den Bos and Volberda 2006). At the same time, dense networks may diffuse strong norms, and limit the flow of new ideas and deviant views and information, and thus may have adverse effects on innovation (Adler and Kwon 2002; Burt 2004; Granovetter 1985). Our quantitative findings show that intra-organizational connectivity, i.e. informal information exchange, coordination between different teams and social activities, indeed contributes to optimization. There is no significant impact of intra-organizational connectivity on innovation. The focus groups participants recognized a tendency to think in ingrained patterns and follow familiar routines, confirming that dense intra-organizational networks strengthen incumbent mind sets and routines, and support optimization.

At the network level connectivity alone is not sufficient
At the *network* level literature shows that connective capacity is essential for effective network governance and achieving consensual, effective, robust, integrative and innovative outcomes (Klijn, Edelenbos and Steijn 2010; Van Meerkerk et al. 2015; Agranoff 2008). However, too strong relationships may support similarity, limited search and a focus on optimization (Jacob and Duysters 2017; Considine and Lewis 2007). Our quantitative findings showed that although the network level is most relevant for both innovation and optimization, connectivity as we operationalized it - effective collaborations, different forms of collaboration, trust and open dialogue – was not significantly related to either optimization or innovation. As we will see below ambidexterity and learning is more decisive. This is an interesting finding when we relate this to existent literature on collaborative innovation that tends to focus on leadership styles and management of networks to overcome barriers, and seems to overlook the relevance of diversity in network ties and actors (Hartley et al. 2013).

Ambidextrous capacity

Individual ambidextrous behaviour at the work floor flourishes in a supportive context
Our quantitative results at the *individual* level show that process- and project leaders contribute to both innovation and optimization. In the focus groups reference was made to innovations or optimizations that 'emerged' from informal problem solving or opportunity grasping behaviour of employees, which indicates ambidextrous behaviour of employees at the work floor (Caniëls and Veld 2016). In low ambidextrous water authorities innovation is often an outcome of informal, almost 'subversive' innovation, or a result of skilful connective and entrepreneurial activities of individuals. In high ambidextrous this seems less so. To encourage ambidextrous behaviour at the work floor employees thus seem to benefit from a more ambidextrous organizational context, where innovation and optimization are both supported.

Public managers contribute mainly to optimizing
At the *individual* level transformative leadership is generally related to innovation, while transactional leadership is considered to enhance optimization (Rosing, Frese and Bausch 2001; Jansen, Vera and Crossan 2009). An ambidextrous manager combines both styles: i.e. transformational elements like stimulating new ways of thinking, coaching and motivating employees, ensuring connection and cohesion, and stimulating learning; as well as transactional activities like steering on results, making performance agreements with employees and facilitating regular work processes. Ambidextrous managers support the adoption and implementation of new ideas, but also the linkage to existing knowledge, routines and processes (Mom, Fourné and Jansen 2015). Although public managers are often deemed of

crucial importance for innovation (e.g. Ricard et al. 2017; Hartley et al. 2013), our quantitative results revealed that overall managers in the water authorities contribute to optimizing, but not to innovating.

This confirms findings in literature that public managers generally have a facilitating and internally oriented role, and their main focus is on incremental improvement rather than on innovation (Moore 2005). However, a closer look at our survey results reveals that there is an interesting difference between low and high ambidextrous water authorities. Managers in low ambidextrous water authorities apply transactional styles more than transformational styles, whereas the reverse is true for more ambidextrous water authorities. Our focus group results confirm that managers in all water authorities are driven by a strong results-orientation and are straitjacketed in strict performance management systems, which encourage them to favour optimization. Especially in low ambidextrous water authorities managers are not tasked and do not feel legitimized to encourage their units to engage in innovation. The same is valid when innovation is conceptually and structurally separated from regular operations: managers who are not involved in innovation programs do not feel legitimized and tasked to allocate resources to innovation. In high ambidextrous water authorities managers steer more on the cohesion between innovation and optimization and their contribution to organizational goals.

Ambidextrous strategies and procedures are generally lacking
Ambidextrous *organisations* develop strategies and procedures and assign resources to connect, support and balance optimizing and innovating (March 1991; Gibson and Birkinsaw 2004; Prieto and Pérez Santana 2012; Plimmer, Bryson and Teo 2017). In our quantitative analysis ambidextrous procedures and resource allocation do not show a significant relation with either optimizing or innovating. These procedures are often lacking in the low ambidextrous water authorities, whereas high ambidexter water authorities do have strategies to systematically analyse the need for innovation or optimization and divide their resources over the two. Below we will discuss the underlying causes for these differences and the relevance of integrative strategies and supportive procedures. The focus groups also revealed a hampering connection between larger innovation projects and regular operations, as well as between strategic intents and operations, and between invention and implementation.

Ambidextrous networks are essential for innovation and contribute to optimizing
Ambidextrous *networks*, featuring weak ties for the creation of novel combinations as well as strong ties to validate and exploit them, have shown to be effective for developing and exploiting innovations (Gilsing and Duysters 2008). For optimizing a strong familiarity and mutual understanding between organizations is needed, while for innovating less embeddedness (Uzzi 1997) and a larger cognitive distance is favourable (Nooteboom et al. 2007). Our quantitative results show that at the network level the ability to engage with new parties contributes to both innovation

and optimization, although the association is much stronger for innovation. This finding underlines insights about the potential of participating and collaboration in external networks for innovation (Hartley et al. 2013; Lewis, Considine and Alexander 2011), but points to the importance of building networks that include new, unusual parties. Respondents from high ambidextrous water authorities agree with statements that their organization collaborates with new, unusual parties with novel viewpoints, in informal settings, to develop new solutions, whereas respondents from low ambidextrous water authorities disagree with these statements. Our focus group discussions confirmed that high ambidextrous water authorities deliberately engage with unusual parties when formulating their visions and strategies, whereas low ambidextrous water authorities show a more inward orientation, and restraint and even suspicion towards engaging with external, unusual actors.

Learning capacity

Individual learning is insufficient to contribute to innovating and optimizing
Important characteristics of *individual* learning capacity are tolerance of ambiguity and change, openness to experience and unconventionality and self-reflectiveness (Crossan and Apaydin 2010). While first order learning supports optimizing, innovating is supported by transformative second order learning, involving a reflective attitude towards one's own norms, values and practices and those of the organization (Argyris and Schön 1974; Schön 1983; Mezirow 1990). Learning at the individual level does not show a significant association with either innovating or optimizing. Of course this should not be interpreted in the sense that individual openness to experience, tolerance of ambiguity and self-reflectiveness are not important, but rather that in the structural model individual connectivity and ambidexterity show stronger associations, and although indispensable, individual learning in itself is insufficient to contribute to innovation or optimization at the organizational level. Rather, it is the interaction between individual and organizational learning that is decisive, as we describe below.

Organizational learning is indispensable for innovation
Organizational learning is a mutual process in which organizations learn from their members and vice versa (Crossan, Lane and White 1999). Organizations store knowledge they learn from their members in their strategies, procedures and structure. Our quantitative results show that organizational learning, i.e. developing and employing knowledge of employees and adapting organizational policies and routines to new insights, contributes to innovation. There are however difference between water authorities with different levels of ambidexterity. Survey respondents from high ambidextrous water authorities agree with statements that their organizations learn from their experiences, and that policies and routines are adapted regularly responding to new insights. The focus group discussions confirm that these water authorities value organizational learning and have put several procedures in

place to support this. Respondents of low ambidextrous water authorities disagree with these statements and focus group results indicate that they apply more project-oriented evaluation approaches, whereby knowledge sharing is limited to the project or unit level.

Learning at the network level is essential for both innovation and optimization
At the *network* level experimenting and learning supported by flexible institutions and temporary arrangements in informal networks is important for innovation (Gilsing and Duysters 2008;Van Buuren and Loorbach 2009). Our findings emphasize the important role of learning. Learning at the network level has the strongest association with both innovation and optimization, in comparison to the other capacities and other levels. For innovation the association is stronger than for optimization. This finding confirms once more the importance of collaboration in external networks for innovation (Hartley, Sörensen and Torfing 2013; Lewis, Considine and Alexander 2011), but also for optimization. Obviously, for optimization new ideas, knowledge and learning are essential also, although this may involve 'single loop' learning (Argyris 1976). However, we should underline the importance of carefully connecting inter-organizational learning with intra-organizational learning (Holmquist 2003) to ensure implementation, especially of innovative solutions, as we also found in our MLP analysis of a policy innovation.

Table 7.1. Table displaying the significant relationships between capabilities and innovating and optimizing and between the latter and performance.

Innovating	**bèta**	**Optimizing**	**bèta**	**Performance**	**bèta**
Learning network	0,333***	Learning network	0,242***	**Optimizing**	0,465***
Network with new, unusual parties	0,279***	Ambidexter manager	0,202***	**Innovating**	0,272***
Learning organization	0,166**	Connective project or process leader	0,168***	Connective aldermen	0,186***
Connective project or process leaders	0,091*	Intra-organizational connectivity	0,135*	Connective project or process leaders	0,106**
		Network with new, unusual parties	0,119*		

*Relations are significant at ***=p < 0.001, **=p < 0,01, *=p < 0,05 level*

Conclusion 3: Both optimizing and innovating contribute to enhancing performance, although optimizing more than innovating (RQ3)

The survey results show that both optimization and innovation contribute to enhancing performance, whereby the association between optimization and performance is stronger than between innovating and performance (see table 7.1). Enhancing public performance can for a large part be achieved by continuous improvements of policies, processes, techniques and services (Damanpour, Walker and Avellaneda 2009). This puts the call of national governments and international institutions like EU and OECD (OECD 2015; Bason 2018; Arundel, Casali and Hollanders 2015) and innovation scholars (e.g. Alburry 2005; Hartley et al. 2013) on public organizations to enhance their innovation efforts into perspective, as the expected benefit of innovation is often disproportionately emphasized, while the potential costs or risks are underexposed (Osborne and Brown 2011; Choi and Chandler 2015). At the same time, the positive relationship between innovating and performance is substantial: there should be no doubt that innovation is essential to enhance public performance. This underscores that it is crucial for public sector organizations to acquire and strengthen capabilities that allow them to be effective in both optimizing and innovating, and be proficient in dealing with the tensions between them.

