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A review and extension

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INTERNAL AND EXTERNAL ANTECEDENTS OF PROCESS INNOVATION: A REVIEW AND EXTENSION

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INTERNAL AND EXTERNAL ANTECEDENTS OF PROCESS INNOVATION: A REVIEW AND EXTENSION

Abstract

Innovation in public organisations is widely documented and has increasingly been subjected to empirical scrutiny. This article integrates the empirical evidence of the internal and external antecedents of process innovations in local governments and proposes directions for future research. The importance of the internal antecedents of organisational size, administrative capacity and organisational learning is uncovered using the meta-analytic support score method, but not in relation to external antecedents. Directions for further research are presented on the independent, joint and non-linear effects of antecedents on the adoption of innovation, and the implications of these arguments for the future study of innovation in local governments are considered from a structural contingency perspective.

Evidence shows that public organisations regularly implement new services and service delivery methods. These innovations occur in response to changes in the external environment – deregulation, resource scarcity and customer demands – and are based on internal organisational choices such as perceived performance gaps, pursuit of a higher level of aspiration and increasing the extent and quality of services (Aiken and Alford 1970; Borins 1998; Light 1998; Osborne and Brown 2005). The evidence base on the factors influencing the adoption and implementation of innovation is longstanding (Mohr 1969) and has been growing in public organisations over recent years (Berry 1994; Borins 1998; Light 1998; Newman et al. 2000; Wu et al. 2013). It is important to take stock of the antecedents of innovation, to integrate and synthesise the existing knowledge and to identify a research agenda that populates the gaps in the evidence base.

Researchers have examined the innovativeness of organisations, patterns of diffusion and the consequences of innovation across a range of different types of public agencies (Berry 1994; Borins 1998; Light 1999; Salge and Vera, 2009). The dominant line of enquiry in the social sciences literature has been driven by a technological imperative that examines the organisational and environmental conditions that lead to innovative products and services (Gallouj and Weinstein, 1997; Miles 2005). Given this bias, this review contributes to the public management and innovation literatures by focusing on process innovations. Process innovations are concerned with how services are rendered. They include the organisational and technological components of organisations, together with inter-organisational relationships. Recent changes in the management of public organisations have heightened the importance of internal organisational changes. Such changes include the New Public Management (NPM) movement of the late twentieth century that placed emphasis on process innovation through its focus on business and

managerial practices, or the more recent changes associated with networked governance (Arganoff 2007; Pollitt and Bouckaert 2004). Furthermore, process innovations are anticipated in older organisations such as local governments.[1]

This article seeks to make two contributions. The first is to examine and integrate the empirical findings from studies on the internal and external antecedents that lead to the adoption and implementation of process innovations at the organisational level. The second is to suggest future directions for research in this field. The organisations examined are local governments – a suitable unit of analysis because they are responsible for the delivery of many of the public services that people use on a daily basis, and support many of the basic aspects of human existence. This ensures healthy environments through garbage removal, clean food and water supplies, the education of children destined to become future citizens and the support of those most vulnerable in society. The focus is on the antecedents most widely examined in the studies reviewed – administrative capacity, organisational size, organisational learning, slack resources and deprivation, urbanisation and wealth.

To meet these aims, this article commences by defining innovation and discussing innovation types, noting the importance of clear and comparable definitions to ensure that the results are comparable, and thus generalisable. The published empirical academic evidence on the internal and external antecedents that influence adoption is subsequently reviewed. The review focuses on empirical journal articles on innovation in local governments published and recorded in the Public Administration section of the Web of Science database. The examination of this evidence points towards the importance of organisational size and administrative capacity,

[1] This emphasis on process innovations in public organisations can be seen in the local government studies reviewed here – only three studies examining service innovations were uncovered in the literature search, an insufficient number for review.

but offers less compelling evidence for other determinants. To advance the field through directions for future research on the independent effects of internal characteristics, the joint effects of internal and environmental antecedents and likely nonlinear relationships in the organisational environment are discussed within a structural contingency framework.

PROCESS INNOVATIONS

Innovation occurs when new ideas, objects and practices are created, developed or reinvented for the first time in an organisation (Aiken and Hage 1971; Kimberly and Evanisko 1981; Rogers 1995). Because public organisations may innovate to secure their legitimacy, they may not fully adopt an innovation. Thus, the implementation and use of an innovation is a critical aspect of its definition (Boyne et al. 2005; Damanpour and Evan 1984).[2] Given this imperative, scholars have identified models of innovation adoption that range from sequential stages such as initiation, adoption decision and implementation to complex iterative process models (Van de Ven et al. 1999; Zaltman et al. 1973).

Social scientists generally concur that inconsistent results arise from variations in the definition and operationalisation of concepts. Previous studies have sought to address this problem by distinguishing between innovation types to overcome problems of limited cumulative knowledge development (Aiken and Alford 1970; Damanpour 1991; Wolfe 1994). Researchers have, for example, examined radical and incremental innovations as an essential aspect of understanding the adoption of innovation (Ettile et al. 1984).[3] Product and process innovations are the most commonly distinguished (see Edquist et al. 2001). Product innovations can be understood as what is produced or, more appropriately in public sector settings, what

[2] Adoption is used throughout the remainder of this article to infer adoption and implementation.
[3] For a review of radical and incremental innovation in the public sector, see Osborne and Brown (2005).

service is delivered. Processes innovations pertain to how a service is rendered. It is also possible to distinguish between ancillary and inter-organisational innovations; that is, those that are developed at the organisation-environment boundary (Armbruster et al. 2008; Damanpour 1987).

Process innovations affect management and organisation. They change relationships amongst organisational members and affect rules, roles, procedures and structures, communication and exchange among organisational members and between such members and the environment (Abernathy and Utterback 1978; Damanpour and Gopalakrishnan 2001). Given these wide-ranging effects, Edquist et al. (2001) drew attention to the organisational and technological aspects of process innovations.

