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What's in it for me: Firms strategizing for public-private innovation

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Abstract

Purpose: Public-private innovation (PPI) is often claimed to contribute to societal welfare, to bring positive effects to the public sector and to open new markets to private firms. Engaging in public-private relationships for innovation is, however, also recognised as challenging and problematic. This paper discusses the managerial and strategic challenges faced by private firms when engaging in public-private relationships for innovation.

Design/methodology/analysis: This qualitative study presents 10 firms' engagement in public-private relationships. Half of them are experienced in innovation in public-private relationship; the other half are engaging in public-private relationships for the first time. Cross case analysis brings insight into how these different types of firms strategize for handling relationships with public partners.

Findings: Contrary to non-experienced firms, experienced firms deliberately build a long-term strategy for engaging in PPI in expectation of outcome from more than a single project. They not only engage in building an understanding of the public using setting, but also seek to bridge with the public developing and producing setting to a greater extent than less experienced firms. The experienced firms utilise relationships with actors in the wider public network as a device and an asset for overcoming challenges and for reaping benefits from their engagement.

Originality/value: The study outlines the characteristics of strategizing among the most experienced firms and their special ability to embrace the complexity of the public sector network while working simultaneously on developing innovation for specific public counterparts.

Keywords: Public-private innovation; relationships; developing setting; producing setting; using setting, welfare solutions

Introduction

Recent years have seen a stronger focus on how private firms can become involved in public-private innovation (PPI) to assist solving public welfare challenges by jointly creating new products and services with public organisations. From a societal perspective, PPI is often claimed to be a valuable source of welfare innovations and as a means to create economic potential for developing business by integrating the respective strengths of public and private actors (Klijn & Teisman, 2003). The expectation is that PPIs can rethink and develop innovative public welfare solutions by combining resources across the public and private sectors. In general, it has been argued that PPI that originates from relationships between public organisations and private businesses brings advantages at several levels. First, from a societal level perspective, PPI is considered a source of welfare innovation that benefits citizens by rethinking and improving existing welfare services and solutions (Hartley, Zirger, & Kamath, 1997). Second, from a public sector perspective, PPI can contribute to strengthening and leveraging the innovativeness of public actors. Third, from a private business perspective, PPI can yield profit by opening up a new public market.

Thus, building relationships between public and private actors for specific exchanges and joint innovative activities ideally brings to fore new solutions that provide a basis for solving jointly defined problems (Dittmer et al., 2009). However, the claimed value potential of PPI for participants as well as for society has also been questioned due to the diverging institutional goals and organisational traits of public and private sectors (Ingemansson & Waluszewski, 2009; Waluszewski, 2006).

Some studies have argued, e.g., that a public actor's expectations for the joint innovation effort will be based on an aspiration for professional competence building (Schmidt, 2008) as well as multiple, intangible social and political goals (Currie et al., 2008). The private actor will engage in the innovation activities mainly to create shareholder value (Currie et al., 2008; Schmidt, 2008) and because of the economic incentive (Dudley & Rood, 1989). Furthermore, the private firm will organise to diffuse the innovation to gain added value through additional applications (Schmidt, 2008). Additionally, it has been highlighted that the unique legislative requirements and EU rules for public procurement play a special role in framing innovation through relationships between public and private actors (Martin et al. 1997 Vaidya et al.2006).

Such differences in perspectives and institutional framing influence the PPI process and the relationship between public and private actors. These issues also influence the potential and the challenges faced by private firms engaging in public-private relationships for innovation in pursuit of the long-term profit opportunities that may arise from developing their business. Diverse interests across the developing, producing and using settings have to be aligned to reap the benefits sought. In these settings, relationship

is to be utilised as a device and an assets for encountering the challenges faced. This study explicitly focuses on private firms' engagement in PPI. The following research questions are raised: How do public-private relationships affect the PPI process, and how do firms engaging in public-private relationships strategize for handling relationships with public actors and do innovation?

The following sections first discuss in detail the innovation setting of public-private relationships; second, build the theoretical framework used for discussing how public-private relationships affect the innovation process and how experienced firms differ from non-experienced firms when strategizing for PPI; third, present the methodology and the qualitative study; and finally, present the analysis and the findings and ends with a concluding discussion.

Challenges related to doing public-private innovation

The potential and benefits of PPI are several across societal, organizational and citizen levels. However, reaping the benefits of PPI necessitates the combining of resources that cut across the public and the private sectors. For instance, a claim often made is that the public sector can learn from the private business sector in organising, coordinating and implementing innovation. In the innovation literature, it is widely accepted that an invention is only turned into an innovation when the new technology, product or service is actually implemented and put into use (Van de Ven, Angle, & Poole, 1989). In their seminal work, Utterback and Abernathy (1975) stress that implementation requires that "the new" being develop fits into the system of investments already in place. The advantages and disadvantages of bringing innovation to use are determined not only by "the new" itself, but by (re-)combinations of resources in the system in which it is put to use. The potential of PPI not only rests in innovating technologies and products, but also in the process of implementing these technologies and products in the public sector system.

Following the IMP research tradition, Håkansson and Waluszewski (2007) argue that the value of innovation is determined by a least three issues: technical functionality, social aspects and cost efficiencies. Neglecting any of these issues is shown to be ingenuous when partners believe that innovation uncomplicated can bring, e.g., cost-efficiencies. Indeed, investment in the full system is necessary (Wagrell & Waluszewski, 2009). In general, innovation is more easily brought to use when "the new" 'fits' into the present, while also creating value and without having negative side effects.

For innovation to become widespread and commercialised, it has to 'live' in three empirical settings – the developing, the producing and the using setting (Håkansson & Waluszewski, 2007). The developing setting

is where material and immaterial resources are combined in new ways. This setting is characterised by a trial-and-error process where effects cannot be outlined beforehand. The producing setting comprises the influence that emanates from the established production system, including suppliers, partners and others, who are parties to the production of “the new”. This setting is thus characterised by the presence of different perspectives and understandings among the parties, which creates a heterogeneous knowledge pool. The using setting consists of a whole set of material and immaterial investments. In this setting, it is determined to which degree a new innovation fits into or differs from the already established physical and organisational investments in the larger ‘using system’; and this match will determine the commercialization and value of the innovation (Ingemansson & Waluszewski, 2009).