Conclusion 4: Although optimizing initially contributes more to enhancing performance than innovating, at high levels of optimizing its impact becomes negligible, and timely innovation is essential (RQ3)

A further analysis shows that the relation between optimization and performance is curvilinear and that although optimization initially contributes more to public performance than innovation, the positive impact of optimization on public performance diminishes the more optimization is conducted. This is indicative of the so-called 'Too Much of a Good Thing effect' (Pierce and Aguinis 2013). A strong focus on predictable short-term results, cost-efficiency and limiting risk may lead to over-optimization and sub-optimal levels of innovation, and may even lure organizations into 'optimization traps' (Levinthal and March 1993; Uotila et al. 2009; Choi and Chandler 2015). The focus group data revealed that water authorities show a bias towards optimization and do run a risk of over-engagement in optimization. Several factors explain this bias: the water authorities show a strong focus on short term results and cost control, a huge normative pressure to perform and an reinforcing role of managers therein, an inward focus and abounding procedures that enforce fixed patterns in thinking and behaviour, and risk avoidance, scrutiny of failure and limited learning. Remarkably, a strong bias to optimization and some over-optimization occurs in low ambidextrous water authorities, whereas high ambidextrous water authorities which already engage in high levels of optimization run less risk of over-optimization, as they are more capable of dealing with the tensions between the two.

Vice versa a too strong focus on innovation may lead to over-innovation and 'innovation traps' (Levinthal and March 1993; Uotila et al. 2009; Choi and Chandler 2015). Although we found some indications that water authorities may occasionally engage too much in innovation, the risk of over-innovation is much smaller, as the extent of innovating activities is relatively low, and innovation is carried out within the regular decision-making and operational processes, and with strong restraints on risk-taking. Innovation takes place in a cautious and rational approach, e.g. piloting and upscaling of innovative concepts has to be supported by business cases in all water authorities. Our results thus indicate that public organizations should be aware of a potential optimization-bias and anticipate the moment that '*the knob cannot be turned any further*', as a manager of a high ambidextrous RWA put it, i.e. further optimization is no longer beneficial and new paths should be explored.

Conclusion 5: Contextual configurations of organizational ambidexterity, in addition to structural configurations, are most beneficial for dealing with tensions between innovating and optimizing and support higher levels of performance (RQ4)

For combining innovation and optimization ambidextrous capacity is essential. Taking into account a potential optimization bias, it is important for public organizations to reconcile the interdependent and mutually reinforcing processes of innovation and optimization (Bryson et al. 2008). This is quite challenging, as innovation and optimization compete for resources in the short term (He and Wong 2004; Smith and Lewis 2011). Moreover, our focus groups showed tensions between the two due to a strong results-orientation and risk-averseness, which leads to short term result-oriented performance management systems, a perceived huge work pressure and often self-imposed abundant rules and procedures to safeguard accountability and reduce risks.

To deal with the different demands of innovating and optimizing organizations may apply different designs (Raisch and Birkinsaw 2009; Cannaerts, Segers and Henderickx 2016). Structural designs separate innovation and optimization in time, in different organizational units, or in temporal structures such as project teams or pilots. Contextual designs consist of strategies, processes and believes that support and shape individual ambidextrous behaviour (Gibson and Birkinsaw 2004; Andriopoulos and Lewis 2009). Contextual approaches advocate a paradoxical 'both-and' approach, that assumes that tensions persist and are beneficial, and should be dealt with simultaneously (Smith and Lewis 2011; Lövstål and Jontoft 2017). Our comparative analysis of ambidextrous practices of low, moderate and high ambidextrous water authorities uncovered different ambidextrous configurations and the factors that give rise to these differences (Cannaerts et al. 2016). In low ambidextrous water authorities no ambidextrous design is in place at all. Moderately ambidextrous water authorities apply a structural and temporal approach, e.g. by

installing an innovation unit or team and an innovation policy that support the invention phase of innovation, and carrying out innovation as projects. The high ambidextrous water authorities show more contextual ambidexterity, formulating cohesive strategic visions and plans, encouraging employees to both optimize and innovate, and putting processes in place that support connection to both organizational goals and regular operations.

Conclusion 6. Organizational antecedents shaping ambidextrous practices – strategies and procedures, management style and organizational culture - are mutually reinforcing and are strongly defined by organizational norms and values (RQ5)

Organizational antecedents that shape ambidextrous organizational practices are organizational strategies and procedures, leadership and culture (O'Reilly and Tushman 2013; Junni et al. 2015; Boyne 2003; Bryson et al. 2008). In addition, informal routines of organizational members are needed to cope with 'eventualities' in practice (Brown and Duguid 1991). If formal and informal systems are congruent they are mutually reinforcing and beneficial for organizational ambidexterity (Plimmer et al. 2017).

These antecedents appear to be mutually reinforcing in the water authorities. Different ambidextrous configurations result from different attitudes of the water authorities towards innovation, which are strongly related to their organizational identity.

A strict legalistic task-orientation and risk-averse culture goes along with a transactional, results- and cost-oriented management style and little attention for innovation in strategic plans and policies, which leaves no room for embedding innovation in the daily routines of the organization. As a result informal innovation routines are not connected to formal strategies and organizational goals, and the managerial style prevents rather than stimulates innovation. The relatively low engagement in innovating and optimizing in low ambidextrous water authorities also results in lower levels of public performance.

In moderately ambidextrous water authorities future goals-oriented strategies and formal innovation policies allow for and reward formal, legitimate innovation routines within the formal innovation programme, but do not stimulate innovation efforts nor ambidextrous behaviour in regular operations. This hampers the implementation of innovation and the connection of innovating and optimizing processes.

A different pattern was observed for high ambidextrous water authorities in which a more open, societal value-oriented perception of responsibilities is reflected in more integrative strategies and intra-organizational alignment, a more transformational

management style and more embedded innovation practices. This context and management style support more interaction and iteration between innovation and optimization, a better connection of innovation and optimization practices to organizational goals, as well as ambidextrous behaviour of employees. Therefore there seems to be less necessity to resort to informal routines by entrepreneurial employees.

Thus a more ambidextrous organizational context of ambidextrous norm and values, strategies, procedures and management style supports mutual enforcement of innovating and optimizing in ambidextrous practices, and leads to higher levels of public performance.

7.3 Revisiting our case-study, does proficiency in innovating and optimizing facilitate paradigm change?

We used a case study to exploratively sharpen our understanding and research approach of innovating in a context of stable public policy regimes, using the Multi-level Perspective (Schot and Geels 2008). We identified connecting and learning at the three levels mentioned above as major capacities. Revisiting the case study with our present insights on the relevance of ambidextrous capacity and the bias for optimization and its diminishing return on performance, leads to new perspectives. These may be highly relevant in light of the challenges posed on public organisations by the transition to a more sustainable society.

The case concerned a major innovation in the inundation protection policy of a regional water authority, that was installed following inundation events that caused significant economic damage. When initially successful measures taken by the water authority (Ruigh-van der Ploeg 2011) reached financial and technical feasibility limits, the water authority and several municipalities tried to resolve increasing tensions by installing a collaborative innovation program involving several experimental areas or niches. However, innovative solutions developed in the niches initially remained within the incumbent norm-oriented policy paradigm. Only when the full extent of the financial overstretch of the water authority came to light and led to considerable organizational destabilization, a policy window opened, and learning processes at the niche and regime level became connected, resulting in a paradigm shift to a more adaptive, effect-oriented approach. An implementation phase, involving both innovation and optimization followed. Now, an intriguing question arises: Would a high ambidextrous water authority have foreseen such a crisis, and have timely adapted? After all, high ambidextrous water authorities show awareness that "*fine-tuning the system*" will not hold much longer. And they are aware of their tendency to think in ingrained patterns and their natural inclination to act rather than reflect.

In transitions research it is argued that societal regimes develop path-dependently through processes of optimization, which ultimately may lead to lock-in and inability to change (Loorbach, Frantzeskaki and Avelino 2017). Whereas the MLP is a framework to analyse 'historical transitions', transition management advocates that lessons learned from MLP-analyses should be applied in transition governance for hypothesizing possible future patterns and possible interventions (Loorbach et al. 2017). However, with its perspective of path-dependent, locked-in societal regimes it seems to overlook the self-reflectiveness and reconfiguration potential of the 'regime'.

As we have seen high ambidextrous water authorities are aware of their potential 'lock-in' and limits to further optimization, which might make them receptive or even proactive actors in sustainability transitions. Thus, our proposition is that ambidexterity helps to anticipate potential lock-in and destabilization. Still, it seems that the water authorities have to reach further, given the challenges of more extreme weather events, sea level rise and soil subsidence, the transition to a circular economy and demands of higher responsivity and social innovation. Reflecting on the functioning and sustainability of present systems is crucial, but should include reflection on norms, values, discourses and paradigms. Water authorities should include such reflectiveness in their strategizing and visioning processes.

This brings us to the more general question what implications our research has for practice.

