THREE ESSAYS ON PUBLIC SECTOR INNOVATION

Mehmet Akif Demircioglu

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Doctoral Committee

Sergio Fernandez, Ph. D. (Chair)

Claudia N. Avellaneda, Ph.D.

Barry M. Rubin, Ph.D.

Lois R. Wise, Ph.D.

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Dedicated to the public employees around the world who are motivated to serve the public, and who have been proposing innovative solutions to both old and current complex problems.
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Doctoral studies are challenging for everyone. In general, doctoral education in the United States consists of three parts: course work, qualifying exams, and a dissertation. I should admit that I have greatly enjoyed writing my dissertation. This process has been the most enjoyable part of my education since elementary school. I have also enjoyed taking the many courses offered by SPEA, the Kelley Business School, and the departments of Political Science and Sociology. I have met wonderful people in each of these schools and departments. In particular, I am grateful for the opportunity to study at teach at the Indiana University School of Public and Environmental Affairs, a very high quality institution. It is not possible to thank all the individuals who helped me to achieve my goals, but I will acknowledge some of them below.

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This dissertation provides three different perspectives and research questions on the concept of public sector innovation. The first essay looks at innovation and innovation complexity as outcomes and testing the potential conditions for those outcomes. The second essay focuses on the origins of innovative ideas and how those origins impact employee job satisfaction. The third essay examines how the innovation climate within an organization can help retain employees directly as well as indirectly through the influence of climate on work-related attitudes such as job satisfaction and affective commitment.

Regarding theoretical frameworks and research designs, the first essay tests the framework of Sahni, Maxwell, and Christensen’s *Unleashing Breakthrough Innovation in Government* (2013) for describing and predicting conditions of innovation and innovation complexity. The second essay draws on theoretical insights from the Self-Determination Theory (SDT) framework to understand how the origins of innovation can influence job satisfaction. The third essay employs the Structural Equation Modeling technique to test a causal model of the impact of an innovation climate on work-related attitudes—job satisfaction and affective commitment—and turnover intention.

Overall, the results support that innovation itself, sources of innovation, and innovation climate matter. First, while intrinsic factors such as experimentation and motivation to make improvements positively affect innovation and innovation complexity, reducing budgets does not affect innovation. Second, the results partially support the Self Determination Theory (SDT) framework; if the source of innovation
enhances autonomy (e.g. innovative ideas coming from the employees’ work group), then employees tend to have higher job satisfaction resulting from the most significant innovation. However, if the sources of innovation undermine employees’ self-determination, employees’ job satisfaction does not change significantly. Finally, a positive innovation climate helps to reduce employee turnover intention and increases employee job satisfaction and affective commitment. The results show that the innovation itself, the sources of the innovation, and an innovation climate can contribute to organizational behavior via intrinsic factors, self-determination, lower turnover, higher satisfaction and commitment, and effective human resource management.
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Chapter 1: Introduction to Three Essays on Public Sector Innovation: The Australian Context

Introduction

Innovation in organizations is a means of survival, growth, performance, legitimacy, and stability (e.g. Burns & Stalker, 1961; Damanpour, Walker, & Avellaneda, 2009; Lawrence & Lorsch, 1969; Thompson, 1967; Verhoest, Verschuere, & Bouckaert, 2007), so innovation is crucial for all organizations, including public ones. Literature on innovation in the public sector has expanded since the late 1990s (Altshuler & Behn, 1997; Bekkers et al., 2011a; Damanpour, Walker, & Avellaneda, 2009; Fernandez & Pitts, 2011; Fernandez & Wise, 2010; Hartley, 2005; Osborne & Brown, 2005; Sørensen & Torfing, 2011; Walker, 2006, 2008), and it has particularly expanded since data sources such as the Community Innovation Surveys in Europe and the Australian Public Service Commission’s (APSC) State of the Employee surveys have become available to the public (Bloch & Bugge, 2013; Bugge & Bloch, 2016; Demircioglu, Audretsch, & Slaper, 2017; Torugsa & Arundel, 2016a, 2016b). However, due to limitations in the established theoretical frameworks for the study of public sector innovation and a lack of studies focusing on sources of innovation and innovation climate, many questions remain unexamined. In particular, (1) which factors may enable single and complex innovations in the public sector, (2) the impact of the source of innovations on job satisfaction, and (3) the outcomes of an innovation climate in the public sector. This dissertation aims to address all three of these questions.

Despite differences between public and private sector organizations in their structures and environments, public organizations adopt innovations relatively frequently
(Fernandez & Rainey, 2006; Rainey, 2009; Rainey & Steinbauer, 1999). In fact, many empirical studies have found that public organizations are as innovative as organizations in the private sector, and that they implement many types of innovations (Bloch & Bugge, 2013; Bugge & Bloch, 2016; Fernandez & Pitts, 2011, Walker, 2014; Wise, 1999). For instance, Leman (2002, 71) states that “Contrary to the stereotypes, public agencies have been remarkably innovative, and much of this innovation has come from those involved with direct government.” He gives examples from the national parks system, construction projects completed by the government, the US Census, IT usage in government organizations (particularly in the military), and the US Geological Survey, all of which have implemented many innovations.

Although many scholars use reform, organizational change, and innovation interchangeably as these terms have similar connotations of making or adopting something new (e.g. Fernandez & Wise, 2010; Pierce & Delbecq, 1977; Wise, 2009; Wise & Szuc, 1996), innovation refers to “something” new to an organization such as a policy, a management practice, an organizational process, or a method (Bartos, 2003; Borins, 2000; Demircioglu, 2017; Hartley, 2005; Pierce & Delbecq, 1977; Wettenhall, 1988). Damanpour, Walker, and Avellaneda (2009, 653) define “innovation” as something “new to the adopting organization.” These definitions of innovation are consistent with the idea of “ingested innovation” (Fernandez & Pitts, 2011; Fernandez & Wise, 2010).

While many public management reforms are innovations, such as the National Performance Review (NPR) and applying Total Quality Management (TQM) ideas to public organizations (Breul & Kamensky, 2008; Borins, 2000; Kamensky, 1996; Osborne
Gaebler, 1992; Osborne & Plastric 1997), not all reforms are innovations. For example, particular types of reforms have non-innovative patterns in the same context that repeat from time to time. Like organizational change, these types of reforms may simply revert to previous ideas (Wise, 2002). Likewise, many of the reorganizations in public organizations are not innovations (Durant, 2008). While reform implies an active agenda (Wise, 2002), organizational change may occur as a consequence of more passive forces and in response to management agents, such as changes in performance standards (Fernandez & Rainey, 2006).

In addition, public administration reforms and organizational changes by governments are typically political and ideological (Montgomery, 1967). However, innovations are typically instrumental (e.g. solving a management problem) and make primarily small changes such as “a new IT solution for joint login to public services, which enabled switching between services without new logins for each service; and self-service in the personnel and payroll system” (Bugge & Bloch, 2016, 286). This dissertation does not focus on particular reorganizations of the Australian government, or on major or minor reorganizations in particular agencies in Australia. The focus of this paper is on public sector innovation throughout the entire APS.

Regarding scope and density, reforms and organizational changes mostly focus on larger scope actions (e.g. solving problems for the entire public sector) (Pollitt and Bouckaert, 2004), such as creating the Department of Homeland Security to deal with terrorism (Wise, C., 2006), the government reorganization of federal agencies to increase performance (Durant, 2008), and the reorganization of supranational organizations like the European Commission to increase efficiency and effectiveness (Bauer, 2008; Kassim
et al., 2013). However, the scope of innovations are usually smaller, such as making small improvements in the APS or in European public organizations (Bloch & Bugge, 2013; Bugge & Bloch, 2016; Torugsa & Arundel, 2016a, 2016b).

Overall, although Becker and Whisler (1967) argue that innovation is an individual or a group action, organizations and nations can also innovate, as many organizations and countries have implemented innovations. For example, several scholars argue that public agencies and governments are innovative and need to be innovative due to complex and substantial long-term problems (e.g. aging populations and social security), financial constraints, and citizens’ expectations for the government (Albury, 2011; Bloch & Bugge, 2013; Bugge & Bloch, 2016). Likewise,

Organizations innovate because of pressure from the external environment, such as competition, deregulation, isomorphism, resource scarcity, and customer demands, or because of an internal organizational choice, such as gaining distinctive competencies, reaching a higher level of aspiration, and increasing the extent and quality of services. Either way, the adoption of innovation is intended to ensure adaptive behaviour, changing the organization to maintain or improve its performance (Damanpour, Walker, & Avellaneda, 2009, 653-654).

In this regard, many innovations occur at the organizational and national level, as well. The following section will discuss the uniqueness of public sector innovation in Australia by examining the perceived necessity of innovation, duration of the innovative
period, intensity of the innovative period, span and scope of innovation, and grassroots involvement in innovation.

**The Uniqueness of Australian Public Sector Innovation**

The climate for innovation in the Australian public service appears to be characterized by specific features that promote innovation and that may give Australia an advantage in its efforts to implement innovations. Scholars have remarked, for example, on the fact that Australians have long perceived innovation as a necessity for their survival, as will be further discussed in this section. This section also discusses the uniqueness of innovation and the innovation climate in the Australian public sector based on the following factors/categories: duration of the innovative period, intensity of the innovative period, span and scope of innovation, and grassroots involvement in spawning innovations.

**Perceived Necessity of Innovation**

Gregory (1993) explains that innovation is considered as a necessity due to historical and geographic reasons of Australia. Since the establishment of Australia, due to the small population compared to the very large size of the country as well as its location far from other major countries including the United States and European countries, it was difficult for the Australian private sector to compete with international companies. Likewise, the small population was supposed to produce the primary products and services, and the country was dependent on foreign technology. In this regard,
innovation is a relevant option for the Australian government, and innovation is mostly controlled and supported by the Australian government.

For example, after the end of the Second World War, the Australian government focused on economic development. One strategy that the government pursued was instead of financing research in private firms, it undertook research directly. Gregory (1993, 328) argues, “the tradition of ’colonial socialism,’ the satisfactory experience of war-time planning, and the lack of a technologically sophisticated private sector naturally led to the belief that government should take the lead.” One solution to increase innovation was for the Australian government to establish research centers, and these research centers could adopt and implement innovations while receiving incentives from the government. Even if colonial socialism in the Australia government has declined since the 1930s due to the private sectors’ development, the idea of the government as the central actor in the development of technology, investments, and innovation still persists (Newman & Michelsen, 1998). In addition to government efforts, McLean (2004) states that uncertainty and limited information about Australia’s economy and the growth of enterprises and living standards created incentives for individuals and firms to innovate.

Economic challenges caused the Australian government to implement the National Innovation System (Gregory, 1993). Therefore, the national innovation agenda in Australia is conceived of as offering solutions for economic problems and development and as taking the lead in improving the country. Indeed, literature and

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1 The colonial socialism of Australia refers to the central government’s "interventionist role" in the market to encourage private and mostly foreign firms. The main cause of this colonial socialism is that Australia’s lesser population density was unable to create comparative capital formation (Newman & Michelsen 1998). This involvement also leads the government to invest in research and technology, and thus indirectly in innovation.
government documents on innovation in Australia explain how these factors lead to productivity and growth (McLean, 2004). In the mid to late 1980s, Australia witnessed rapid job growth, particularly for part-time jobs (Gregory 1993), because of innovation efforts. Indeed, as seen in the Australian experience, innovation can be a crucial tool for increasing a country’s competitiveness and world standing. As the Minister for Innovation, Industry, Science and Research Senator Kim Carr wrote in the foreword of the government report Powering Ideas: An Innovation Agenda for the 21st Century, the Australian government has

a ten-year reform agenda to make Australia more productive and more competitive. Increasing our capacity to create new knowledge and find new ways of doing business is the key to building a modern economy based on advanced skills and technologies. It is the key success in this, the global economy. Innovation is not an abstraction. Nor is it an end itself. It is how we make a better Australia, and contribute to making a better world

(Australian Government, 2009, iii)

According to the State of the Service Report in Australia (2011a), over 30% of Australia's gross domestic product comes from the public sector, so public organizations are considered a crucial arena for innovation in Australia. Similarly, the Management Advisory Committee (2010) explains that innovation should be a priority for Australia because of policy challenges, changing expectations, global competition, fiscal pressures, and the need for effective public sector management and high-performance public
service. All of these points support the idea that necessity is the mother of innovation in the Australian context. Thus, the Australian government is a leading government in terms of its commitment to innovation and reform (Christensen et al., 2007; Løegreid & Christensen, 2013; Pollitt & Bouckaert, 2003).