Moreover, critique has been raised concerning the over-simplification of the ease with which PPI can be implemented (Ingemansson & Waluszewski, 2009; Wagrell & Waluszewski, 2009) – e.g. by policy makers advocating for the use and benefits of PPI. Such studies point to differences in organisational settings that serve as obstacles to potential innovations being imbedded (Wagrell & Waluszewski, 2009) or differences between the development and use settings in which the innovation unfolds (Ingemansson & Waluszewski, 2009).

Drawing on the conceptualisations by Håkansson and Waluszewski (2007) on development, production and use settings, the next section builds a framework for discussing private firms’ engagement in PPI relationship and strategizing for interacting with public organisations for innovation. However, to be able to pinpoint different aspects of relationship challenges and strategic concerns encountered by private firm, we combine this conceptualization with the IMP view of relationships as devices, assets and problems (Ford, Gadde, Hakansson, & Snehota, 2011).

Dealing with challenges in relationships

Building the theoretical framework on the IMP approach implies contemplating innovation as taking place in interactive and interdependent relationships embedded in a network where material and immaterial investment affects implementation of “the new”. Technological development and innovation emerge over time as part of long-term relationships between producer and users who seek to mobilise support and direction through their investments.

Collaboration may be considered the locus of innovation (Håkansson, 1989; Powell, Koput, & Smith-Doerr, 1996). Still, it is also acknowledged that engaging in relationships is challenging (e.g. Håkansson & Olsen,

2011; Håkansson & Snehota, 1998). The burdens that come with engaging into relationships include giving up some control when sharing business with the counterpart; and the partner may have different perceptions and opinions on how to develop the relationship that also need to be addressed. Relationship development is resource demanding wherefore tough prioritisation of which relationships to develop may have to be made (Håkansson & Snehota, 1995). Managing in relationships and paving the way for profiting from PPI imply complexity, extendedness, ambiguity and multi-contextual challenges (Håkansson & Olsen, 2011). For the present purpose, it is relevant to emphasise the potential challenges and dark sides of relationships which are proposed to influence private firms' engagement in PPI due to the inherent conflicts sketched in the introduction. However, to fully understand the strategic concerns faced by private firm who engage with public actors and seek to reap the full potential of PPI, we oppose benefits obtained with the dark sides of PPI relationships.

The IMP literature conceptualises the business landscape as involving more or less interdependent actors engaging in interactive processes of activities and resources. These resources and activities are combined and organised in various ways within and between business actors, thus evolving heterogeneously but in more or less interdependent combinations. The interactions with a specific counterpart are unique and not uniform across the different relationships of a firm. The literature offers a nuanced view on managing and strategizing in relationship, since studies using this approach often – at least indirectly – encompass a coinciding view of relationships as devices, assets and problems (Ford et al., 2011). This conceptualisation fits well with the prevailing situation encountering private firms engaging in PPI, where dark sides and challenges need to be faced and dealt with.

To address the present research question, a theoretical framework is developed based on the concepts of relationships as devices, assets and problems, and the innovative framing of developing, producing and using settings. This framework is set up to explore how aspects PPI relationships influence the innovation process in general and to provide the basis for expanding our knowledge on how firms experienced in public-private relationships strategize for handling relationships with public actors and do innovation in particular. The framework is illustrated in Figure 1 and discussed in more detail in the following sections.

Figure 1: A theoretical framework for strategizing for innovation in public-private relationships

	Developing setting	Producing setting	Using setting
Relationship as device		<ul style="list-style-type: none"> • efficiency • innovation • for influencing others 	
Relationship as asset		<ul style="list-style-type: none"> • gaining access • creating economic value • dealing with a portfolio of relationships 	
Relationship as problem		<ul style="list-style-type: none"> • unruly • demanding • prioritisation • aligning engagement 	

The theoretical frame is intended to include direct as well as indirect relationship effects in an interdependent setting between interdependent actors. Even though the purpose of the present study is to gain more knowledge on private firms' engagement in PPI, the interactive nature of the framework provides opportunities for investigating PPI projects from the perspective of all involved actors. A comprehensive analysis of a PPI project thus entails inclusion of every actor – directly or indirectly – identified at the developing, producing and using setting. However, it is also relevant to note that the framework provides only a snapshot of a given PPI project since the inherent nature of the innovation process and the relationship entails constant development.

Handling relationships in the developing setting

Considering relationships as a device in the developing setting will enable the management to innovate and will be a tool for influencing others (Ford et al., 2011; Håkansson, 1989). Using relationships for innovation can be achieved by combining and developing the firm's resources in conjunction with that of its counterparts (Ingemansson & Waluszewski, 2009). Both the public and the private actor may be part of the continuous trial-and-error process that is an inherent part of the developing setting, although not necessarily so. The firm may also search for new ways to utilise resources in its existing business relationships for the PPI to succeed. As such, the firm's portfolio of relationships can render an asset in the developing setting as the firm uses interaction in relationship for innovating (Håkansson, 1989).

Using relationships as a device for influencing others will be a way for a firm to reach its own as well as joint goals of the PPI, e.g. other actors directly or indirectly involved to leverage the innovation.

Relationships can also be important assets in the developing setting, e.g. for accessing other actors' knowledge, technology or other resources, needed for the innovation (Håkansson, 1989). Seldom, however, will an entirely new relationship be a valuable asset from its inception. This is due to relationships developing through an incremental process which demands resources in terms of time, financing and technology. Only over time can the investment in relationships be harvested (Ford, 1980; Håkansson, 1989).

To leverage and utilise relationships as devices, a firm needs problem solving abilities and abilities to handle related uncertainties (Ford et al., 2011). These uncertainties may relate to the differences between the public and the private sector sphere as discussed in the introduction. In the literature, the relationship management abilities for problem solving and for handling uncertainties are mostly addressed from the perspective of utilising the *positive* effects of relationships as devices – whereas, handling the dark sides are only addressed indirectly.