Organisational process innovations occur in structure, strategy and administrative processes (Armbruster et al. 2008; Damanpour 1987). They include improvements in an organisation's practices, the introduction of new organisational structures and the coordination of human resources (Borins 1998; Edquist et al. 2001; Light 1998). Within the public sector, such changes embrace methods of purchasing, delivering services and generating revenue and include themes such as contracting, externalisation and the market pricing of public services reflecting the NPM (see Hansen [2010] on Danish local government and Morgan [2010] on economic development). Organisational process innovations include new approaches to personnel (motivating and rewarding organisational members), tasks and units (searching out new approaches and structure) and modifying the organisation's management processes (Daft 1978; Kimberly and Evanisko 1981; Light 1998). For example, Fernández and Wise (2010) examined the personnel innovations arising from changes in employment visas and Teodoro (2009) explored a number of innovations, including workforce succession planning.

Technological process innovations are new elements introduced into an organisation's

production system or service operation to render its services to users and citizens (Abernathy and Utterback 1978; Knight 1967; Damanpour and Gopalakrishnan 2001). The drivers of these innovations are, primarily, reduction in delivery time, increase in operational flexibility and decreased production costs (Boer and During, 2001), and they are typically associated with information technology (IT) in public organisations. Researchers initially examined the use of IT in public organisations (Perry and Kraemer 1978), but have recently shifted towards e-government (Jun and Weare 2010). Technological process innovations, therefore, modify the organisation's operating processes and systems (Schilling, 2005).

Innovations can be intra- or inter-organisational in character (Armbruster et al. 2008). Damanpour (1987) offered the first and clearest definition of inter-organisational innovations and labelled them ancillary. Ancillary innovations are differentiated from other innovations because they are "organisation-environment boundary innovations" (1987, 678). An ancillary innovation is distinguished by the fact that successful adoption is dependent on factors outside an organisation's control and their successful implementation is reliant on other actors in the organisational environment. Given that ancillary innovations involve a public organisation working across their organisational boundaries (i.e. business, users, citizens or non-profits), the growth of governance and the networked relations that have come to dominate service delivery mean that process innovations abound and are concerned with partnerships and joint efforts across sectors. Studies have examined tutorial services and adult continuing education programmes in libraries (Damanpour 1987) and the development of external partnerships and internal coordination between departments (Walker 2008).

ANTECEDENTS

Internal Antecedents

The internal antecedents examined include organisational size, slack resources, administrative capacity and organisational learning.[4] Arguments about the role of organisational size as a determinant of innovation are presented from two diametrically opposed perspectives, and supported by inconsistent results. First, public choice theory holds that large public organisations are monopolistic, inefficient and driven by the interests of bureaucrats rather than users or political sponsors. They are characterised as sluggish and unable to respond to changes in the environment, and as such are not likely to innovate (see Downs [1967], Niskanen [1971]). The alternative perspective on size presents it as an antecedent of innovation because larger organisations are associated with access to more complex and diverse facilities, professional and skilled workers and higher technical potential and knowledge (Hage and Aiken 1970; Damanpour et al. 2009; Rogers 1995). Furthermore, process innovations are more readily associated with older organisations (such as local governments) that use them to enhance efficiency. These theoretical arguments point towards a possible non-linear U-shaped relationship with smaller and larger organisations offering optimal structural conditions for innovation.

During the adoption and implementation of innovations, organisations must assign staff and resources to manage what can be a difficult and turbulent time (Van de Ven et al. 1999). If an organisation is cash strapped, it may not have the flexibility to deploy resources for the task of innovating, and in resource-scare environments, levels of formalisation may be higher and control over the budget and other resources sufficiently tight enough to hinder innovation. Slack resources provide organisations with the capacity to innovate, bear the costs of innovation, and

[4] In excess of 30 internal antecedent variables were identified in conducting this review. Those included were considered in at least four of the studies examined.

experiment (Berry 1994; Damanpour 1991; Walker 2003). Although the availability of slack resources is not consistently associated with all types of innovation, the case has been made for process innovations because they are more typically associated with efficiency gains that may, in turn, release further resources (Borins 1998; Light 1998).

The administrative intensity or capacity of public organisations has long been associated with their ability to adapt to circumstances to maintain effectiveness, of which innovation is a key mechanism (Burgess 1975). Studies of capacity and intensity vary in their focus. For example, the Government Performance Project painted administrative capacity as the ability of public organisations to direct and control human, physical and informational resources to achieve policy goals (Ingraham et al. 2003). In relation to innovation, it has long been maintained that a strong administrative core or a large number of managers are positively associated with the adoption of innovation because they provide the leadership, support and coordination necessary for innovation to succeed (Daft and Becker 1978). Put another way, Andrews and Boyne (2011, 895) note that "low capacity governments would struggle to develop and implement innovations". In studies of local government, this notion has been operationalised as administrative intensity or administrative overheads (ratio of managers to employees, see Fernández and Wise [2010]) and capacity (financial, personnel and managerial capacity, see Moon and Bretschneider [2002]). The term administrative capacity is used to capture the capacity and intensity facets of this notion in this study, and it is associated with the adoption of innovation.

