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Innovation in public sector organizations: The role of push and pull factors

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Abstract

The public sector is vitally important part of all modern and economically developed economies. However, the repercussions in the aftermath of the global economic crisis which started in 2007 has put the public sector under pressure in most developed countries. As a response, practitioners and academics have called for more innovation and entrepreneurial behaviour in the public sector. However, our current understanding of the sources of public sector innovation is inadequate. Motivated by this, the paper seeks to learn more about the forces fostering innovation in the public sector. Drawing on classical theorizing on push and pull in the innovation literature, the following research question is asked: To what extent are push and pull factors related to innovation among organization in the public sector? Using cross-country survey data collected among organizations in the public sector, and regression analyses, 5 hypotheses elaborating on how pull and push are related to innovation in this sector is examined. The paper contributes to the literature by examining the relevance of innovation in the public sector context. Further, it advances theorizing on push and pull mechanisms by examining their relevance for innovation among public sector organizations.

Innovation in public sector organizations: The role of push and pull factors

1. Introduction

The public sector is vitally important part of all modern and economically developed economies. For instance, among the member countries of the OECD, public sector expenditures constitute from 30 to 58 % of GDP. However, the repercussions in the aftermath of the global economic crisis which started in 2007 has put the public sector under pressure in most developed countries. Its role in economic and social life is severely threatened by high and increasing public debt in many countries, a rapidly aging population, high health costs, and a burgeoning administration. With these developments as a backdrop, policymakers, practitioners and academics have called for more innovation and entrepreneurial behaviour in the public sector as a response to demands for increased and improved public services and the need for lowering public expenditures (Walker, 2006).

Hence, innovation is now centre stage of the agenda for how the public sector can renew itself. Unfortunately, the scholarly literature is underdeveloped when it comes to understanding innovation in the public sector context. Innovation theorizing has largely excluded the public sector from its frame of reference, focusing mainly on innovation in the private sector (e.g. Fagerberg, Mowery, & Nelson, 2005; Gonzalez, Llopis, & Gasco, 2013; Kinder, 2002). Studies of innovation in public sector organisations have often been descriptive and undertheorized, relying partly on conceptual development from the general innovation literature and partly discussing the peculiarities of the public sector context (Gonzalez et al., 2013; Potts & Kastle, 2010). It has been argued that models from private sector innovation cannot easily be transferred to the public sector, particularly due to the different incentive structures these two sectors operate under (Potts & Kastle, 2010).

Particularly, the current understanding of the sources of public sector innovation is inadequate (Sørensen & Torfing, 2011; Walker, 2006). Further we have limited knowledge on "what does and does not work in fostering public sector innovation" (Potts & Kastle, 2010, p. 135). This study addresses this gap by examining the role of push and pull mechanisms in encouraging the introduction of innovations among public sector organisations. To guide our analysis of this issue we draw on classical theorizing in the innovation literature on the distinction between supply side push factors and demand side pull factors driving innovation and apply this framework to the public sector context. Push or supply side factors are broadly understood as intra-organizational creative attempts and strategies to propel innovation. Conversely, external mechanisms potentially extracting innovation from public sector organizations are referred to as pull or demand side factors. The following broad research question is asked: To what extent are push and pull factors related to innovation among organization in the public sector? Five hypotheses are developed and empirically tested using

a comprehensive cross-country dataset on innovation in more than 2000 public sector organisations in 29 European countries.

The present study adds to the literature in several ways. First, it represents an empirical analysis of the relative role of pull and push factors for the introduction of innovation among public sector organisations. To the authors' knowledge, there has been no prior systematic analysis of pull and push factors for innovation in the public sector context. Second, and related, we develop a framework for analysing the influence of push and pull factors utilizing established literature from the private sector context. In this effort, we take into account that public sector innovation has peculiarities which implies a reinterpretation of the understanding of push and, particularly, pull factors which take into account the specific characteristics of public sector organisations. Hence, we add to the literature by proposing new indicators and factors that constitute push and pull factors for innovation in the public sector context

Third, this study also contributes to the general innovation literature by examining classical questions in a new context. Public sector innovation is scrutinized through the lens of well-established theorizing about pull and push factors from the broader innovation literature. We thereby also seek to add to and build cumulative insights about the role of supply and demand side factors for innovation activity. Further, we examine the applicability of well-established innovation theorizing to the public sector context, thereby helping to establish the boundary conditions of this framework.

Fourth, although our research has implications for the academic study of innovation, it will also be relevant for policy makers and managers in the public sector who are facing increasing demands for innovation and entrepreneurial behaviour among the organizations they manage and fund. As already noted, there is little research to guide managers and policymakers looking for research based insight into how public sector organizations actually innovate. New knowledge on to what extent different supply and demand factors promote innovation among public sector organizations may be helpful in this regard. Moreover, the distinction between push and pull may be a useful construct to bring into the discussion about how one can help stimulate innovation in the public sector. As the scholarly literature on innovation reminds us, supply and demand side factors and their interrelationships is crucially important to innovation, also in the public sector as indicated by the results from this study.