7.4 Strengthening innovation and optimization – implications for practice

Within the focus groups, we also discussed how our findings could be used to strengthen innovation and optimization. When asked what could be improved, managers and employees mentioned aspects that fit quite well in our analysis. They stressed the need of developing a long term vision, embracing a more integrative approach to innovation and optimization and ensuring better internal and external connections. They also mentioned that they should ask themselves and each other '*the innovation-or-optimization question*' on a regular basis. Furthermore, all water authorities called for more comprehensive performance management systems that include measures for innovation as well as for optimization. They acknowledged that they should improve their proficiency in risk management. The water authorities also saw room for improving organizational learning, ranging from merely '*closing the Plan-Do-Check-Act cycle*' to improve learning '*over the policy cycle and between work floor, management and board*'. Finally, they mentioned that support of board or upper-echelon members for innovation is needed. In the remainder of this section we further elaborate on these ingredients by confronting them with our main findings.

We have found that higher levels of optimizing and innovating lead to higher levels of public performance and that a contextual approach supports iteration between and mutual enforcement of innovating and optimizing. Public organizations thus benefit from contextual ambidextrous designs, that support ambidextrous behaviour of managers and employees, in addition to structural and temporal designs. Contextual organizational ambidexterity can be supported by formulating and communicating an integrative vision on the public organizations role and contribution to society. Ambidextrous strategies that are based on a comprehensive analysis of the need to either optimize or innovate to create societal value, and processes and procedures that support connection and interaction between the two, are important. Accepting and resolving tensions from a 'both-and' instead of an 'either-or' perspective is necessary, i.e. incorporating both long-term and short term goals, both societal value-creation and 'core' tasks, allocating resources to both innovation and optimization, combining transformational and transactional management styles, and embracing paradoxical values such as trust and control, autonomy and discipline, uniformity and diversity. As organizational identity and culture strongly determine the attitude of public organizations towards optimization and innovation, public organizations should reflect on their perceptions on their role in society and strategic stance. Performance management systems that include measures for innovation as well as for optimization may support dialogue and comprehensive evaluation on how public performance is best served (Bedford et al. 2018), as well as ambidextrous behaviour and learning at the individual and unit level.

With respect to capabilities that support innovation and optimization we found that connecting and learning with new unusual parties is crucial for both innovation and optimization. Thus, it is important to build ambidextrous networks and to stimulate network learning, by arranging experimentation and learning in 'niches' or pilots. Care should be taken to connect inter-organizational learning with intra-organizational learning and to include what is learned in regular processes and routines. Allowing for learning from mistakes, and developing risk management procedures and competences (Brown and Osborne 2013) are also needed.

Strengthening organizational connective capacity supports optimizing and the implementation of innovations, and can be stimulated by coordination and socialization tactics, i.e. stimulating informal encounters as well as interdisciplinary and inter-unit collaboration (Jansen, Volberda and Van den Bosch 2006). However, care should be take that strong internal connectivity reinforces ingrained existing mind sets and routines. Inter-organizational connective capabilities can be strengthened by networking policies, assigning network roles and training in networking and negotiation skills.

Public managers evidently should play a major role in shaping an ambidextrous context and strengthening individual and organizational capacities to support both

innovation and optimization, informed by the findings of this study and others that more ambidextrous organizations perform better (Andrews, Boyne and Walker 2006; Junni et al. 2013). Managers may encourage reflection on organizational culture, identity and task-orientation, and initiate integrative visioning and strategizing. In fact, in addition to the "*innovation-or-optimization?*" question they recommended, they should also ask "*is our system sustainable in the long run?*" and question incumbent paradigms. They should be aware of the draw-backs of the natural inclination to emphasize optimization and embrace the tensions between the two as beneficial rather than trying to 'regulate' them. Leadership development should include attention for ambidextrous leadership skills, i.e. combining transformational and transactional activities.

Furthermore, elected board members or politicians should take their role in building ambidextrous networks, stimulating public organizations to become more societal-value oriented and responsive and encourage integrative strategies. They should be aware of the tensions that originate from anticipating a more sustainable future and present day pressures for results, and support their organizations in dealing with these tensions. And connective and entrepreneurial employees should seek to enhance their network with unusual parties and keep good-spirited while advocating new ideas, spanning boundaries and influencing strategies and managers.

7.5 Methodological reflection

We applied a complementary qualitative and quantitative research approach, consisting of a) a case study based on interviews and document analysis, b) building a theoretical model based on literature, c) operationalization and testing of this model by means of statistical analysis of survey data, followed by d) comparative analysis of focus group data that allowed us to understand the quantitative relationships found, as well as the underlying causes of the differences between similar public organizations, and e) a combined quantitative and qualitative analysis of the previously collected data to further deepen our understanding of the nature of relationships and underlying causes. This design proved fruitful, as in each step we were able to build on and deepen findings of previous steps.

Optimization and innovation tensions are ubiquitous - that is, exist and will persist - in private sector as well as public sector organizations. Nevertheless, for the generalizability of our findings is important to put them in context. The Dutch context is a decentralized governance structure with strong local and regional governments, corporatist tradition and civic society, which is potentially favourable for public innovation (Bekkers, Tummers and Voorberg 2013). However, NPM-like measures, including performance management, have been implemented extensively in Dutch public organizations (Ter Bogt 2008; Speklé and Verbeeten 2014). For the water authorities, as functional democracies with clear goals and well-

specified tasks that are fully financed by the taxes they levy, the transparent link between performance and taxes stands out. They are relatively small organizations (200-800 fte), with little distance between politicians and organization. This may affect managers' behaviour (Smith and Umans 2015), causing them to focus mainly on measurable results and designing abundant procedures to avoid risks. However, our main findings reinforce and extend insights from other research. E.g. the finding that similar public organizations embrace different strategic stances (Boyne and Walker 2004; Andrews et al. 2009), and show different ambidextrous configurations (Cannaerts et al. 2016), has been confirmed for different types of public organizations as well as in different countries. Doing research in one's own practice has specific advantages and demands. It proved extremely helpful in data collection, for which a tremendous amount of time was made available by the water authorities, firstly for the interviews, secondly for pre-testing, distributing and completing the (lengthy) survey, thirdly in organizing and participating in the focus groups and fourthly in participating in two reflection workshops. The fact that the researcher was 'a colleague' most probably supported an open, trustful atmosphere during the interviews and focus groups. It however also demands a critical awareness and continuous reflection on one's own tacit assumptions and ingrained views of the water authorities and their specific flairs and discourses, and requires critical questioning by co-researchers, especially when interpreting qualitative data.

7.6 Contribution to theory, limitations and further research

With this research we contribute to literature in several ways. Although it is well recognized that innovation and optimization are different processes that are both needed to enhance public performance, they are hardly researched in coherence in the public domain. We contribute to the knowledge gaps we previously identified as follows. Innovation studies tend to focus on innovation barriers and drivers (Cinar et al. 2018), and antecedents of innovation are often addressed independently at different levels (De Vries et al. 2015). Research attention for capabilities that organisations need to support innovation and optimization is limited (Piening 2013; Pablo et al. 2007). We identified the most relevant capacities for innovation and optimization. We contribute to the emerging literature on ambidexterity (Smith and Umans 2015; Boukamel and Ivery 2017; Palm and Lilja 2017; Plimmer et al 2017) by studying attributes of ambidexterity on individual, organizational and network level, in coherence with two more generally studied abilities, i.e. learning and connecting. We found that at the individual level connective individuals contribute to both innovating and optimizaing, at the organizational level connective capacity is more strongly related to optimizing, and learning capacity to innovating, and that learning in a network with new parties contributes to both innovating and optimizing, although stronger to innovating.

Furthermore, although scholars address tensions between innovating and optimizing (e.g. Hartley et al 2013; De Bruijn 2002), the way public organizations deal with these tensions is under-researched. We built on private sector research to analyse different configurations of innovation and optimization processes (e.g. Raisch and Birkinsaw 2009; Junni et al. 2015). We found that contextual configurations of organizational ambidexterity, in addition to structural configurations, are most beneficial for dealing with tensions between innovating and optimizing and support higher levels of performance. We also studied organizational antecedents shaping ambidextrous practices, i.e. strategies and procedures, management style and organizational culture, and uncovered that these are mutually reinforcing and are strongly defined by organizational norms and value. We thus showed that different organizational norms and values in similar public organizations may lead to quite different ambidextrous configurations (Cannaerts et al. 2016).

Thirdly, although scholars warn for either too much focus on innovation (Osborne and Brown 2011; Jordan 2014; Choi and Chandler 2015) or an incessant focus on efficiency and performance measurement (Hartley et al 2013; De Bruijn 2002), the actual contribution of innovation to public performance is rarely tested (De Vries et al. 2015) and also quantitative research on the impact of optimization is scarse (Walker, Damanpour and Devece 2010; Gerrish 2016). We studied the impact of both innovation and optimization on performance, which is new to public sector literature. We found that both contribute significantly to performance, but that the impact of optimization is stronger. Furthermore we found a nonlinear relation of optimization with performance, indicating a diminishing return of optimization on performance at higher levels of optimization.

Studying the twenty-one regional water authorities has been helpful, as they are very similar with regard to their political structure, legal tasks, performance management, knowledge base and skills, and thus differences in organisational antecedents can be uncovered by comparative analysis quite well (Cannaerts et al. 2016; Smith and Umans 2015). Regarding the generalisability of our findings we have indicated above that the water authorities as functional democracies are a rather specific type of government. We encourage future research to tests whether our findings hold in different contexts, e.g. in multipurpose public organizations such as municipalities, or in other administrative or political contexts (O'Toole and Meier 2014).

