Innovation in public services: Private, public, and public-private partnership


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Abstract: The contemporary academic discourse regards innovation as an inherent quality of public-private partnerships (PPP). The link between PPP and innovation is, however, poorly understood and empirical evidence of innovation in PPPs remains anecdotic and largely detached from conceptual work. This paper aims to address this conceptual void and attempts to disentangle the concepts of innovation and PPP within the context of infrastructure PPP. We introduce from the innovation literature two fundamentally different logics of innovation in PPP: a public sector-centered approach and a market-centered approach. By combining these two approaches to the study of innovation, we show that innovation in the context of PPP has a much wider implication and potential outcomes than emphasized in the literature so far. We also provide a conceptual framework that can advance future work on PPP and innovation.

1. Introduction

In contemporary public-private partnership (PPP) literature innovation is often seen as an intrinsic characteristic of PPP (Yescombe 2007). In similar vein, today hardly any PPP policy strategies go without emphasizing the importance of innovation. Consequently, promises about the innovative potentials of cross-sectoral partnerships now proliferate among public administration researchers and policy practitioners alike (Huxham & Vangen 2004; Osborne & Brown 2013). However, the relationship between innovation and PPP has not yet been systematically conceptualised: it is far from being clear what actually constitutes as innovation in the context of PPP and how the introduction of PPP actually facilitates or constrains innovation in public service delivery as well as in public and private domains in general. We accord here with Hodge who argued that:

The PPP brand promises political success on the basis of symbolizing innovation and forward thinking from both sectors, and there has been much political capital invested in
advocating jurisdictions across the globe. The ideal of PPP has power in the public psyche as well. Exactly what we mean by PPP success (or VfM) deserves more sophisticated consideration to my mind. (2014 p. 4).

Innovation in the PPP literature is most commonly understood in terms of productivity gains or design improvement (e.g. Grimsey & Lewis 2004; Zhang and Chen 2013), whereas others regard PPP as a form of public sector innovation or an organizational innovation in itself (Windrum 2008). Although relevant in specific settings, the prevailing understanding has nevertheless remained too narrow and sometimes even misleading. It is common to regard innovation as the main source of PPP productivity gains while empirical evidence on the other hand indicates that it is often the lower labour costs of private contractors rather than innovation that lead to changes in service delivery (Rosenau 1999; for a review see Hodge & Greve, 2009). There is a tendency in the PPP scholarly community to regard innovation as more or less equal to any (positive) change, whereas innovation can sometimes also lead to negative side-effects (Soete 2013). Most PPP studies do not distinguish between minor every-day changes (adjustments to evolution in society) and changes that progressively lead to more radical transformations. However, if any change can be regarded as innovation then the concept of innovation in the context of PPPs runs into risk of becoming yet another fashionable but essentially empty concept (on a similar point in public sector innovation literature generally see Drechsler 2009; Pollitt 2011; Lember et al 2011).

The quest for understanding innovation in PPP is far from being a simple task. The fact that PPP stands at the cross-roads of the public and private sectors assumes that one takes into account the differences in the innovation process according to different sectorial logics. There is moreover a growing awareness that public sector innovation is and should be treated as something different from private sector innovation (Osborne and Brown 2013, Kattel et al 2013). At the same time, though, the whole concept of public sector innovation is still under-conceptualized and no clear frameworks exist that predicts and explains the meaning and process of innovation in the public sector. It is today widely accepted that innovation matters in the private sector settings not just because it explains how “new combinations” come into being, but how these new combinations help us to explain the evolutionary change in markets and societies in general (see Schumpeter 1912/1983, Nelson and Winter 1982). However, in terms of grasping fully the links between PPP and innovation, little academic mileage has so far been gained in terms of conceptually understanding these two catchy concepts. Consequently, what is needed is a more refined view
on the relationship between innovation and PPP, which not only takes into consideration the specific features of PPPs, but also reflects the specific features of innovation in the public and private domain.