**Duration of the Innovative Period**

Public management reforms and public sector innovation have been pursued very seriously in Australia since the 1980s, consistent with the New Public Management (NPM) reforms. Since the 1980s, the Australian Public Service (APS) has enacted major reforms and innovations, such as shifting attention from process to results as well as focusing on productivity and citizen satisfaction (Reith, 1996). A Government Agencies Review Group in Australia was established in 1990 “to stimulate major public sector reform…[focusing on] improving both public sector productivity and levels of service to the public; and fostering innovation in management-operational activities" (APSC, 2003, 50). Additionally, the Task Force on Management Improvement analyzed public management reforms and innovation in Australia in a report of over 600 pages. This report was unique in terms of its scope and scale in examining reforms and innovations (Boston, 2000).

Australian National Audit Office has also produced the following report, further confirming the need for innovations: *Innovation in the Public Sector: Enabling Better Performance, Driving New Directions* (Australian National Audit Office, 2009). Barzelay (2001, 81) states, “routines in the area of audit and evaluation were changed as a result of innovation within the Australian National Audit Office as well as the implementation of Program Management and Budgeting.”

*Towards a Best Practice Australian Public Service* (1996) is a report prepared by Peter Reith, the Minister for Industrial Relations and Minister Assisting the Prime Minister for the Public Service. He claimed in a discussion paper that the APS should be more innovative and adaptive: “[employees in the Australian public service] want the freedom to be more innovative, to manage risks effectively and to achieve and to be recognised for higher levels of performance. They want the process driven hierarchies to be replaced by more flexible working arrangements” (Reith, 1996, 3). In June 1996, the Minister Assisting the Prime Minister of Australia announced that the government was pursuing a new reform agenda with the following goal: "to make certain that workplace structures, systems and culture in the APS emphasize innovation and recognize creativity and commitment" (APSC, 2003, 48).

Particularly since the 2000s, the Australian government has emphasized innovation more than ever, and innovation has remained a major agenda in Australia despite different political parties (e.g. the Australian Labor Party and the Liberal Party of Australia) coming to power. *Ahead of the Game: Blueprint for Reform of Australian Government Administration* is another comprehensive reform agenda emphasizing innovation. It was introduced by the Department of Prime Ministers and Cabinet in 2010.
(Australian Government, 2010). The suggested reforms and innovations aimed to strengthen strategic direction, citizen engagement, and staff capability across the APS. Overall, all of these government documents focus on innovation, and especially on establishing a climate of innovation in the APS.

**Intensity of the Innovative Period**

Intensity is another main feature of public sector innovation in Australia. Halligan and Power (1992, 2) state that since the early 1980s, Australian public services “have experienced the most intensive period of change since the beginning of the [twentieth] century.” The Australian Federal government and government agencies, all the states in Australia, and local governments have pushed innovation intensively in Australia (ACELG, 2016; Audit Commission, 2007; Australian Government, 2009, 2010, 2011; Australian National Audit Office, 2009; APSC, 2011a, 2012c, 2013a). Overall, instead of permanent bureaucrats, Australians have started moving to “the greater control of policy and programs in the hands of the elected government,” which was considered both managerial and democratic (Aucoin, 2012, 178). These innovative changes—with their particular focus on leadership—have dramatically affected bureaucracy. In particular, senior leaders in APS have more power to initiate and encourage innovation in the APS (APSC, 2011a, 2012c, 2013a).

The intensity of innovation has surged since the 1980s, and political initiative and support are crucial for effective innovations in Australia (Halligan & Power, 1992). Political executives are the crucial actors pushing for innovations, as seen in the establishment of Centrelink, which is the main service delivery agency for the Australian
government (Wills & Halligan, 2008). Overall, the successful adoption of innovations by the Australian government show that political support is required for innovations (Wills & Halligan, 2008). Additionally, the number of political advisors has increased in Australia since the 1980s (Aucoin, 2012) and public managers, particularly departmental secretaries, have been granted power to manage and innovate their agencies. Moreover, as Albury (2011) states, creating the Department of Innovation, Industry, Science and Research in 2007 clearly shows the Australian government’s emphasis on public sector innovation and the intensity of innovation.

The intensity of the innovation period also derives from the efforts of organizational leaders. Major government reports emphasize the importance of organizational leadership for successful innovation in the APS (ANAO, 2009; Australian Government, 2009, 2010; APSC, 2011a, 2012c, 2013a; Public Sector Innovation, 2016). For example, a government report states that for an effective and innovative public sector, “senior leaders need to be highly skilled public sector managers who can decipher the political, economic and social contexts, anticipate future requirements, identify vision and objectives and lead change towards the vision and objectives” (APSC, 2011a). Another report published by the Australian government reveals that senior executives “must support innovation by fostering creativity, and ideas—a culture of risk aversion may prevail if innovation is not rewarded. Leaders must promote APS values, and support a culture of performance, openness and trust” (Australian Government, 2010, 21).

In addition, since the late 2000s, the APSC’s employee and agency surveys have aimed to measure innovative activities, including the intensity of innovation, innovation...
climate, and barriers to innovation (APSII, 2011; see also APSC, 2011a, 2011b, 2012a, 2013a, 2014, 2015). Thus, these surveys have important contributions for understanding innovation in the APS. Furthermore, Australian government agencies “are actively pursuing measures aimed at increasing innovation and establishing and maintaining an innovation culture—in other words, at doing innovation” (APSII, 2011, 16). Since 2010, the Australian states and territories have been developing innovation action plans, encouraging public sector innovation, organizing innovation workshops for public sector managers, preparing case studies for successful public sector innovation, and distributing innovation surveys (APSII, 2011; APSC, 2011a), demonstrating the intensity of this innovative period in Australia. Additionally, local governments have been developing an innovation culture, and they emphasize innovative activities and adoptions (APSII, 2011; Sharif, Troshani, & Davidson, 2015).

**Span and Scope of Innovation**

The span and scope of innovation in the Australian government also reveals the distinctiveness of public sector innovation in Australia. As mentioned earlier, the Australian government and Australian public agencies actively pursue and support innovation at the individual, organizational, and national levels. The main theme of reform and innovation in Australia since the 1980s has been to empower managers by employing a “letting the managers manage” model (Kettl, 2005). Parallel to NPM reforms, establishing a Senior Executive Service (SES)² in the 1984 Public Service

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² Establishing SES in the APS is an innovation because it is new to the APS although the United States already implemented similar kinds of reforms during the Carter administration in the late 1970s. See Lah and Perry (2008).
Reform Act increased the power of politicians and executives to make decisions, as well as to coordinate and implement innovations (Pollitt & Bouckaert, 2000). In fact, the Australian government considers organizational leadership a crucial enabler of innovation in the public services (Australian Government, 2009, 2010; APSC, 2011a). Results from employee surveys show that organizational leaders are very important source of innovation in the Australian government (APSC, 2011b). Agency leaders and supervisors are considered agents for innovation; supportive leadership is considered necessary for successful innovation and to increase performance (APSC, 2011a).

In terms of the federal government level, the Australian government focuses extensively on innovation at the federal level via experimentation in industry, science, technology, and government policies. O’Neill (1996) stated some time ago that international literature on public management reforms and public sector innovations ranks Australia very highly, and the OECD and other international organizations have acknowledged Australia’s reforms and innovations. Likewise, recent literature on innovation also acknowledges that Australia is a leading country in public sector innovations (e.g. Bankins et al., 2016; Fernandez & Pitts, 2011; Wills & Halligan, 2008). Additionally, the Australian government has adopted an innovation policy agenda at the national level (ACELG, 2016; Australian Government, 2009; Dodgson, Hughes, Foster, & Metcalfe, 2011; O’Neill, 1996), with local governments (Wettenhall, 1988), as well as at the level of agencies and individuals (APSC, 2011b). Regarding local governments, Wettenhall (1988, 352) states that the Australian government has embraced innovation and provided innovation awards to local governments since the 1970s: “Innovation in Australian local government has received recent official notice, both in the inauguration
of Innovation Awards by the Commonwealth’s Office of Local Government (OLG) and in the Report of the National Inquiry into Local Government Finance.”

At the organizational level, the Australian Management Advisory Committee assists public employees in developing innovations through sharing best practices, disseminating innovative ideas and approaches, identifying important sources of innovation, and providing guidance on strategic thinking and innovative behaviors to public sector employees and organizational managers (Australian Government, 2010; Management Advisory Committee, 2010). Similarly, the Australian National Audit Office (ANAO) (2009) aims to encourage innovations via providing guidelines that explain essential conditions for innovation, innovation process models, innovation implementation, and innovation evaluation. Additionally, the guidelines include information on administrative engagement, risk assessment, reviewing agencies’ innovativeness, and monitoring and reporting innovations (ANAO, 2009). Australia is particularly successful in the efficiency of its delivery of public and social services in terms of cost-saving and innovation (Peters, 2010). For instance, the public agency Centrelink emphasizes citizen services and innovative approaches (a one stop, multipurpose and flexible delivery agency providing government services on behalf of other agencies) for delivering those services (Halligan, 2007; Wills & Halligan, 2008).

Other aspects of public sector innovation in Australia come from the local government, in particular the Australian Centre of Excellence for Local Government (ACELG). ACELG provides many documents related to innovation in Australia’s local governments (e.g. adoption and applications, challenges, making the change, innovations in training, and social media), offers short courses (e.g. on service delivery), and provides
innovation awards (e.g. Innovation in Natural Resource Management, and Innovation in Water Supply and Wastewater) (ACELG, 2016).

**Grassroots**

Finally, innovation in the Australian government is not only a top-down but also a bottom-up process. For example, survey results show that employees in the lower ranks (e.g. APS 1-6) and members of the public are crucial sources for innovations in Australia (APSC, 2011a). Additionally, the Department of Industry, Innovation, and Science encourages public sector employees to generate ideas and assess their feasibility. Not only employees but also members of the public can submit their ideas to the “Innovation Development Early Assessment System” (IDEAS) to ascertain whether these ideas may lead to innovation. Moreover, to evaluate ideas, the Department has developed a model to assess the size of risk, to identify resources as well as risks, and to predict the likelihood of success/failure after implementing the innovative ideas (Public Sector Innovation, 2016).

Public sector employees and individuals working in other sectors are also encouraged to sign up for the Public Sector Innovation Network Group (PSIN), which was started in 2009 by the Management Advisory Committee. Via this network, employees can engage with and learn from other public employees about how innovation occurs in their agencies. The PSIN Coordination Group, which consists of public employees, meets monthly to discuss public sector innovation and innovation events. This group includes people from different departments and agencies, including the Department of Industry, Department of Communications, Department of Human
In terms of the employee and group level, the State of the Service Report of 2010-2011 is a formulation of recent plans, activities, and achievements in innovation (APSC, 2011b). Since 2009, the Australian government has been collecting employee and agency data to analyze innovation in public organizations. Results of the 2011 APSC data show that employees in the APS are crucial sources for innovation (APSC, 2011a). Since 2012, all public sector employees have been asked to fill out survey questions, and an important aim of the questions is to measure innovation and increase innovativeness in the Australian government (APSC, 2012a). Therefore, innovation is particularly worth studying in the Australian context because the Australian government prioritizes research on public sector innovation for the employee and group level.

Australian citizens also demand innovation from public services in Australia. For instance, a government report shows that Australian citizens are also pushing for innovation, as they expect a high quality of services and want to increase their involvement in the decisions of public agencies (Australian Government, 2010; see also
Wills & Halligan, 2008). Citizens are also crucial sources for innovation, as many employees indicate that citizens are important sources of new ideas and information (APSC, 2011a). In sum, public sector innovation in Australia exists at different levels and is motivated by multiple sources, including federal, state, and local governments, agency leaders, employees, and citizens.

**How Organizational Contextual Variables Can Affect Innovation in the Australian Public Service (APS)**

The previous section explained the uniqueness of public sector innovation in Australia and discussed when and why innovation in APS persists via focusing on the perceived necessity of innovation, duration of the innovative period, intensity of the innovative period, span and scope of innovation, and grassroots involvement in innovation. However, a crucial question remains. How does the organizational context affect innovations in the Australian public organizations? Thus, this section aims to analyze why certain public agencies may be more innovative than others within the APS. First, this section will briefly define context and explain the main reasons why context matters. Then, key organizational contextual variables (organizational size, locus, type of organization, and demographics) will be explained.