As we were interested in "overall" innovation and optimization – including policies, services, processes and techniques -, and their impact on "overall" public performance – including efficiency, effectiveness, quality, future-proofing, collaboration and legitimacy -, we used comprehensive scales. Our results indicate differences in the correlations between the different items of optimizing and innovating with those of performance. Future research can seek to tweak out which public performance dimensions are particularly impacted by innovation and optimization and how.

Furthermore, we based our analyses on the perceptions of organizational staff concerning the performance of their water authority. This allowed us to include also more qualitative items. We used multiple methods (quantitative and qualitative) to better understand these perceptions. It would be interesting to also use stakeholder assessments. A further step could be to design and measure more objective measures for innovating, optimizing and performance, and test their relationships (O'Toole and Meier 2013; Walker, Boyne and Brewer 2010).

We concur with scholars that have recently begun researching ambidexterity in public organisations (Smith and Umans 2015; Choi and Chandler 2015; Cannaerts et al. 2016; Boukamel and Ivery 2017; Palm and Lilja 2017; Plimmer et al. 2017; Kobarg et al. 2017; Trong Tuan 2017) in recommending further research into the antecedents of ambidexterity in public organizations, as a more comprehensive approach of innovation and optimization will help public organizations enhance public performance. Besides comparing findings from different contexts, future research could seek to identify relationships over time and include a baseline performance variable to assess actual improvement in public service performance (O'Toole and Meier 1999). In view of the limited quantitative research and even less mixed method approaches on innovation, optimization and performance, we strongly encourage more comprehensive mixed method approaches. This should include attention for nonlinearity between optimizing, innovating and public performance to help better understand the conditions under which such nonlinearity appears.

Well-designed procedures to support organizational ambidexterity are essential (Plimmer et al. 2017). Special attention should be paid to performance management practices. Although these may contribute to public performance (e.g. Walker, Damanpour and Devece 2010; Gerrish 2016), our findings indicate that a focus on efficiency and performance measurement may lead to an optimization-bias. A balanced set of performance measures, and the use of performance measurement systems for dialogue and learning have shown to contribute to organizational ambidexterity in private sector organisations (Bedford et al. 2018). Further research is needed on how performance management systems may support contextual ambidexterity and organizational learning in public sector organisations to enhance public performance.

To conclude, we have analysed a major policy innovation at regime level which showed that singular innovations and optimizations do not necessarily lead to a paradigm shift. It would be interesting to analyse and compare major policy innovations or paradigm shifts in similar public organizations with different levels of ambidexterity to test our proposition that more ambidextrous public organizations anticipate and deal with future challenges better, and reassess the sustainability of their policies or systems more timely.

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Appendix A. Survey

Questionnaire innovating capacity regional water management

This questionnaire is about innovating and optimizing and takes about 20 minutes. It is about the employees of your water authority (part A), the organisation itself (part B) and your organisation in relation to its environment (part C). Please answer the questions for the work field you are involved in. All answers are anonymous and will be treated stricty confidential.

1. I work for the regional water authority *(select)* since *(select)*

2. My function is *(open answer)*

3. This function can be categorized as follows:
   - manager
   - project/process leader
   - project/process employee
   - different, namely*(open answer)*

4. My education is
   - academic
   - high vocational training
   - vocational training
   - different, namely *(open answer)*

5. My age is *(select)*

6. I am female/male

7. I work for at least half of my time in the following work field *(tick one)*:
   - water safety
   - water quantity
   - water quality
   - sewage water treatment
   - overarching, more than half of my time *(tick 1)*:
   - water system
   - sewage treatment

8. My activities within this work field concern *(tick minimum 1, maximum 3)*
   - policy and research
   - planning
   - licensing and enforcement

Questionnaire continues

- maintenance
- finance/administration
- communication
- different, namely

The following questions concern the performance of your water authority over the last five years

*(Innovating) **

To improve performance for work field *(substitute with answer 7)* my organization has during the last five years: **

- implemented really new policies *(i: really new for the water authority, the water authority entered a new path)*
- implemented really new technology *(i.: really new for the water authority, really different from existing technology)*
- offered really new services *(i.: really new for the water authority, really different from existing services)*
- implemented really new processes *(i.: really new for the water authority, no optimization)*
- experimented with really new policies or techniques

*(Optimizing)**

To improve performance for my work field *(substitute with answer 7)* my organization has during the last five years:

- improved existing policies
- improved existing techniques
- improved existing services
- improved existing processes

*(Performance) **

My organization has improved performance over the last five years for work field *(substitute with answer 7)* on:

- efficiency (same results against lower costs or faster)
- quality (we deliver more quality against similar costs and time)
- effectiveness (we reach our goals better)
- collaboration (we reach our goals better combining those with the goals of others)
- legitimacy (stakeholders are satisfied with the water authority)
- future proofing (we can face the future with trust, expected future developments are included in policies and plans)

Part A: This section is about individuals within the water authority. Questions concern aldermen, managers, project- and process leaders within work field *(substitute with answer 7)*

*(Individual connective capacity) **

Questionnaire continues

Aldermen
- connect different ideas, policy areas and disciplines
- build and maintain sustainable relations with other organizations
- build trust
- connect interests of different parties
- manage exchange between network and own organization
- span boundaries within organization

(same items for Project/process leaders): *(i: if it is difficult to give a general impression please take the people in mind with whom you deal with most)*

*(Ambidextrous leadership)**

Managers: *(i: if it is difficult to give a general impression please take the people in mind with whom you deal with most)*
- stimulate employees to think in new ways
- have vision
- look for new opportunities for the organization
- coach employees to develop their talents
- motivate employees to contribute jointly to the goals of the organization
- delegate challenging responsibilities to employees
- arrange good working conditions for employees
- make agreements on results and rewards
- see that agreements are met
- live up to agreements

*(Embedding manager) **

Managers: *(i: if it is difficult to give a general impression please take the people in mind with whom you deal with most)*
- connect innovation with regular work processes
- see that innovation contributes to organizational goals
- arrange conditions for the implementation of innovation
- see that polies and work processes are adapted if necessary for the implementation of an innovation

*(Learning individual) **

Aldermen (same items for Managers and Project/process leaders: *(i: if it is difficult to give a general impression please take the people in mind with whom you deal with most)*
- reflect *(i: are critical)* on their assumptions
- learn by doing and adapt their action
- deal well with uncertainty
- are open for new ideas, situations and parties

Questionnaire continues

Part B: The water authority as an organisation. This parts concerns organisation, procedures and culture of your water authority

(Intra-organizational connective capacity) *
This question is about supporting internal and external connectivity

- we have regular social activities
- there is sufficient opportunity for informal information exchange
- new colleagues are coached intensively
- collaboration between different teams is stimulated

(Inter-organizational connective capacity) *

- there are policies and routines for network management
- there are roles or functions for network management
- there is training in network management and networking skills

(Ambidextrous procedures) *
This question is about how innovation is situated in your organisation:

- we have a strategy or plan that addresses both innovation ánd optimization
- we systematically evaluate if innovation ór optimization is required to improve performance innovation is part of our year plan and team plan
- our innovation policy contributes to good innovation processes
- we have clear innovation procedures for innovation
- regular and innovation processes are well connected

(Ambidextrous resource allocation) *

- our HRM takes innovation into account (in selection, training, career support, personnel evaluation)
- resources (money/time) are allocated well to regular tasks ánd innovation
- there are enough resources (money/time) for innovation

(Learning organization) *
This question is about learning at the organisational level

- We use knowledge and expertise of colleagues well
- our policies and routines are regularly adjusted to new insights or techniques
- there are routines to reflect on the relevance of new insights for the organization
- my organization learns from my experiences

Part C: Your organization in collaboration with others

(Connective network) *
This question is on collaboration of your water authority with other parties (also) for work field *(substitute with answer 7)*

- we have effective collaborations with other parties
- we use many different forms of collaboration
- parties trust that all live up to agreements
- all parties always look for solutions in open dialogue

Questionnaire continues

*(Network existing parties) **

This question concerns the composition of the networks your water authority is part of (also) for work field *(substitute with answer 7)*

My water authority collaborates:
- with existing, usual parties
- in long-lasting, formal arrangements
- to develop solutions based on existing knowledge and technology
- with parties with known standpoints and visions

*(Network new parties) **

My water authority collaborates:
- with new, unusual parties
- in loose, brief, informal arrangements
- to develop solutions based on new knowledge and technology
- with parties with unusual, unexpected standpoints and visions

*(Learning network) **

This question is about learning with and by parties that collaborat (also) for the work field *(substitute with answer 7)*

My water authority:
- uses pilots and experiments to test new solutions with other parties
- collaborating with other parties results in new knowledge and solutions
- stimulates joint learning with other parties
- learns from the collaboration with other parties

Please supply name and address of a party your water authority collaborates with for work field *(substitute with answer 7)***. We would like to send him/her a brief anonymous questionnaire*****

Do you wish to react, did you miss anything or do you have remarks or suggestions?

We thank you very much for your response!

NOTES:

* Variable names between brackets, these were not included in the questionnaire
** A 7-points Likert-scale was used, from totally disagree (1) to totally agree (7)
*** We initially intended to send the questions on innovating, optimizing and performance to parties the water authorities collaborate with, to obtain a stakeholder perspective on these items, but later reconsidered this for practical and methodological reasons

Summary

Introduction

This thesis explores, tests and explains which capabilities public organizations (PSOs) – and more specifically Dutch regional water authorities - and their employees need to be able to incrementally improve their policies, processes, technology and services, as well as to innovate them to enhance performance. We also elaborate how public organizations deal with the tensions between the different demands, and which organizational antecedents support a balanced and mutually enforcing approach to innovation and optimization. Finally we explore the contribution of innovation and optimization to enhancing performance, and if there are drivers that may cause a bias for innovation or optimization with a potential adverse effect on performance. We translate our findings into implications for practice that can serve as guidance for public organizations to enhance their proficiency in dealing equally dextrous with both innovation and optimization.