2. Background and theorizing

The role and importance of innovation in economic growth and development has been central to the study of innovation ever since Schumpeter's seminal theorizing at the beginning of the 1900's (Fagerberg, 2003; Schumpeter, 1934). Economic development, as Schumpeter understood it, is not only tied to economic growth, but also to qualitative changes in society and the economy (Fagerberg, 2003). Innovation has a large influence on the ways in which people live their lives, for economic and industrial development, and also for the offering of welfare services to an increasingly more demanding population. Hence, innovation is generally encouraged both at the organisation and the society levels.

The growing demand for innovation in public sector organisations have been motivated from several different pressures. First, citizens have increasing expectations related to the quality and availability of public services (Naranjo-Gil, 2009; Sørensen & Torfing, 2011; Walker, 2003). Second, and related, new developments in technology and research make new services possible, something which spurs demand for new public services (Potts & Kastle, 2010). Third, demographic changes has led to an increase in the need for public services, particularly related to health and elderly care, a development which will only continue in the near future. Consequently, the production and distribution of public services in more efficient ways become important. Fourth, the fact that public resources are limited point in the same direction (Naranjo-Gil, 2009). Tax payers and politicians are increasingly demanding effectiveness of public services to reduce, or at least not increase public expenditures (Potts & Kastle, 2010). Finally, increased complexity demands new and innovative solutions to solve societal problems in many areas (Weber & Khademian, 2008).

Increased interest in public sector innovation has resulted in a number of studies dealing with different aspects of the phenomenon. Research has examined the applicability of entrepreneurial management in public sector (e.g. Currie, Humphreys, Ucbasaran, & McManus, 2008; Zerbinati & Souitaris, 2005), adoption of innovations by public sector organizations (e.g. Naranjo-Gil, 2009; Walker, 2006), explorations of the different types of innovation that public sector organizations introduce, their prevalence and correlations (e.g. Damanpour, Walker, & Avellaneda, 2009; Gonzalez et al., 2013) and performance consequences (e.g. Damanpour et al., 2009; Naranjo-Gil, 2009), as well as how innovation is understood in the public sector setting (Nahlinder, 2013). Most research has had a rather exploratory nature, which is natural since innovation in the public sector is a rather new research frontier for the study of innovation.

2.1 Types of innovation in the public sector

While the literature contains many definitions of innovation, many rely on Schumpeter's (1934) description of innovation as new combinations of production factors such as the production of new goods, introduction of new processes, opening of new markets, access to new sources of raw materials and intermediates, and re-organization of an industry. Inherent in this definition is an understanding that there are various types of innovation. Innovation literature often distinguishes between types of innovation because they have different characteristics and, hence, are associated with different driving forces (Damanpour et al., 2009). While many conceptual typologies of innovation have been introduced, the distinction is often made between product innovations, process innovations, and market innovations, a distinction that is also implemented in innovation surveys in the private sector (OECD and Statistical Office of European Communities, 2005). Adapted to the public sector context, product innovation is understood as the introduction of a new or improved service to users (Damanpour et al., 2009; Walker, 2006). New and improved services are an important element of the development of public sector organizations to more efficiently serve community needs. Process innovation refers to a new or improved method of production and influence on management and organization (Walker, 2006). Process innovations may be technological (e.g. information technology) or organizational (e.g. management practices, organizational structure or work processes) (Damanpour et al., 2009; Gonzalez et al., 2013; Walker, 2006).

Market innovation refers to new ways of offering a product or service to the customer, including distribution and communication with the market. In a public sector context, characterized with absence of a market in the traditional sense, the concept is rephrased to distribution innovation, understood as a new or improved method of distributing public services to an existing or new group of users.

2.2 Push and pull mechanisms

A fundamental question for innovation research is to explain how innovation occurs (Fagerberg, 2005). The literature has pointed to several factors influencing innovation in public sector organisations, including external context factors such as demanding environments and political expectations, and organizational characteristics such as organization size, leadership, organizational culture, transfer and application of knowledge, and well-educated employees (Luke, Verreynne, & Kearins, 2010; Sørensen & Torfing, 2011; Walker, 2006). However, systematic reviews and examinations of drivers of innovation in this context have been scarce. In this study, we utilize theorizing from the innovation literature which put forward two competing broad hypotheses on the drivers of innovation: On the one hand, innovation may be seen as pushed from the supply side within the organization based on its capacity to develop and implement new things. On the other hand, innovation may be seen as pulled from the demand side increasingly requiring new and better or less expensive products and services.