Engaging in a relationship utilising it as a device for innovation and for gaining access to a partner's resource, knowledge or technology will also require the firm to give up some control of its own resources (Håkansson & Snehota, 1998; Tidd & Bessant, 2013). This loss of control may not be perceived as a problem as long as the parties have similar and aligned intentions. However, if this commonality is lost, it can become a burden or dark side to the relationships (Håkansson & Snehota, 1998).

Handling relationships in producing settings

A relationship serving as a device for increasing efficiency may do so by way of linking activities between actors that can reduce costs of, e.g., operations, logistics and handling (Dubois, 1998), which will also affect the partners' mutual adaptations and investments (Hallén, Johanson, & Seyed-Mohamed, 1991; Håkansson & Snehota, 1995). This linking may directly concern the public counterpart or others in the firm's network involved in the producing setting.

Whereas using relationships as devices is considered something that enables managers to handle a problem, using relationships as an asset concerns gaining access to something for creating economic value. Furthermore, a firm's portfolio of different relationships may constitute different assets and benefits. When looking at a relationship as an asset in the producing setting, we consider it as a gateway through which we may access something to create economic value over time (e.g. effective coordination providing cost reductions as discussed in broader terms by Dubois, 1998; Richardson, 1972). Dealing with relationships as assets implicitly suggests reaping the positive effects of engaging with a partner. The dark sides are not directly addressed. However, in the producing setting, it is important to consider the influence

from the established production system. Thus, it will be more problematic to utilise relationships as assets or devices for PPI if “the new” developed does not comply with the exiting investment in resources made especially by directly involved suppliers, other customers or even competitors.

Relationships can be a problem or have dark sides due to at least four issues. These problems may occur in all of the three settings. 1) Relationships may be unruly if partners are having different perceptions of the goal influencing the joint effort. As already discussed, this is particularly an issue in PPI. 2) Furthermore, relationships are demanding as it takes time and efforts to develop and maintain a close relationship between two partners. Resources are needed in order to learn about each other, to carry out necessary adaptations and to coordinate own activities with those of the counterpart. 3) Relationships also require prioritisation, which does not only mean giving priority but also considering the preclusion of other preferences. In the public sector, this is an issue due to procurement rules and regulations, among others. Some relationships formed in the developing setting may not be utilised in the producing setting due to legislation formed to encourage a competitive market. 4) Finally, relationships require engagements, support and interest from top-management as well as personal relations between employees from both partners of a relationship which is resource demanding and may be difficult to align (Ford et al., 2011; Håkansson & Snehota, 1998). In relation to PPI, this may be a very concrete problem if public managers do not agree with the public user on how the innovation is to be settled in the public producing setting.

Handling relationships in using settings

The using setting is particularly important for the PPI to become implemented and used. The success of “the new” is directly dependent on how “the new” affects other actors and their activities and resources in the using setting (Håkansson, 1989); its success also depends on how “the new” then creates value for the user as a product or service in itself but also by way of how it is brought to use (Baraldi, Gressetvold, & Harrison, 2012). As the firm engages with its public counterpart, it may be the users who are the first individuals related to the project with whom the firm interacts.

As argued by Ford (1980), a relationship will put different demands on the firm at different phases of its development. In PPI the pre-relationship phase – where the firm engages with the public using setting – will be characterised by questions such as who to involve as well as what to invest in and gain from the relationship. Since public and private actors represent different perspectives on and approaches to innovation, a matching of expectations proves particularly important (Clarke, Evald, Munksgaard, & Nissen, 2012) in relation to the public users involved. Since PPI is often single projects involving new partners, the relationship process will start over and over again – even for a firm who engages in several successive PPI

projects. This issue is addressed in discussions in the literature on interaction and relationships in business projects (Lind, 2006). It is thus very important for the firm to build abilities to scan the using setting for evaluating how “the new” will differ from the already established physical and organisational investments to ascertain which resources are needed for creating a ‘fit’. Still, a firm participating in multiple PPI projects will build another starting point in a new project than a firm that becomes involved in a PPI for the first time. In other words, a firm becomes more experienced as the PPI process develops and when it learns what demands and uncertainties the PPI process involves.

Methodological considerations

To get detailed insight into and understanding of how public-private relationships affect the PPI process and how firms strategize for handling relationships with public actors and do innovation, this paper adopts an explorative and qualitative approach. Our empirical data are rooted in qualitative interviews with firms engaged in different PPI projects in Denmark. For the present purpose, ten firms have been interviewed. Five of these have experience from engagement in several PPIs and thus experience from handling relationships with different public actors, while the other five firms are ‘novices’ in collaborating with public partners for innovation. These novices only have reports from one specific PPI project. Experienced as well as novice firms are included to give comparable insights into how firms may strategize for handling the potential as well as the dark sides of relationships with public partners. All of the ten firms included in the study are successful contributors to public sector innovation in the sense that at least one of the PPI projects in which they have been engaged has been implemented by the public partner, resulting in one-off sales. The experienced firms have been interviewed on their experiences in general but with a focus on one successful PPI project of the interviewee’s own choice. The interviewees were asked to report in detail on this particular PPI project. The firms interviewed for the study were selected among a larger pool of cases in two larger PPI research projects.

The ten firms are briefly presented in Table 1 along with a brief outline of a PPI solution developed. Table 1 also lists the role as ‘developer’, ‘producer’ and ‘user’ of the participating private and public actors, respectively. For the present study, the role of ‘developer’ is defined as the actor who initiates and participates directly in activities for combining technology, knowledge and resources for developing the invention. The role of ‘producer’ is defined as actors who coordinate and combine resources from suppliers and other partners in the wider network for production of “the new”. Furthermore, the producer is an important influencer on existing relationships and network in which “the new” is produced or of which it is

to become part (e.g. public managers and purchasers). A ‘user’ is the (intended) user of “the new”, who has deep knowledge of the existing using setting, as well as potential end-users.