Our main research question thus is: What is the impact of innovating and optimizing on performance and what capabilities and organizational antecedents contribute to innovation and optimization? We aim to translate our findings into implications for practice that can serve as guidance for public organizations to enhance their proficiency in dealing with both innovation and optimization. Our research questions thus are:

1. How do the individual, organizational and network levels interact?
2. What capabilities support innovating and optimizing?
3. What is the relative contribution of innovating and optimizing to performance?
4. How do public organizations deal with the tensions between optimizing and innovating?
5. How do organizational antecedents impact practices of innovation and optimization?

We used a mixed method research design, combining both qualitative and quantitative methods, including case study research, literature research, a survey, statistical analysis, and focus group research.

Defining innovation, optimization and performance

We defined innovation as the implementation of a new - technical, organizational, policy, service or other - concept that changes and improves the functioning and outcomes of the public sector. This concept is perceived as new by an individual or other unit of adoption, and represents a discontinuity with the past. We use the term ‘optimization’ for continuous gradual, intentional improvement. Optimization thus concerns the incremental improvement of existing policies, processes,

technologies and services, in continuity with the past. Public service performance can be conceptualized as achieving public goals in an effective and efficient manner, preserving present and future quality of public services as well as legitimacy among stakeholders.

Interaction between different levels in collaborative innovation processes (research question 1)

In our case study of a policy innovation we have shown that strong pressure between regime actors - a water authority, municipalities, stakeholders, knowledge institutions and consultants - following inundation events, invoked collaborative experimenting and learning in niches. Analysing the pathway of a shifting policy paradigm showed that innovations did take place preceding the paradigm shift but these were insufficient to bring about a major mind shift. Crucial for the latter was also stress within the main actor - the water authority -, due to financial problems that received significant exposure in the media. This tension strengthened the connection of learning in the niches to organizational learning processes, whereby connective civil servants played a pivotal role. We have also shown that this major policy innovation was followed by an implementation phase involving multiple optimizations in regime policies, procedures and routines, for which again piloting and testing with regime actors in niches was needed.

Capacities that support innovating and optimizing (research question 2)

Drawing on literature on innovation, organizational sciences, network science and network governance, learning, policy entrepreneurs, boundary spanning and leadership, we singled out three dimensions of capacity of public organizations that support innovating and optimizing: connective capacity, ambidextrous capacity and learning capacity. We defined the main attributes of these capacities at the individual, organizational and network levels, thus constituting a multidimensional and multilevel framework.

Connective capacity

Individuals who smoothen collaboration across boundaries within and between organization, span structural holes in networks, and make new ideas available for the network or organization, are instrumental for innovation and also contribute to optimization. Connective strategies include linking content (ideas, insights), actors (within and between organizations), and/or processes.

At the *organizational* level dense intra-organizational networks support trust and cooperation and exchange and refining of existing knowledge, which supports optimization. However, dense networks may also diffuse strong norms and

behavioural expectations, and may have adverse effects on innovation. Supporting connectivity at the network level requires dedicated efforts at the organizational level to develop network management policies, assign networking roles and enhance networking skill of employees.

At the *network* level connective capacity is needed for effective network governance and achieving consensual, effective, robust, integrative and innovative outcomes. Densely connected organizations are reported to efficiently exchange knowledge and skills, but also at the network level too strong relationships may support similarity, limited search and a focus on optimization.

Ambidextrous capacity

At the *individual* level transformative leadership is generally related to innovation, while transactional leadership is considered to enhance optimization. An ambidextrous manager has the skills to combine a transformational with a more transactional style, to combine innovation and optimization related activities, and to support the adoption of new ideas and the linkage to existing knowledge and routines.

Ambidextrous *organisations* develop strategies and processes, and assign resources to connect, support and balance optimizing and innovating. Structural approaches separate optimization and innovation, whereas contextual approaches advocate a supportive organizational context to support ambidextrous behaviour at the individual or unit level.

Ambidextrous networks, i.e. networks with new parties with new ideas and perspectives as well as with well known, similar partners, have shown to be effective for developing and exploiting innovations. For optimizing a strong familiarity and mutual understanding between organizations is helpful, while for innovating less embeddedness and a larger cognitive distance is favourable.

Learning capacity

Important characteristics of *individual* learning capacity are tolerance of ambiguity and change, openness to experience and self-reflectiveness. While first order learning supports optimizing, innovating is supported by transformative second order learning, involving a reflective attitude towards one's own norms, values and practices, and those of the organization.

Organizational learning is a mutual process in which organizations learn from their members and vice versa. Organizations store knowledge they learn from their members in their strategies, procedures and structure. Organizational learning

includes stimulating idea generation, experimentation, absorption and sharing of new knowledge, and codification and institutionalization of what is learned in strategies, policies and routines, as well as reflection on the continuity of organizational learning.

At the *network* level collaborative innovation is supported by flexible institutions and temporary arrangements in informal networks that allow for experimenting and learning. These arrangements should be embedded in the incumbent formal institutions, and be connected to learning processes at the organizational level.

Relative contribution of the different capacities to innovation and optimization (research question 2)

We operationalized the multilevel and multidimensional framework into measurement scales, and conducted a survey among 22 regional water authorities. We used structural equation modelling (SEM) to test to test the contributions of the different capacities to innovating and optimizing. The findings demonstrate that all capacities matter, but differences in impact exist. In a qualitative follow-up we presented the results to focus groups of employees and managers in ten water authorities, and discussed their innovating and optimizing practices.

Capacities that contribute to innovating

At *the individual* level connective project- or process leaders contribute to innovation as well as to optimization. This indicates ambidextrous behaviour of individual employees on the work floor and is in line with references in the focus groups to connective and entrepreneurial activity of employees.

At the *organizationa*l level the capacity to learn as an organization, i.e. developing and employing knowledge of employees, and adapting organizational policies and routines to new insights and technology, contributes to innovation.

At the *network* level the ability to engage and learn with new parties stands out, both for innovation as for optimization, although the association is stronger for innovation.

Capacities that contribute to optimizing

At the *individual* level project- or process leader also contributes to optimization, as mentioned above. Ambidextrous managers are positively associated to optimizing, but not to innovating. Public managers often have a more facilitating and internally oriented role, and their main focus is on incremental improvement rather than on innovation. Our focus group results confirm that managers in water authorities are

driven by a strong results-orientation, mainly focus on optimization and often not tasked to contribute to innovation.

At *the organizational* level intra-organizational connectivity is important.There is no significant impact of intra-organizational connectivity on innovation, which may indicate that too close ties reduce the flow of new ideas. The focus groups participants recognized a tendency to think in ingrained patterns and follow familiar routines.
At the *network* level engaging and learning with new parties is also important for optimizing, although the association is less strong than for innovating. Obviously, for optimization new ideas, knowledge and learning is essential also, although this may involve 'single loop' learning.

Contribution of innovation and optimization to performance (research question 3)

We used the survey data to test the contribution of innovating and optimization to performance by SEM. Both optimizing and innovating contribute to a higher level of perceived performance. Optimizing shows a stronger relation with performance than innovation. This seems a plausible finding as public sector organisations are more likely to incrementally improve their processes, techniques and services in their regular operations to enhance performance, than to engage in innovation with its perceived risks and higher transaction costs. Our findings thus contribute to putting the 'innovation imperative', i.e. the normative pressure and high expectations of the benefits of more innovation in public organizations, in a broader perspective. Nevertheless, the contribution of innovation is significant.

A further analysis however showed that the relation between optimization and performance is curvilinear and that although optimization initially contributes more to public performance than innovation, the positive impact of optimization on public performance diminishes the more optimization is conducted. Our focus group discussions confirmed a strong focus on optimization and revealed tensions between innovation and optimization. The discussions revealed an over-engagement in optimization due to a strong results-based approach and focus on efficiency, cost-reduction, and risk avoidance. Remarkably, our focus group data revealed a strong bias to optimization and some evidence of over-optimization especially in water authorities that engage in relatively low levels of optimization and innovation, and showed that water authorities which are proficient in optimization and innovation are also more capable in dealing with the tensions between the two and run less risk of over-optimization.

Dealing with tensions between innovation and optimization: different configurations of ambidexterity (research question 4)

As innovation and optimization are both essential for enhancing performance it is important for public service to reconcile the interdependent processes of innovation and optimization. Temporal or structural approaches aim to separate innovating and optimizing in time or in separate structures, such as separate units or projects. Paradoxical 'both-and' approaches assume that tensions persist and are beneficial, and aim at dealing with competing interrelated demands simultaneously, accepting as well as resolving the tensions. Contextual, paradoxical approaches are widely advocated to deal with innovation and optimization tensions and enhance organizational ambidexterity.

Our survey results revealed different levels of innovating and optimizing in the water authorities. The focus group data uncovered different ambidextrous designs. In low ambidextrous water authorities no ambidextrous design is in place at all. Moderately ambidextrous water authorities apply a structural and temporal approach, e.g. by installing an innovation unit or team and an innovation policy that support the invention phase of innovation, and carrying out innovation as projects. The high ambidextrous water authorities show more contextual ambidexterity, formulating cohesive strategic visions and plans, encouraging employees to both optimize and innovate, and putting processes in place that support connection to both organizational goals and current operation.