Scholars addressing questions of innovation adoption in local governments have drawn on concepts of professionalism, boundary spanning and external communication. These concepts are central to organisational learning, "social interaction" and "shared thought and action in an

organisational context … which can be the sources of collective knowledge stimulating organisational change" (Rashman et al. 2009, 470).[5] Organisational learning is seen to be particularly suited to the public sector due to high levels of professionalism and learning through collective action. In studies of innovation in public organisations, authors have argued that professionalism reflects individual managerial and organisational experience. Higher levels of education and experience have been argued to increase the boundary-spanning activities of managers and a commitment to move beyond the status quo. The concept of professionalism is very closely associated with external communication. For example, the "environmental scanning and extraorganisational professional activities of members can bring innovative ideas" and "innovative organisations exchange information with their environments effectively" (Damanpour 1991, 559). External communication through professional associations has been shown to lead to the adoption of innovation. Walker (1969) argued that professional meetings and associations promote innovativeness because they generally have a pro-innovation bias. Empirically, Balla (2001) found that the state managers most active in professional associations were more likely to adopt model laws. Rashman and Radnor (2005) showed how professional collaboration results in knowledge transfer in a system of local government. Given the very close association with these variables used in studies on innovation and the concept of organisational learning, the label organisational learning is used, and it is presumed that higher levels are associated with the adoption of innovations in local governments.

External Antecedents

The external organisational environment can offer opportunities for, or place constraints on, the

[5] I am grateful to one of the anonymous reviewers for suggesting the value of the organisational learning literature.

adoption of innovation. Contingency theorists argue that adaptation to the external environment takes place to enhance organisational efficiency and effectiveness, and that innovation is one such route to these outcomes (Donaldson 2001). Consequently, the external organisational context will have bearing on the adoption of innovation.

Three external antecedents are examined: needs, wealth and urbanisation.[6] Public organisations' primary function is to meet needs, be they expressed as demands for service from particular groups or the level of deprivation in a jurisdiction. Ensuring that goals are met is likely to motive them to innovate and provide appropriate and necessary levels of service. Public organisations are therefore motivated to innovate to meet basic service needs. However, need alone might not be sufficient to facilitate the adoption of innovation, and thus two additional perspectives have been developed. The first proposes that innovation adoption will be easier in more munificent external environments because more affluent, economically skilled and socially enterprising households can use their resources alongside those of a public agency to coproduce services, increasing the opportunity for innovation (Armstrong and Taylor 2000). Hence, researchers have included measures of affluence and wealth in models of adoption (Moon and deLeon 2001). Second, the benefits of a supportive or malleable external environment have been identified as a mechanism to overcome obstacles to innovation (Light 1998; Meyers and Goes 1988). Urbanisation has also been a subject of enquiry as a practical expression of malleable environments. The presumption is that urban environments are more amenable to innovation due to population concentrations that are relatively easy to access (Aiken and Alford 1970).

The relationship between the environment and the adoption is likely to be non-linear.

[6] At least four studies examining a variable applied the same decision rule to internal and external antecedents.

Technical organisational environments place limits on organisations that are likely to constrain organisational outcomes (Andrews et al. 2005; Pettigrew et al. 1992). Public organisations cannot maintain innovation in the face of growing need because its adoption is disruptive (Van de Ven et al. 1999), and at some point organisational failure is likely to be substituted for innovation (Boyne and Meier 2009).

METHODS

The empirical literature on innovation in local governments was located in the Thompson Reuters Web of Science database. Searches of titles, abstracts and keywords were conducted for the 1956 to 2010 period (inclusive), and supplemented by searches in the 'advance access' sections of journal websites in the public administration section of the Web of Science. The search terms used included: innovation AND local government, counties, cities and public (and derivatives thereof). The search terms were kept broad, so as not to omit studies. Once articles had been identified using these terms they were examined in further detail and only studies that included the local government as the unit of analysis and process innovation were included. The search focused on the disciplinary areas of business, management, political science and public administration. Careful reading of the articles led to a final sample of 17 empirical studies that contained full tables of statistical results. Articles were excluded from the review if they were not empirical, innovation was not the dependent variable, they did not include independent variables of internal and external antecedents, they contained partial statistical data, case studies were presented or they were conceptual pieces.

The review strategy adopted in this article benefits from focusing on peer-reviewed journal articles that were judged to be of suitable quality for publication by editors following a blind review, and therefore should meet the basic requirements of theoretical and methodological

rigor. However, it excludes unpublished papers on the antecedents of innovation in local government and work sponsored by government and national and global organisations, such as the OECD, with an interest in innovation in public organisations, along with books and book chapters. This approach may lead to bias if the relationship between antecedents and innovation adoption is overstated because articles that contain statistically significant results are more likely to be published. Estimates from other fields suggest that the magnitude of such a bias is small (Rosenthal 1991). The publication of weak research findings is generally limited, although there are wider examples from the innovation and management literature (Damanpour 1990; West and Schwenk 1996).

The studies examined span the four most recent decades of the search period. The distribution of these articles over time suggests that although not a mainstream topic, innovation adoption in local government is one that scholars have revisited with increased interest in the twenty-first century. Table 1 shows that studies were typically undertaken in the US (12 of the 17 studies) with three in the UK and two in Denmark. The non-US samples focused on general purpose local governments that delivered a range of services. For example, the services surveyed in English local governments included corporate services, benefits and revenues, education, housing, land use planning, leisure and culture, social services and waste management (Walker 2006). Danish municipalities' service provision includes education and culture, social services, technical services and city managers (Hansen 2010). The structure of government in the US reveals many single-purpose local governments. Bingham (1978), Damanpour (1987), Teodoro (2009) and Ferdández and Wise (2010) examined single-purpose authorities whereas the remainder investigated city, municipal and county governments. The large number of US studies in the sample is likely to bias results – a point that is addressed in the conclusion.