Context refers to situational factors, including “physical workplace conditions, broader social or normative environments [e.g. national culture]...industry, sector, or economy-wide characteristics, as well as other normative and institutional structures and regimes” (Bamberger, 2008, 840). Riggs (1980, 107) defines context as “something at the same level of analysis or abstraction as whatever may be ‘contextualized’” and argues
that policy makers should take the organizational environment into account in their analyses, considering that context is dynamic and subject to evolution. In particular, bureaucratic structures influence policy processes and organizational outputs—crucial concerns for practitioners—so bureaucratic structure and organizational context need to be analyzed (Egeberg, 2007).

Organizational context can substantially change or alter relationships between variables and affect organizational outcomes such as performance and decision-making (Aufrecht & Bun; Egeberg, 2007; O’Toole & Meier, 1999; Riggs, 1980). Organizational outcomes depend on structures and context such as environmental influences and agency leadership, which may affect organizational performance and effectiveness (O’Toole & Meier, 1999). As Pierce and Delbecq (1977, 34) claim, “structure and context cause innovation.” Likewise, organizational structures and contexts affect innovation and innovative behavior differently (Egeberg, 2007). Riggs (1980, 115) argues, “when we view public administration as an environed and contextualized open system—rather than as a closed and self-sufficient system—we will, I believe, secure a far more effective grasp of its important, interrelated problems.”

Overall, context can be external—which would include the political context (e.g. Federalism and concentration of power), the environmental context (e.g. complexity of the environment and munificence, or availability, of resources)—and internal, which would include organizational goals, centralization/hierarchy such as in a traditional Weberian bureaucracy, and professionalism (O’Toole & Meier, 2015). Riggs (1980) states that bureaucracies, extra-bureaucratic institutions, and the international context affect organizational outcomes. Organizational demography (e.g. gender, education,
length of service), organizational locus (working at the headquarters, or in the field), and institutionalization (norms and practices) are significant aspects of context (Egeberg, 2007; Wise, 1999; Wise & Szucs, 1996).

Employing ethnographic methods via gathering data from Chinese academics, bureaucrats, and citizens, and conducting interviews in China, Aufrecht and Bun (1995) have found that (1) traditional Chinese culture including Confucianism and personalism, (2) socialist values such as the Communist Party membership and cadres, and (3) development values such as size, economics, population, and density of cities all affect the adoption and success of civil service reforms in China. They argue that while these contextual variables may conflict with each other (e.g. merit-based civil service may conflict with socialist values) and one may become more dominant at certain times (due to the shifting of values and power), the combination of all of these contextual variables affects the types of reforms and innovations that succeed.

Taking into consideration the Australian context is crucial because as Bamberger (2008, 841) states, context theories “specify how surrounding phenomena or temporal conditions directly influence lower-level phenomena.” This dissertation concerns employee attitudes (a lower-level phenomena), which are influenced by the specific Australian context. For instance, bureaucratic structures such as organizational demography and location affect “substantive policy making” as well as organizational outcomes such as decision-making. “Substantive policy making,” according to Egeberg (2007, 119), is “the kind of policy making most bureaucrats are supposed to engage in most of the time.” The Australian government’s focus on innovation (e.g. establishing the Department of Innovation), organizational goals, and the effects of the New Public
Management (NPM) in Australia may affect innovation in the Australian Public Service (APS). Given that my dissertation focuses on the following variables with respect to innovation and innovation climate, the next section will define and describe each of the contextual variables relevant in Australia.

**Structural variables (Organizational context)**

*Organizational size*

Because larger organizations have more resources and more employees with different skills, expertise, specialization, and performance levels, many studies suggest that organizational size is positively related to innovation and reforms (Fernandez & Wise, 2010; Pierce & Delbecq, 1977; Wise, 1999; Wise & Szucs, 1996; Wynen et al., 2014). Discussing innovations in the public sector, Bugge and Bloch (2016) explain that larger organizations are more innovative than smaller organizations, and most public agencies are larger. Similarly, Nasi, Frosini, and Cristofoli (2011) have found that in Italy, because larger municipalities and organizations have a more complex, diverse, and higher resource capacity both in terms of personnel and budget, larger municipalities and organizations tend to be more innovative. More specifically, Bankins et al. (2016)'s qualitative study indicates that the size of an organization positively affects innovation in the Australian Public Service (APS). Likewise, analyses using quantitative data from the APSC state that size and innovation are correlated (Torugsa & Arundel, 2016b). The APSC (2011a) also acknowledges that size of agency affects innovations, as large agencies have a greater ability to introduce reward and recognition programs; however, smaller organizations are more dynamic, so smaller organizations can be very innovative.
Additionally, employees in smaller agencies are more likely to report innovation than employees working in larger agencies in the APS (APSC, 2011a). Thus, organizational size is one of the contextual factors affecting public sector innovation although there are conflicting findings whether smaller or larger organizations are more innovative.

*Locus (location)*

Organizational location affects innovation adoption in the public sector (Fernandez & Wise, 2010; Nasi, Frosini, Cristofoli, 2011; Wise, 1999; Wise & Szucs, 1996). In particular, organizational location is a crucial contextual variable affecting innovations in general (Wise, 1999) and particularly in the APS (Torugsa & Arundel, 2016a). Likewise, the location of the innovation’s source is a vital factor for determining the success of the innovation adoption and implementation, particularly in the APS (Moldogaziev & Resh, 2016). For example, organizational location affects many different types of innovations and reforms, such as personnel reform, cost of performing work, performance reporting, and employee empowerment (Moldogaziev & Resh, 2016). Larger and more central organizations tend to be more innovative due to the critical role of the location (e.g. access to knowledge and resources) (Nasi, Frosini, & Cristofoli, 2011) and employees in the national government are in some cases are more supportive of innovation and reforms than employees in the local government (Wise & Szucs, 1996). In other cases, agencies in the local or regional offices are more innovative (Bankins et al., 2016). For instance, one interviewee working at the APS from a case in Bankins et al (2016, 9) argues, “It’s easier for us [employees in the regional office] to pilot new things because we are out of their eyes and I say to people here ‘just do it’. Like what’s the
consequence? Unless it’s illegal or immoral, just do it.” Finally, the APSC (2011a) recognizes that employee location is important for accessing resources, which will affect innovations. Thus, different locations affect innovation differently.

Types of organizations

Different types of organizations have different effects on innovation (Fernandez & Wise, 2010; Løegreid et al., 2011; Vigoda-Gadot, 2009; Wise & Szucs, 1996; Wynen et al., 2014). In particular, while ministerial departments have more contact with the political leadership of the government, employees working in the central agencies tend to have less interaction with political leadership and parliament (Egeberg, 2007), so types of organizations may have different innovation outcomes. Additionally, independent agencies are different from central agencies and ministerial departments in the sense that their executive and advisory boards have representatives from different interest groups (e.g. users, employees, and clients), political parties, and independent specialists (Egeberg, 2007). Analyzing innovation in American companies, Demircioglu, Audretsch, and Slaper (2017) have found that type of organization and innovation adoption are highly correlated; for example, organizations dealing with information technology are more innovative than other organizations. Through in-depth case analyses of the three APS agencies, Bankins et al. (2016) have found that type of organization matters hugely for public sector innovation, including in regards to the innovation process and innovation adoption. These findings show that different types of organizations and agencies influence innovation outcomes differently.
Demographics

Gender, education, and length of service are important demographic variables for organizations (Egeberg, 2007). Demographic factors such as education, experience, and tenure are highly correlated with innovation (Damanpour, 1991). Wise and Szucs (1996) summarize studies on gender in Sweden and have found that, on average, women tend to see innovation and reforms as being to their disadvantage more so than men. In particular, length of service is a crucial factor because compared to other demographic variables, “only length of service can, in a strict sense, qualify as a real organizational factor among the demographic variables mentioned” (Egeberg, 2007). On the one hand, tenure has a negative effect on innovation as more experienced employees and leaders tend to become more conservative and risk-averse (Fernandez & Wise, 2010). On the other hand, more experienced employees are more familiar with issues and processes for implementing innovations (Torugsa & Arundel, 2016a, 2016b). Thus, demographic variables are crucial factors affecting innovation although there are contradictory results as to how demographic factors affect innovation.

Affective variables (Mediators)

As mentioned in the earlier sections, the Australian government and particularly the APS is very active in terms of adopting innovations. Australia has created a workplace environment that positively enhances two major mediating variables, job satisfaction and affective commitment. The state of the innovation climate provides information about whether established processes exist for evaluating ideas, if there are resources for innovation, if agency leaders support innovation, and the degree of
innovative behavior of individuals (APSC, 2012a). Australia’s 2011 State of the Service Report defines innovation climate as “the opportunity to be innovative, understanding the processes supporting innovation, the leadership climate, and the individual’s contribution to workplace innovation” (APSC, 2011a, 214). An innovation climate is crucial for organizations, as it increases organizational efficiency and effectiveness (Wynen et al., 2014), and it is necessary for successful innovations and reforms in Australia (McTaggart & O’Flynn, 2015). Guerin (1987, 207) argues,

The most fundamental investments we can make, however, are in our people and in creation of a climate which is supportive of enterprise and innovation. Once that climate is established, every routine review, every question of internal organisation will become an opportunity to get the right things right.

With the theoretical insights from perceived organizational support, employee engagement, participative management, and employee empowerment, innovation climate can increase employees’ job satisfaction in different settings (Harter, Schmidt, & Hayes, 2002; Rhoades, Eisenberger, & Armeli, 2001; Kearney & Hays, 1994; Spreitzer, Kizilos, & Nason, 1997). Likewise, research has found that innovation climate can also increase employees’ organizational commitment (Cantwell, 2010; Holliman, 2013; Johnson & McIntye, 1998; Spreitzer, Kizilos, & Nason, 1997). The third essay of the dissertation provides more information about how innovation climate affects job satisfaction and affective commitment.
What Matters For This Dissertation (Key Concerns of This Dissertation)

Considering the power, authority, size, and budget of public organizations—and the NPM tenant that public organizations should do more with less—we need more research on innovation in public organizations. Despite the Australian government’s agenda of innovation, efforts, and freely available data, there are still few studies on innovation in the public sector in general and in the Australian public service in particular. Therefore, we need more systematic studies on public sector innovation in the Australian context. Based on the uniqueness of the Australian case and the existing findings on the key contextual variables of this study, I anticipate that certain variables are more important to examine than others. The following describe the topics that are the focus of this dissertation:

First essay: Innovation and Innovation Complexity

Analyzing innovation is crucial because public sector innovation can increase the efficiency, effectiveness, performance, and legitimacy of public organizations (Damanpour, Walker, & Avellaneda, 2009; Hartley, 2005; Osborne & Brown, 2013; Verhoest, Verschuere, & Bouckaert, 2007). In addition to single innovations, because today’s socio-economic problems are becoming more complex and diverse as well as increasing citizens’ expectations of the government, implementing more complex innovations is necessary for public sector organizations (Bugge & Bloch, 2016; Torugsa & Arundel, 2016a). For example, Torugsa and Arundel (2016a, 411) state, “Due to their high value, the ability to develop and implement complex innovations should be an
important goal for both policy and for public sector managers.” Thus, innovation and innovation complexity are important variables that need to be studied. Therefore, using a framework developed by Sahni, Maxwell, & Christensen (2013), the first essay of the dissertation tests how the following five conditions affect innovation and innovation complexity: experimentation, responding to low performers, feedback, motivation to make improvements, and budget constraints.

**Second essay: Sources of Innovation**

The second important variable is sources of innovation. Sources of innovation refers to the actors providing knowledge or innovative ideas for innovations. Major sources for innovative activities in the APS are the Australian government, agencies’ senior leadership, members of employees’ work groups, industry stakeholders, and the members of the public (APSC, 2011a, 2011b). Different sources of innovations are necessary for successful innovations (Moldogaziev & Resh, 2016). However, as Demircioglu, Audretsch, and Slaper (2017, 3) argue, “despite its central importance, there is only a paucity of studies actually attempting to uncover what exactly are the most important sources of innovation as well as their impacts on overall innovative activity and the various dimensions and manifestations of innovation.” Although several studies discuss sources of innovation and its organizational outcomes (Arundel, 2001; Arundel & Geuna, 2004; Bloch & Bugge, 2013; Borins, 2001; Hüsig & Mann, 2010), the effects of sources of innovation on employee attitudes are not well-known. Because employees are the main assets of public organizations (Demircioglu, 2017; Rainey, 2009; Wilson, 2000), it is crucial for organizations’ employees to have positive attitudes, such as higher
job satisfaction. However, different sources of innovation affect employees’ job satisfaction differently. Thus, using insights from the self-determination theory, the second essay explores how different sources of innovation affect employees’ job satisfaction differently.