Table 1: List of experienced and novice firms included in the study

The firm – experience, role and business area	The public counterpart(ies) – role and business area	Description of the PPI solution	Innovation settings (development – production – use)
<p><u>Experienced A:</u> developer and producer.</p> <p>Designing and manufacturing electric linear actuator solutions.</p> <p>The firm was founded in 1976.</p>	<p><u>Larger hospital (medical and intensive):</u> user.</p> <p>Testing among nurses and patients providing feedback on the functionality of the solution.</p> <p><u>School of Engineering:</u> developer</p> <p>Official project manager conducting clinical documentation and analysing work processes.</p>	<p>Development of an intelligent bed primarily targeted at nursing homes in municipalities.</p> <p>The PPI project started in 2010 and lasted 2½ year.</p>	<p>Products are developed based on information from users derived from tests and meetings.</p> <p>Establish forums with other private firms for exchanging experiences for engaging in PPI.</p>
<p><u>Experienced B:</u> developer and producer.</p> <p>Manufacturer of software and hardware products for the healthcare sector.</p> <p>The firm was founded in 1981 by a group of researchers.</p>	<p><u>University hospital (anaesthesia):</u> developer and user.</p> <p>Doctors and nurses testing solution and developing organisational processes around the solution.</p>	<p>Development of a tele medical application to be used for communication between ambulances and hospitals.</p> <p>The PPI project started in 2002 and lasted several years.</p>	<p>Uses interaction and user-driven-innovation methods for building knowledge combined with existing technological knowledge.</p> <p>Builds relationship with actors at different public levels and succeeds in selling adopted product to additional public users.</p>

The firm – experience, role and business area	The public counterpart(ies) – role and business area	Description of the PPI solution	Innovation settings (development – production – use)
<p><u>Experienced C:</u> developer and producer.</p> <p>Manufacturer of beds, side tables and related products for hospitals and nursing homes.</p> <p>The firm was founded in 1970.</p>	<p><u>Regional hospital (surgical):</u> user.</p> <p>Doctors, nurses, caregivers, porters, cleaning staff and patients participate with ideas for development and in testing.</p> <p><u>Municipality:</u> user.</p> <p>Part of the steering committee.</p>	<p>Development of an intelligent bed for hospitals.</p> <p>The PPI project started in 2010 and lasted 5 years.</p>	<p>Interacts with users and decisions makers for developing and testing products.</p> <p>Builds flexible solutions based on knowledge from additional projects to easily adopt product to new users.</p>
<p><u>Experienced D:</u> developer and producer.</p> <p>Manufacturer of products and services within two main areas: beds and lifting equipment and a product range which includes ramps, lifting platforms and small lifts.</p> <p>The firm was founded in 1980.</p>	<p><u>Two municipalities:</u> user and developer.</p> <p>Nurses and citizen patients participate in ideation workshops and in subsequent testing.</p>	<p>Development of lifts for shower facilities in health care.</p> <p>The PPI project started in 2009 and lasted until 2011.</p>	<p>Practices user-driven-innovation methods for obtaining knowledge from user to develop and test possible solutions.</p> <p>Draws up documentation from user setting tests.</p>
<p><u>Experienced E:</u> developer, producer and user.</p> <p>Provides services within four business areas: Assistance, emergency, healthcare and training.</p> <p>The firm was founded in 1906.</p>	<p><u>Larger hospital (heart angioplasties):</u> developer, producer and user.</p> <p>The solution is tested and developed in collaboration with heart department that performs angioplasties.</p> <p><u>Smaller hospital:</u> user and producer.</p> <p>Tests existing procedures against new ones and educates users.</p>	<p>Investigating heart patients in order to stop using blood clot dissolving medicine and instead do angioplasty in the right away. The aim is to transport patients directly to the heart centre as opposed to a local hospital for a first examination.</p> <p>A three-step PPI project initiated in 1990-1994 with follow-up in 1997-2002 and 2008-2009.</p>	<p>Has a long-term and close relationship with one public partner with whom other additional projects are completed.</p> <p>Development and testing included interaction with many different users (doctors, nurses and ambulance assistants).</p>

The firm – experience, role and business area	The public counterpart(ies) – role and business area	Description of the PPI solution	Innovation settings (development – production – use)
<p><u>Novice A:</u> developer and producer.</p> <p>Manufacturer of healthcare products with special focus on tele-medical solutions.</p> <p>The firm was founded in 2006 as a spin-off of an incumbent firm which had no previous experience with the public sector.</p>	<p><u>Smaller hospital (respiratory medicine):</u> developer and user.</p> <p>Doctors, nurses and patients participate with ideas for development and in testing of the solution. Develops internal working practices accordingly.</p>	<p>Development of a tele-medical solution aiming to provide treatment and control of hospitals' chronic obstructive pulmonary disease (COPD) patients.</p> <p>The PPI project started in 2006 and lasted 3 years.</p>	<p>Close and personal relationship between owner and doctor.</p> <p>Developed solution is tested among potential user-staff at the hospital where the doctor is employed.</p> <p>Later the solution is tested at other hospitals to obtain documentation of use and effects.</p>
<p><u>Novice B:</u> developer and producer.</p> <p>Manufacturing of healthcare products such as lifts.</p> <p>The firm was founded in 1997.</p>	<p><u>University hospital (bariatri):</u> user.</p> <p>Doctors, nurses and porters generate ideas for developing the XXL lift and participate in the later testing.</p> <p><u>Larger hospital and smaller hospital:</u> user.</p> <p>Test solution in order to get proof of operation.</p>	<p>Development of a self-propelled person lifter for hospitalised patients who are extremely overweight.</p> <p>The PPI project started in 2007 and ended in 2008.</p>	<p>Close interaction with users.</p> <p>Uses user-driven-innovation methods for building knowledge on public working processes.</p>
<p><u>Novice C:</u> developer and producer.</p> <p>One business area based on a transport pipe invention for the internal transport of blood samples in hospitals.</p> <p>The firm was founded in 2008 as a spin-off of an incumbent firm that had no had previous experience with the public sector.</p>	<p><u>Larger hospital (medical laboratory):</u> developer and user.</p> <p>Laboratory technicians and patients participate in developing ideas for the solution and in testing.</p>	<p>Development of a transport system for transportation of blood samples in hospitals.</p> <p>The PPI project started in 2008 and lasted 1½ year.</p>	<p>Builds personal relationship with a dedicated doctor. Gains access to doctors' network of potential users.</p> <p>Uses knowledge from user tests combined with existing technological knowledge.</p>