[Position of Table 1 here]

The average sample size is 655 and ranges from in the 70s (Damanpour 1987; Teodoro 2009; Walker 2008) to over 1,000 (Bhatti et al. 2010; Damanpour and Schneider 2006; Jun and Weare 2010) (see Table 1). The majority of the studies examined surveyed one respondent from each organisation, the exceptions being those in Demark, England and Wales (Boyne et al. 2005; Hansen 2010; Walker 2006, 2008).[7] The balance of the studies use a combination of secondary and survey data, with seven using only survey data, whereas the article by Bhatti et al. (2010) relies exclusively on secondary data. The studies were marginally more likely to report associations because their research design was cross-sectional. However, seven studies were able to build some semblance of time into their research design, of which two used longitudinal datasets. The remaining five studies (Brudney and Selden 1995; Boyne et al. 2005; Walker 2008, Kwon et al. 2009; and Fernández and Wise 2010) built a time lag between the dates that the independent and dependent variables were recorded. Twelve of the studies included explanatory variables of both internal and external characteristics, whereas Perry and Kraemer (1978) focused on external antecedents alone and the remaining four internal determinants (Brudney and Selden 1995; Damanpour 1987; Moon and Bretchneider 2002; Teodoro 2009).

Support Score

The method used to combine and synthesise the results of the empirical evidence is based on the percentage of statistical tests that support the hypothesis that internal and external antecedents, positively or negatively (depending on the hypotheses presented), influence innovation adoption. The support score approach is adopted because the majority of studies implemented multiple

[7] In the case of Hansen (2010) organisation is the unit of analysis, but the actual empirical research is undertaken on managers, with each manager representing a unit of local government.

regression techniques and do not report correlations (Boyne 2002; Damanpour 2010). To count as supporting the hypothesis, two conditions must be satisfied. First, the results must be in the predicted direction. Second, the results must be statistically significant; that is, greater than would be likely to arise by chance alone ($p < .05$). If these criteria are applied to all of the tests in a single study, then a support score can be calculated as a percentage of all of the tests that are reported in the study (ranging from 6 to 105).

Following this, an aggregate support score can be calculated across all of the studies in at least two ways (Boyne 2002; Rosenthal 1991). First, the support score for each study can be treated equally, regardless of whether it contains 1 or 300 tests. Second, each study can be weighted (multiplied) by the number of tests in that study so that an equal weight is attached to each test, rather than to each study. The method can be illustrated using two hypothetical studies. Study A has one test that is statistically significant and positive at .05 or better. Study B has 10 tests, of which five are positive and statistically significant. The unweighted positive support score would be 75 per cent (100 [per cent of positive statistically significant tests in Study A] + 50 [per cent of positive statistically significant tests in Study B]/2 [number of studies]). The weighted support score would be 55 per cent (Study A 100 [per cent of positive statistically significant tests in study] * 1 [number of tests] = 100. Study B 50 [per cent of positive statistically significant tests in study] * 10 [number of tests] = 500. Sum per cent of positive statistically significant tests: 100 + 500 = 600. Calculate the weighted percentage as 600/11 [number of tests in total] = 55 per cent). As this example reveals, the weighted mean has the advantage; that is, studies that report only a small number of tests do not have a disproportionate influence on the analysis. The advantage of the unweighted mean is that studies that conduct a large number of tests on the same data set are not given undue importance. The real level of

support for the antecedent-innovation hypothesis probably lies somewhere between the unweighted and weighted figures. The text reports both support scores, but the more conservative weighted score is reported first.

Alternative approaches can be adopted for the purpose of critical review. However, the majority of these techniques require the reporting of correlation matrices, and as Table 1 shows, only 8 of the 17 studies reported these. Unlike studies using correlation coefficients, the support score method reports statistically significant associations at the *p* .05 level from regression models that control for other variables, thereby reducing concerns about bias arising from spurious relationships (Damanpour 2010).

RESULTS

The results are presented in two parts. The first section presents the support scores for organisational size, administrative capacity and organisational learning. In each case, a positive relationship with innovation adoption is anticipated. The second section examines the external antecedents. Again, it is anticipated that deprivation, wealth and urbanisation will be positively associated with adoption. To determine what counts as support for the hypotheses, Boyne (2002) and Damanpour (2010) proposed that a support score of 50 per cent shows moderate to strong support for a hypothesis – higher than chance alone. This decision rule is implemented in this study.

Internal Antecedents

The findings commence with organisational size. Table 2 shows that organisational size affects the adoption of process innovations in local governments. The weighted support score for statistically significant positive results is 62 per cent (unweighted is 54 per cent). These results show that process innovations are associated with larger organisations and, as such, the findings

reflect evidence of the size-innovation hypothesis in the management literature (Camison-Zornoza et al. 2004; Damanpour 1991, 2010) without supporting the public choice arguments. In reaching this conclusion, the Camison-Zornoza et al. (2004) meta-analysis noted the importance of consistency in the measurement of size. Size is typically measured using employees or a proxy measure of population.[8] Sub-analysis indicates that the measure of population is likely to marginally underestimate this relationship (weighted 53 and unweighted 46 per cent) compared with all of the studies, whereas using the actual number of employees (Boyne et al. 2005; Damanpour and Schneider 2006, 2009; Fernández and Wise 2010; Moon and Bretschneider 2002; Teodoro 2009) increases the level of the weighted support score (64 per cent, unweighted 57 per cent).[9]

[Position of Table 2 here]

Table 2 also presents the results for slack resources. The support score results do not indicate a positive or negative association between slack resources and the adoption of innovations in local governments. The weighted support score for a positive relationship was 22 per cent and fell to 11 per cent for a negative association. This leaves the balance of scores at nearly two thirds, suggesting non-significant relationships (59 per cent unweighted). This is in contrast with the line of reasoning that slack resources provide the capacity and space to bear the costs of innovation and experimentation. There are a number of possible explanations for this contrast, including that the number of studies measuring slack resources may be too small. In addition, different approaches were used to operationalise slack, ranging from simple budget

[8] Population is used because the size of a local government's labour force will vary by the population being served, given that they have statutory responsibilities to provide a given range of services.