**Third essay: Innovation Climate**

The third essay’s focus is on innovation climate. To adopt and implement innovation, an innovation climate is a crucial factor. Because employee turnover has financial costs as well as other problems (e.g. training new employees), the Australian government considers turnover one of the biggest problems in the APS (Australian Government, 2010; APSC, 2011a, 2012c; 2014a). In this regard, creating an innovation climate can be a solution for reducing turnover in the APS, as the former can increase employee job satisfaction and affective commitment. Additionally, almost all organizations, including public sector organizations, emphasize increasing employees’ job satisfaction and commitment (Fernandez & Moldogaziev, 2015; Judge & Klinger, 2008; Lindorff, 2011; Peters & Waterman, 1982; Wilson, 2000). Because more satisfied and committed employees tend to stay in their organization rather than leave for other organizations (Bright, 2008; Kim & Fernandez, 2016; Meyer, Becker, & Vandenberghe, 2004; Meyer et al., 2002; Pitts, Marvel, & Fernandez, 2011; Vroom, 1994), an innovation climate can both directly and indirectly reduce employees’ turnover intention. Thus, the third essay explores how innovation climate has different effects on main mediators (job satisfaction and affective commitment) and (eventually) employees’ turnover intention.
Conclusion

This introductory chapter has explained and discussed the context for this dissertation’s research: the Australian Public Service (APS). The unique contribution of this introductory chapter to the innovation literature is systematically exploring and discussing the uniqueness of public sector innovation in Australia. To understand what, how, when, and why innovation persists in the APS (the context for this dissertation’s three essays), this section has offered the following five dimensions for exploring innovation: (1) Australia’s perception of innovation as a necessity, (2) duration of innovative period, (3) intensity of innovations, (4) span and scope of innovations, and (5) grassroots involvement in spawning innovations. Australia has been carefully and intentionally chosen as the context for this dissertation’s research on public sector innovation, as all layers of government in Australia emphasize innovation and the APSC prepares many questions on innovation to measure innovative activities (e.g. complexity, sources, and climate of innovations) for their annual surveys/census.

For example, at the national level of analysis, Australia is one of the few countries to include “innovation” in the name of a government department. Regarding the organizational level of analysis, agencies in Australia are asked to be innovative, and agency heads are granted power to implement innovations in their agencies. Finally, in terms of a group and individual level of analysis, employees in the Australian public service are encouraged to be innovative. Thus, the Australian government emphasizes innovative features such as innovation, complexity of innovation, sources of innovation, and climate of innovation. Overall, Australia is very active in innovation compared to other countries, as there is an established culture for innovation in the Australian...
government. For instance, the Australian government and government agencies organize an innovation month, hold conferences and lectures on innovation, and distribute awards for innovative individuals and public organizations (Albury, 2011).

Finally, in terms of the modeling approaches, the first essay uses logit and negative binomial regression models respectively because the first dependent variable is binary (whether there is an innovation or not) and the second dependent variable—innovation complexity—represents the number of dimensions influenced by this particular innovation. The second essay implements ordinary least square (OLS) and ordinal logit model regressions. Finally, the last essay uses the generalized structural equation model (GSEM) to understand the direct effects of an innovation climate and the indirect effects of job satisfaction and affective commitment on turnover intention. All three essays use quantitative models, and the level of analysis is at the individual level.

The following sections will introduce three different essays on public sector innovation using the Australian Public Service Commission data. How and what conditions enable public organizations to implement single and complex innovations are the first essay’s research questions. How and what sources of innovation affect employees’ job satisfaction are the second essay’s research questions. Finally, how an innovation climate affects employee turnover is the third essay’s research question. This dissertation ends with a brief summary, limitations, and a discussion of future directions for this research.
The Contribution of Each Essays

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Table: Dissertation Plan
Chapter 2: 1st Essay

Conditions for Innovation and Innovation Complexity in Public Sector Organizations

Abstract

Public sector innovation is an enduring topic for government organizations all over the world. However, research on public sector innovation is still limited. This paper tests the effects of conditions for single and complex innovations on public sector employees using the 2012 Australian Public Service Commission data (n=21,093). This is one of the first studies to systematically investigate what affects innovation complexity in the public sector. Results show that experimentation, responding to low-performers, the existence of feedback loops, and motivation to make improvements positively affect innovation and innovation complexity. In contrast, while budget constraints tend to increase complex innovations, they do not have a statistically significant effect on single innovation. Results suggest that intrinsic factors such as experimentation and motivation to improve performance are crucial for achieving public sector innovation.

Key Words: public sector innovation, innovation complexity, conditions for innovation, Australian public service
Introduction

Public sector innovation has become a popular topic over the last few decades. As a field of study, innovation in the public sector often focuses on the management of organizations. For instance, innovation in the public sector can increase efficiency, improve the quality of government services, create public value, improve performance, and increase the legitimacy of public organizations (see Bernier & Hafsi, 2007, Brown & Osborne, 2012; Damanpour, Walker, & Avellaneda, 2009; Hartley, 2005; Osborne, 2013; Osborne & Brown, 2013; Verhoest, Verschuere, & Bouckaert, 2007), so innovation in the public sector is crucial from an organizational standpoint.

In addition, innovation is also related to the role the public sector plays in socio-economic-technical transitions and grand challenges (e.g. the role of the government role in facing social and organizational problems); innovation—and, in particular, developing complex innovations—in government and public organizations can be a remedy for complex challenges and problems (Geels, 2002; Geels & Schot, 2007; Tumheim & Geels, 2013; Kuhlmann & Rips, 2014). Likewise, innovation in the public sector may constitute an important driver of increased innovation in the private and nonprofit sectors and for users of public services. For example, many studies show that the public procurement of innovation is an important driver of innovation both within and beyond the limits of the public sector (Aschhoff & Sofka, 2009; Edler & Georghiou, 2007; Edler & Yeow, 2016; Edquist & Hommen, 2000; Edquist & Zabala-Iturriagagoitiaa, 2012; Rolfstam, 2009; Rolfstam, Philips, & Bakker, 2011), a role which is particularly relevant for understanding or developing complex innovations.
Therefore, thanks to the importance, size, budgets, power, and legitimacy of public organizations—and the increasing importance of the public sector in solving the grand challenges of our time—the study of public sector innovation matters greatly. For instance, a small innovation in the public sector may yield large improvements (such as large savings) in the public sector and may have positive spillover effects on private and nonprofit organizations and society. Using data from a large-scale census of the Australian public service sector, this study tests whether a new framework (the five conditions for innovation) leads to innovation and innovation complexity.

In addition, this paper aims to analyze the concept of innovation complexity. Although most innovations deal with the complex dynamics of innovation processes, systems, actors, and outcomes (Torugsa & Arundel, 2016), we have limited knowledge about which factors most affect both single and complex innovations. For instance, analyzing over 1,500 qualitative examples of public sector innovations, Bugge and Bloch (2016) have found that about one in four innovations include multiple types of innovation (e.g. complex or systemic innovations), and many innovations are bricolage (e.g. ad hoc, small, or simple) innovations. They suggest that both bricolage and complex innovations are necessary parts of public sector innovation, and that we need more research on both types of innovations.

Moreover, this study also aims to contribute to the task of measuring innovation. For the last several years, there has been growing (though still limited) interest in measuring the adoption of innovations in the public sector using surveys (Arundel, Casali, & Hollanders, 2015; Audit Commission, 2007; Arundel & Huber, 2013; Bloch & Bugge, 2013; European Commission, 2011; Hughes, Moore, & Kataria, 2011; Kattel et
al., 2013; Torugsa & Arundel, 2015, 2016), as well as qualitative methods such as interviews and case studies (e.g. Bugge & Bloch, 2016; Ferlie, Fitzgerald, & Wood, 2000; Ferlie et al., 2005). Using data from the 2012 Australian Public Service Commission (APSC), this paper also contributes to this literature via measuring conditions of innovations as well as single (ad hoc) and complex (breakthrough) innovations, with a focus on the workgroup level. The workgroup in the Australian Public Service includes both middle managers and front-line employees with different ranks (e.g. Australian Public Service [APS] 1-6 and Executive Level [EL] 1-2). Torugsa and Arundel (2016, 394) state that an important advantage of APSC is their focus on “innovation at the workgroup level and [the survey] obtains perspectives of individuals at levels within the government bureaucracy…surveying innovation activities at the workgroup level can provide high-quality information on a diversity of innovation activities.”

The following section provides a brief introduction to the concepts of innovation and innovation complexity. The second section reviews the existing literature regarding the potential conditions for innovation and develops hypotheses based on the conditions for innovation and innovation complexity. The third section provides information about the methods and data used in this paper. The fourth section reveals the results. The paper concludes with a discussion of the results, implications, and limitations of this study.

**Innovation and Innovation Complexity**

There is no clear definition of innovation, as the field of innovation is very extensive and ambiguous. The terms change, innovation, invention, creative behavior,
and adaptation are somewhat vague and have been used interchangeably (Pierce & Delbecq, 1997). Overall, innovation can be considered an existing idea adopted by an organization (Damanpour, 1991, 2002; Laegreid et al., 2011; Wynen et al., 2014). An innovation can be single, complex, or both. While single innovation refers to any types of innovation, which may not incorporate multiple dimensions of innovation, complex innovation refers to innovations that demonstrate multidimensionality, or a number of different types of innovation (Torugsa & Arundel, 2016).

The different dimensions of an innovation make up the degree of an innovation’s complexity (Torugsa & Arundel, 2016). Goffin and Mitchell (2010) argue that innovation and managing innovation are complex and multifaceted; innovation networks, forces in the external environment, new technologies, organizational contexts, innovation sources, and the changing needs of clients all affect the degree of complexity. Examining eight case studies with longitudinal analyses of innovations, Ferlie et al. (2005) have found that innovations are typically complex and nonlinear. Applying innovation dimensions and types to the study of health service innovation, Windrum and Goni (2008) likewise discovered that the innovation process is very complex, as it involves competition and novelty, is embedded within institutions, and involves many different actors and users. Accordingly, “almost all sources of complexity are relevant, and one must explicitly consider the multiple dimensions and the complex co-evolutionary dynamics” (Windrum & Goni, 2008, 668). Thus, the study of the innovation process and innovations is becoming more complex.

Both single (ad hoc, bricolage, or simple) and complex innovations are necessary for the public sector (Bugge & Bloch, 2016). For instance, single innovations can solve
the simple and straightforward problems of organizations and the organizational process. On the other hand, today’s socio-economic problems are becoming more complex; citizens and stakeholders expect different outputs and outcomes from the public services, and these factors often require more complex innovations. In this regard, developing complex innovations is becoming a goal for public organizations because the increasing and diverse objectives and outcomes of public sector services are “offering high-quality services to citizens,” “offering efficient services to the private sector,” “boosting innovation in the private sector,” “ensuring public values such as democracy, trust and safety,” and “the need for the public sector to address new societal challenges” (Bugge & Bloch, 2016, 282). Likewise, Torugsa and Arundel (2016, 411) argue, “Due to their high value, the ability to develop and implement complex innovations should be an important goal for both policy and for public sector managers.” Therefore, we argue that developing complex innovations should be a goal for organizations; analyzing the factors contributing to complex innovation is an important question.

In sum, the complexity of a public sector innovation refers to the number of dimensions affected by a single innovation. For instance, if an innovation improves services, the organizational process, and employee policy thinking, the innovation is a complex one. Because innovations and innovative behaviors are complex, using one binary survey item (innovation or no innovation) may not capture the complexity of the most significant innovations. Therefore, building on work on innovation complexity by Torugsa and Arundel (2016)3, this study tests whether those five factors are also related

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3 Both this study and Torugsa and Arundel (2016)’s paper use the concept of innovation complexity, which is “the number of dimensions of the ‘most significant innovation’ implemented by each public employees’ workgroup as a proxy for innovation complexity” (Torugsa & Arundel, 2016, 392). Torugsa and Arundel’s study uses the APSC’s 2011 State of the
to innovation complexity. In fact, this is one of the first studies to systematically investigate what conditions affect innovation complexity in the public sector. The following section will introduce this paper’s hypotheses.

**Conditions for Innovation and Innovation Complexity**

This paper’s framework of the five potential conditions for innovation is adopted from Sahni, Maxwell, & Christensen's Unleashing Breakthrough Innovation in Government (2013). Accordingly, this paper tests how the following five conditions for innovation affect a single (or ad hoc) innovation and complex (or breakthrough) innovations: experimentation, responding to low-performers, the existence of feedback loops, motivation to make improvements, and budget constraints.