Organizational antecedents that impact practices of innovation and optimization (research question 5)

Organizational antecedents that have an impact on ambidexterity are organizational strategy and vision, structure, organizational culture and leadership. Integrative strategies, ambidextrous leadership and a culture that support paradoxical norm and values help synchronize innovating and optimizing. In addition, informal routines of organizational members are needed to cope with 'eventualities' in practice. If formal and informal systems are congruent they are mutually reinforcing and beneficial for organizational ambidexterity.

Our focus group results revealed that different ambidextrous configurations result from different attitudes of the water authorities towards innovation, which are strongly related to their organizational identity. The constituting elements of these practices appear to be mutually reinforcing.

A strict task orientation and risk-averse culture goes along with a transactional, results- and cost-oriented management style and little attention for innovation in strategic plans and policies, which leaves no room for embedding innovation in

the daily routines of the organization. As a result informal innovation routines are not connected to formal strategies and organizational goals and the transactional managerial style prevents rather than stimulates innovation.

In moderately ambidextrous water authorities future goals-oriented strategies and formal innovation policies allow for and reward formal, legitimate innovation routines within the formal innovation programme, but do not stimulate innovation efforts nor ambidextrous behaviour in regular operations.

A different pattern can be observed for high ambidextrous water authorities in which a more open, societal value-oriented perception of responsibilities is reflected in more integrative strategies and intra-organizational alignment, a more transformational management style and more embedded innovation practices. As this context and management style supports a better connection of innovation and optimization practices to organizational goals and ambidextrous behaviour of employees there seems to be less necessity to resort to informal routines.

Conclusions

Summarizing our main conclusions: we found that innovation and optimization both contribute to performance. Optimization initially contributes more, but its contribution diminishes at higher levels. A strong results-orientation causes a bias to optimization and public managers often find it difficult to accommodate innovation. Similar public organizations may exhibit very different ambidextrous configurations of strategies, management style, culture and informal practices, induced by different perceptions of their identity and role in society. High ambidextrous public organizations show a more contextual ambidextrous design, are more proficient in dealing with the tensions between innovation and optimization, run less risk of over-optimization, and perform better.

Contribution to literature

With this research we contribute to literature by presenting a more comprehensive approach of innovation and optimization, and focus on how public organizations can deal with tensions between innovation and optimization. We add to the emerging literature on ambidexterity in public organisations by studying attributes of ambidexterity on individual, organizational and network level in coherence with two more generally studied abilities, i.e. learning and connecting. We also studied different ambidextrous configurations of organizational antecedents in similar public organizations, and identified underlying causes for these differences. We studied relations between innovation and optimization with performance, which is new to public sector literature, including nonlinearity.

Relevance for practitioners

With respect to capabilities that support innovation and optimization we found that connecting and learning with new unusual parties is crucial for both innovation and optimization. It is important to build ambidextrous networks and to stimulate network learning, by arranging experimentation and learning in 'niches' or pilots. Care should be taken to connect inter-organizational learning with intra-organizational learning and to include what is learned in regular processes and routines, e.g. by including reflection on organizational learning in performance management procedures. For innovation 'double loop' learning may be supported by proactively searching for new insights and by reflection on existing practices and mind sets. Individual and organizational connective capabilities could be supported by network policies, processes and training.

At the organizational level contextual ambidexterity, i.e. a coherent set of strategies and processes, norms and values, and leadership style, helps to stimulate ambidextrous behaviour at the work floor and supports decision making with respect to the allocation of resources to innovation and optimization at the organizational as well as unit level. It is thus important to formulate and communicate an integrative vision and strategy that stimulate the creation of societal value, to engage in a recurring dialogue at the strategic as well as operational level on the need for either optimization or innovation to enhance performance, and to install policies and performance management procedures that support both. Innovation policies should support implementation as well as invention. Performance management systems should include measures for innovation as well as for optimization and support ambidextrous behaviour and learning at the individual as well as unit level, as well as dialogue and comprehensive evaluation on how public performance is best served.

To support an ambidextrous context a leadership style is needed that combines transformational elements, including stimulating new ways of thinking, coaching and motivating employees, ensuring connection and cohesion, with transactional activities, including steering on results, making performance agreements with employees and facilitating regular work processes.

This implies that public organizations should not focus on a specific determinant to enhance ambidexterity, but rather pursue a comprehensive approach, by jointly addressing strategy and leadership style, culture and identity, and create a context that empowers managers and encourages and supports employees. Public organizations should be well aware of a potential bias for optimization and prepare for the moment that the contribution of optimization to performance starts to diminish, and innovation is necessary.

Samenvatting

Van dit proefschrift is ook een publieksversie in het Nederlands beschikbaar. Ik verwijs lezers die met de hier gepresenteerde kennis en inzichten in de praktijk aan de slag willen graag naar: 'Hoe kunnen waterschappen in samenhang innoveren en optimaliseren om beter te presteren', door Hanneke Gieske.

Introductie

Dit proefschrift onderzoekt welke capaciteiten van belang zijn voor publieke organisaties, meer specifiek de Nederlandse waterschappen, en hun medewerkers om beleid, processen, technieken en diensten te optimaliseren én te innoveren om beter te presteren. We onderzoeken hoe publieke organisaties omgaan met de spanning tussen deze verschillende processen, en welke organisatie-aspecten of organisatorische randvoorwaarden bijdragen aan een gebalanceerde benadering van innoveren en optimaliseren. Tenslotte onderzoeken we de relatieve bijdrage van innoveren en optimaliseren aan presteren, of er factoren zijn die een bias kunnen veroorzaken voor innoveren en optimaliseren, en of dat een negatief effect heeft op presteren. We vertalen onze bevindingen in implicaties voor de praktijk, die als handreiking kunnen dienen voor publieke organisaties die hun vaardigheid om even handig om te gaan met innovatie en optimalisatie willen versterken.

De onderzoeksvraag is dus: Wat is de impact van innoveren en optimaliseren op publieke prestatie en welke capaciteiten en organisationele randvoorwaarden dragen bij aan innoveren en optimaliseren? Deelvragen zijn:

1. Hoe interacteren het individuele, organisatie en netwerkniveau?
2. Welke capaciteiten ondersteunen innoveren en optimaliseren?
3. Wat is de relatieve bijdrage van innoveren en optimaliseren aan presteren?
4. Hoe gaan publieke organisaties om met de spanning tussen innoveren en optimaliseren?
5. Welke organisatorische randvoorwaarden zijn van belang voor innoveren en optimaliseren?

Het onderzoek bestond uit een verkennende case studie, literatuuronderzoek op basis waarvan een multidimensionaal en multilevel raamwerk voor innoveren en optimaliseren is opgesteld, het testen van dit raamwerk door middel van statistische analyse aan de hand van de resultaten van een enquête onder 22 waterschappen. Ook is de bijdrage van innoveren en optimaliseren aan presteren onderzocht. Vervolgens is in tien focusgroepen nader ingegaan op de innovatie- en optimalisatiepraktijken van de waterschappen en zijn onderliggende oorzaken voor verschillen in de mate van innovatie en optimalisatie tussen de waterschappen onderzocht.

Definities van innoveren, optimaliseren en presteren

Innovatie is de implementatie van een nieuw (technisch, organisatorisch, beleids-, dienstverlenings-, of ander) concept dat het functioneren en presteren van de publieke sector verandert en substantieel verbetert en dat publieke waarde creëert. Dit concept wordt als iets nieuws beschouwd door de betrokkenen, een discontinuïteit met het verleden. We introduceerden de term 'optimaliseren' voor geleidelijk, continu verbeteren van bestaand beleid, technieken, processen en diensten, in continuïteit met het verleden. Publieke prestatie definiëren we als het bereiken van publieke doelen op een effectieve en efficiënte manier, waarbij zowel huidige en toekomstige kwaliteit van de publieke diensten gewaarborgd wordt, als legitimiteit onder belanghebbenden.

Interactie tussen verschillende niveaus bij een beleidsinnovatie (onderzoeksvraag 1)

In de case studie van een majeure beleidsinnovatie bleek dat sterke druk op regime actoren (een waterschap, gemeenten, belanghebbenden) als gevolg van eerdere overstromingen en nieuw nationaal beleid, leidde tot een gezamenlijk innovatieprogramma en experimenteren in niches ('proeftuinen'). Spanningen in het waterschap zelf, door grote financiële problemen die het gevolg waren van het bestaande wateroverlastbeleid, waren doorslaggevend voor een paradigmashift ('van normgericht naar effectgericht waterbeheer'). Ondernemende en verbindende medewerkers speelden hierbij een cruciale rol, door hetgeen geleerd werd in de niches te verbinden met organisatieleerprocessen. Uit analyse van het verloop van de paradigmashift bleek dat innovaties voorafgaand aan de paradigmashift plaatsvonden in het bestaande beleidsparadigma. De analyse laat ook zien dat de beleidsinnovatie werd gevolgd door een implementatiefase, met meerdere optimalisaties in beleid, procedures en werkwijzen, waarvoor opnieuw experimenteren en testen met netwerkactoren nodig was.

Capaciteiten die innoveren en optimaliseren ondersteunen (onderzoeksvraag 2)

Op basis van literatuur over o.a. organisatiekunde, innovatie, netwerkkunde en governance, leren, beleidsentrepreneurs en leiderschap, kunnen drie dimensies van capaciteiten van publieke organisaties worden onderscheiden die innoveren en optimaliseren ondersteunen: verbindend vermogen, ambidexter vermogen en lerend vermogen. We hebben uit de literatuur de belangrijkste aspecten van deze capaciteiten op individueel, organisatie en netwerkniveau bepaald en daarmee een multilevel en multidimensionaal raamwerk ontwikkeld.