[9] Two studies are excluded from this sub-analysis: Damanpour (1987) used budget and Bingham (1978) did not report how size was measured.

surplus (Fernández and Wise 2010) to a ratio against nationally determined spending guidelines (Walker 2008). These results raise questions about the importance of measurement consistency.

An analysis of the effect of administrative capacity on the adoption of innovation is presented in Table 3. The findings for administrative capacity show a positive simple majority. The 62 per cent positive weighted support score (58 per cent unweighted) strongly supports the role of this variable as an antecedent of process innovation. All of the measures are of the number or proportion of staff as a ratio of administrators or supervisors over other personnel, or a portion of a staff dedicated to a particular task or function. The exception is for Moon and Bretschneider (2002), who used a perceptual measure that included financial, personnel and managerial capacities. Thus, there is some consistency in the approach to measurement across the articles reviewed here. The evidence implies that a larger number of managers in an organisation provide capacity and play an important role in providing leadership and coordination in the pursuit of process innovation.

[Position of Table 3 here]

The relationship between organisational learning and the adoption of innovation is presented in Table 4 (operationalised as level of professionals employed and external communication, environmental scanning and involvement in professional organisations). The weighted support scores point towards a positive association with 45 per cent of the aggregate support scores tending in this direction.[10] Although the balance of evidence leans towards no significant relationship, indicating neither a positive nor negative association between

[10] These results are not unduly affected by the two different approaches to the operationalisation of organisational learning. Sub-analysis shows that the three articles used measures of employees (qualification or full-time) and three professional activity. They had support scores of 44 and 45 per cent, respectively.

organisational learning and the adoption of innovation, scores near 50 per cent do indicate that a variable is likely to play an important role beyond chance alone (Boyne 2002). This finding suggests that organisations that engage in social interaction through collaborative action tend to practice organisational learning, which has positive consequences in the adoption of innovation.

[Position of Table 4 here]

External Antecedents

An analysis of the technical environment was undertaken for studies that examined need, wealth and urbanisation (Table 5). Nine of the studies examined included a measure of deprivation or poverty, producing a relatively low positive weighted support score of 28 per cent (unweighted 21 per cent). Five of the studies included measures of community wealth and produced similar support scores: 29 per cent weighted and 40 per cent unweighted. Finally, four studies included urbanisation as an external antecedent of innovation, prompting lacklustre results with a weighted support score of 30 per cent and an unweighted score of 38 per cent.

[Position of Table 5 here]

It is possible that measurement is, once again, an important factor influencing these results. Measures of deprivation varied widely, ranging from indices of multiple measures of deprivation (Walker, 2006, 2008), to the poverty rate taken from the US census (Morgan 2010) to the "unemployment rate (the full-time unemployed as a percentage of the municipal population of working age)" (Hansen 2010, 11). These tap different dimensions of deprivation, such as income and activity in the labour market. Similar variation exists in the operationalisation of wealth. Urbanisation is slightly more consistent in that studies measure either population density (Boyne et al. 2005), with larger numbers indicating more urban local governments, or the percentage of inhabitants in a municipality within a city (Hansen 2010).

Until more researchers can agree on and implement consistent measurement, it is likely that the lack of reliability and validity of measures will continue to produce inconsistent findings.

DIRECTIONS FOR FUTURE RESEARCH

Independent Effects on Internal Antecedents

The evidence base that generated the presumption that size matters for process innovation was developed in technology-driven models. The technological imperative presumes that process innovations follow product innovations and are associated with more mature organisations that have moved beyond the search for effectiveness to efficiency gains that stem from internal administrative, managerial and organisational changes (Abernathy and Utterback 1978). The applicability of technological models of innovation is increasingly questioned because local governments are more likely to adopt innovations from other sectors that can be intangible (Barras 1986; Damanpour et al. 2009; Miles 2005). Although future studies can now more convincingly argue that larger organisations – associated with more complex and diverse facilities – are more readily able to adopt process innovation, new theory and research is required that examines the dynamics of the adoption of process innovations in larger public organisations.

Aspects of this theoretical elaboration may come from examining process innovation types. Innovation types can have different relationships with antecedents. Organisational process innovations focus on basic work activities, structures, strategies and administrative processes, whereas technological process innovations relate to organisations' production systems or service operation in relation to providing services to users. Damanpour's (1987) study of libraries is an example of a study that included an examination of technological process innovation, and it found a positive association with slack resources. Further theoretical and empirical work could examine the relationship between slack financial resources and technological process innovation.

Another fruitful area to examine could be e-government, a growing area of research in its own right (Jun and Weare 2010; Moon 2002). For example, new IT hard and software is expensive, and as such innovation in this field, as opposed to the adoption of administrative and organisational practices, may require organisations to make substantial investments. Indeed, longstanding enquiry into this field may address such questions relatively quickly.

The budgeting processes of public organisations lend additional weight to this proposition. Most public organisations work on annualised budgeting cycles based on patterns of previous expenditure and the need for the support of higher political authorities. Typically, organisations that develop financial slack are not rewarded, but rather may be punished for "under spending". Consequently, the level of slack resources available in public agencies would be expected to be low and only contribute towards the adoption of innovations in limited ways. It may be this that resulted in largely non-significant results. Thus, the circumstances of public organisations may be at odds with much of the evidence on this topic typically derived from the management literature (Bourgeois 1981). However, as Fernández and Wise (2010) noted, innovation requires that costs be implemented, whereas future improvements are only promised. Further research is necessary to unpack the role of slack in studies of local government.

Building on the notion that differing antecedents will engage in varying relationships with innovation types, it is possible that administrative capacity will be more important in organisational process innovations. In public organisations, administrative capacity represents a critical area of 'slack' because public agencies can build slack in human resources more readily than in dollar terms (see above). The adoption and implementation of organisational innovations is likely to be more successful in organisations with a larger cadre of managers that can be diverted from other projects to focus on innovation without adversely affecting the day-to-day

operation of the organisation, including the delivery of services to the public. For example, Bhatti et al. (2010) looked at new organisational forms and Fernández and Wise (2010) studied personnel reforms. Both identified a positive association with administrative capacity. Furthermore, these innovations are concerned with motivating and rewarding staff, strategy and structure and the core tasks of organisation and management that are accorded to managers, which creates a stronger association with the successful adoption of innovation.