This framework has been chosen for at least two reasons. First, there are not many established theoretical frameworks for testing which factors in the public sector lead to successful innovations, and particularly to complex innovations. Second and more importantly, in analyzing markets in which innovations and particularly breakthrough innovations have been successful, Sahni et al. (2013) looked at management theories and potential market failures in economic theory and applied those factors to the study of public sector innovation. This framework has a bottom-up approach, and this framework

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Service (SOS) survey (n=4,369); this study uses the APSC’s 2012 SOS census (n=21,093). Additionally, while this paper’s outcome variables are single and complex innovations, Torugsa and Arundel (2016)’s outcome variables are innovation complexity and outcome variety (a summated scale of how the most significant innovations affect cost, procedures, quality, user satisfaction, job satisfaction, workplace, and cross-agency collaboration). Thus, these two papers have two different research questions. Moreover, while this study tests Sahni et al.’s (2013) five conditions, Torugsa and Arundel’s paper tests the effects of barrier breadth, search breadth, and individual and team creativity. Thus, this study differs from Torugsa and Arundel (2016) in several ways.
can be adapted to both the individual and group level of analysis. Overall, this framework is systematically analyzed, theoretically supported, and empirically grounded for practical research on public sector innovation. Sahni et al. (2013) state that this framework is supported by contributions from research groups at the Harvard Kennedy School, the Harvard Business School, many municipalities, and the White House Office of Science and Technology Policy. They have surveyed hundreds of people in government, interviewed public sector innovators, and collaborated with many academics in the United States.

Sahni et al. (2013) state that public sector innovation is affected by the following five conditions: (1) experimentation, (2) ability to sunset outdated infrastructure, (3) existence of feedback loops, (4) motivation to improve performance, and (5) existence of budget constraints. Originally, their second concept is named as the “ability to sunset outdated infrastructure.” Here, this concept is modified to measure “responding to low performers” (i.e. elimination of poor performers), as both concepts refer to similar actions—the elimination/improvement of poor job practices and performances and the elimination/improvement of poor performers. According to Sahni et al. (2013), the achievement of public sector innovations—particularly complex ones—depends on whether most (if not all) of these five conditions are met by public organizations. This section will discuss how these conditions can affect innovation and innovation complexity.

Employees prefer to feel that they have control over their actions, such that they want to have a choice of how they do their work (Deci & Ryan, 1985; Ryan & Deci, 2000). Intrinsic motivation, according to Ryan & Deci (2000), is “doing of an activity for
its inherent satisfactions rather than for some separable consequence” (Ryan & Deci, 2000, 56). Providing choices and opportunities for experiments enhances intrinsic motivation and satisfaction because they can increase employees' autonomy, competence, and relatedness (Zuckerman, Porac, Lathin, Smith, & Deci, 1978). Borins (2001, 34) states that “The process of innovation often proceeds by trial and error. Organizations undertake experiments, put in place a process for evaluating the results, and, depending on those results, expand, modify, or scrap the innovation.” Thus, when employees are given opportunities and are able to experiment, employees can enjoy their work and increase their capability, knowledge, and experience; thus, they are more likely to make both single and complex innovations.

Albury (2011, 233) argues that public organizations innovate thanks to “encouraged experimentation” and state that “allowing space for innovation and adaptation, openness and deregulation are all absolutely key to whether innovation happens and whether it spreads.” Space, openness, and deregulation are key components that allow public sector employees to experiment and innovate. Likewise, Sahni et al. (2013, 29) state, “Without the ability to develop experimental infrastructure, fundamentally new and different approaches rarely emerge.” The Australian government encourages trials, so employees are able to make experiments related to their jobs. For instance, the APSC states that the “government can encourage greater experimentation and innovation in program implementation and service delivery where one solution is unlikely to successfully address the whole problem” (APSC, 2003, 162). More experimentation can lead to both single and complex innovations.
Innovations are influenced by individual motivation, organizational culture, and the magnitude of the challenge for employees. The magnitude of challenge is relevant to employees who take risks, experiment, and innovate (Glor, 2001). According to Marfleet (2008, 153), employees tend to work best in organizations that “encourage creativity and experimentation.” Dawson and Denford (2015) argue that government agency leaders and organizations should encourage experimentation because doing so will increase innovative behavior and innovations. Therefore, when employees are able to experiment, they feel more motivated to work, and they can create both single and complex innovations. Likewise, when employees are given a choice of how to do their work, they can improve their skills and are able to make more complex innovations. This leads to the following hypotheses:

H1a. Experimentation will be positively related to single (ad hoc) innovation.
H1a. Experimentation will be positively related to complex innovation.

Although both agencies and supervisors encourage innovation and even give rewards to employees who are more innovative, there could always be employees who perform poorly and do not innovate. If employees perform poorly but are not dealt with by the agency itself or by supervisors, these underperforming employees may negatively affect other employees who are performing well. In this regard, managers can provide incentives or directions for underperformers to improve. Several studies have found that turnover of low performers can be beneficial for organizations and other employees because doing so increases regular or high performing employees’ job satisfaction.
(Futrell & Parasuraman, 1984; Keller, 1984; Spencer & Steers, 1981). LePine and Dyne (2001) explain that if employees have low ability and experience, the organization can help them through training. If, however, employees have low conscientiousness, the organization can deal with those employees via motivating low-experienced employees and via rejecting (e.g. firing) high-experienced employees. Thus, based on the situation, organizations and supervisors can respond to low performance differently, which affects both single and complex innovations.

If all employees are treated the same regardless of their performance, then there will be no motivation and support for those employees whose performances are outstanding, and high performers will not feel that they are being treated justly. If supervisors and agencies can improve underperforming employees (e.g. via incentives or pressure), other employees will feel that they should do their job well. Indeed, Verhoest, Verschuere, and Bouckaert (2007) argue, “pressure is needed…Pressure can be created internally in the public sector by means of harsh performance standards…Sanctions and rewards function as drivers for performance and, as a condition for performance, for innovation” (Verhoest, Verschuere, & Bouckaert, 2007, 471). Finally, the Australian Public Service Commission’s report argues that “Innovation is generally seen in light of the introduction of new ideas or processes; however, an important corollary is that innovation [single and complex innovations] can also take the form of removing old or redundant processes” (APSC, 2011, 237). Thus, the following hypotheses:

H2a. Responding to low performers will be positively related to single innovation.
H2b. Responding to low performers will be positively related to complex innovation.

Because organizations and organizational managers emphasize employee development and managers are accountable to different stakeholders, organizations and managers are expected to provide feedback to employees (Steelman, Levy, & Snell, 2004). Feedback tends to positively affect organizational outcomes such as employee performance (Higgins, Hartley, & Skelton, 2002; Kluger & DeNisi, 1996). According to Weibel and Six (2013), if feedback supports an individual's self-development (e.g. learning) and increases an employee’s self-esteem, then it will positively affect the individual’s motivation and performance. Specifically, constructive feedback enables intrinsic motivation (Deci, 1971; Harackiewicz, 1979; Ryan & Deci 2000), increases the need for competence (Six, 2013; Weibel, 2007), and thus results in higher performance and innovation. Without clear feedback, public managers cannot make good decisions regarding work such as “when to focus on improving service versus reducing costs” (Sahni et al., 2013, 29).

When constructive feedback does not undermine employees’ autonomy, it will enhance internalization of actions and employees' self-determination. A meta-analysis shows that feedback-seeking behavior is positively and strongly related to job satisfaction, proactive relationships, networking, and socialization (Anseel et al., 2015). Ryan and Deci (2000) claim that “offering optimal challenges and effectance-relevant feedback facilitate internalization” (Ryan & Deci 2000, 64), which will encourage employee efforts to be more innovative and to improve their learning and development.
Receiving feedback on their performance will also increase employee capability and relatedness, which are positively correlated with innovation. Therefore, since feedback mechanisms will enhance employees’ competence, autonomy, and relatedness, it will also tend to increase employees' innovativeness. In this regard, employees who receive feedback can create both single and complex innovations. This leads to the third hypotheses:

H3a. Feedback will be positively related to single innovation.
H3b. Feedback will be positively related to complex innovation.

For a high-technology firm, producing a large number of innovations and innovative products may increase employees’ motivation to improve performance, yet selling these products and making profits may motivate shareholders (Makri, Jane, & Gomez-Mejia, 2006). Additionally, for any types of organization, trust (i.e. institutional trust, such as trust in the organization’s objectives and strategy, and trust among employees and coworkers such as vertical and lateral trust) can increase employees’ motivation to achieve organizational objectives and employees’ innovativeness (Ellonen, Blomqvist, & Puimalainen, 2008). In this regard, organizational members will be more innovative if organizations motivate employees to improve organizational performance by creating motivation to improve performance and establishing trust, so that employees can create new and complex ideas that they “developed internally” or “discovered externally” (Makri, Jane, & Gomez-Mejia, 2006, 1061). While motivation to improve performance in the private sector comes from the desire to reach more customers and
increase profits (Christensen, Anthony, & Roth, 2004), motivation to improve performance in the public sector comes from other factors. For instance, Wise's (1999) findings on public sector managers who are interested in innovation and reforms found internal, non-monetary, and employee-focused factors.

If a plan for an organization matches with desired outcomes (e.g. innovation in the APS), agencies and organizational leaders motivate employees to help achieve the organization’s objectives and inspire employees to be more innovative. Indeed, public managers in the Australian public service are expected to encourage innovation and creativity, and it is expected that organizations motivate employees to make improvements and inspire them to do their best in their job (APSC, 2011). Likewise, to explain how the motivation to improve performance will increase innovation, Denhardt et al. (2009) suggest that “although managers can bring about some changes ‘from the top’; in the long run many more innovations probably occur if those throughout the organization know that change and innovation are valued, that they have been empowered to act, and that calculated risks will be supported by top management” (Denhardt et al., 2009, 364). Likewise, Sahni et al. (2013) argues that employees in public sector organizations can be motivated by how agencies inspire employees to achieve the mission of the work and do their best job. They provide the following example demonstrating how motivation to improve performance can increase innovation:

In Washington, D.C., the motivation to improve performance was twofold. First, municipal leaders saw the mobile payments system as a way to capture savings and increase revenue—thereby decreasing budget burdens
on the city. Municipal innovators also had another meaningful motivator: being considered forward-thinking. Adrian Fenty, the mayor of Washington, D.C., at the time of the effort, was known to promote this trait in his managers. Innovators inside the government knew that they would be recognized for their innovative solutions, a public reward that provided a powerful, non-financial incentive (Sahni et al., 2013, 29).

Thus, public sector employees can make single or complex innovations when they are motivated to make improvements. This leads to the following hypotheses:

H4a. Motivation to improve performance will be positively related to innovation. H4b. Motivation to improve performance will be positively related to innovation complexity.

Resource scarcity is believed to be associated with innovation. Prominent/widespread public management reforms such as the New Public Management (NPM) have forced countries to do more with less (Farazmand, 1999; Kettl, 2005, Pollitt, 2010) and doing so can increase not only efficiency but also innovation. Likewise, many practitioners argue that public sector employees can be more innovative if they are asked to do the same tasks with reduced budgets (Osborne & Gaebler, 1992; Osborne & Plastric, 1997). According to Bernier (2001, 18), “More than ever, innovations were becoming necessary” (Bernier, 2001, 18). Glor (2001, 15) claims, “Frequently innovation was driven or affected by central budget cuts,” so higher budget cuts will be related to
higher innovation because employees must be more innovative when they are asked to accomplish more or the same with a reduced budget. Sahni et al. (2013) have found that budget constraints in Philadelphia, Boston, Hampton, VA, Indianapolis, and Washington D.C. have led to complex innovations (e.g. via Parkmobile and Citizens Connect initiatives) in these cities.

Budget constraints and resource scarcity are also expected to increase both single and complex innovations in the Australian public service. Since the 1980s, agency managers in Australia have been given extensive autonomy to allocate budget resources, and budget cuts have become common in Australia. “The result,” according to Bartos (2003, 10), “was to encourage a higher degree of innovation and experimentation within the bureaucracy as a whole, with considerable improvements in public sector productivity and effectiveness.” The 2008 global financial crises affected most governments around the world, including Australia. After the crisis, the Australian Minister for Innovation, Industry, and Science Kim Carr wrote, “Tough times demand creative solutions” (Carr, 2009, iii). Thus, as necessity is considered the mother of invention, when public employees are asked to do the same tasks with a reduced budget, they tend to be more innovative. Wynen et al. (2014, 50) conclude, “Linking result-achievement with sanctions and rewards even increase this pressure to innovate in order to achieve high performance, because public organizations and their managers are assumed to be self-interested actors.” Hence, research supports that budget cuts will increase single and complex innovations.