Verbindend vermogen

Individuen die grenzen overbruggen binnen en tussen organisatie en de samenwerking over deze grenzen heen faciliteren, de gaten in netwerken overbruggen en nieuwe ideeën beschikbaar maken voor het netwerk en de organisatie, zijn cruciaal voor innovatie en dragen ook bij aan optimalisatie. Verbindende strategieën zijn o.a. het verbinden van inhoud (ideeën, inzichten), actoren (binnen en tussen organisaties) en/of processen.

Op het *organisatieniveau* ondersteunen dichte intra-organisationele netwerken onderling vertrouwen en samenwerking en uitwisseling en verfijning van bestaande kennis, hetgeen het verbeteren van bestaand beleid, processen en vaardigheden in een organisatie ondersteunt. Anderzijds kunnen dichte netwerken ook sterke normen en verwachtingen ten aanzien van gedrag verspreiden, en de verspreiding van nieuwe ideeën en informatie juist beperken, hetgeen negatieve effecten op innovatie kan hebben. Het versterken van verbinding op netwerkniveau vereist inzet op organisatieniveau, bijvoorbeeld om netwerkbeleid te ontwikkelen, netwerkrollen in te stellen en netwerkvaardigheden van medewerkers te vergroten.

Op het *netwerkniveau* is verbindend vermogen nodig voor effectieve netwerk governance en het bereiken van gedragen, effectieve, robuuste, integrale en innovatieve uitkomsten. Organisaties met sterke onderlinge verbanden wisselen efficiënt kennis en vaardigheden uit, maar ook op het netwerkniveau kunnen te sterke banden gelijkvormigheid versterken, het zoeken naar nieuwe inzichten beperken en een focus op optimalisatie versterken.

Ambidexter vermogen

Op het *individuele* niveau draagt transformatief leiderschap bij aan innovatie, terwijl transactioneel leiderschap bijdraagt aan optimalisatie. Een ambidexter managementstijl, die een transformatieve en transactionele stijl combineert, ondersteunt het combineren van innoveren en optimalisatie, de acceptatie van nieuwe ideeën, maar ook de verbinding met bestaande kennis en werkwijzen, en daarmee de inbedding van innovatie in reguliere processen.

Ambidexter *organisaties* ontwikkelen strategieën, processen en structuren, en alloceren middelen om innovatie en optimalisatie te verbinden, ondersteunen en balanceren, en deze in te bedden in reguliere processen. Structuurconfiguraties gaan uit van het scheiden van innovatie en optimalisatie in aparte organisatie-eenheden, teams of projecten. Contextuele configuraties bepleiten een ondersteunende organisationele context, om ambidexter gedrag op individueel en teamniveau te stimuleren met een samenhangende set van strategieën, processen en normen die gelijktijdige innovatie en optimalisatie bevorderen.

Ambidexter *netwerken*, met zwakke verbindingen voor het creëren van nieuwe combinaties en sterke verbindingen om deze te valideren en benutten, dwz netwerken met zowel nieuwe partijen met nieuwe ideeën en perspectieven als bekende partners, zijn effectief voor het ontwikkelen van innovaties en de implementatie ervan. Voor optimaliseren is een sterkere wederzijdse bekendheid en begrip tussen organisaties gunstig, terwijl voor innoveren minder inbedding en een grotere cognitieve afstand gunstig is.

Lerend vermogen

Belangrijke aspecten van *individueel* lerend vermogen zijn tolerantie van ambiguiteit en verandering, openheid voor nieuwe ervaringen, en zelfreflectie. 'Eerste orde' leren ondersteunt optimalisatie, terwijl voor innovatie transformatief 'tweede orde' leren nodig is, vanuit een reflectieve houding ten aanzien van de eigen normen, waarden en handelen, en die van de organisatie.

Organisatieleren is een wederzijds proces waarbij organisaties leren van hun medewerkers en vice versa. Organisaties slaan de kennis die ze leren van hun medewerkers op in hun strategieën, procedures en structuur. Organisatieleren houdt zowel het ontwikkelen van ideeën en absorptie en delen van nieuwe kennis, en het codificeren en institutionaliseren van wat geleerd is in strategieën, beleid en werkwijzen in, als reflectie op de continuïteit van organisatieleren.

Op het *netwerk* niveau wordt gezamenlijke innovatie ondersteund door flexibele instituties en tijdelijke arrangementen en informele netwerken, die experimenteren en leren mogelijk maken. Het is van belang deze arrangementen in te bedden in de bestaande formele instituties, en te verbinden met leerprocessen op organisatieniveau.

De bijdrage van de verschillende capaciteiten aan innoveren en optimaliseren (onderzoeksvraag 2)

Het multilevel en multidimensionele raamwerk voor innovatie en optimalisatie is geoperationaliseerd in meetschalen. Om de bijdrage van de capaciteiten aan innoveren en optimaliseren, en van innoveren en optimaliseren aan presteren te testen is een survey uitgezet onder de toen 22 waterschappen. Statistische analyse laat zien dat alle vaardigheden in verschillende mate van belang zijn. In een kwalitatief vervolg zijn de resultaten gepresenteerd aan focus groepen van medewerkers en managers in tien waterschappen. In de discussies is gefocust op ambidextrie in de praktijk van de waterschappen, omdat ambidextrie op organisatieniveau het meest relevant is om grip te krijgen op het versterken van innoveren en optimaliseren en daarmee presteren te verbeteren.

Capaciteiten die bijdragen aan innoveren

Op *individuee*l niveau dragen verbindende project- of procestrekkers bij aan innoveren én optimaliseren. Dit duidt op ambidexter handelen op de werkvloer en is in lijn met eerder empirisch onderzoek naar ondernemende medewerkers in water management. Ook in de focusgroepen is veelvuldig gerefereerd naar verbindend en ondernemend gedrag van medewerkers.

Op *organisatie* niveau draagt lerend vermogen, d.w.z. het ontwikkelen en toepassen van kennis van medewerkers, en het aanpassen van het beleid en de werkwijzen van de organisatie aan nieuwe inzichten en technologie, bij aan innovatie.

Op *netwerkniveau* valt op dat het vermogen om verbinding aan te gaan met nieuwe partijen én gezamenlijk te leren van groot belang is, vooral voor innoveren.

Capaciteiten die bijdragen aan optimaliseren

Op *individuee*l niveau dragen verbindende project- of procestrekkers ook bij aan optimaliseren, zoals hiervoor beschreven. Ambidexter managers dragen bij aan optimaliseren, maar niet aan innoveren. Managers in publieke organisaties hebben vaak een intern georiënteerde rol en ze richten zich meer op optimaliseren dan op innoveren. De focusgroep resultaten laten inderdaad zien dat de managers in de waterschappen sterk op het behalen van resultaten gericht zijn, en voornamelijk bijdragen aan optimaliseren.

Op *organisatieniveau* is interne verbinding belangrijk. Interne informatie-uitwisseling, coördinatie tussen verschillende teams en sociale activiteiten dragen bij aan de uitwisseling van ideeën en kennis die nodig is voor het verbeteren van bestaand beleid, procedures en werkwijzen. Interne verbinding draagt niet bij aan innoveren, hetgeen mogelijk veroorzaakt wordt doordat door te hechte banden het verspreiden van nieuwe ideeën en afwijkende meningen afneemt, waardoor innovatie gehinderd wordt. De deelnemers aan de focusgroepen herkennen een neiging om in vaste patronen te denken en vertrouwde werkwijzen te volgen. Op *netwerkniveau* valt op dat het vermogen om verbinding aan te gaan met nieuwe partijen en gezamenlijk te leren ook belangrijk is voor optimaliseren, hoewel minder dan voor innoveren.

De bijdrage van innoveren en optimaliseren aan presteren (onderzoeksvraag 3)

Innoveren en optimaliseren zijn beide belangrijk om presteren te verbeteren. De relatie tussen optimaliseren en presteren is sterker dan voor innoveren. Dit lijkt een plausibele bevinding voor publieke organisaties, die eerder hun processen, technieken en diensten in kleine stapjes verbeteren dan zich richten op innovatie. Deze bevinding plaatst de hoge verwachtingen van meer innovatie in publieke organisaties en normatieve druk om te innoveren in een breder perspectief.

Nadere analyse laat echter zien dat de relatie tussen optimalisatie en prestatie curvilineair is: hoewel optimalisatie in eerste instantie meer bijdraagt aan prestatie dan innovatie, neemt de bijdrage af bij toenemende mate van optimalisatie. Uit focusgroep resultaten blijkt een sterke focus op optimalisatie en spanning tussen innoveren en optimaliseren. Deze nadruk op optimalisatie wordt veroorzaakt door een sterke resultaat-georiënteerde benadering en focus op efficiëntie, kostenreductie en het vermijden van risico. Uit de focusgroepen blijkt ook dat juist waterschappen met lage scores voor innoveren en optimaliseren een risico van over-optimalisatie lopen, en dat waterschappen die meer innoveren en optimaliseren ook behendiger zijn in het omgaan met de spanning tussen beiden en dus minder risico lopen op over-optimalisatie.

Omgaan met de spanning tussen innovatie en optimalisatie: verschillende configuraties van ambidextrie (onderzoeksvraag 4).

Innoveren en optimaliseren zijn beide essentieel voor het verbeteren van het presteren van publieke organisaties, en daarom is het belangrijk deze beide processen in samenhang te benaderen. Organisaties kiezen vaak voor configuraties, waarbij innovatie en optimalisatie gescheiden worden, bijvoorbeeld in aparte organisatieonderdelen of projecten, een 'óf/óf' aanpak. 'Paradoxale' 'én-én' benaderingen gaan ervan uit dat spanningen tussen beiden persistent zijn en nuttig, en dat tegenstrijdige vragen of eisen gelijktijdig bij de kop gepakt moeten worden, waarbij beoogd wordt de spanning te accepteren of zo mogelijk op te lossen. Contextuele, paradoxale configuraties worden vaak bepleit om met de spanning tussen innoveren en optimaliseren om te gaan.