Administrative capacity is also likely to be important in ancillary organisational process innovations. Kwon et al. (2010) and Morgan (2010) examined innovative approaches to local economic development that required local governments to work with other organisations, in this case private sector firms. The networking literature also points to the resource intensity of managing across organisational boundaries, and the ways in which doing so can take managers away from immediate and core organisational issues (Agranoff 2007).

Attention must also be directed towards measurement. This was notable for organisational size. Across all of the studies reviewed, those using the number of employees resulted in higher positive support scores than those using population measures. The number of employees may be less accurate a measure because of practices such as contracting and partnership, which may reduce the number of employees on the payroll.

Joint Effects on Innovation Antecedents

All of the studies examined in this review test for the independent effects of internal and external antecedents on the adoption of process innovations. A number of areas present themselves for empirical exploration. For example, it would be possible to examine whether larger organisations have the internal capacity to develop administrative volume and engage in organisational learning practices that systematically work across organisational boundaries to create the climate

for change and innovation. One aspect of organisational learning – environmental scanning – points towards the joint effects between organisational environments and internal capacities. Managers who undertake environmental scanning may be better able to judge the technical environment their organisation faces through an understanding of how it influences them, thereby responding to these pressures. Although it is possible that size may correlate with these other variables, they are conceptually distinct and empirical studies would serve to clarify such relationships.

Nonlinear Relationships

The bulk of the innovation evidence on the technical environment assumes a linear relationship between the pressures that emanate from the social-economic or political content. Only two of the studies included in the sample examined here explored these relationships, thus it was not possible to apply the support score method (Jun and Weare, 2010; Walker 2008). If the relationship between the environment and adoption were linear, it would imply increasingly greater external pressures that would result in ever-higher levels of innovation adoption, the limits to which are noted above.

Empirical effort should be directed towards examining nonlinearities with an inverted-U shape. Very low levels of need in the external environment will not place sufficient pressure on an organisation to innovative. As the scale and diversity of need accumulates, organisations will read the external environment and begin to implement innovations to meet the demands. However, as pressures grow, the context becomes too demanding and organisations, while seeking to maintain service levels, find it very difficult to innovate. The downward slope of the inverted-U shape is likely to be found in turbulent technical environments, which are typified by uncertainty, complexity and change on change, all of which stifle attempts at innovation

(Buganza et al. 2009). The proposed nonlinear relationship points towards moderate levels of need being positively associated with the adoption of process innovations. A similar argument can be made for munificent environments. The reviewed evidence points towards some support for wealth as a driver of innovation. However, in situations of very high wealth, there is unlikely to be an incentive for public organisations to innovate because services are less likely to be required. Future research could examine where these tipping points occur.

Finally, it is noted in the review section that the relationship between size and innovation adoption may not be non-linear. Future studies should include a quadratic size term to ascertain whether there is an optimal size for an organisation looking to develop process innovations.

Structural Contingency Theory

The aforementioned questions are largely empirical, and must be located within a framework. Suggested theories have included open system theories that posit organisations as adaptive systems that introduce change to function effectively, and the resource-based view of the firm (Bryson et al. 2007; Damanpour et al. 2009; Scott 2003). However, it has been proposed that a longstanding paradigm – structural contingency theory – be applied to these questions of innovation (Qui et al. 2011). At the centre of this theory is the notion of *fit*. Fit between structure and key contingencies results in higher performance. Innovation is an outcome designed to assist in achieving fit, and it drives higher levels of organisational outcomes by embodying adaptation to new circumstances put in place to ensure that high performance is attained. In moving towards goal achievement, organisations respond to contingencies in the environment. Seminal management research on contingency theory has examined technology, tasks, strategy and size (Burns and Stalker 1967; Child 1975; Miles and Snow 1978; Thompson 1967; Woodward 1965). While these studies were of firms, there is a public sector local government focused tradition that

includes research from the Institute for Local Government Studies at the University of Birmingham in the 1970s (Greenwood et al. 1975; Greenwood 1987). A second illustration of a contingency framework applied to local government is Miles and Snow's (1978) strategy framework. Miles and Snow argued for fit between strategy content, structure, process and external context. For example, an innovative prospecting strategy was associated with decentralised structures, incremental processes and uncertain environments. Facets of these contingent relationships have been upheld in studies of local government (Andrews et al. 2011; Greenwood 1987).

Donaldson's (2001) Structural Adaptation to Regain Fit (SARFIT) contingency theory provides a framework that could facilitate the testing of the independent, joint and nonlinear suggestions posed above. Figure 1 shows Donaldson's 'organisation in fit' model, adapted to include innovation as a key element in the process of achieving fit and organisational performance. The figure suggests that the relationship between structure and contingency moderates the achievement of acceptable levels of performance. Changes in a contingency or contingencies may upset this relationship. For example, the external context may become less munificent or malleable. Change takes place within the organisation, but structures remain unmodified, resulting in misfit and reduced performance. As performance falls to an unacceptable level (real or perceived) the organisation must make adaptive changes and a new structure is sought to bring the organisation back into fit, which restores performance. In seeking to attain fit and acceptable levels of performance, process innovation is implemented (technological e-government innovation or partnerships with external agencies). Innovations lead to change in structure that could include large-scale shifts from mechanistic to organic, or subtler changes in organisational size. The mechanisms used to bring about innovations are what

Donaldson referred to as adaptive change, but which innovation researchers working on questions of public services innovation have implicitly called organisational learning. As such, organisational learning can be conceived of as a variable that mediates organisational responses to changes in contingencies.