This paper aims to disentangle the complex and dual nature of two of the most significant catchwords in contemporary public administration: innovation and PPP. Our argumentation builds on two fundamentally different views on the co-creative process of innovation and the respective roles of the public and private sectors in this regard (Osborne and Brown 2013, Kattel et al. 2013). First, based on the literature on innovation in the private sector, we address the private domain of PPP by building on the Schumpeterian understanding of innovation and linking innovation to various features of PPP under the label of a *market-centered approach to innovation*. Second, in a *public sector-centered approach to innovation*, we then link the PPP and innovation debate with recent developments in the public sector innovation literature, thus highlighting the key features of PPP in relation to innovation and the role of public sector as an innovator in its own right (innovation *in* the public sector) and as facilitator of innovation (innovation *through* the public sector). By combining these two approaches to the study of innovation, we show that innovation in the context of PPP has a much wider implication and potential outcomes than emphasized in the literature so far. Moreover, by grounding the understanding of innovation and PPP more firmly on the dual logics of the public and private sectors than has hitherto been done, we provide a conceptual framework that embeds the PPP concept more firmly in the innovation literature and thereby attempts to advance future research on PPP and innovation.

The paper develops as follows. We first define the concepts of PPP and innovation. Second, we review the existing literature that deals with innovation and PPP and draw some preliminary conclusions on their mutual relationship. Third, we make a case for launching the market-centered and public sector centered approaches to innovation in the PPP discussion. In the final section some conclusions and lessons for future research are drawn.

2. Defining PPPs

A common definition of PPP is that it concerns ‘co-operation of some sort of durability between public and private actors in which they jointly develop products and services and share risks, cost and resources which are connected with these products’ (Van Ham and Koppenjan 2001: 598; see
also Klijn and Teisman 2003). This definition embraces a wide range of cooperative institutional arrangements of a more or less binding character ranging from relatively loose policy-communities and issue-networks to more binding and long-term contractual relationships with specified deliveries (Hodge and Greve 2005). Weihe (2008) distinguishes between four PPP literature families (infrastructure PPPs, urban development PPPs, policy PPPs and development PPPs) each with distinct theoretical and empirical origins. Many scholars also see PPP as an umbrella concept covering a broad range of public-private arrangements active at both national and supra-national level (Mörth 2007). Even within a relatively confined notion of PPP as infrastructure service delivery that combines design, finance, construction operation and maintenance into a joint and long-term agreement, which is the type of PPP we focus on in the paper, at least ten different partnership models have been identified (Grimsey and Lewis 2004).

Although in vogue, the concept of PPP thus remains an ambiguous term with differing meanings and usages in various contexts (cf. McQuaid 2000; Hodge and Greve 2005). Looking at PPP from a historical perspective, Savas (2000) interprets contemporary PPPs as a heritage of earlier marketization and privatization reforms, whereas Wettenhall (2003: 92) traces the origins of PPPs back to the early 19th century. Many scholars also see contemporary PPPs as a legacy of the early Blair government’s third way policy, which transformed the Private Finance Initiative (PFI) into the current PPP movement (Flinders 2005). Linder (1999) moreover argued that the upsurge of PPPs was inspired by and accordance with the neoliberal focus on efficiency gains, often with an explicit assumption about the private sector being more effective and innovative than its public counterpart (see also Grimsey and Lewis 2005).

The conceptual roots and political motivations behind contemporary PPPs are thus diverse and include both micro-economic (collaboration, cost effectiveness, value-for-money, innovation), macro-economic (deficit, debt, private finance) and political (marketization, private finance) motives (McQuaid and Scherrer 2010). Hodge (2004) coined this discussion by noting that debates over what should be public and what should be private have abounded for centuries, and that ‘PPPs are simply the latest chapter in the book’ (ibid.: 37). Moreover, at the organisational level,PPP is commonly seen as a route to improved collaboration in the public-private interface and thereby a way to realize collaborative advantage and, ultimately, innovative solutions (Yescombe 2007). The very idea about innovation in PPP thus builds on the argument that synergy and added-value – something which could not have been achieved by the public and
private sectors acting single-handedly – can be achieved by and through PPPs (Huxham and Vangen 2004).