However, studies have also found that rather than tight budgets, higher budgets are more likely to produce an innovative workplace culture and thus innovation (Wynen
et al., 2014). In fact, higher budgets and resources are seen as a necessity for innovations in the United States federal government (Dawson & Denford, 2015). Likewise, Bernier and Hafsi (2007) conclude, “Public sector organizations perform better when resources can be secured from an organizational and political environment” (Bernier & Hafsi 2007, 500). Additionally, larger organizations are more likely to be innovative due to their larger budgets and greater power. On the other hand, Laegreid et al. (2011) does not find a relationship between budget size and an innovation-oriented culture in agencies in Norway and Flanders. While necessity and budget cuts drive innovation, they may also stifle it (Fernandez & Wise, 2010). Therefore, several researchers suggest that budget constraints do not always positively affect innovation.

H5a. Budget constraints will be related to single innovation, but the direction of this relationship will be either positive or negative.

H5b. Budget constraints will be related to complex innovation, but the direction of this relationship will be either positive or negative.

Methods and Data

This section describes the data; dependent, independent, and control variables used in the analysis; model selection; and estimation process.

Data

Data comes from the Australian Public Service Commission (APSC)'s 2012 State of the Service Employee Census. The level of analysis is individual. The census requires
that all public sector employees are invited to respond to questions, so it is not a random sample. A total of 87,214 valid responses from individuals were received, representing a response rate of 55% (APSC, 2012). The census provides data on employee attitudes toward working conditions in the public sector, including leadership, job satisfaction, and innovation. The data are expected to help public sector leaders and managers of Australia "develop targeted and measurable strategies to improve innovative performance" (APSC, 2011, xxxii).

Since this paper aims to correctly and comparatively measure potential conditions for innovation, employees who have worked at their job for at least five years and have experienced changes in budgets are included in the analysis (24,341 out of 87,214 employees). Likewise, since the paper focuses on employees who are sure about changes, non-sure responses are not used for analysis. Finally, because there are no significant differences in observations with and without missing data, missing observations from the dependent, independent, and control variables are not used. As a result, among 24,341 employees who worked for at least five years in their agencies, 21,093 (87%) responses have been used for testing hypotheses.

Because data is self-reported, cross-sectional, and collected from one survey, several authors note the potential for common source bias (e.g. Jakobsen & Jensen, 2015; Meier & O’Toole, 2013; Podsakoff et al., 2003). Harman’s one-factor test reveals that a single factor has not emerged from the factor analysis. More importantly, according to Podsakoff et al. (2003), procedural remedies such as anonymity of respondents, better scale items, and clear questions are very important to reduce this bias. The APSC has taken the survey very seriously and spent a considerable amount of time and money on
procedural remedies. Survey items were repeatedly validated by the APSC (APSC, 2012). Finally, Jakobsen and Jensen (2015, 25) conclude that “the best way to evaluate the risk of common method bias when the sources of bias are not measured directly seems to be based on theoretical considerations about the nature of the constructs being measured, through considerations of the survey design.” Thus, the results suggest that common method bias is not eliminated, but it is not a crucial issue in this paper thanks to the theoretical framework of the paper and survey design.

**Dependent Variable**

The focus of this research is on whether a work group implemented any innovations because innovation is a cooperative work group action (Becker & Whisler, 1967). Innovation and complexity of innovation are two dependent variables used in this study. The following survey indicator measures the first outcome variable, *innovation*: "In the last 12 months, has your work group implemented any innovations?" There are three options for answering this question: “yes”, “no”, and “not sure.” Since this paper focuses on people who are sure about innovation, "no" (about 35% of responses) and "not sure" (about 15% of responses) responses were combined. Approximately half of responses answered "yes" and the other half answered "no" or "not sure." Previously, Bowman (1980) used one dichotomous innovation score similar to this study’s variable.

This paper’s focus is on actual innovations rather than innovative ideas or innovative behavior because most organizations and employees are “good at generating innovative ideas, but are weak at bringing an idea to fruition” (Dawson & Denford, 2015, 13). Although methodologists have claimed that using a single survey item as the
dependent variable is considered valid, has methodological advantages, and is commonly used in different studies (Nagy, 2002; Wanous et al., 1997; Wanous & Hudy, 2001), this paper also uses innovation complexity as the second dependent variable.

Respondents who responded “yes” to this question were asked to respond to a follow-up question, which measures the six dimensions of innovation and thus innovation complexity (Torugsa & Arundel, 2016; Windrum, 2008): “Thinking of the most significant innovation that was implemented by your work group in the last 12 months; which parts of your work did it affect?” (1) “Your policy thinking”, (2) “Your services”, (3) “The way you provide services”, (4) “The way you interact with stakeholders”, (5) “Your administrative or organisational processes”, (6) “The way you look at problems or challenge assumptions” (APSC, 2012). It is coded “1” if the particular dimension is stated by employees (and “0” otherwise). If no innovation is adopted, the innovation complexity is coded as “0”. Thus, the innovation complexity variable is constructed as the sum of the six dimensions (From 0 = no innovation to 6 = very complex innovation) (Torugsa & Arundel, 2016).

**Independent Variables**

This paper tests the five conditions for innovation identified by Sahni, Maxwell, and Christensen’s *Unleashing Breakthrough Innovation in Government Framework* (2013). Survey indicators construct factor scores for experimentation, responding to low performers, feedback, and motivation to make improvements. Budget constraint is not constructed as it is captured with one survey item (Appendix 1). Table 1 shows
descriptive statistics for the dependent, independent, and control variables. Appendix 1 shows operational definitions, and Appendix 2 shows the correlation matrix.

Table 1: Descriptive Statistics (N = 21,093)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementing innovation</td>
<td>0.52</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Innovation complexity</td>
<td>1.21</td>
<td>1.55</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Experimentation</td>
<td>3.22</td>
<td>0.72</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Responding to low performers</td>
<td>2.96</td>
<td>0.85</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Feedback</td>
<td>3.51</td>
<td>0.93</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Motivation to improve performance</td>
<td>3.13</td>
<td>0.92</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Budget constraints</td>
<td>2.84</td>
<td>1.07</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Size of agency</td>
<td>2.85</td>
<td>0.43</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Gender is female</td>
<td>0.52</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Working in the capital city</td>
<td>0.37</td>
<td>0.48</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Level of job classification</td>
<td>1.42</td>
<td>0.49</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Education Level</td>
<td>2.24</td>
<td>0.84</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Working full-time</td>
<td>0.87</td>
<td>0.34</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Job satisfaction</td>
<td>3.43</td>
<td>0.72</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Agencies' concern for employees' health</td>
<td>3.55</td>
<td>0.86</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Organizational performance</td>
<td>3.01</td>
<td>1.04</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Barriers to Innovation</td>
<td>0.56</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Access to training and learning</td>
<td>3.42</td>
<td>1.01</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Receiving individual performance feedback</td>
<td>0.81</td>
<td>0.39</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Specialist/professional agency</td>
<td>0.06</td>
<td>0.23</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Regulatory agency</td>
<td>0.03</td>
<td>0.16</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Policy and design agency</td>
<td>0.18</td>
<td>0.38</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Small operations agency</td>
<td>0.04</td>
<td>0.20</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Large operations agency</td>
<td>0.70</td>
<td>0.46</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Accounting and finance job</td>
<td>0.07</td>
<td>0.26</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Administrative job</td>
<td>0.11</td>
<td>0.31</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Communication and marketing job</td>
<td>0.02</td>
<td>0.15</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Regulation job</td>
<td>0.12</td>
<td>0.33</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Engineering and technical job</td>
<td>0.04</td>
<td>0.19</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Information and communication technology job</td>
<td>0.09</td>
<td>0.28</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Information and knowledge management job</td>
<td>0.02</td>
<td>0.14</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Legal and parliamentary job</td>
<td>0.02</td>
<td>0.15</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Monitoring and audit job</td>
<td>0.03</td>
<td>0.16</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Organizational leadership job</td>
<td>0.03</td>
<td>0.16</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>People job</td>
<td>0.06</td>
<td>0.23</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Science and health job</td>
<td>0.03</td>
<td>0.17</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Service delivery job</td>
<td>0.14</td>
<td>0.34</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Strategic policy, research, project job</td>
<td>0.12</td>
<td>0.32</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Other jobs</td>
<td>0.11</td>
<td>0.32</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Scale reliability is calculated using Cronbach's alpha tests, which shows low to moderate internal consistency for experimentation (0.60) and responding to low performers (0.63), and moderate to high internal consistency for feedback (0.82) and motivation to make improvements (0.84). For scales with fewer survey items, researchers consider that a lower alpha is also consistent (Damanpour, Walker, & Avellaneda, 2009).

Control Variables

Structural and organizational factors (such as organizational size) and cultural factors are correlated with innovation (Wise & Szucs, 1996). Organizational size is positively related with innovation (Wise, 1999), and larger organizations in particular are more innovative as these organizations have more resources, differentiation, and specialization (Pierce & Delbecq, 1977), and they are more likely to have an innovative culture (Wynen et al., 2014). Wynen et al. (2014) have found that higher budgets are likely to increase the innovativeness of an organization’s culture and thus innovation. Agency types, job classification (e.g. managers), and task-related factors can affect innovation, reform, and change (Fernandez & Wise, 2010; Nasi, Frosini, Cristofoli, 2011; Wynen et al., 2014). Different sectors and types of organizations affect innovation differently (Wise, 1999). For instance, service delivery agencies focus more on innovation because they interact with people (Borins, 1998; Vigoda-Gadot, 2009; Laegreid et al., 2011; Wynen et al., 2014). Moreover, organizational location affects innovativeness and change (Fernandez & Wise, 2010; Nasi, Frosini, Cristofoli, 2011), as well as the success of the adoption of reforms and changes (Wise & Szucs, 1996). Thus,
type of job, type and size of agency, job classification, and organization location are controlled.

Barriers to innovation are considered to negatively affect adoption of reforms and innovations (Rainey, Pandey, & Bozeman, 1995; Wise, 1999). However, other research conducted in the private and public sectors has found that barriers to innovation had a positive effect on innovation (D’Este et al., 2012; Torugsa & Arundel, 2016). Job satisfaction tends to be positively correlated with innovation and change (Fernandez & Moldogaziev, 2013; Hage & Aiken, 1967). Several researchers have found that work training and learning opportunities can change employees’ habits and increase employees’ willingness to implement reforms and adopt innovations (Bingham & Wise, 1996; Kaufman, 1981; Wise, 1999). Likewise, access to training and skills positively affects innovation and innovation success (Fernandez & Moldogaziev, 2013; Fernandez & Pitts, 2011). Finally, analyzing the Australian Public Service Commission’s 2011 data, Torugsa and Arundel (2015) found that gender and education have a significant effect on innovation (e.g. males and more educated people have indicated that they had more chances to implement innovations). Therefore, barriers to innovation, whether employees’ organizations provide access to training and learning opportunities, gender, and education variables are controlled for.

Organizations’ concerns for employees’ wellbeing and health can affect employees' perceptions of reforms and innovations. Wise (1999, 154) found that “A variable measuring managers' concern for their employees' well-being was the single most important factor accounting for the presence of innovation in organizations.”

Moreover, perceived organizational performance and communication are associated with
innovation (Fernandez & Moldogaziev, 2013), so these two variables are also controlled for. Because employees who receive annual reviews or performance feedback in Anglo-Saxon countries tend to be more innovative (Wise, 1999), individual performance feedback is also controlled for. Finally, employment status is also controlled for because it may affect innovation and innovation complexity.

**Estimation**

The first dependent variable *innovation* is a binary variable—whether there was an innovation or not. The second dependent variable *innovation complexity* is a count variable (from 0=no innovation to 6=very complex innovation). Using Linear Regression Models such as Ordinary Least Square (OLS) models for categorical variables cause biasedness (e.g. incorrect answer and interpretations), inefficiency (e.g. not using the data well), and inconsistency (e.g. not estimating parameters correctly) due to the nonlinearity and heterogeneity of the categorical variables (Long, 1997; Long & Freese, 2006). Thus, a logit model is preferable for the first dependent variable, and the negative binomial regression model (NBRM) or the Poisson regression model (PRM) is preferable for the second dependent variable. The NBRM is used in this paper because the PRM rarely fits due to overdispersion. Overdispersion in this case refers to the fact that although the estimates from the PRM are consistent, they are inefficient and the standard errors are biased downward, causing large z-values and thus overly statistically significant results.