Innovation studies differentiate between two alternative perspectives to the introduction of innovation: On the one hand, the stimulus for innovations can be new ideas or new knowledge and the goal is to make commercial use of this knowhow, i.e. push mechanisms. On the other hand, the stimulus can be demand side issues including characteristics of end users and the society as a whole, i.e. pull mechanisms (Brem & Voigt, 2009; Di Stefano, Gambardella, & Verona, 2012). The two perspectives originate from attempts to explain innovation, in particular technological innovation, in the 1950's and 1960's (Peters, Schneider, Griesshaber, & Hoffmann, 2012). Related to technological innovation, the concept of technology push takes a linear supply-side perspective of the innovation process. It assumes that technical change starts with advances in science and technology, resulting in the development of new products and processes that are subsequently diffused within the business sector (Brem & Voigt, 2009). As a reaction to the technology push perspective, Schmookler (1966) put forth what became known as the demand-pull hypothesis, which postulates that technological innovation is fundamentally driven by (expected) market demand that influences the direction and rate of innovative activity. The demand-pull perspective subsequently identified a broader set of market related factors and features, such as the importance of the end user, that influence innovation (Di Stefano et al., 2012). While the relative explanatory power of these two alternatives has been hotly debated (Kleinknecht & Verspagen, 1990), more recent literature sees them as two driving forces which may have a joint effect on innovation (Brem & Voigt, 2009; Di Stefano et al., 2012; Kim & Lee, 2009).

A substantial part of the debate and analysis of technology-push and demand-pull in technological change has been macro-oriented and conceptual. More recent research consider technology and demand as sources of innovation for organizations, thus taking a

more micro-oriented view focusing on how firms convert new technological knowledge and demand-related inputs into innovation (Di Stefano et al., 2012). A micro-oriented view emphasize how organisations use their agency to convert demand- and supply-side factors into innovation. In this perspective, innovations may on the one hand be pushed from inside the organisation based in the generation and adoption of (new) knowledge. New technology or new knowledge create possibilities for production of new products, services, and production processes which innovative firms can exploit. On the other hand, innovation may be pulled from the market based on new demands from users and other stakeholders. Changes in customer needs or preferences lead to demand for new or improved products and services which create business opportunities for innovative entrepreneurs and firms encouraging them to introduce innovation on the market. In this paper, however, we focus on how push and pull related inputs and factors play out in the innovation processes within public sector organisations. We thereby bring the push and pull framework over in a new context. The consequences of this change of stage is discussed in the following.

2.3 Push and pull mechanisms for public sector innovation

To utilize the innovation push and pull framework in a public sector context requires some adaption. The public sector has peculiarities (Currie et al., 2008; Gonzalez et al., 2013; Kinder, 2002; Potts & Kastle, 2010) that may influence how pull and push factors are related to the ability of public sector organizations to introduce innovations. The specific characteristics of the public sector have been described along several dimensions, including in terms of goals, products, resources, customers, risk, suppliers, organisation, outcomes and governance (Kinder, 2002). Maybe the most apparent difference between public and private sector when it comes to incentives for innovation is the market mechanism (Potts & Kastle, 2010). While competition is an important driving force for investment in innovation in private sector, the incentive structure of the public sector works differently. The decoupling of users from payment of public services, means that changes in user needs not directly imply changes in demand and potential rewards from innovation. Further, public administrations are accountable for public funds, something which brings in several different stakeholders, and also requirements when it comes to transparency and reluctance to risk (Kinder, 2002; Nählinder, 2013).

When it comes to organisational factors, public administration organisations generally have well-educated employees and well-developed organisational structures. Hence, the willingness and ability of the administrations themselves to pursue changes may be an important source of innovation (Bartlett & Dibben, 2002; Gonzalez et al., 2013). However, the bureaucracy may also lead to inflexibility and more constrained strategic options inhibiting innovative activity in public organisations (Kinder, 2002)

Given these specific characteristics of public sector organisations, and that we take the perspective of the organisation, we interpret *push mechanisms* as factors within the public sector organisations which are creating possibilities for developing new public services or new ways of producing and distributing services, such as information search activities, organisational support of innovation and absorptive capacity of the organisation. Further, we interpret *pull mechanisms* for innovation in public sector organisations as external factors

requiring or "demanding" the implementation of innovation from public sector organisations, such as laws and legislation, the change of framework conditions (e.g. budgets) or changes in client needs.

3. Development of hypotheses

3.1 Push mechanisms

The technology push perspective has traditionally been synonymous with the argument that it is advances in science and technology that stimulates innovation. However, this is a macro argument, paying little attention to how push factors play out in innovation processes within organizations. When seen from the perspective of the organization, the logic change. Advances in science and technology is not automatically transferred to the organization. The organization needs to become aware about it, often through deliberate search efforts, and thereafter such knowledge needs to be assimilated and put into practice. Adopting an organisational lens, push mechanisms can be conceptualized as intra-organizational creative attempts and strategies to propel innovation. Through various creative efforts and strategies organizations can seek to learn about and use supply side factors as sources of innovation. In this study we focus on the following push factors: information search, organisational support for innovation and absorptive capacity of the organisation.

