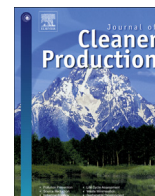




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## Realizing innovative public waterworks: Aligning administrative capacities in collaborative innovation processes

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### ABSTRACT

The importance of government support for innovation is widely acknowledged, but the way governments support innovation is changing. We discern three trends: local innovation policies are gaining importance; governments increasingly choose a bottom-up, tailor-made approach to support specific innovations; and there is more collaboration between public and private actors. We analyse these trends and investigate how modern governments employ their administrative capacities to support innovation. We conduct a comparative case study of four attempts to realize integrated energy and waterworks, combining water safety and sustainable energy generation. Despite broad support, attempts to realize such innovative, multifunctional works in The Netherlands have had varying degrees of success. We examine the governmental support for these attempts and assess how governments' actions affect the innovation process. We conclude that all governmental administrative capacities have to be employed, and that public alignment is crucial for a synchronized endeavour. We elucidate the growing importance and special role of local authorities in innovation and demonstrate how modern governments spur innovation with tailor-made support in close collaboration with the private sector. We further conclude that 'encouraging interaction' is an insufficient public contribution to innovation and that expectations must be carefully managed to avoid role confusion in public–private innovation.

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### 1. Trends in governmental support for innovation

It has become common practice to understand innovation as a result not solely of a private firm's research and technology activities (Smith, 2000), but also of the complex interaction between private producers, public policy, consumers, research and education, politics and infrastructure (Lundvall, 2010). The important role of governmental action in the generation, diffusion and adoption of innovation is widely acknowledged (Etzkowitz, 2003). This role is changing however. Different trends can be discerned in the way governments support innovation.

First, there is a gradual dispersal of innovation policy away from the national government towards regional and transnational (European) authorities, leading to a more multi-level setting (Partzsch, 2009: 986). Public research, technology and innovation are no longer exclusively in the hands of national authorities (Kuhlmann, 2001: 953). Reacting to the perceived failure of national governments to address environmental challenges, local governments are

for example implementing their own policies to support innovation for sustainability, in a 'rebirth of regionalism' (Garret-Jones, 2004: 3). The emergence of 'smart' cities is one example (Cohen and Amorós, 2014). Local governments are seeking to attract the creative class, establish innovation districts and profit from the job creation that innovation brings (Cohen and Amorós, 2014; Doh and Kim, 2014). The local environment is an important determinant of a private firm's capacity to innovate, and research shows that R&D intensity and innovation activity vary more across regions than across national states (Oughton et al., 2002).

Related to this trend towards localization is the trend towards more applied, tailor-made governmental support for innovation. Increasingly, policy measures are developed in interaction with industry and universities (Etzkowitz and Klofsten, 2005). This results in 'smart regulation, a new type of negotiated settlement in which improved procedures allow for better, institutionally assured cooperation, more ambitious goals and limited administrative costs' (Partzsch, 2009: 985). Instead of 'sponsoring grand technology citadels', governments increasingly choose a more bottom-up approach, aimed at establishing local clusters, knowledge hubs and innovation districts (Garret-Jones, 2004: 3).

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The third trend is the focus on collaborative governance and a more coordinating role for governments. Modern governments increasingly rely on collaboration to realize their policy goals. A host of non-governmental actors, public and private, are mobilized to solve today's 'wicked' public problems (Salamon, 2000; Klijn and Koppenjan, 2016). This also applies to the field of environmental innovation policymaking. Now that the state's capacity to deal with environmental challenges is diminishing, 'other actors and institutional arrangements are stepping in' (Francesch-Huidobro, 2015: 11). The role of the government in innovation processes shifts to 'encouraging interaction and cooperation between institutional spheres' (Lundberg, 2013: 213; Etzkowitz, 2003). A result of this trend towards collaborative governance is the blending of public and private innovation. Governments often involve private actors to address (traditionally) public problems. They try, for example, to increase private investments in innovation in the water sector (World Bank, 2004).