Due to the heteroscedasticity (inappropriate standard errors), robust standard errors are used for all estimations (Verbeek, 2008; Wooldridge, 2015). Finally, to understand whether multicollinearity exists in the models, the variance inflation factor
scores (VIF) scores are calculated. Accordingly, as a rule of thumb, a multicollinearity problem does not threaten the validity of models if VIF scores are less than 10. The VIF scores for all variables in the both of the models are less than 10. Indeed, the highest VIF score is job satisfaction 3.31 (job satisfaction) for both models; the mean VIF for both models is 1.68. Thus, multicollinearity is not an issue in this paper.

Results

Table 1 reports the descriptive statistics. Many employees report that they receive feedback, and their agencies are large organizations (> 1,000 APS employees). 52% of employees are female while 48% of employees are male. Around 63% of employees work in the field, outside of the Australian Capital Territories (ACT). 87% of employees are full-time employees. Over half of the employees report that there are barriers to innovation. 70% of employees work at the large operations agencies (e.g. Department of Defense, Department of Human Services, and Australian Taxation Office). Many employees’ jobs involve service delivery.

The results of the regressions used to test the five hypotheses are shown in Table 2. These results are based on perceptions from public sector employees working in the Australian public service. As a summary, except for hypothesis 5, all the results are in the expected direction and statistically significant in the first model. Model 1 shows that all else being equal, the odds of innovation are 1.51 times greater for experimentation, 1.08 for responding to low performers and feedback, 1.18 for motivation to make improvements, and 1.02 for budget cuts. Although the magnitude of the effects of the second and third measures are not high, they are still statistically significant (p<0.01).
The odds ratios of the first and fourth measures are relatively high, suggesting that experimentation and motivation to make improvements can positively affect innovation. On average, for every unit increase of experimentation, an implementation of innovation by a work group increased by 0.41 points, holding other variables constant.

Regarding control variables, surprisingly, the effect of barriers to innovation is positive, statistically significant, and its effect size is very high. Accordingly, the odds of innovation are about three times greater when employees report a barrier to innovation, holding other variables constant. Indeed, the coefficients (both standardized and unstandardized) of barriers to innovation are the highest in both of the models. In addition to barriers to innovation, and all else being equal, women report slightly less innovation than men. Organizational performance and access to training and learning have a negative effect on innovation. On the other hand, more education, working full-time, job satisfaction, and receiving individual performance feedback have a positive effect on innovation.

The results of the second model are similar to those of the first, except that all the variables of interest are positively associated with innovation complexity. For instance, the second model is different than the first model in that holding all other variables at a constant, the budget is positively and statistically correlated with innovation complexity. For each unit increase of experimentation, a work group’s mean innovation complexity increases about 0.18, holding other variables constant. The effects of responding to low performers, feedback, and budget cuts are statistically significant, but the magnitudes are not very high.
The effect of barriers to innovation is that higher barriers to innovation lead to higher innovation complexity. On average, while full-time employees and managers have a higher tendency to implement complex innovations than part-time employees and front-line employees (APS 1-6), females tend to implement less complex innovations, holding other variables constant. While individual performance feedback is positively associated with innovation complexity, access to training and learning is negatively associated with innovation complexity, holding other variables constant. Because negative binomial regression models are more conservative than the Poisson regression models (Long, 1997; Long & Freese, 2006), some control variables are not statistically significant in the model.
Table 2: Results* of Logit Coefficients for Innovation and Negative Binomial Regression Coefficients for Innovation Complexity

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DV = Innovation</td>
<td>DV = Innovation Complexity</td>
</tr>
<tr>
<td></td>
<td>Unstandardized</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>Experimentation</td>
<td>0.414*** 1.513</td>
<td>0.180*** 1.197</td>
</tr>
<tr>
<td>Responding to low performers</td>
<td>0.083*** 1.087</td>
<td>0.044** 1.045</td>
</tr>
<tr>
<td>Feedback</td>
<td>0.072*** 1.075</td>
<td>0.040** 1.041</td>
</tr>
<tr>
<td>Motivation to improve performance</td>
<td>0.163*** 1.177</td>
<td>0.082*** 1.085</td>
</tr>
<tr>
<td>Budget constraints</td>
<td>0.015 1.015</td>
<td>0.021* 1.021</td>
</tr>
<tr>
<td>Size of agency</td>
<td>0.094 1.098</td>
<td>0.057 1.058</td>
</tr>
<tr>
<td>Gender is female</td>
<td>-0.127*** 0.881</td>
<td>-0.043* 0.958</td>
</tr>
<tr>
<td>Working in the capital city</td>
<td>-0.03 0.967</td>
<td>0.036 1.037</td>
</tr>
<tr>
<td>Level of job classification</td>
<td>0.258*** 1.295</td>
<td>0.105*** 1.111</td>
</tr>
<tr>
<td>Education Level</td>
<td>0.054** 1.055</td>
<td>0.015 1.015</td>
</tr>
<tr>
<td>Working full-time</td>
<td>0.183*** 1.201</td>
<td>0.153*** 1.165</td>
</tr>
<tr>
<td>Job satisfaction</td>
<td>0.174*** 1.19</td>
<td>0.063** 1.065</td>
</tr>
<tr>
<td>Concern for employees' health</td>
<td>0.060** 1.062</td>
<td>0.038* 1.039</td>
</tr>
<tr>
<td>Organizational performance</td>
<td>-0.006 0.994</td>
<td>-0.001 0.999</td>
</tr>
<tr>
<td>Barriers to Innovation</td>
<td>1.080*** 2.944</td>
<td>0.605*** 1.832</td>
</tr>
<tr>
<td>Access to training and learning</td>
<td>-0.079*** 0.924</td>
<td>-0.037** 0.963</td>
</tr>
<tr>
<td>Individual performance feedback</td>
<td>0.191*** 1.21</td>
<td>0.082** 1.085</td>
</tr>
<tr>
<td>Constant</td>
<td>-4.464***</td>
<td>-2.165***</td>
</tr>
<tr>
<td>Log-likelihood-intercept</td>
<td>-14597.077</td>
<td>-32047.9</td>
</tr>
<tr>
<td>Log-likelihood-model</td>
<td>-13279.961</td>
<td>-31205.2</td>
</tr>
<tr>
<td>Chi-square-deviance</td>
<td>26559.92</td>
<td>62410.4</td>
</tr>
<tr>
<td>Chi-square-wald</td>
<td>2196.887</td>
<td>1806.478</td>
</tr>
<tr>
<td>McFadden R²</td>
<td>0.09 0.03</td>
<td>0.03 0.08</td>
</tr>
<tr>
<td>McFadden (adjusted) R²</td>
<td>0.09 0.03</td>
<td>0.03 0.08</td>
</tr>
<tr>
<td>Cox-Snell/ML R²</td>
<td>0.12 0.08</td>
<td>0.08 0.08</td>
</tr>
<tr>
<td>Cragg-Uhler/Nagelkerke R²</td>
<td>0.16 0.08</td>
<td>0.08 0.08</td>
</tr>
<tr>
<td>AIC</td>
<td>26631.92</td>
<td>62484.4</td>
</tr>
<tr>
<td>BIC</td>
<td>26918.36</td>
<td>62778.8</td>
</tr>
</tbody>
</table>

(n = 21093) * p<0.05, ** p<0.01, *** p<0.001

* Note: The results of 5 agency types and 15 job types are controlled for the regressions, but not included here due to space limitations. These are available from the authors upon request.
Finally, several robustness checks have been conducted to test the validity, reliability, and stability of the results. Originally, the first dependent variable had three categories: yes, no, and not sure. Because “employees who innovated in the previous year” are the focus of the paper, the responses of “no” and “not sure” were combined, as explained in the method section. We have conducted several tests to find out whether the choice of dependent variable is better than other options. First, a logit model is run without using “not sure” responses (so, the number of observations dropped from 21,093 to 17,353). The results are very close to the original model; while none of the statistical significance of the models changed, the coefficients increased very slightly. Second, we recoded the dependent variable (Regarding innovation, 1=No, 2=Not Sure, 3=Yes) and tested the ordinal logit model because the dependent variable becomes ordinal. The results are very similar; and again, except for the fifth hypothesis, all hypotheses are supported in the first statistical model. Third, instead of ordinal logit models, multinominal logit models are tested (with yes, no, or not sure based categories). Again, the results are very similar to our original results. It should also be noted that statistically, the original model (logit model) has a better fit than the other models (ordinal and multinominal logit), as the former has higher pseudo $R^2$ as well as lower AIC and BIC scores. Likewise, regarding the second model, the results of the Poisson regression model, ordinal logit model, and ordinal probit model (not shown) are very similar to the negative binomial regression model, while the significance of the coefficients increased a little bit in the alternative models. Thus, alternative models have very similar results to the original models.
Discussion and Conclusion

The conditions for innovation in public organizations is an important and interesting theme, yet there has been little large-scale survey research in this area of public sector innovation. This paper analyzes data from a large-scale census of Australian public service employees conducted by the Australian Public Service Commission (2012). This empirical study is one of the first studies to systematically analyze innovation complexity at the workgroup level (including front-line employees and middle-level managers). Analyzing innovation at the workgroup level has many advantages, such as “to overcome possible biases in favour of ‘top-down’ innovations when only senior managers or agency heads are surveyed” (Torugsa & Arundel, 2016, 409). Because many innovations are complex and multi-dimensional, we need more research to identify which factors are associated with innovation complexity. As Bugge and Bloch (2016, 287) argue, “innovation should be understood as a systemic [complex] phenomenon, which involves multiple actors and evolves through different phases.”

This study examines the effects of the five conditions for innovation suggested by Sahni et al. (2015) on innovation and innovation complexity. Results show that experimentation, responding to low performers, feedback, and motivation to make improvements are positively correlated to public sector employees’ innovation. In addition, budget constraints do not have any statistical effect on public sector employees’ innovation. In terms of innovation complexity, all variables of interest are positively associated with it. Thus, overall, Sahni et al. (2015)’s framework is applicable to both single and complex innovations, so policy makers may consider using these conditions to enhance both single and complex innovations.
Although conditions are based on the judgment of individual employees, out of the five measures, the first and fourth concepts—experimentation and motivation to make improvements—focus on the employee; the second and third concepts—responding to low performers and feedback—focus on managers. The fifth concept—budget changes—focuses on the department or government. The results suggest that the conditions of the employee (the first and the fourth conditions) have a higher effect for innovation and innovation complexity. Managers (the second and the third conditions) still have a positive and statistically significant effect on innovation and innovation complexity, but the effect size is small. Finally, the department or government (the fifth condition) does not have a statistical effect on innovation while it has small effect on innovation complexity. Thus, focusing on employees can bring higher returns for innovation and innovation complexity than focusing on managers and the government. It is suggested that politicians should give employees control of the innovation process (Torugsa & Arundel, 2015), as most of the successful innovations were enacted by employees themselves (Borrins, 2001).

This paper demonstrates that internal factors such as experimentation and motivation to make improvements in the public sector are strongly associated with innovation and innovation complexity. Thus, the findings of the paper are consistent with the self-determination theory (SDT). SDT, which is concerned with the beneficial effects of valuing intrinsic aspects of work, suggests that individuals' behaviors should be self-motivated and self-determined (Deci & Ryan, 1985, 1987, 2000; Deci et al., 2001). In this regard, when employees feel that they can control their work such that they can experiment and have motivation to make improvements and innovate, they can
implement innovations, including complex innovations. As a result, public organizations should focus on intrinsic aspects of jobs and increase employee motivation to innovate. Thus, the effects of experimentation and motivation to make improvements in particular are very consistent with early studies of innovation that propose that experimentation and providing motivation to public sector employees are not only key to innovation but also key to motivation and job satisfaction. In this regard, future studies may test how these five conditions affect employee attitudes such as their job satisfaction and organizational commitment.

Finally, results show that budget cuts do not affect single innovations. Additionally, increasing budgets is positively correlated with innovation complexity, suggesting that higher budgets are needed for complex innovations. Since developing complex innovations requires more resources and effort, it makes sense for organizations to provide larger budgets for complex innovations. Therefore, NPM’s “do more with less” theme may not increase single or complex innovations in the public sector. More studies in different settings are needed to determine the effects of budget changes on innovation and innovation complexity in the public sector.