As a matter of fact, the concepts of synergy and added value became widespread in the early 1990s and were defined by Huxham as ‘when something unusually creative is produced – perhaps an objective is met – that no organization could have produced on its own and when each organisation, through the collaboration, is able to achieve its own objectives better than it could alone’ (Huxham 1993, 603). Subsequently, from the early 2000 onwards, it became common ground to talk about innovation in PPPs, although the partnership literature has oftentimes struggled with the distinction between PPP as an innovation in itself (i.e. organizational innovation) and innovation through PPP (i.e. output/outcome innovation). Although the concepts of innovation and collaborative advantage are obviously linked in many ways there are also important differences, and it is the concept of innovation that we now turn to.

3. Conceptualizing innovation

3.1 Innovation as a market phenomenon

The concept of innovation has been advanced within various social science disciplines, which all tend to treat and understand innovation differently (Godin 2008). As a market phenomenon innovation is understood as a continuous, cumulative and path-dependent process that characterizes the main engine of evolutionary transformations in the market (Dosi et al. 1997). In evolutionary economics tradition the relevance of innovation is rooted in the very nature of how capitalism works. As put by Lundvall (1992/2010, 8):

   In modern capitalism, innovation is a fundamental and inherent phenomenon; the long-term competitiveness of firms, and of national economies, reflect their innovative capability and, moreover, firms must engage in activities, which aim at innovation just in order to hold their ground.

To follow Schumpeter, innovation is about “‘doing things differently’ in the realm of economic life” (Schumpeter 1939). For Schumpeter innovation is the engine of economic growth and development as it brings forth evolutionary changes that will spread throughout the market and beyond. New combinations of resources bring about five different types of innovation: new products or a new quality of a product, new methods of production, new markets, new sources of
supply of raw materials and intermediate goods, and new methods of organizing the economic process (see also Oslo Manual, OECD and EC 2005, pp. 46f).

Innovation therefore in the Schumpeterian view is something “new” that has been applied in the marketplace: thus innovation differs from invention, knowledge production or new ideas, which are often part of innovation processes, but which alone are not sufficient to qualify as innovation. The term “new” is understood as introducing a combination in a specific context in which it was not used before. Although this can come close to imitation it is of a different nature because usually an adaptation effort is required which, in turn, resembles incremental innovation (Niosi 2012). Thus, innovation is a cumulative process where one innovation (e.g. driven by first mover advantage) leads to imitation and further innovation by other firms (driven by profit opportunities) that eventually changes entire sectors, market and society (Fagerberg 2005).

However, innovation is not only a technological but also a social and organizational phenomenon. This is due to organizational innovation in a narrow sense on the one hand, and on the other hand institutional innovation is required as a complement for technological innovation (Perez 1983; Van de Ven 1986). Therefore not only for technological reasons (e.g. feedback loops which lead to incremental improvements) innovation is essentially a continuous process rather than consisting of discrete phases (Fagerberg 2005).

In the private sector, market competition is the ultimate test if something new is considered an innovation (if the market accepts the new product, process etc.) or not (if the new fails to be accepted in the market). Therefore being new is not sufficient for being considered innovative, and innovation does not necessarily mean “progress in society” representing a Schumpeterian process of “creative destruction” but rather “destructive creation” – … innovation benefiting a few at the expense of many’ (Soete 2013, p. 134-135). Soete (ibid.) uses the ecologically unsustainable innovation-led consumerism and financial innovations as examples of destructive creation. At the same time Nelson (2013) among others emphasizes the fact that innovations affect different groups in the economy differently. In other words, it is the market selection process that determines the relevance of innovation and also if and how innovations influence economic and social change or not.

From a PPP perspective the organization of the innovation process is particularly relevant. In his early work (“Schumpeter Mark I”) Schumpeter focused on the individual entrepreneur and new
firms who act as drivers of “creative destruction”: They search for unexploited business opportunities by trying out new combinations of resources. In his later work (“Schumpeter Mark II”) he acknowledged that competition in many markets is dominated by large established firms which can build up substantial barriers to entry for new innovators; thus such firms – and their path-dependent routines and capabilities (Nelson and Winter 1982) – play a crucial role in the innovation process. As both types of organization are compatible with cooperation between private and public innovation partners, the concept of PPP is applicable to analyze the organization of the innovation process. This is important as on the private side in some PPP-relevant markets (such as transport, construction and hospitals) there is a tendency towards increasing firm sizes and market concentration which suggests that Mark II innovation might become increasingly relevant.