3.1.1 The role of information search

To become aware about new knowledge, advances in science and technology, and other types of information, organizations need to undertake search for it. In theorizing on innovation among organizations in the business sector such behaviour was initially measured by R&D investment (Nelson & Winter, 1967) but has later been referred to as "search" (Nelson & Winter, 1982; Helfat, 1991). This literature theorize that search behaviour increase when organizations face increased pressure to improve their performance and functioning (Cyert & March, 1963; Greve, 2003) and has time and again documented that search is an important antecedent to innovation in the business sector (e.g. Larusen & Salter, 2003; Clausen et al, 2012). Thus, search is an important push factor with an internal origin capturing creative attempts by the firm to actively scan their own organization as well as their external environment for relevant information and knowledge. Hence, the following hypothesis is proposed:

H1: The more the public organisation engage in internal and external information search, the more likely it is to introduce innovations

3.1.2 Organizational support

Prior research on innovation in the business sector has shown that a key internal driving force is organizational support of new ideas and solutions, including managerial support which encourages staff and members in the front office to bring new ideas and solutions for further development at the back office and for managers to further fund and improve (Bartlett & Dibben, 2002; Potts & Kastle, 2010). Thus, organizational support is not only directed towards the generation and development of internal ideas, as captured by information search,

but reflects an organizations ability and willingness to think and act entrepreneurially (Currie et al., 2008), to risk think outside the box and play around with new ideas, either internally or externally generated. Such organizational support is an important push factor in the literature on innovation in the business sector, and we propose that organizations in the public sector is no different. Thus, the following hypothesis is put forth:

H2: The stronger the internal organisational support for innovative activity, the more likely is the public organisation to introduce innovations

3.1.3 Absorptive capacity

Few, if any, organizations innovate alone in absence of external information and knowledge (Fagerberg et al., 2005). Accessing external information and knowledge has for a long time been highlighted as one of the most important inputs to the innovation process, recently popularized in the literature on open and collaborative innovation (Chesbrough, 2003; Dahlander & Gann, 2010). However, external knowledge do not simply flow freely, effortlessly into the focal organization to be converted into new innovations. Making sense of external knowledge and knowing where to find useful knowledge in an economic world increasingly characterized by an abundance of external information requires what has been referred to as absorptive capacity, namely “a firm's ability to recognize the value of new information, assimilate it, and apply it to commercial ends” (Cohen & Levinthal, 1990). Cultivating absorptive capacity is a must for organisations seeking to innovate (Fagerberg, 2005).

In studies of absorptive capacity in the business sector, an organizations absorptive capacity has traditional been measured by investment in R&D. While this is a poor indicator for organizations in the public sector, which seldom has dedicated R&D labs, Cohen & Levinthal (1989/1990) discussed two other key dimensions of an organizations absorptive capacity, namely investment in training and workers human capital. Thus, organizations which invest in training of its workforce, in relation to innovation, and which have a workforce with higher educational qualifications are expected to be more innovative (Di Stefano et al., 2012), as reflected in the following hypothesis:

H3: The stronger absorptive capacity in terms of education and training of employees, the more likely is the public organisation to introduce innovations

2.2 Demand-pull mechanisms

Although market demand – a traditional conceptualization of demand-pull in studies of innovation in the business sector – may not work in the same way for organizations in the public sector, public sector organizations may be motivated by other types of external factors demanding innovation. While the details in what constitute “demand-pull” factors may vary across the public and private sector, we do expect that also organizations in the public sector react to external needs, demands and changes in expectations in the society in which they are a part of and that sensitivity to this may extract innovation from them through distinct mechanisms (Gonzalez et al., 2013). In this study, we emphasize the role of political and

legislative demands as a direct pull mechanism, but also acknowledge that public sector organisations respond to anticipated changes in user demands and framework conditions.

3.2.1 Political and legislative demands

While organizations in the public sector do not serve a market in the classical sense, public sector organizations earn their justification from serving needs of citizens (Kinder, 2002). Hence, they need to respond to demand for public services and changes in needs in the community. In this sense, demand may pull innovations in the public sector. Further, most organizations in the public sector, at least historically, do not have to compete with each other in a market which rewards the 'winners' with superior economic performance. Instead, public organizations are dependent on various stakeholders and earning legitimacy to secure the continuance of public funds (Gonzalez et al., 2013). Public sector organisations are expected to be sensitive to external political signals, including legislation, which sometimes directly demand changes and the introduction of innovation among public sector organisations. Moreover, the fiscal budget of many public sector organizations is up for negotiations every year. Thus, political and legislative factors may therefore pull innovation from organizations in the public sector. As reflected in the following hypothesis:

H4: The stronger legislative and political demands for innovation faced by the public organisation, the more likely it is to introduce innovations