De enquêteresultaten laten verschillende niveaus van innoveren en optimaliseren zien in de waterschappen. Uit de focusgroep discussies blijkt dat in de waterschappen innoveren en optimaliseren verschillend organiseren, en de daaraan ten grondslag liggende oorzaken. In waterschappen met lage scores voor innoveren en optimaliseren is geen sprake van enige gestructureerde benadering van innoveren en optimaliseren. In de waterschappen met gemiddelde scores voor innoveren en optimaliseren wordt een 'óf/óf' aanpak gevolgd, er is bijvoorbeeld een innovatieteam

en een innovatiebeleid, die de inventiefase van innovatie ondersteunen, en innovatie wordt opgepakt als project. De waterschappen met bovengemiddelde scores laten meer contextuele ambidextrie zien, zij hanteren meer een ‘én/én’ aanpak. Deze waterschappen formuleren samenhangende, integrale strategische visies en plannen, moedigen medewerkers aan om zowel te optimaliseren als te innoveren, en hebben werkprocessen ingericht die de verbinding met zowel de organisatiedoelen als het reguliere werk borgen.

Organisatorische randvoorwaarden voor innoveren en optimaliseren (onderzoeksvraag 5)

Organisatorische randvoorwaarden die innovatie- en optimalisatiepraktijken vormgeven zijn zijn strategie en visie, cultuur, structuur en leiderschap. Integratieve strategien, ambidexter leiderschap en een cultuur die paradoxale waarden ondersteunt zijn van belang voor in samenhang innoveren en optimaliseren. Daarnaast is informeel handelen van medewerkers om om te gaan met ‘eventualiteiten’ in de praktijk van belang. Als formele en informele systemen congruent zijn versterken ze elkaar en dragen zo bij aan ambidexter vermogen op organisatieniveau.

De waterschappen vertonen verschillende ambidexter configuraties. Deze ontstaan door de verschillende houding van waterschappen ten opzichte van innovatie, die sterk gerelateerd is aan hun perceptie van hun rol en identiteit als waterschap. Verschillende aspecten versterken elkaar. In de onder-gemiddeld scorende waterschappen gaan een strikte (kern)taakgerichte oriëntatie en risicomijdende cultuur samen met een transactionele, op resultaat en kosten georiënteerde management stijl en weinig aandacht voor innovatie in strategische plannen en beleid, hetgeen geen ruimte laat voor het inbedden van innovatie in de dagelijkse werkprocessen van de organisatie. Daardoor vindt innovatie vaak plaats ‘onder de radar’ en zijn informele innovatiepraktijken niet gekoppeld aan de formele strategie en organisatiedoelen. De transactionele managementstijl stimuleert innovatie niet, maar hindert die juist. Gemiddeld ambidexter waterschappen hebben toekomstgerichte strategieën en een formeel innovatiebeleid, die de inventiefase van innovatieprocessen ondersteunen en innovatie belonen binnen het formele innovatieprogramma. Echter, in het reguliere proces worden noch innovatie, noch ambidexter gedrag gesteund of beloond. De boven-gemiddeld scorende waterschappen laten een ander patroon zien, waarbij een meer open, op maatschappelijke waarde gerichte perceptie van verantwoordelijkheden gereflecteerd wordt in meer integrerende strategieën en interne samenhang, een meer transformationele managementstijl en meer ingebedde innovatiepraktijken. Deze context en managementstijl ondersteunt een betere verbinding tussen innovatie- en optimalisatiepraktijken, en faciliteert ambidexter gedrag van medewerkers, waardoor er minder behoefte is aan informele werkwijzen rondom innovatie of optimalisatie.

Conclusies

Samenvattend zijn de belangrijkste conclusies dat zowel innovatie als optimalisatie bijdragen aan prestatie, dat optimalisatie initieel meer bijdraagt dan innoveren, maar dat bij hoge niveaus van optimaliseren de bijdrage aan prestatie minimaal wordt. Een sterke resultaatgerichtheid veroorzaakt een bias voor optimalisatie. Publieke managers vinden het mede daardoor moeilijk om innovatie te accommoderen en in te bedden in reguliere processen. Vergelijkbare publieke organisaties kunnen, als gevolg van hun perceptie van hun identiteit en rol in de samenleving, sterk verschillende ambidexter configuraties van strategie, managementstijl, cultuur en informele praktijken ontwikkelen. Ambidexter publieke organisaties kunnen beter omgaan met de spanning tussen innoveren en optimaliseren, lopen minder risico op over-optimalisatie en presteren beter.

Bijdrage aan de literatuur

Dit proefschrift draagt bij aan de bestaande literatuur door innovatie en optimalisatie in samenhang te analyseren, en door te onderzoeken hoe publieke organisatie omgaan met de spanning tussen beide. Het draagt bij aan de recente onderzoeksaandacht voor ambidextrie in publieke organisaties, door aspecten van ambidextrie op individueel, organisatie en netwerkniveau te onderzoeken in samenhang met twee andere vaardigheden waarover al veel meer onderzoek bestaat, namelijk leren en verbinden. Door verschillende ambidexter configuraties binnen goed vergelijkbare publieke organisaties te analyseren, hebben we onderliggende oorzaken voor deze verschillen kunnen duiden. We hebben de relatie tussen innoveren en optimaliseren met presteren geanalyseerd, waarbij we ook nonlineaire relaties hebben onderzocht, hetgeen nieuw is voor publieke sector literatuur.

Relevantie voor de praktijk

Netwerkniveau

Voor innoveren en optimaliseren is vooral het vermogen om te verbinden en te leren met nieuwe, ongebruikelijke partijen van belang. Het is dus van belang om ambidexter netwerken te vormen en leren binnen het netwerk te stimuleren, bijvoorbeeld door experimenteerruimte te creëren in de vorm van ‘niches’ of pilots. Van belang is dat dit netwerkleren wordt verbonden aan organisatieleerprocessen.

Organisatieniveau

Op organisatieniveau is contextuele ambidextrie van belang, d.w.z. een samenhangende set van strategieën en processen, waarden en normen en leiderschapsstijl, die ambidexter gedrag op de werkvloer stimuleren en

besluitvorming op organisatie- en teamniveau ten aanzien van het toekennen van middelen aan innovatie en optimalisatie ondersteunen. Het is dus van belang een integrerende visie en strategie te formuleren en communiceren, die uitgaat van het creëren van maatschappelijke waarde, en voortdurend in dialoog te zijn zowel op strategisch als op operationeel niveau over de noodzaak om hetzij te innoveren of te optimaliseren om prestatie te verbeteren. Ook is van belang beleid en procedures zodanig vorm te geven dat ze zowel innoveren als optimaliseren ondersteunen. Innovatiebeleid moet zowel de inventiefase als de implementatiefase ondersteunen. Het is belangrijk dat prestatiemanagement systemen worden ingezet om dialoog en evaluatie te ondersteunen over hoe het presteren van de publieke organisatie het best gediend wordt, en dat hiervoor indicatoren voor optimaliseren én innoveren op organisatie, team en individueel niveau benut worden.

Daarnaast is aandacht nodig voor organisatieleren, dat wil zeggen dat hetgeen geleerd wordt, wordt vertaald in reguliere processen en procedures. Regelmatige reflectie op organisatieleren zou onderdeel moeten zijn van prestatiemanagement procedures. Voor innovatie is 'tweede orde'-leren van belang, hetgeen ondersteund kan worden door het proactief zoeken naar nieuwe inzichten en door reflectie op bestaande praktijken en mind sets. Het leren van fouten en het ontwikkelen van risicomanagement procedures en competenties is ook van belang.

Verbindend vermogen is belangrijk voor optimaliseren en kan ondersteund worden door netwerkbeleid, het instellen van netwerkrollen en netwerktrainingen.

Individueel niveau

Om een ambidexter context en gedrag te ondersteunen is een ambidexter leiderschapsstijl nodig die transformationele activiteiten, – zoals het stimuleren van nieuwe manieren van denken, coachen en motiveren van medewerkers, zorgen voor samenhang en verbinding –, combineert met transactionele activiteiten – zoals het sturen op resultaat, het maken van resultaatafspraken met medewerkers en het faciliteren van reguliere werkprocessen –.

In samenhang innoveren en optimaliseren

Om het vermogen om in samenhang te innoveren en te optimaliseren te versterken is dus van belang dat publieke organisaties strategie, cultuur en leiderschapsstijl in samenhang adresseren, de relevante capaciteiten verder ontwikkelen en een context creëren die ambidexter gedrag van managers en medewerkers ondersteunt. Publieke organisaties moeten zich bewust zijn van een potentiele optimalisatiebias en anticiperen op het moment dat de bijdrage van verdere optimaliseren aan presteren minimaal wordt, en innovatie noodzakelijk is om duurzaam publiek presteren te waarborgen.

About the author

Hanneke Gieske obtained her bachelor degree in Geology in Utrecht in 1981. After working for two years in ore exploration in Surinam she graduated in Hydrogeology at the Free University in Amsterdam in 1988. She worked 18 years at TNO, in applied research on hydrological systems, ecohydrology, marine geology and geochemistry, and interdisciplinary research on knowledge development in multi-actor processes. International assignments included EU research, and a two years integrated water resource management study in Yemen. She is the founder of the GAIA network for women in geosciences.

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