In the innovation systems literature (Lundvall 1992/2010) the focus is both on the actors in the innovation process (which had been the focus of the traditional “linear model” of innovation) but also on the linkages and feedback loops between the actors. Systems of innovation approaches most distinctly embody the systemic view of the innovation process and have been developed based on (1) technological, industrial or sectorial characteristics of innovation actors, or on (2) spatial characteristics (national systems of innovation and regional systems of innovation). A systemic view of the innovation process has major policy implications because then, not only the individual actor in the innovation process is the target of innovation policy, but the linkages between (potential) actors (including the government) and the supply of relevant complementary actors as well.

3.2 Innovation as a public sector phenomenon

In spite of growing scholarly interest in public sector innovation as a concept and practice (see Fernandez & Wise 2010; Osborne & Brown 2011), there is still a considerable confusion concerning what innovation means in the public sector, how it can be conceptualized, and what (if at all) the public sector can learn from private sector innovation literature (see Drechsler 2009, Pollitt 2011, Lynn 2013). There is an emerging consensus that innovation in the public sector should be understood as a radical departure from old solutions (Osborne and Brown 2013), and that the new solutions have to be sufficiently radical to bring about irreversible changes in core
tasks (or routines) in public sector organizations (Lynn 1997). Related to the organizational perspective are different system-level innovations that are found to be crucial in the public sector context and that either facilitate or determine radical change in organizations: new kinds of regulation, public infrastructure, social relationships, governance mechanisms (including PPPs) and public policies (Osborne and Brown 2013, Valkamaa et al 2013, Windrum and Koch 2008).

The current public sector innovation (PSI) literature focuses on three, partially overlapping, themes of innovation. First, innovation-related activities linked to changes in organizational performance (productivity) (Valkamaa et al 2013; Dunleavy and Carrera 2013). This covers various efforts from introduction of new services and processes to policy, conceptual and system-level innovations (Windrum 2008). Second, new services and ways of service delivery that ultimately alter the relations between citizens and government (Hartley 2013). Here, compared to physical products, it is the interactivity as a core characteristic of services (Miles 2005) that is in focus. And third, public value creation in its widest sense, pointing towards the need to consider qualitatively different values compared to market-relevant innovations (Moore 1995). These public sector innovation processes use different modalities (innovations within and through public sector), agency (public sector proactively initiates changes or reacts to technological, environmental etc. changes), and morphology (from incremental to discontinuous changes) (Kattel et al. 2013).

In spite of the calls to relate public sector innovation to specific public sector features such as public values, transparency, accountability, and political and policy contexts (see e.g. Hartley 2013), the underlying logic of analyzing the innovation mechanisms in the PSI literature still borrows heavily from private sector thinking (Kattel et al. 2013). But this poses a theoretical challenge as it is not clear whether public sector and industrial innovations can ‘be studied through the same “lenses”’ (Fagerberg et al. 2013, 13). Among other aspects, the absence of profit opportunities, replication and market selection mechanisms makes it important to unpack the specific evolutionary mechanisms of innovation in the context of the public sector and how this differs from innovation in the private sector.

There has been a lot of attention paid at search heuristics, i.e. how public sector organizations attempt at finding out best ways to organize their activities, how this changes organizational routines and to what extent (radically or incrementally). The existing literature stresses the role of individuals as change agents and related conditions that support or limit the change (borrowing,
again, heavily from private sector (management) literature). But there exists a limited understanding on which mechanisms determine the evolution of search processes in the public sector, how the selection process of innovations works, and what results and capabilities are to be considered as successful. Consequently, today no clear frameworks exist that enable us to explain how the process of radical transformation differs from the process of every-day changes in public sector and also from innovation in the private sector (Kattel et al. 2013). As there is no natural selection mechanism similar to market competition that would determine the success (or not) of “new combinations”, the understanding and evaluation of innovation in a public sector context has remained disputed.