The firm – experience, role and business area	The public counterpart(ies) – role and business area	Description of the PPI solution	Innovation settings (development – production – use)
<p><u>Novice D:</u> developer and producer.</p> <p>Manufacturer of intelligent lighting control equipment.</p> <p>The firm was founded in the 1950s and later sold to an international firm.</p>	<p><u>Two municipalities and a smaller hospital:</u> user.</p> <p>The Led system is tested at the hospital's x-ray department and in two office locations in the municipalities.</p>	<p>Development of LED lighting control systems and wireless lighting control systems for hospitals and public offices.</p> <p>The PPI project started in 2011 and lasted until 2013.</p>	<p>Uses user-driven-innovation methods for obtaining knowledge from user to adapt and test possible solutions.</p> <p>Draws up documentation from user setting tests.</p>
<p><u>Novice E:</u> developer and producer.</p> <p>Developer of software solutions to the healthcare, transport and agricultural sectors.</p> <p>The firm was founded in 2003.</p>	<p><u>Municipality:</u> user.</p> <p>Nurses and social- and healthcare assistants generate ideas for development and participate in tests of the solution.</p>	<p>Development of software for nursing homes. The aim is to improve the employees' electronic time schedules and to map movement patterns of demented people through the use of motion sensors carried by these people.</p> <p>The PPI project started in 2012 and closed in 2015</p>	<p>Develop and test solution with different user groups.</p> <p>When implementing the solution. Issues with IT compatibility need to be dealt with.</p> <p>Develops personal relationships with dedicated nurse.</p>

A project manager or managing director from each firm was interviewed about their perception of PPI relationship potentials and obstacles; activities and resources related to carrying through innovations; developing and selling innovations; and their approach to strategizing in relationships with public partners. The questions were based on the theoretical framework presented, e.g., focusing on devices, assets and problems, providing insights into firms' experiences with public partner relationship, in order to help us to identify how firms were strategizing in relationships. Each interview is a study of a particular PPI project investigated in a relational and network context. The focus in the interview is on how the interviewee interprets the project and the innovation process and strategy in which the process unfolds. Additional questions were asked to reveal how direct and indirect relationships in different innovation settings were perceived as forming and influencing the particular project. The interviews each lasted for 1 ½ - 2 hours and 2-3 of the authors participated in each interview. The interviews took place at the firm's premises. All of the interviews were digitally recorded and transcribed verbatim for subsequent analysis.

Data analysis followed the framework developed by Miles and Huberman (1994), building on three phases; data reduction, data display, conclusion drawing and verification. The data reduction process was

conducted with the purpose of selecting, focusing, simplifying, abstracting, and transforming data. The next phase was to display the data to provide an organized, compressed assembly of information. This was done by using display matrix analyses following the innovative settings as conceptualised by Håkansson & Waluszewski (2007) and the matrixes were organized to further our understanding of relationships as device, asset, and problem (Ford et al., 2011). Finally, conclusions were drawn by considering the analysed data in light of the overall theoretical framework (Figure 1).

Findings: How firms engage in PPI

The PPI projects included in this study are typically characterized by product or technology development. Technology is either being developed for a particular project or – more often – it is adjusted to be utilized for new public welfare solutions. Other PPIs are aiming at improving efficiencies and strengthening efficiency in welfare processes. Across the ten PPI projects, the firms in general explain that profit from single PPI projects is seldom anticipated. Private firms engage in PPI to establish public sector knowledge related to competitive bidding and public procurement, and some even deliberately use the Danish public market for developing and testing welfare innovations as a prime mean for exporting. Single projects are hence considered devices for leveraging next-generation innovation and long-term economic value. The following sections will provide a more detailed outline of the benefits obtained by the experienced and novice firms and the different potential or problems encountered in the developing, producing and using settings. The findings show how some of the private firms succeed in utilizing their relationships as devices and assets in the quest for handling PPI relationships.

Handling the PPI relationship in the developing setting

The PPI projects included in this study are characterized by incremental developments in products or technology. New technologies are being developed for a public counterpart only in a few of the projects. More often, existing technology and the private firm's knowledge are combined with specific knowledge in the public using setting and developed to be utilized for new welfare solutions. In every case, the firms also draw on existing knowledge and technology resources, e.g., from established supplier relationships. Most of the projects reported lasted for more than 2 years and involved trial-and-error processes for finding optimal solutions to the development issues in focus. The reported innovations are related to improving working environment, developing more efficient working process, and in a few instances securing more cost-effective welfare processes. Since the innovations largely draw on re-combinations of firms' existing

technology and knowledge, the production of, e.g., new products is completed in the firms' existing producing setting and network.

Although public users are entirely/almost absent in the development and adjustment the PPI, they assume an important role by providing input to the private counterpart's technology development and adjustment process. One firm explains the public actor's role in developing and adjusting the technology base:

'Sometimes we talk more to the nurses than with our own people at the office because we interact so often with the nurses. It is important to get the chemistry between us to work well' (Novice A). The novice firm further explains that the close interaction is necessary to get to understand the tacit knowledge that lies at the root of the nurses' behaviour. A few firms build relationships with individual, very dedicated public employees – e.g. a doctor or nurse who shares the interest of the technology and product under development. Half of the private firms in this study utilize the Danish public sector and user setting for developing and testing products to be sold on international markets. One firm explains: *'Even though the Danish hospitals collaborate with us, they do not always want to invest in our solution afterwards. However, it is simply up to them. We will use the value we get from the innovation collaboration, nevertheless, and for instance sell our solution in Germany or US'* (Experienced A).

An additional demanding issue when private firms engage in PPI is reported by the experienced firms. That is, the need for constantly developing new relationships with new public partners when engaging in new PPI projects. Only one firm (E) seems to have built an ongoing business relationship with a local hospital with whom several PPI projects are successfully completed. Other firms benefit from ongoing relationships with individual and very dedicated public professionals for repeated projects.