[Position of Figure 1 about here]

Such a model enables innovation scholars to consider and clearly articulate the key contingences that must be studied to better understand the factors resulting in the adoption of innovation in local governments. These factors may be individual effects (such as slack), or joint relationships between internal variables such as formalization and specialization, or nonlinear effects including variables such as size. Further research from a structural contingency perspective would lead to proposed contingencies between key variables to achieve the adoption of innovation in local governments. It would require researchers to tackle some of the aforementioned questions while extending the range of internal and external antecedents examined. Such work would likely contribute towards the exploratory work on public sector innovation and configurations, similar to that proposed by Walker (2008), to assist in advancing the field in this important area.

A range of methods, data and analytical techniques will need to be mustered to tackle these questions within a structural contingency framework. Crisp and clear measurements of the adoption of different types of innovation and antecedents across time and contexts will be needed. The examination of moderated and mediated relationships will require robust data that can withstand detailed investigation through interactions or regression-based moderation techniques (see Brewer et al. [2011] for an application in public management). If organisational learning mediates an organisation's response to a change in contingencies, then future studies

may need to use structural equation models to tease out the subtleties in these relationships. In short, research will need to summon a range of social science and analytical techniques to advance this research agenda.

CONCLUSIONS

This article has undertaken a critical review of the antecedents of innovation in local government, along with integrating the research findings. The search rubric uncovered 17 articles that were analysed by the support score technique, recording the proportion of statistically significant relationships in multiple regression models and thereby controlling for other variables (Boyne 2002; Rosenthal 1991). The main finding from this review is that internal antecedents matter more than their external counterparts, and that the internal determinants reviewed – organisational size and administrative capacity – are particularly important explanatory variables.

The findings of this review must be tempered by the limitations of the small size of the dataset and the geographical distribution of the examined studies. Notable here was that 12 of the 17 studies were located in the US, indicating a strong orientation towards studies conducted in the US. Thus, the artifacts of the structure, politics and varying organisational forms of local government – special purpose districts and small multiple purpose organisations – together with a tradition of non-professional management, may influence the findings.

The directions for future research as initially developed reaffirmed the importance of some key arguments from the literature, such as in relation to organisational size, while pointing towards likely variations in internal antecedents and different process innovation types. Theory and evidence, often from the management literature, has suggested that the capacity for innovation is likely to come through slack resources. However, administrative capacity is more

likely to be an important concept for public organisations. The importance of joint effects was highlighted as a way to further draw out important relationships and inconsistencies between antecedents, and arguments were made about the non-linear effects of the technical environment. Future research on the antecedents of innovation adoption in local governments can build on these propositions as long as the work is located within structural contingency frameworks that identify the potential relationships between variables and have the capacity to tease out causal relationships. Such frameworks should be tested across a range of innovation types (service, process and intra- and inter-organisational), differing sectors and localities and in studies designed to obviate or reduce concerns about causality and measurement bias.

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Table 1: Measurement of innovation, context, sample, analysis and antecedents in reviewed articles.

Study	Innovation	Context	Sample	Data source	Time	Analysis	Antecedents	
							Internal P	External P
Bingham, 1978	Y/N	US	310	Both	CS	r	X	X
Perry & Kraemer, 1978	Y/N	US	112	Survey	CS	β		X
Damanpour, 1987	Y/N	US	75	Survey	CS	r, β	X	
Brudney & Selden, 1995	Y/N	US	297	Survey	Lag	β	X	
Moon & Bretschneider, 2002	Perception	US	285	Survey	CS	β	X	
Boyne et al., 2005	A&U	UK	79	Both	Lag	r, β	X	X
Damanpour & Schneider, 2006	A&U	US	1276	Survey	CS	r, β	X	X
Walker, 2006	Perception	UK	120	Both	CS	r, β	X	X
Walker, 2008	Perception	UK	101	Both	Lag	β	X	X
Damanpour & Schneider, 2009	Y/N	US	725	Both	CS	r, β	X	X
Kwon et al., 2009	Y/N	US	233	Survey	Lag	β	X	X
Teodoro, 2009	Y/N	US	139	Survey	CS	β	X	
Bhatti et al. 2010	A&U	Demark	3931	Secondary	L	β	X	X
Fernández & Wise, 2010	A&U	US	532	Both	Lag	r, β	X	X
Hansen, 2010	A&U	Demark	585	Both	CS	r, β	X	X
Morgan, 2010	Y/N	US	217	Both	CS	β	X	X
Jun and Weare, 2010	Y/N	US	2110	Both	L	β	X	X

Note: Y/N = Dichotomous yes/no adoption, Perception = perception of innovativeness, A&U = measure of adoption and utilisation, L= longitudinal, Lag = lagged, CS = cross sectional, r= correlation and β = multiple regression.

Table 2: The influence of the size and slack on the adoption of process innovations

	Size				Slack			
	N	+	ns	-	N	+	ns	-
Bingham, 1978	4	75	25	0				
Damanpour, 1987	2	50	50	0	3	33	67	0
Brudney & Selden, 1995					2	0	100	0
Moon & Bretschneider, 2002	1	0	100	0				
Boyne et al., 2005	1	0	100	0				
Damanpour & Schneider, 2006	4	50	50	0				
Walker, 2006	4	25	75	0				
Walker, 2008	3	33	0	67	3	0	67	33
Damanpour & Schneider, 2009	1	100	0	0				
Teodorom 2009	4	100	0	0				
Bhatti et al. 2010	2	0	100	0				
Fernández & Wise, 2010	3	67	0	33	1	100	0	0
Hansen, 2010	5	80	20	0				
Jun and Weare, 2010	3	100	0	0				
Total number of tests	37				9			
Weighted support score %		62	30	8		22	67	11
Unweighted support score %		54	38	8		33	59	8