4. Empirical evidence on PPP and innovation

The academic discourse on the link between innovation and PPP usually identifies innovation as an inherent quality of private sector involvement. This perception stems from (an often tacit) assertion that private partners bring about new ideas, knowledge, competencies and resources and thereby generate innovation by their mere presence (see Huxham and Vangen 2000; Debande 2002; Bougrain 2012). However, a review of empirical studies on innovation in PPPs illustrates that the evidence across a broad range of both technological and non-technological innovation outcomes is inconclusive (see table 1).

<insert Table 1 around here>

Several points can be learned from the table. First, the evidence about PPPs bringing forth innovation is much more scarce compared to the prevailing assumptions in the literature. There are some evidence that PPP leads to incremental technology innovations (Bourn 2003; Chan 2009; Debande 2002; Leiringer 2006), infrastructure design innovations (Leiringer 2003, 2006; Fitzgerald 2004; De Lemos et. al, 2003), innovations in organizational setup of services (Bourn 2003) and new services (Hoope and Schmitz, 2013), but in general there is very little evidence to support the claim that innovation was a pervasive and inherent quality of PPP. In addition to the identified innovation drivers such as profit opportunities (Debande 2002), design freedom (Leiringer 2006) and stimulating environment for user-provider relationships (Bougrain 2012; Eaton et. al. 2006; Russel et al. 2006; Chinyere 2013), the literature has also documented several important barriers to innovation in PPP such as risk-averseness (Barlow and Köberle-Gaiser 2009; Demirag and Khadaroo 2010) and non-existing design freedom (Reeves 2003). Yet, little is
still known about what mechanisms exactly enable, determine or inhibit innovation in PPP, and most existing studies still fail to back the rather anecdotic assertions about innovation in PPPs with hard empirical evidence.

Second, the literature in general does not account for whether possible efficiency gains in PPP assumed the public and private sectors to change their routines or whether the efficiency gains mainly resulted from incorporating the existing market capabilities into the realm of public service delivery. Much of the current literature does not delineate between changes in the private and public organizations, nor does the literature analyse the positive and negative feedback loops that might reinforce this change. There seems to exist an implicit assumption in the PPP literature that efficiency gains mainly happen because of innovation, which, of course, may not necessarily be the case (Dunleavy and Carrera 2013). Also, there is a lack of studies that document the claim that innovation is a result (an effect) of PPP in itself rather than a result of an increased focus on innovation, which would expectedly lead to more innovation but at the same time is not a documented result of PPPs. Obviously, innovation can both occur as a result of innovative acts of the parties involved or due to the sheer scale and complexity of PPPs (cf. Raisbeck, 2008), but the empirical literature remains silent on this important issue.

Third, the tendency to understand innovation in PPP in terms of public sector efficiency gains means that it is the very narrow perspective on innovation that dominates the literature. The current literature largely ignores the fundamental feature of PPP – that it always occurs at the cross-road of public and private sectors – and thus disregards the different logics and effects innovation has on these sectors. PPP always involves several stakeholders operating under very different institutional rationales (Klijn and Teisman 2003). Also, it is not just the different logics of the private and public sectors, but a mix of sectorial (finance, construction, services) and policy (fiscal and field domains such as transport or health) rationales that characterise PPPs. Moreover, partnership projects are designed in the political arena, which adds yet another layer to the PPP-specific innovation process. Innovation in PPP can thus have very different meanings and consequences for various PPP stakeholders, but the existing studies generally lack evidence of these gains having any systemic effects on the government, market or society.

Finally, by concentrating merely on public service delivery performance, the literature by and large ignores the systemic nature of innovation: innovation not only assumes that one understands the system that influences innovation (cumulativeness), but also how innovation influences the
evolution of the wider institutional system. As noted by Bourn (2003), there is little evidence documenting that this interaction effect has any influence beyond a particular project on the actual organization of the public sector.

5. Towards a conceptual framework for innovation in PPP

What follows is an attempt to contextualize innovation and PPPs through two broad perspectives: innovation as a market phenomenon ("market-centered approach") and innovation as a non-market phenomenon ("public sector-centered approach"). Finally, we combine the two approaches and set out a framework for understanding innovation throughout the PPP value chain.

5.1 Market-centered approach

From a market perspective PPPs are “an essential instrument for fostering innovation in OECD countries”, and “have become increasingly popular in R&D and innovation” (OECD 2010, 104). The function of PPPs in relation to market sector innovation is threefold: providing an organizational frame for generation and exploitation of innovation activities, providing innovation-relevant infrastructure, and being a mode of innovation policy delivery (Kristensen et al 2014).