3.2.2 Anticipated environmental demands

As already touched upon in the above discussion, it is not only current size of market that are believed to pull innovation in the private sector, but also the *expected* size of a market. Thus, a central tenant in demand pull theorizing is that firms react to, i.e. they innovate, in response to some expected future state of the environment. For firms this could be the development and introduction of a product innovation in response to a perceived new market or a process innovation to secure existing market shares in a market believed to be mature and highly competitive. Although public sector organizations seldom compete directly with each other over citizens, they do compete with each other over scarce public financial resources and the attention of politicians. Failure to adapt to demands from policymakers, citizens and other interest groups may have dire consequences. Thus, and perhaps in contrast to the popular view, public sector organizations cannot risk to not adapt themselves to environmental demands and expectations from the broader society, citizens and policymakers that they serve.

Organizations differ however in their ability to perceive anticipated changes in their environment. Further, organizations differ in their ability to adjust to such anticipated environmental changes. One frequent mechanism through which organizations adjust themselves to (anticipated) changes in their environments is through innovation. Therefore, the following hypothesis is put forth:

H5: The stronger experienced environmental demand for innovation, the more likely is the public organisation to introduce innovations

4. Method

4.1 Sample and data collection

To address the research question and examine the influence of push and pull factors for the introduction of innovation by public sector organizations, we draw on a large cross-country survey conducted in 2010 on request of Directorate General Enterprise and Industry the European Commission (The Gallup Organization, 2011). The objective of the survey was to study the introduction of innovations in the European public administration sector in response to changing constraints and opportunities. The survey was administered to public sector institutions in 29 European countries, of which 27 are members of the European Union.

The sample was selected randomly within each of the participating countries among organizations in the public sector employing 10 or more persons (The Gallup Organization, 2011). Data was collected through structured telephone interviews with senior managers, more specifically the Executive Director responsible for strategic planning and decision making or the Chief Executive. In total 4063 interviews were conducted, varying between 10 and 400 per country depending on country size.

The survey contains detailed questions about different types of innovation, such as services, distribution, and process or organizational method. Respondents were asked to state whether the organization had introduced these types of innovation. The three types of innovations are used as dependent variables in this study.

The survey further contains several specific questions related to external and internal driving forces for innovation in public sector organizations, here conceptualized as pull and push factors. Push factors include information related to the skills of the workforce, organizational support, in addition to internal and external sources of ideas. Pull factors include political or legislative factors.

The sample included different types of organization including independent organizations and private companies. In this study these types of organizations are excluded, hence, we focus at government organizations only. This requirement reduced the sample to 3,699 cases. Moreover, when investigating pull and push factors only organizations reporting either to have performed service-, distribution- or process innovations were included in the sample, further reducing the sample to 3,310 respondents. Since there was missing data relating to dependent and independent variables, the sample was further reduced, giving a final sample of 2,279 respondents for the analysis of service innovation, 2,345 cases for the analysis of distribution innovation and 2349 respondents for the analysis of process innovation.

4.2 Measures

The Innobarometer on Innovation in public administration which we utilize for this study, was conducted to study innovation strategies of the European public administration sector, and included measures on various types and amounts of innovation, workforce profiles and organisational support of innovative activities, benefits of innovation, innovation strategies

and drivers, etc. Measures were inspired from the Community Innovation Survey and the Oslo manual, but adapted to be relevant for public administration. For this study, we make use of a sample of available variables, as accounted for in the following.

4.2.1. Dependent variables

To measure the introduction of innovation in public sector organisations, we differentiate between three types of innovation: service innovation, communication innovation and organizational innovation. Service innovation is measured by a scale based on two questions: First, the respondents were asked 'Since January 2008, did your organization introduce any new or significantly improved services?' Responses indicating 'no' were coded as '0=no service innovations'. For those answering 'yes' a second question was asked: 'Please think of the different types of services provided by your organization in 2010. What percent of these are new or have been significantly improved since 2008?' '1=Less than 25%, 2=Between 25% and 49%, 3=Between 50% and 74% and 4=75% or more'. The scale ranging from 0 to 4 was used as a measure of service innovation.

Distribution innovation is measured based on three questions: 'Since January 2008, did you organization introduce any new or significantly improved methods of communicating your activities to the public, such as: a) new or improved methods of promoting your organization or your services? b) New or improved methods of influencing the behaviour of users, citizens or others?, and, c) First time commercialization (for sale) of services and goods?.' Respondents answered yes or no to each of these questions. A scale was constructed by adding the yes answers of three items, it ranges from '0=no communication innovation' to '3=all three types of communication innovation'.

Finally, process innovation was measured using five questions for which the respondents answered yes or no: 'Since January 2008, did your organization introduce any new or significantly improved processes or organizational methods such as a) New or improved methods of providing services or interacting with your users, b) New or improved delivery or logistics systems for your inputs, c) New or improved supporting activities such as maintenance systems, purchasing, accounting, or computing systems, etc., d) New or improved management systems, and d) New or improved methods of organizing work responsibilities or decision making'. A scale was constructed by adding the yes answers of five items, it ranges from '0=no organisational innovation' to '5=all five types of organisational innovation'.