The vast literature on government support for innovation generally distinguishes between supply-oriented and demand-oriented policy instruments (Aschhoff and Wolfgang, 2009; Guerzoni and Raiteri, 2015). The former stimulate the supply side of innovation, for example by providing subsidies to private firms to support their R&D activities. Demand-side instruments stimulate the market for innovative products and services, for example by public procurement or mandatory standards. Many studies test the effectiveness of a specific policy instrument for innovation, for example public procurement (Uyarra et al., 2014) or R&D project subsidies (Kang and Park, 2012). Recently, growing attention has been given to the combined effect of various policy instruments (Rogge and Reichardt, 2013). The term *policy mix* is used to refer to the 'set of different and complementary policy instruments to address the problems identified' (Borrás and Edquist, 2013: 1514). The current literature, however, still focuses predominantly on traditional governmental support for innovation. There is a dearth of research exploring how local governments support innovation (Mazzarol et al., 2014) and, although innovation in the public and the private sector are melding, the literature on public and the literature on private innovation are still largely separated. There are, in other words, few studies that cover the new ways in which governments support innovation and the capacities they employ in doing this. Therefore we formulated the research question: What capacities are employed by public authorities to support public–private innovation and with what consequences?

To answer this question, we analyse four cases that reflect the trends in governmental support for innovation. We compare four regional projects in which public and private actors collaborate to add innovative techniques for sustainable energy generation (tidal energy, salinity gradient power) to public waterworks. Not only are these techniques innovative. Also the fact that public waterworks are used for commercial goals is novel, as is the way in which public and private actors have to collaborate to realize the implementation of the innovative techniques.

Transnational, national and local governments are involved in the projects, and their role differs per case. We unravel how the authorities contribute to the innovation processes by mobilizing different administrative capacities. We do not focus on the support of one sole government or policy instrument, but rather analyse the actual mix of different instruments and resources in a multi-level and multi-actor setting, thereby zooming in on a tailor-made form of governmental support for specific innovation projects. We investigate what extra activities authorities undertake to spur the adoption of innovations, in addition to the institutional framework of policies, rules and regulations at national level. Instead of comparing national systems, we thereby analyse

variation within one such system to determine whether different mixes of employed capacities result into different outcomes. In Section 2, we further elaborate the public–private nature of integrated energy and waterworks and the special position of authorities in realizing them.

## 2. Our research: integrated energy and waterworks as public–private innovation

Innovation can be defined as 'the successful exploration of new ideas' (Francis and Bessant, 2005: 171) or, more elaborately, as 'the recognition of opportunities for profitable change and the pursuit of those opportunities all the way through to their adoption in practice' (Baumol, 2002). The technologies used in our cases, such as the turbines that generate tidal energy and the membranes for osmotic energy, are typical, private sector innovations developed by private firms for 'cost reduction, market expansion and profit maximization' (Schumpeter, 1934; Stoneman, 1983). These techniques are implemented, however, in public infrastructure, in dams, sluices, levees and dikes that normally are used only for flood risk safety and water management. As these waterworks are publically owned and managed, realizing integrated energy and waterworks thus inevitably has a public component. Such works could therefore be called public–private innovations.

In the water sector governmental support is of great importance to achieve innovation, because, compared to other sectors, the R&D intensity and innovation rate is relatively low (Ipeksidis et al., 2014). Innovation in the water sector is driven predominantly by regulatory developments and social and environmental factors and much less by market demand and competitiveness (European Commission, 2014: 275). The relatively low profitability is one of the reasons for the lagging private investments in water innovation (World Bank, 2004). The same holds for the renewable energy sector; technology development for renewable power generation is largely driven by governmental support (Cantner et al., 2014).

To realize integrated energy & waterworks besides the cooperation of public asset managers is essential. Their cooperation is not straightforward however, because the infrastructure used in energy and waterworks is vital for flood protection and the supply of fresh water. Dutch water management, anchored in laws and regulations, focuses on risk avoidance, and public asset managers have a strict, monofunctional task orientation (Van Buuren et al., 2013; Roovers and Van Buuren, 2014). It is therefore not easy to accommodate other functions at waterworks, as required in integrated energy and waterworks.

Governments generally promote innovation because it fosters economic growth (Smith, 2000: 75; Aschhoff and Wolfgang, 2009: 1235). Innovation is believed to increase competition, create jobs and generate wealth for individuals and the nation (Michael and Pearce, 2009: 285). These objectives also apply to governments' support for integrated energy and waterworks. In addition however, the realization of such works contributes to climate adaptation, sustainability and the transformation towards a green economy; and local governments hope that the innovative constructions will attract tourists and international businesses to their region.

The factors described combine into a complex position for authorities in the realization of integrated energy and waterworks. In our study, we take a closer look at this special position and investigate how authorities' contributions influence the attempts to realize such works. In Section 3, we discuss the literature on the different capacities governmental actors can employ to support innovation.

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