First, PPP is a mode of fostering the generation and exploitation of innovation activities by providing the organizational frame for “producing” innovations and bringing new products, processes, modes of organization etc. to the market and thereby affecting the evolution of businesses’ capabilities and skills. Government intervenes in the market by selecting topics and partners of a PPP and therefore it is confronted with picking-the-winners problems – which is not much different from using other instruments of direct and focused policy intervention. But if the difference between private and social returns of R&D is large due to market failure, then government intervention in technology and innovation policy is justified in this context and could yield enormous benefits (Stiglitz and Wallsten 1999, 70).

Further, PPP acts as a variety creation mechanism by linking agents from different sectors in the innovation process and thereby creating new opportunities for user-provider interactions and learning. In this way PPP contribute to the performance of innovation systems in general by strengthening the quality of feedback linkages in the economy. Here the quality of demand or the
ways government articulates the user needs for private partners is a key factor affecting market behavior. By demanding new products or even facilitating the emergence of new industries that go beyond the state of the art the public sector can act as a testing-ground for innovative products and encourage innovation by providing a “lead market” for new technologies (Rothwell 1994). Innovation-oriented PPP can also affect business capabilities beyond the creation of new products by using R&D procurement or supporting market diffusion of already existing technologies (Hommen and Rolfstam 2009). By applying innovation-friendly public procurement principles PPP can affect the technology life cycle, promote clusters and innovation systems, and thereby increase local, regional and national competitiveness (Lember et al 2014).

Second, providing infrastructure is a major field of implementing PPP models in many sectors (e.g. transport, health, education, etc.), and it is also relevant for innovation-related infrastructure. Particularly the build-up and operation of infrastructure for the diffusion of new technologies through close cooperation between the public and private sectors has a long tradition and thus PPP can support systemic changes in innovation patterns.

Third, PPP is a mode of innovation policy delivery and is used for innovation program development, innovation project implementation, and as a demand-side policy tool. Developing and implementing innovation support programs and projects usually requires integrating partners from the private business sector, public (and private) research institutions, and other agents of the public sector. In this context PPP is supportive to organize the innovation process, provided that government combine various innovation policy modes (tax reductions on R&D investment, R&D grants, innovation-supporting regulation, public procurement of innovation etc) and deliberately link this innovation policy mix with specific PPP projects.

5.2 Public sector-centered approach

As noted above, it is still debatable how exactly the concept of innovation should be understood and approached in the context of the public sector. But bearing the caveats in mind and based on the previous sections we can delineate between three main public sector dimensions of innovation in the context of PPP: (1) PPP as a catalyst of change in public sector organizational routines; (2) PPP as a mode of addressing social challenges, and (3) PPP as a strategic tool to introduce governance changes.
First, introducing PPPs may significantly alter the organizational routines of public organizations. Direct innovation effects emerge if PPP assumes new capabilities and learning patterns to be developed in order to launch and implement a project. Indirect innovation effects may emerge as side effects of PPP projects if, for example, public sector organizations’ productivity increases due to redesigning of work teams and business processes (Dunleavy and Carrera 2013).

Second, PPP may play an important role in meeting social challenges. Governments often play a key role in developing new solutions to emerging problems such as ageing or environmental challenges, but may lack legitimacy, knowledge or resources to address those concerns. Often these challenges pose existential problems for societies and in order to overcome these problems, innovative solutions may be inevitable. At the same time, radical new solutions usually require not only technological innovations, but assume institutional changes to take place, and public sector is often best placed to facilitate those changes. PPPs in fact are actively pursued by many governments to tackle challenges like the diffusion of clean energy in transport, the use of energy efficient materials and products in construction or new health care services in hospitals.

Third, PPPs can bring about important change in governance and the provision of public services when used as a tool for introducing market deregulation. While public monopolies in the transport, health, and energy sectors have traditionally provided “public goods”, the introduction of PPPs has changed this by engaging private market operators in order to meet public needs. PPPs open up possibilities for the market and for citizens to be involved in public policy making. At the same time, new governance mechanisms such as PPPs may be used by governments in developing strategic capacities of various social and market agents (Jayasuriya 2005) in order to increase government legitimacy. PPPs therefore not only alter the relationship, accountability and authority structures between government and market, but also between government and citizens.