4.2.2. Independent variables

The included independent variables were related to push and pull factors assumed to influence the introduction of innovation in organisations. The following push factors were included: internal and external information search, organisational support, and absorptive capacity. Information search was measured using a list of eight knowledge sources. The respondents were asked to indicate if each of the sources were "not important=1", "somewhat important=2" or "very important=3" as source for the development of innovations. Two sources were categorized as internal (ideas from management, ideas from staff), and six sources were categorized as external (examples of best practice by another

government organisation, professional organisations, visit to conferences, enterprises as suppliers, enterprises as clients or users, citizens as clients or users). A principal component analysis confirmed the categorization in internal and external sources, but indicated that one item should be removed from the external sources index (“examples of best practice”). The variables 'internal information search' and 'external information search' were calculated as summated scales of the two and five remaining items respectively.

Organisational support was measured using a question where respondents were asked to indicate how well five different support issues applied to their organization (1=not at all, 2=partly and 3= fully). The five items were 'Managers support trial-and-error testing of new ideas', managers takes an active role in developing and implementing innovations, staff have incentives to think of new ideas and take part in their development', users are involved in the design or planning of new or improved services, and 'new or improved services are evaluated after completion'. The variable 'organisational support' was calculated using a summated scale including the five items.

Absorptive capacity was measured using the education and training of employees as a proxy. 'Education' was measured as the percentage of employees with a university degree on a scale from 1=0% to 6=75% or more. 'Training' was measured using a question on the type of training provided by the organisation for employees, differentiating between training specifically for implementing, using or providing a) new or improved services, b) new or improved communication methods, and c) new or improved processes or organisational methods'. Respondents were asked to state yes or no to the provision of each of these types of training. A scale was constructed by adding the yes answers of the three items, ranging from '0=no training' to '3=all three types of training'.

Further, we included two independent variables representing pull factors for innovation: Political and legislative demands was measured using a question where respondents were asked about five political or legislative factors and if they were: '1=not important', '2=somewhat important' or '3=very important'. The five items included 'Mandated decrease in your organization's budget', 'Mandated increase in your organization's budget', 'New laws or regulations', 'New policy priorities', and 'Mandated introduction of new e-government or online services'. Since the item “Mandated increase in your organization budget” had extensive missing data (more than 15%), it was decided to remove this item from the scale. Hence, the variable was calculated as a summated scale of the four items. Anticipated environmental demand for innovation was measured using a question to which respondents stated if they expected the each of six factors to have a positive or negative impact on the introduction of new or significantly improved services (1=positive impact, 2=negative impact and 3=no impact). The items included 'Mandated decrease in your organization's budget', 'Mandated increase in your organization's budget', 'New laws or regulations', 'New policy priorities', 'Increasing demands from citizens', and 'Introduction of new technologies'. The items were recoded for each of the six factors to positive impact='1', otherwise '0'. Two of the items, “New laws or regulation” and “New policy priorities”, had extensive missing values (both more than 20%). It was therefore decided to exclude these items from the anticipated environmental demand scale. The scale was constructed by adding the four items, giving a scale ranging from “0” no positive impact to “4” answering that each of the four factors had a positive impact.

4.2.3 Control variables

In the analyses we controlled for organisation size and geographical areas served. Organisational size was measured as the number of employees if the organisation on a scale ranging from 1=less than 10 to 7=1000 or more. Organisations with less than 10 employees were excluded from the survey. The variable was therefore recoded "1"=10-49 employees to "6"=1000 or more employees. Geographic area was measured by three dummy variables indicating that the organisation mainly served local, regional or national area. Local and regional area was added as dummy variables in the analyses, while national area was kept as a reference category.

4.3 Sample description

Table 1 reports on the prevalence of different types of innovation among public sector organizations in European countries. It shows the share of organizations that has introduced each of the types of innovation, and the mean score on the scales for each innovation type. These results relates to a sample consisting of government organizations only. It is apparent that public sector organizations to a large extent carry out innovations. For each of the innovation types, between 67 and 82 percent of the public sector organizations included had introduced an innovation between January 2008 and October 2010, i.e. the last 2.5-3 years. Process innovations are the most common, followed by distribution innovations and service innovations. These findings reflect the need of public sector organizations to renew and reorganize their service production to more efficiently offer better services to their clients. Further, initial analyses indicated that the likelihood of introducing an innovation is larger for large public sector organizations than for small, and local organizations more seldom introduce innovations compared to regional and national public sector organizations. Hence, organisation size and geographic area are relevant control variables for the analyses. On the other hand, there seem to be few variations between the different public sectors.