Table 3: The influence of administrative capacity on the adoption of process innovations

	N	+	ns	-
Damanpour, 1987	3	67	33	0
Moon & Bretschneider, 2002	3	100	0	0
Boyne et al., 2005	1	0	100	0
Kwon et al. 2010	1	0	100	0
Bhatti et al., 2010	1	100	0	0
Fernández & Wise, 2010	1	100	0	0
Jun and Weare, 2010	1	100	0	0
Morgan, 2010	2	0	100	0
Total number of tests	13			
Weighted support score %		62	38	0
Unweighted support score %		58	42	0

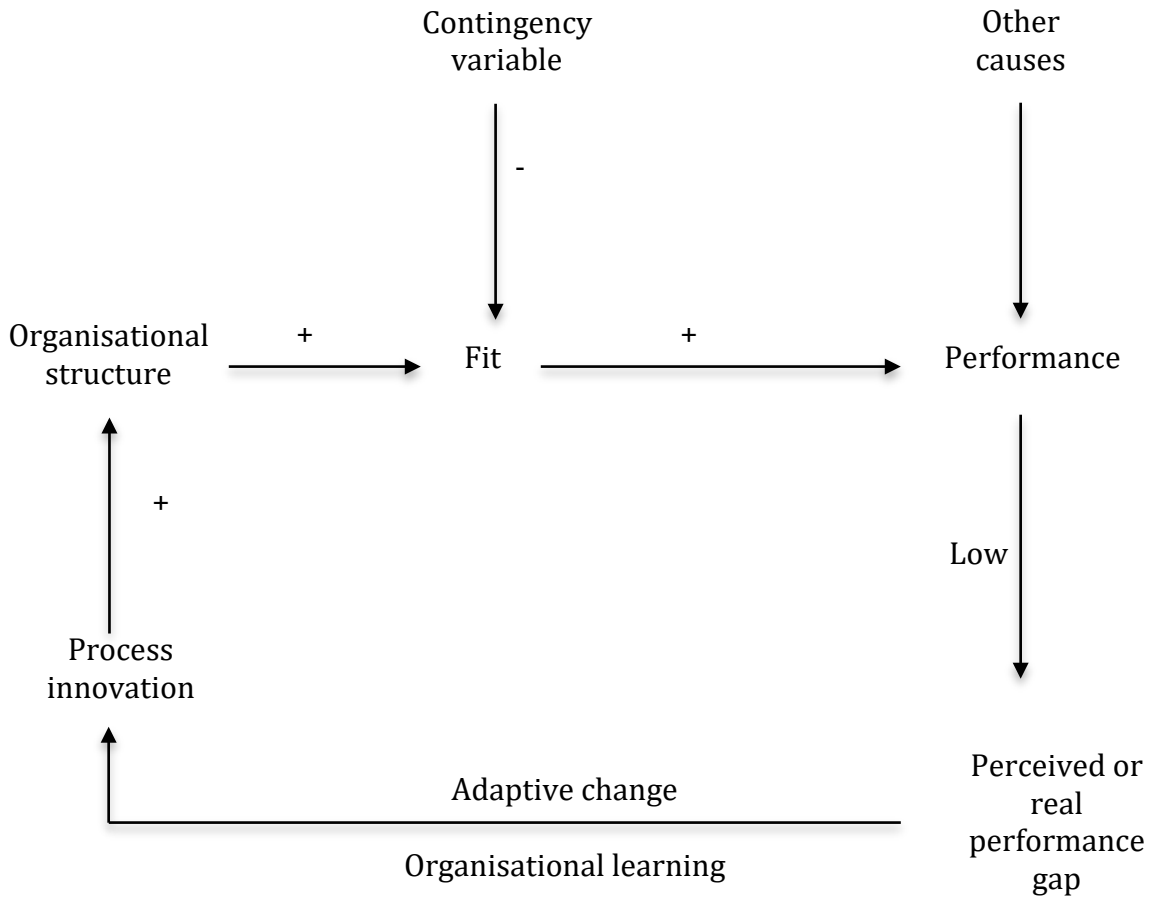
Table 4: The influence of organisational learning on the adoption of process innovations

	N	+	ns	-
Bingham, 1978	5	20	40	40
Damanpour, 1987	2	50	50	0
Brudney & Selden, 1995	2	50	50	0
Damanpour & Schneider, 2006	3	100	0	0
Walker, 2008	3	0	100	0
Teodoro, 2009	4	50	50	0
Total number of tests	23			
Weighted support score %		45	45	10
Unweighted support score %		48	45	7

Table 5: The influence of urbanisation, deprivation and wealth on the adoption of process innovations

	Urbanisation				Deprivation				Wealth			
	N	+	ns	-	N	+	ns	-	N	+	ns	-
Bingham, 1978					8	25	62	13				
Boyne et al., 2005	1	0	0	100	1	0	100	0				
Damanpour & Schneider, 2006	3	33	67	0	3	0	100	0	3	100	0	0
Walker, 2006					4	0	100	0				
Walker, 2008					4	50	50	0				
Damanpour & Schneider, 2009	1	0	100	0	1	0	100	0				
Kwon et al., 2009									3	0	100	0
Bhatti et al. 2010									1	100	0	0
Fernández & Wise, 2010												
Hansen, 2010	5	20	80	0	5	0	80	20	5	0	100	0
Morgan, 2010					2	0	100	0				
Jun and Weare, 2010					5	100	0	0	2	0	100	0
Total number of tests	10				32				14			
Weighted support score %		30	60	10		28	66	6		29	71	0
Unweighted support score %		38	37	25		21	75	4		40	60	0

Figure 1. Structural adaptation to regain fit through innovation



Adapted from Donaldson (2001)