5.3 The two approaches combined

We have argued that innovation in the context of PPP has a much wider connotation and potential effects than what has been emphasized in the literature so far. Table 2 summarizes the market-centered and the public-sector-centered approaches to innovation in PPP along the dimensions of resource organization, deployment and policy relevance.

< Insert TABLE 2 here >
Innovation potentially takes place in all stages which are typical for the PPP value chain in the provision of infrastructure (procurement, design, finance, build, operation, transfer; see table 3). The occurrence and dominance of types of potential innovation in PPPs vary along this value chain. From a market-centered perspective PPP is a mode of fostering the generation and exploitation of innovation by acting as a variety creation and selection mechanism which is important in all forms (new product, process, material, market, organizational design), though not in each stage. Other types of innovation from a market-based perspective (PPP as a mode of providing infrastructure, and of innovation policy delivery) occur less frequently as a dominant feature of innovation. From a public-sector-centered perspective types of potential innovation vary across stages, too. PPP may be a catalyst of change in the public sector primarily in the earlier stages; it can bring about change in governance and act as a (new) mode of meeting social challenges in most stages.

< Insert TABLE 3 here >

Examples of potential innovations and activities potentially leading to innovations include introducing multi-stage tendering in procurement, designing and building infrastructure with regard to minimizing cost over the whole life-cycle, tapping new sources of finance for infrastructure, and implementing new forms of user charge collection. Each stage of the value chain is dominated by very few (groups of) stakeholders: the procuring public sector agent, the bidding consortia, the financiers, the “special purpose vehicle” (i.e. an organization consisting of contractors related to the project which is established to implement the PPP contract), engineering and construction firms, and the users of the infrastructure provided by the PPP. As stakeholders are characterized by different technological competences, technological and interaction patterns (Pavitt 1984; Castellacci 2008) and sectoral innovation systems (Malerba 2004), innovation behavior and the potential innovation outcomes in various PPP stages differ. Construction and infrastructure service industries are supplier dominated, and their innovation activities focus on the introduction of new processes rather than products. As technological development in these sectors to a great extent is determined by customers’ demand-pull, innovation behavior depends heavily on how the public sector articulates user needs in the PPP. The finance sector uses ICTs, process and software development engineering which facilitates both product and process innovation. The public sector is technologically in many ways similar to supplier dominated sectors (Miozzo and Soete 2001).
A major potential of PPPs for enabling innovation arises from intensifying inter-sectoral linkages and knowledge flows between firms with different technological competences and strategies which may release external economies beyond the individual PPP project. While special suppliers, engineering and ICT service providers are among the most dynamic and knowledge intensive sectors under the current ICT-led techno-economic paradigm (Perez 2002; Castellacci 2008) they typically have not been key players in PPPs. Demand for innovation in these industries is determined by typical PPP players like construction companies and infrastructure service providers which use intermediate goods from knowledge intensive industries as an input to their innovation activities. Here the public sector can act as a major facilitator by articulating needs and by designing PPP set-ups that enable the knowledge flow between stakeholders. For achieving this, the public sector may need to reorganize its own institutions and organizational structures, leading to change within the public sector. The need to cope with new technologies emerging from PPP may also trigger such changes.

Applying the market-centered approach and the public-sector-centered approach to a PPP framework which is structured by stages of the PPP’s value added chain provides some preliminary lessons. Growingly risk-averse financiers might act as an impediment to technological innovation, but probably not to financial innovation because they assume to be better able to judge the risks involved in financial transactions. The SPV as an important player in the finance, build and operate stages has an incentive to innovate (e.g. lowering life cycle cost), but because it acts within the boundaries of the PPP contract its scope to go for more than just incremental innovation (particularly in the build stage) seems to be largely determined already in the procurement and design stages. Thus the design specifications are crucial for the scope for innovation within a PPP. In the operate stage users of infrastructure may push for and benefit from innovation.