Descriptives and correlations between the three types of innovation and independent variables are reported in Table 1. The bivariate Spearman correlations coefficients indicates support for the hypotheses. Moreover, the moderate correlations among the three types of innovation suggest three distinct types of innovation without too much overlap.

INSERT TABLE 1 ABOUT HERE

5. Results - Push and pull factors for innovation

In order to test the five hypotheses, OLS regression analyses were calculated for each of the three types of innovation as dependent variables. The results are reported in Table 2. We first entered the control variables. Organization size is significant for service innovation and process innovation, indicating that larger public sector organisations are more likely to carry out innovation. Further, the results related to geographical area (local, regional. National was used as reference category), indicate that local public organisations are somewhat less likely

to implement service and communication innovations compared to public organisations serving a larger geographical area.

INSERT TABLE 2 ABOUT HERE

5.1. Push factors

The first three hypotheses were related to push factors for innovation in public sector organisations. The following push factors were included the analyses: Internal and external information search, organisational support and absorptive capacity as measured by the training and education of employees. With respect to Hypothesis 1, which stated that the more public organisations engage in internal and external information search, the more likely they are to innovate, the results are different for internal vs external information search. While internal information search does not seem to have any influence on innovation, external information search shows a significant positive relationship with service innovation, distribution innovation as well as process innovation. These results give a partial support of Hypothesis 1.

Further, as Table 2 indicates, organisational support shows a significant positive relationship with all three types of innovation. This supports Hypothesis 2 and indicates that organisational support such as support from managers, incentives to staff, user involvement and evaluation activities push innovation in public sector organisations.

The final push factor hypothesized to be related to innovation activity is absorptive capacity in terms of education and training of employees. The findings indicate a significant positive relationship between training and all three types of innovation, while the education level of employees is significant and positively related to service innovation and process innovation, but not significantly related to distribution innovation. In sum, this generally supports Hypothesis 3, with the exception of education and distribution innovation.

In sum, the results related to Hypotheses 1-3 indicate that push factors strongly influence the extent to which public sector organisations implement innovations. Hence, the way these organisations are organized to utilize the capacity for innovation seems to play an important role. The level of competence among employees, their use of knowledge sources and the extent to which employees are supported by the organization to act innovatively, are important key factors to implement public sector innovation.

5.2. Pull factors

The final two hypotheses were related to pull factors for innovation in public sector organisations. Although public sector organisations do not face a market in the traditional sense that can demand innovation, we suggested that innovation may be "pulled" from demands put forward through legislative and political systems, as well as more indirect demand from user groups and other actors in the public organisations' environment. Such

demands may pull innovations to the extent to which they are anticipated and acted upon by the public sector organisations. Hence, included the following two pull factors in the regression analyses to test for Hypotheses 4 and 5: (1) previous and current political and legislative factors driving the development and introduction of innovations and (2) expected developments in the next two years affecting the ability of the organizations to introduce new or significantly improved services.

The results related to political and legislative demands show a significant positive relationship between such demands and distribution and process innovation, but no significant relationship related to service innovation. Hence, Hypotheses 4, which stated that stronger legislative and political demands for innovation would increase the likelihood for the introduction of innovation, is partly supported. The results related to anticipated environmental demands gave a significant positive relationship with process innovation at the 5 % level, but no significant relationship with service and distribution innovation. Hence, Hypothesis 5 is only marginally supported. The results for both included pull factors are weaker, with lower beta-values, than for the push factors, indication that the push factors play a more important role as drivers for public sector innovation than the included pull factors.

6. Discussion and conclusion

Innovation has lately been put forward as essential for public sector development and sustainability of the European welfare states (European Commission, 2013). Policy makers at transnational, national and local levels are aiming at pursuing innovation in public sector organizations. However, knowledge about the drivers of innovation in the public sector context is still scarce. Public sector has some characteristics which imply that knowledge about innovation in the private sector not automatically can be transferred and implemented to the public sector context. While there has been an increase in research examining innovation in the public sector the last decade, the lack of understanding of innovation processes in this particular context remains severe.

This study has utilized the framework of push and pull drivers of innovation developed to explain technological innovation in the private sector, and adapted this framework to the public sector context. Although the new context necessarily means slightly different interpretation of push and pull mechanisms to take into account the peculiarities of the public sector context, the analyses show that this framework also is relevant for the public sector context. As such, this study documents that theorizing from the innovation literature can be adapted to help better understand the drivers for innovation also in the public sector context. As such, the study supports an assimilationist rather than a synthesis approach to the study of innovation in public sector (Nählinder, 2013). However, it also supports that the specific framework conditions of the public sector needs to be taken into consideration, and documents the need to contextualize innovation research. As such, the study helps to establish the public sector as a new research frontier that can further advance our theoretical understanding of innovation.