Handling PPI relationships in the producing setting

Some firms report that engagement with public partners is demanding in terms of resources spent on interaction and for understanding the culture and public sector mind-set and approach to innovation: *'We feel like we are engaging with a system that is really different from ours. We definitely see some cultural differences between the public and private sector'* (Experienced A). Others perceive public actors as being willing to engage in developments and testing, but to disregard the necessary costs for actually implementing innovations into existing systems: *'One issue missing in the public administration is the focus on implementation. When you have developed something new, no one seems to think about financing the implementation. There is no charter for commercial implementation in the public sector'* (Novice B).

Interactions with the different organizational levels in the public sector is considered unruly, in the sense that firms may find themselves trapped in negotiating for needed developments with public actors being

misaligned on the goal and wanted outcome of a joint PPI project. The differences in interests across public sector levels are further complicated when local decisions to implement newly developed innovations are not supported by central management.

New ideas for welfare innovations may also be caught in the institutionalized framing and national/regional political agenda when budget constraints and legislation on public procurement tip the balance towards local prioritization of new innovations at the expense of a general view of potential benefits obtainable: *'At the political level, it is often proclaimed that development and innovation in the public sector is important. But when it comes to it, public purchasers are trapped in daily product needs, tender requirements and specifications, and budget constraints. The everyday life in the public sector is something else...'* (Experienced D).

Building relationships with policy makers is a device for influencing decisions on up-coming projects and innovative initiatives in the public sector. Thus, the experienced firms invest resources in joining political interest forums also to meet potential new public partners: *'We visited one of those innovation conferences (hosted by the Region, ed.) where actors from the public and private sector meet. Here we met two passionate employees from the hospital and they really liked our ideas'* (Experienced A). Through the participation in various forums with different public actors, private firms obtain access to using these relationships for discussing/testing their ideas or concepts in the producing setting. This provides opportunities for adaptation based on specific requests from potential partners or for initiating contacts for developing new relationships with other potential partners in the public sector, etc.

In general, the experienced firms utilize each single PPI project as an asset for building the basis for engaging in additional projects. Relationships developed in one project are hence leveraged for accessing other potential public partners and building more relationships. Building opportunities through specific projects and partner contacts is relevant; but even more important is to utilize relationships as assets for long-term benefits: *'We will not do a project just to do a project, we will do a project if we see some potential in it; and if we do not see the opportunities with the partners we have, we will terminate our engagement in that specific project'* (Experienced E). Relationships with national and regional politicians are assets for gaining access to information on new PPI projects; and public professionals are assets for gaining access to public management, decision makers, and purchasers. What seems important is to build several such relationships instead of focusing too narrowly on a single relationship with an individual professional.

Reaping benefits in the form of actual profit from engagements in PPI is also tied to engagement in development projects supported by national or European funds. Public partners - local and regional

authorities as well as hospitals - are perceived to use PPI as an asset for cutting costs and for obtaining funding. Some of the firms are very much aware of their vital role in the effort to apply for external project funding: *'We are important for obtaining funding. When applying for funding in the EU, it is crucial to include commercial partners'* (Experienced B).

Handling PPI relationships in the using setting

Especially experienced firms who have participated in multiple PPI projects, but also a few of the novice firms, use extensive interaction with public users for building knowledge to do innovation. Interaction also includes doing interviews and observing public employees (doctors, nurses, care assistants, and other professionals) and citizens or patients. Interaction with public actors for innovation entails involvement at various organizational levels, including patients, user (public professional staff), public procurement staff, decision makers, and management. Even when innovation is incremental and technologically rather simple as reported by the 10 private firms in the present study, engaging in the public using setting is considered complex. However, some seek to overcome these challenges: *'Gaining access to information and knowledge is becoming easier... we do testing at their facilities because we have a good working relationship. This is worth its weight in gold!'* (Novice A).

Among some experienced firms as well as among some of the novice firms, it is a shared understanding that diffusing innovation and profiting from PPI is challenged by a strong 'not-invented-here' syndrome across public entities: *'There is a tendency for a not-invented-here syndrome among hospitals. Each hospital asks for a development process adjusted to their specific problems and needs'* (Novice A). This unruly challenge is a trial in the relatively small Danish public sector market where local hospitals and communities are considered small entities in a private firm profit perspective.

In general, private firms use relationships with public actors as a device for developing and testing solutions to welfare problems in the using setting. These solutions vary from software and hardware solutions for communication and scheduling to intelligent care equipment (e.g. beds and lightning) and solutions that improve the working environment and the public employees' work processes. Both experienced and novice firms are deliberately considering which projects to engage in and are attentive to their needs for reaping benefits from the relationship: *'We only engage in a project where we see some real possibilities'* (Novice A).

Leveraging interaction with individual, particularly dedicated and enthusiastic employees in the public sector is considered especially important by some of novice firms: *'As a private firm it is great to know enthusiastic individuals 'on the other side', who are just as passionate as we are... That we have someone to*

help carry things through, while also knowing that it brings cost benefits to them too' (Novice C). However, this only seems really successful when the individual has an extensive network to leverage. Interaction with patients also seems to bring valuable insights to private firms, e.g. related to how new technology can be applied. Involving patients is considered to provide benefits by reducing uncertainties. However, firms also perceive patient involvement as complex, for example since it is not always clear to which part of the healthcare system the patients 'belong' at any given moment.

Strategizing for handling PPI relationships

The experienced firms emphasize the importance of prioritizing interaction at every public actor level to influence relevant others and to secure project progress. Engaging with the different organizational public partner levels is seen as a way to make PPI projects run more smoothly and effectively. It makes knowledge exchange more effective and helps the private firm build domain knowledge and obtain tacit knowledge that would otherwise be very costly to achieve.

Documentation is an essential tool for successfully diffusing new developments across the public sector and for handling the related uncertainties stemming from different public actors' varying requirements for adjustments. For example, the experienced firms and a few of the novice firms deliberately develop and provide documentation for effects on public working environment and processes or benefits for patient or citizen welfare as an integrated part of developments. This documentation is used also to motivate other public users, especially in the producing but also the using setting to adopt new innovations.