6. Conclusion

In this paper we detected two main problems in the current PPP and innovation literature. First, as shown in our review of previous studies, there is no conceptual clarity of innovation in mainstream PPP literature. While the term innovation is frequently used when describing the characteristics of a PPP, studies rarely define innovation in the context of its investigations. As a result, empirical evidence on innovation in PPPs is sporadic and often controversial. There is a
lack of delineation between change and transformative change, leaving behind an uncertainty if change in PPP projects is due to regular evolutionary processes on the market, or if PPP actually is a tool for powering systemic change on the market. Moreover, there is a lack of distinction if PPP in itself provides an infrastructure for innovation by allowing for knowledge and capability sharing between private and public parties, or if it is the nature of the demand in procurement through PPP which spur change. Second, while lacking conceptual clarity, the prevailing approach to innovation in PPP is also very restricted, leaving out many crucial elements. Stemming from the initial promise of New Public Management ideas, the focus has been on how innovation has contributed to the improvement of public sector efficiency. However, as PPP occur at the cross-roads of public and private sectors, PPP have the potential to facilitate innovation beyond public service provision. Also, innovation does not necessarily mean “progress in society”, but it may bring along severe negative consequences for the society.

In order to remedy the shortcomings, we conceptualize innovation and PPP alongside two dimensions: a market centered approach and a public sector approach. The market centered approach builds upon the Schumpeterian view of innovation as an evolutionary process on the market, where PPP may help or incentivize transformative change among market players. In a public sector view of innovation in PPP it’s suggested that PPP projects can help the public sector to catalyze changes in its organizational routines, meet social challenges and increase its political legitimacy. In order to bring more clarity for the conceptual definition of innovation in PPP the innovation potential needs to be determined by the interplay between different stakeholders. A brief sketch on this approach has been provided in this paper, however, the topic needs further investigation and analysis, as do all aspects of innovation in PPP. Suffice it to say that we still know very little about how the public sector’s need to maintain legitimacy or the dominance of the financial sector in PPP actually enable or constrain innovation in PPPs. Innovation in PPP requires a more nuanced view than is currently acknowledged in the literature, and only then will it be possible to establish less ambiguous concepts for innovation in PPP together with valid measurements supporting theory.
Literature


Table 1: Literature overview on innovation and PPP

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Sector</th>
<th>Technical innovation</th>
<th>Design innovation</th>
<th>Organisational innovation</th>
<th>Efficiency</th>
<th>Public value</th>
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Table 2: Approaches to innovation in PPP

<table>
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<tr>
<th>Focus/dimension</th>
<th>Resource reorganization</th>
<th>Deployment</th>
<th>Policy relevance</th>
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<tr>
<td>Market-centered</td>
<td>PPP as a variety creation and selection mechanism in the market</td>
<td>PPP provides innovation-relevant infrastructure</td>
<td>PPP as a mode of innovation policy delivery</td>
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<td>Public-sector-centered</td>
<td>PPP as a catalyst of change in organizational routines</td>
<td>PPP as a mode of meeting social challenges</td>
<td>PPP as a policy tool for strategic change in governance</td>
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Source: Authors
<table>
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<tr>
<th>Main aspects of innovation in PPPs</th>
<th>Stage in the PPP's value chain*</th>
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<tbody>
<tr>
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<td>Procurement</td>
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<td>Economic domain(s) in which innovation potentially takes place</td>
<td>Process of public procurement</td>
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<td>Examples of innovation activities</td>
<td>Multi-stage tendering in procurement of infrastructure</td>
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<td>Most important stakeholders and industries</td>
<td>Procuring public sector agent; bidding consortia</td>
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<td>Most important potential types of innovation: market-centered approach</td>
<td>Variety creation and selection (new organizational design, new process)</td>
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<tr>
<td>Most important potential types of innovation: public-sector-centered approach</td>
<td>Catalyst of change in public sector</td>
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<td>Lessons for innovation in PPPs</td>
<td>Design specifications are crucial for the scope for innovation</td>
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</table>

* Depending on the extent of pre-design of the service to be procured by the public authority the sequence between the procurement and the design phases might be reversed. Depending on the chosen model of PPP a project need not comprise all stages. Source: authors