This study sheds light on various types of innovations implemented by public sector organizations and the relative influence of the most important drivers for innovation to take

place in this context. We find that public sector organizations in fact do innovate, and that a majority have introduced one or more innovations over the last 2-3 years. Further, our results show that both push and pull factors drive innovation in public sector organizations. Innovation can be pushed through training and other initiatives to enhance the absorptive capacity of public sector organisations, through active information search and organizational support to innovation related activities. Hence, this study support the importance of entrepreneurial leadership for innovation in this context (Currie et al., 2008; Zerbinati & Souitaris, 2005). On the other hand, innovation can also be pulled through political and legislative actions implemented or signalled (Naranjo-Gil, 2009).

As such, the study contributes to modify the new public management inspired literature on innovation in the public sector. We show that innovation is driven not only by pull factors such as new public management driven goals and measurements related to innovation performance in public sector, but also to a considerable extent by push related mechanisms related to internal resources, processes and characteristics of public sector organizations. In fact, the findings indicate that push factors are more effective than pull factors in encouraging implementation of service innovation, distribution innovation as well as process innovation. These findings have important implications. Innovation in public sector should not only be pursued through legislative change and policy reforms. Resources and processes likely to enhance the innovative capabilities of organizations should also be in focus of policy makers. Hence, increased focus on developing innovation capabilities and skills within public sector organizations are just as likely to produce results, and might be even more effective. Strategies towards engaging in open innovation may give results (Lee, Hwang, & Choi, 2012).

This study represents an effort to examine push and pull factors contributing to innovation in public sector organizations. It is associated with some limitations, particularly limitations related to cross-sectional data and self-reported measures. Despite these limitations, it gives important insights into factors associated with different types of innovation in the public sector. The large sample and cross-national data ensures robustness to the findings. A well-developed public sector is an important characteristic with the modern society. As new public sector services and new ways of communicating and distributing these services to the public are crucial for further development of a well-performing public sector. Innovative activity is associated with improved organisational performance (Damanpour et al., 2009) and higher quality public services (Salge & Vera, 2012), and make public sector organisations more sensitive to environmental factors (Naranjo-Gil, 2009). Hence, understanding of push and pull factors which increases the ability of public sector organisations to introduce innovation is needed for an efficient and well performing public sector.

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Table 1 Descriptive statistics and Spearman correlation coefficients (n=2276)

	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
<i>Control variables</i>														
1. Organisation size	2.27	1.66	1.00											
2. Local area	0.78		-.20**	1.00										
3. Regional area	0.16		.16**	-.82**	1.00									
<i>Push factors</i>														
4. Internal info. search	2.38	0.54	.19**	-.11**	.07**	1.00								
5. External info. search	2.37	0.62	.11**	-.05*	.05*	.40**	1.00							
6. Organisational support	2.15	0.45	.17**	-.07**	.03	.36**	.31**	1.00						
7. Training	2.23	1.06	.25**	-.10**	.09**	.20**	.27**	.24**	1.00					
8. Education	3.32	1.50	.17**	-.30**	.21**	.15**	.15**	.10**	.18**	1.00				
<i>Pull factors</i>														
9. Political and leg. demands	2.19	0.54	.18**	-.03	.05*	.22**	.29**	.21**	.20**	.12**	1.00			
10. Anticipated env. demands	2.35	0.96	-.01	.09**	-.06**	.06**	.16**	.13**	.12**	.03	.14**	1.00		
<i>Innovations</i>														
11. Service innovation	1.17	0.93	.16**	-.11**	.08**	.15**	.23**	.21**	.25**	.15**	.12**	.07**	1.00	
12. Distribution innovation	1.48	0.91	.12**	-.07**	.05*	.14**	.25**	.21**	.32**	.08**	.19**	.11**	.30**	1.00
13. Process innovation	2.82	1.58	.27**	-.10**	.07**	.25**	.33**	.32**	.45**	.21**	.25**	.13**	.35**	.42**

Note: Level of statistical significance: * indicates $p < 0.05$; ** indicates $p < 0.01$ (2-tailed).

Table 2 Regression analyses on service, communication and process innovation

	Service innovation	Distribution innovation	Process innovation
<i>Control variables:</i>			
Organisation size: # of employees	.060**	.036	0.130***
Geographical area – local	-.095**	-.073*	-0.033
Geographical area – regional	-.039	-.049	-0.035
<i>Push factors</i>			
<i>Information search</i>			
Internal information search	-.010	-.037	.023
External information search	.141***	.139***	.139***
Organisational support	.099***	.099***	.138***
<i>Absorptive capacity</i>			
Training	.127***	.225***	.299***
Education	.086***	-.014	.086***
<i>Pull factors</i>			
Political and legislative demands	.021	.088***	.080***
Anticipated environmental demands	.001	.034	.040*
F value	28.323***	40.285***	102.882***
R ²	0.111	0.147	0.306
Adjusted R ²	0.107	0.144	0.303
N	2279	2345	2349

* indicates p<0.05; ** indicates p<0.01; *** indicates p<0.001 (2 tailed).