Moreover, experienced firms more easily get involved in larger PPI projects because they have previously been able to 'market' or communicate their products and innovation abilities. Others use the Danish public sector as a means to leverage developing innovative solutions for strengthening the firm's brand or for going to international markets: *'After development in Denmark, the international market is open. When we get the seal of approval from Danish politicians or Danish officials announce that they have good development cooperation with us, then we can go to the United States and elsewhere in Europe'* (Experienced E). Economic value from PPI is created mainly through continuous engagement. Even though the private firms analysed in the present study, experienced and novice firms alike, have all made at least one successful sale as part of a PPI project, few actually succeed in selling to other public buyers in Denmark.

In general, the firms included in the present study aim for building relationships with their public counterparts and they engage actively in project meetings to facilitate the development of the specific solution as well as the public-private relationship itself. However, although most of the firms have

participated in PPI projects that also include other private firms, PPI projects do not seem to directly foster relationship building among the private partners. Such relationships are reported to develop in other settings. Indeed, private firms believe that the direct involvement of other firms in a specific PPI project initiated by the public partner may bring additional problems to the process. The firms are challenged if additional partners are invited with whom it is necessary to match expectations and build consent for joint developments. Indeed, both experienced and novice firms utilize their existing relationships and business networks when engaging in PPI.

Concluding discussion

Most research on PPI highlights the outcome potential in regards to welfare innovation in a general perspective, focusing mainly on the benefits available at the societal level and the public sector level – e.g. in terms of increasing welfare benefitting citizens, the potential for improved working conditions for public employees, or cost-efficiencies. Less attention has been paid to the concrete challenges facing private firms when establishing or developing relationships with public actors for innovation. In the present study, we explicitly adopt a private firm focus on PPI. However, we applied a relationship perspective to discuss the managerial concerns related to utilizing relationships as devices and assets for balancing the challenges related to PPI. This approach helps us understand how public-private relationships affect the PPI process and how experienced and novice firms, respectively, handle relationships with public actors in the context of PPI.

The PPIs reported in this study are single projects leading to one-off sales based on solutions developed and implemented by the public partner. The PPIs are mostly incremental in nature, and most of the ten firms did not succeed in diffusing the same innovation to other public actors. The benefits obtained from PPI are not related to increasing sales, profit or market share as such. Instead, especially the experienced firms are reaping more intangible, derived benefits in terms of access to unique knowledge in using settings, marketing and branding effects, access to participation in additional PPI based on reputation, and opportunities for sales on the private domestic market and/or sales on the international markets. This study shows how firms' engagement in the PPI innovation process is not only a matter of understanding the need for specific developments (in technology or products), but also of understanding and bridging the essential differences between public and private partners. For the experienced firms, it is also notable that the public counterpart also often takes the role as producer (see Table 1). The most experienced firms, which continuously engage in PPI, deliberately adopt a long-term and strategic perspective on PPI. In particular, this study argues that the purposeful and deliberate intentional engagement in and utilization of relationships with the public partners is important in PPI. Firms focusing not only on the innovation itself

seem more successful. Furthermore, they strategize to embrace the complexity of the public setting, while working simultaneously on different dimensions of the innovation process.

Some of the challenges or burdens encountered by experienced as well as novice firms in PPI are closely related to the using setting of the public counterpart. This study points to how PPIs (products, services, or solutions developed) need support from public sector partners acting as producers. As claimed by Håkansson and Waluszewski (2007), a product needs to be commercially valuable in the using setting to become an innovation; and the greater the possibilities for the innovation to be used by others, the greater is the likelihood that the innovation will be diffused. The diffusion of innovation is, however, this is not of particular interest to the public actors in this study. Indeed, the public users analysed in the present study were interested in locally adapted solution, which underscores the dilemma whether the firm should develop an offer specifically for the public user in question or develop an innovation solution that may be diffused to other users as well. This is experienced as a 'not-invented-here' dilemma by the involved firms. According to Waluszewski (2011), the dilemma is, however, more related to the existing resource investments (human and physical) in the using setting, which create imprints on the new functionality. As such, this is not a 'knowledge' paradox or an issue of deficient absorptive capacity, but rather the general exaggerated expectation to a 'smooth' transfer of innovation from one setting to the other (Ingemansson & Waluszewski, 2009). In the present study, the experienced firms instead sought to develop close interaction with public counterparts in concrete projects as a device for collecting information and knowledge among different users to be combined with existing technological knowledge in the developing setting. Networking is also essential for securing adoption and implementation in the producing as well as the using setting. Documentation of potential effects from implementing innovations is a vital outcome from interactions. Documentation is used as a device for influencing others public actors (representing other organizational layers) in concrete PPI projects to secure project progress and implementation.

The ability to understand and interact at various public organizational layers include building understanding of specific working procedures and public employee/user needs; adopting innovative solutions to fit the different needs of users, purchasers and decision makers; and relating innovations to the political institutionalized level. The present study points in particular to how experienced firms navigate strategically to gain access to commence additional PPI projects with other public partners. Engagement in several PPI projects is secured through reputational benefits that spring from former projects, but engagement is also leveraged through networking at institutional and political levels. The present study points to the importance of having abilities to bridge the knowledge and skills gaps between different partners and to utilize partners' networks for specific projects as well as for engaging in new projects. This is, however, not

an ability easily built as argued by Eklinder-Frick (2015). The experienced firms have abilities for handling the exchange with various and changing partners; they build a ground for developing new partnerships and for matching expectations and building consent across involved partners. Similar observations have been made in studies of how the presence of other actors influence innovations (e.g. Gulati, 1998; Hakansson, Ford, Gadde, Snehota, & Waluszewski, 2009; Van de Ven, Polley, Garud, & Vantkatarman, 1999). Abilities to start-up new relationships with public partners are strengthened through repeated engagement in PPI.

The public actors were involved in the technological developing setting only to a small extent. To deal with the uncertainties related to implementing and diffusing innovation through PPI, the experienced firms build-in flexibility in products and technologies used. This flexibility makes it easier to adopt the innovation to the needs of other public users and to sell the innovation to international markets. In the present study, it is interesting to note that experienced as well as novice firm have no interest in letting other firms participate in concrete PPI Project. Coordinating with the public partner is seen as complicated enough. However, the firms mainly use their existing business relationships and networks to support the development related to PPI without directly making these a direct part of the PPI project.

Widening the perspective from the specific project to the wider institutional and network levels invites additional, complicating issues for the PPI innovation process (Eklinder-Frick, 2015). Due to limited budgets, public actors seek partners to find external funding for development projects as a means to investing in new solutions. This adds to the complexity and difficulties for private firms trying to sell newly developed products. Thus, the policy framing of public actors intentions to innovate have some direct and indirect effects on the PPI process. As also reported in the present study, many firms find that this policy framing rather hinders than promotes the innovation process. However, the experienced firms seem to find ways to strategize for coping with these difficulties, as also argued by Waluszewski (2011). The experienced firms employ a long-term strategy, embracing the uncertainties of who will be the next public partner, as they engage in building a position in the network as a potential partner in PPI projects. This makes the firms open for following the opportunities as they occur in the network.

The findings of the present our study have some implications for the potential further development of the theoretical framework. Whereas the theoretical frameworks as presented in Figure 1 is an unpretentious combination of two levels of analysis – one connected to the setting of innovations unfolding among users, producers, and developers, and one related to relationships as leverage for innovation and business in general – it does not embrace the dynamics between these levels. The theoretical framework highlights how firms strategize for engaging in PPI, but it does not include the competences related to, e.g., relationship-specific task, cross relationship tasks (Ritter, Wilkinson, & Johnston, 2002), or network

competence (Munksgaard & Medlin, 2014) required to excel in collaborations such as PPI). Our findings reveal how experience and continuous engagement in PPI provide potential benefits in a long-term perspective. However, more research is needed to fully explore the dynamisms between the levels in the model. A way to go would be to explore the specific competences needed for private firms to reap the full, potential benefit of PPI. Further, based on the present study, we see no potential for arguing how, e.g., 'efficiency' is more important in one setting than in others. Rather, we see implications for how some firms seem to build competences for relating to different settings (e.g. tying public partners as producer to public actors as users) or for turning relationships problems into devices. These are relevant issues to research further.

Managerial implications

Taking an explicitly private-firm perspective on PPI, the present study has implication for firm management. In all settings discussed, the case firm managers have met challenges different from those they encounter on business markets. In the developing setting in particular, but also in the producing and using settings, managers need to nurture their ability to understand the various organizational layers in the public sector and they need to handle complexity, extendedness, ambiguity, and multi-contextual challenges at higher levels. Some of these challenges resemble those encountered in the business markets, but the case analyses highlight the differences. These differences are partly sectoral and partly include differences in interests across sector levels which are more complex and political in the public realm where local decisions to implement newly developed innovation may not be supported by central management. To understand and to be able to produce and implement the innovation, management needs to build a clear understanding of the network and to invest in relationship building. In the IMP literature, this understanding of networks is described as network pictures (e.g. Ford & Redwood, 2005; Henneberg, Mouzas, & Naudé, 2006). To build up the ability to understand and communicate, the management can use the concept and model of network pictures, both in the firm and in the relationship context.

The present also illustrates how the managers need skills to get to the point where they can commence additional PPI projects with other public partners. Evidence-based documentation is important and needed in many PPI. This can be obtained through repeated testing together with the public counterparts. However, it is often difficult to gain specific evidence and alternatives are required. There is a need for continuous networking at much more elaborate levels than hitherto experienced by many firms in business markets, but this is only half the work done. On top of this, an invention turns into an innovation only when the new technology, product, or service is actually implemented and put in use. The managerial challenges facing SME firms in particular are the need for documentation, the size of the

investment required— both in terms of time and money, and the need to adopt a long-term perspective on orders coming in, new markets opening, and commercial success materializing.

The overall challenge for many firms' management is to be able to consider relationships as a device when participating in PPI. No consistent development towards PPI will take place without a strong image of the network relationships, without continuously practicing to build experiences from different projects all the way, and without a serious effort to develop relationships consistently. Using relationships for innovation can be achieved by combining and developing the firm's resources in conjunction with that of its counterparts. The relationship becomes a device to coordinate and combine the actors' resources into a mutual entity for PPI.

Policy implications

As argued by Wagrell and Waluszewski (2009), it is naïve to assume that innovation to be implemented among private and public partners is uncomplicated and that it will easily lead to cost-effective solutions. Even benefits obtained by one public actor are not easily diffused to others due to direct effects only being measured in the single operating unit. Other more indirect effects in the wider public organisation and system go unmeasured and thus unaccounted for in diffusion. This is a problematic issue also accounted for elsewhere (Eklinder-Frick, 2015; Waluszewski, 2011) that arises because policy for PPI is developed at a system level and not for the single public unit. Inversely, PPI is developed among private firms and single public units which allows the development and economic use to take place in 'close spatial proximity' (Waluszewski, 2011). A recommendation to public managers and policy makers dealing with PPI is therefore to create policies that support collaborations across various public levels, such as national, regional and local levels, to enhance the possibilities for knowledge sharing and the opportunity to learn from best practices. This may even enhance joint ownership of new welfare innovations across public levels creating better grounds for implementation of the innovations developed (Nissen, Evald and Clarke, 2015).

It is relevant to once again accentuate concerns over the current public policies for PPI. National and EU regulations for public procurement and public tenders potentially block private firms from developing relationships with public actors and hence become able to reap the full potential for utilizing relationships as assets and devices in innovation (Munksgaard, Evald, Clarke, & Nielsen, 2012). To overcome these challenges it is necessary for public policy makers and managers to be aware of the how to balance bureaucratic forms of governance with a networked governance approach that support the opening of the public sector towards its external environment supporting cross-sector collaborations and innovation (Hodge and Greve, 2010). More, as this study points to, it is also relevant to develop the policies at 'lower'

public sector levels. There seems to be a need for regional and local policies developed to assist and facilitate public and private actors to utilize their relationships as assets and devices for joint PPI project and for bridging the differences between them. A concrete recommendation is therefore to invest in project-facilitators that are able to support heterogeneous partners in developing together and thus professionalize the innovation process (Nissen et al., 2013).

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