The distinctive characteristics of public organizations (e.g. goal ambiguity, organizational structures, decision-making processes, and incentive structures) and environmental components for public organizations (e.g. the political economy of public institutions, performance criteria for government organizations, and different actors with political authority and influence over public organizations) (Rainey, 2009) may cause barriers to innovation in public sector organizations. According to the empirical results of this study, increased barriers to innovation is the highest and statistically most significant
predictor for both innovation and innovation complexity. This result may indicate that public sector employees who understand barriers to innovation could use their knowledge and experience to diminish those barriers (D’Este et al., 2012; Torugsa & Arundel, 2015). Hence, knowledge and experience of innovation, such as learning from innovation activities and the innovation process, can lead to the understanding of how barriers may affect single and complex innovations. More studies are needed to explore the relationships between different types of barriers to single and complex innovations, as well as the effects of barrier breadth on individual and organizational outcomes.

This paper is not without limitations. First, the degree of innovation complexity, conditions of innovation, and other factors affecting innovation and innovation complexity are based on the judgments of individual employees. In other words, these self-reported data are not objective, indicating that results may subject to bias. It is particularly true for the survey items capturing the first and fourth innovation conditions (experimentation and motivation to improve performance) that are concerned with the role and importance of employees, so these items may reflect bias (e.g. employees may overstate the importance of these factors). However, Fernandez and Pitts (2011, 211) argue that “perception is reality in that it is the perception that will guide the respondent's behavior,” indicating that overall the findings of this paper reflect employee behavior and reality. Overall, all survey variables are perceptions from public sector employees, so the results may not be true although they reflect the reality as perceived by employees.

Second, this paper uses data from the Australian public sector, so some of the results may not be generalizable to other countries, particularly non-Anglo-Saxon countries. However, the results of the findings and the insights are important, so they may
inform studies in other contexts. Therefore, other researchers may look at the effects of similar conditions on public sector innovation in different contexts. In addition, this study provides a broad perspective on innovation by answering “what” and “how” questions. This type of quantitative study usually lacks answers to “why” questions. In this regard, qualitative studies such as semi-structured interviews and case analyses could explain why particular factors have higher effects on innovation and innovation complexity, and why budget changes do not affect innovation but affect innovation complexity.

Innovation research is important because public organizations have become more accountable to principals (i.e. citizens) and agents (i.e. managers) due to the forces of globalization and information technology. They need to be efficient (i.e. reducing costs), effective (i.e. improving quality of services), and satisfy citizens. Additionally, there is pressure to save money and reduce budgets since the NPM reforms in the 1980s and particularly since the 2008 economic crises, so creating a workplace encouraging innovation is crucial. Overall, contrary to some early claims, public organizations are innovative, and public sector employees can indeed innovate. Public sector employees can make innovations when they are able to experiment and when they are motivated to make improvements. Receiving feedback and having managers deal effectively with low performers can also help public sector employees innovate. These factors also increase the likelihood of the adoption of more complex innovations. It is best for public sector managers to focus on motivation to improve performance and other internal factors to encourage innovation. Future studies may analyze how single and complex innovations affect both organizational outcomes (e.g. organizational performance) and individual outcomes (e.g.
Chapter 3: Second Essay

The Impact of Sources of Innovation on Employee Job Satisfaction in the Australian Public Service: A Self-Determination Perspective

Abstract

This empirical study aims to explore how the sources of innovations affect employees’ job satisfaction. Sources of innovation is a relatively less studied topic in the field of public management, and in the field of innovation in particular. Employing self-determination theory (SDT) as a framework and using the 2011 Australian Public Service Commission data, this paper examines five important sources of innovation and tests their effects on employees’ job satisfaction. It is hypothesized that if the sources of innovation enhance employees’ autonomy, competence, and relatedness (e.g. innovation coming from employees, industry stakeholders, and members of public), employees tend to have higher job satisfaction. However, if the sources of innovation undermine employees’ autonomy but enhance their competence and possibly relatedness (e.g. innovations coming from organizational leaders and the Australian government), then the source of innovation will not have a statistically significant effect on job satisfaction. Overall, the results support SDT framework.

Key Words: public sector innovation, sources of innovation, job satisfaction, self-determination theory, Australia, public sector.
Innovation is a key theme of current organizational reforms and changes throughout the world (Park, Lee, & Kim 2016). Particularly since the 1980s, along with the New Public Management (NPM) movement, governments all over the world have focused on how to “do more with less,” so innovation has become an agenda of public organizations. Considering the size and power of public organizations as well as their share of the GDP of national economies—along with the NPM’s “do more with less” agenda—public organizations are expected to be innovative and to innovate. Because public organizations, and particularly organizational leaders, are being pushed toward making more changes and innovations (Fernandez & Rainey, 2006; Fernandez, 2008; Light, 1998), we need more public sector innovation research to analyze how innovation affects organizational (e.g. organizational performance) and individual (e.g. employees’ job satisfaction) outcomes.

Most previous studies on innovation in both the public and business management fields have focused on the antecedents or outcomes of innovation rather than on the sources of innovation and the nature of their involvement in innovation. In addition, many of the previous studies focusing on public sector innovation consider innovation at the national or agency level, and from the perspective of particular national agendas. Fewer papers in public management scholarship consider innovation at the individual level. Finally, the studies and published papers on public sector innovation are predominantly case studies rather than empirical work (Arundel & Huber, 2013). Thus, a research gap exists in the study of innovation, particularly at the individual level of analysis.
Whereas “antecedents of innovation” refers to factors affecting innovation such as decentralization, specialization, experience, and communication, “sources of innovation” refers to actors, such as an employee’s work group, or organizational leaders who provide innovative ideas or implement innovations. Although several studies have addressed the issue of where ideas come from and the sources/actors that contribute to innovation (e.g. Dawson & Denford, 2015; Hüsig & Mann, 2010; Osborne & Brown, 2011), how these different sources affect employee attitudes—such as their job satisfaction—has not yet been studied. In fact, no studies thus far have analyzed the effects of the source of innovation on employees’ job satisfaction. This link is important because if employees are satisfied with their jobs and they enjoy what they do, it may increase their commitment and productivity, improve their performance, and reduce turnover. To address this gap, we use self-determination theory (SDT) to offer theoretical insight into the relationship between sources of innovation and the job satisfaction of employees.

SDT, a leading theory of motivation and job satisfaction, deals with individual’s growth and intrinsic psychological needs. SDT argues that instead of extrinsic factors such as punishment and external awards, individuals are motivated mainly by intrinsic factors. For instance, individuals tend to be motivated and satisfied from an activity that is interesting, satisfying, and over which employees feel ownership, and thus have internalized; such activities can fulfill people’s needs for autonomy, competence, and relatedness. According to SDT, these three needs—autonomy, competence, and relatedness—are the basis for self-motivation and satisfaction.
This paper hypothesizes that when the sources of innovation are employees themselves, industry stakeholders, and members of the public, then these sources can enhance employees’ self-determination (their autonomy, competence, and relatedness) because these sources are internalized, and employees may not feel that a bureaucratic or political authority controls their actions. Employees can also find it interesting, enjoyable, and meaningful to interact with these sources. Thus, these sources are positively associated with employees’ job satisfaction. On the other hand, the Australian government and organizational leaders as sources of innovation may not have a statistically significant affect on employees’ self-determination because while these two sources may hinder employees’ autonomy, these sources can also increase employees’ competence and relatedness.

Thus, this paper aims to make at least three contributions to public administration studies. First, it contributes to research on innovation and analyzes the effects of the sources of innovation, an under-explored sub-topic of innovation. Second, it extends research on SDT in a public sector setting. Although the idea and application of SDT framework has been used in psychology, management, health, nursing studies, and education, public management scholars have not paid as much attention to SDT. Third, considering job satisfaction as the dependent variable, this paper contributes to job satisfaction research by showing how and why particular sources of innovation affect employees’ job satisfaction. In particular, the effects of sources of innovation on job satisfaction are still unknown. The relationship between sources and their involvement in the innovation process is interesting and worth studying because depending on the source, an innovation may increase or decrease employees’ job satisfaction; the SDT
framework can explain how and why the involvement of different sources affects employees’ job satisfaction.

This article is organized as follows. First, the following section will briefly review SDT and the reasons why SDT is used in this study. Then, hypotheses based on the SDT framework will be explained. The methodology, results, and discussion sections will follow.

**Self-Determination Theory (SDT), Sources of Innovation, and Job Satisfaction**

In testing hypotheses derived from the SDT perspective, this section explores how five important sources of innovation might affect employees’ job satisfaction.

**Self-Determination Theory (SDT)**

Self Determination Theory (SDT) suggests that individuals have inherent tendencies toward growth and intrinsic motivation. They would like to satisfy their needs for autonomy, competence, and relatedness (Deci & Ryan, 1985; Ryan & Deci, 2000). Autonomy refers to respect for people’s self-determination and emphasizes individual choice (Deci, 1975; Stone, Deci, & Ryan, 2009); competence refers to an individual’s ability to achieve something via desired and challenging tasks (Skinner, 1995); and relatedness refers to satisfying mutual respect, connectedness to groups and people, and the desire for social relationships (Baumeister & Leary, 1995).

While carrot-stick approaches and Expectancy Theory argue that external factors can motivate employees, SDT suggests that employees can be motivated by intrinsic factors. In other words, SDT focuses on the intrinsic aspects of work and argues that
people have three basic needs to be satisfied. Connell and Welborn (1991, 73) argue that “the needs for competence, autonomy, and relatedness are universal psychological needs that are experienced in and influenced by multi-leveled socio-historical contexts.” In fact, although studies of SDT started in the United States, research on SDT has spread globally, including but not limited to research in Australia, Canada, France, India, and the United Kingdom. Work environments supporting employees’ self-determination improve their well-being as well as both individual and organizational outcomes, results which are consistent across different cultures (e.g. Eastern European countries), providing strong support for SDT (Deci, Ryan, Gagne, et al., 2001; Grouzet et al., 2005).

Articles and books using a SDT framework typically do not test the effects of autonomy, relatedness, and competence because the relationship is not mechanical but conceptual. For instance, Sun et al. (2012) use the SDT framework to hypothesize that structural empowerment affects psychological empowerment and creativity without testing SDT; Fernandez and Moldogaziev (2015) use a SDT perspective to make claims that empowerment can increase employees’ job satisfaction. Likewise, this paper also hypothesizes that different types of innovation sources affect employee job satisfaction by using (but not testing) the SDT perspective. The following section will explain the hypotheses derived from the SDT framework.

**Why is SDT used for this research?**

The sources of an innovation are closely associated with employees’ self-determination, so an innovation source can affect employees’ job satisfaction. SDT framework works better than other motivation/job satisfaction theories to investigate the
effects of innovation sources on job satisfaction for the following reasons. First, although early theories of motivation such as Maslow’s Hierarchy of Needs Theory, McGregor’s Theory X and Theory Y, Herzberg’s Two-Factor Theory, and McClelland’s Theory of Needs provide insightful information about motivation, they are typically conceptual concepts, not testable, and also seem not relevant to today’s organizations. SDT, on the other hand, is contemporary, scientific, supportable, and can be applied to different types of organizations and organizational settings.

Second, the motives of public organizations are typically internal, due to the organizational structures and external environment of public organizations (Rainey, 2009). Employees in the public sector typically prefer intrinsic rewards rather than external rewards (Perry & Wise, 1990). According to Wilson (2000, 157-158), three types of intrinsic rewards exist in public organizations: “A sense of duty and purpose, the status that derives from individual recognition and personal power, and the associational benefits that come from being part of an organization [or a small group] that is highly regarded by its members or by society at large,” rewards which are consistent with SDT. Thus, SDT’s concern with the positive effects of intrinsic motivation and employees’ self-determination can provide more insight in a public sector setting. For instance, if the innovation comes from the employees themselves, employees feel that these innovations can increase their power and thus their job satisfaction.

Third, SDT states that environmental and social factors as well as psychological feelings of autonomy, competence, and relatedness enhance or hinder intrinsic motivation and job satisfaction. In this regard, this theory is dynamic and can provide useful arguments about how and why sources of innovation affect job satisfaction, because
sources of innovation are organizational/environmental while also affecting employees’ psychological sense of self-determination. If sources potentially affect employees’ self-determination, then the particular source will positively or negatively affect employees’ job satisfaction. Thus, based on SDT, we can make predictions about whether particular sources enhance or reduce employees’ job satisfaction.

**Hypotheses**

The Australian Public Service Commission (2011) has identified five important sources of innovation in the Australian public sector: the Australian Government (e.g. ministers), the senior leadership of an employee’s agency (outside of her or his work group), an employee or other members of her or his work group, industry stakeholders (e.g. industry/business groups, individual businesses), and members of the public. The APSC data (2011a, 2011b) show that most innovations come from employees. The section *independent variables* will explain these sources in more detail.

Research on SDT demonstrates that when people do not have autonomy—for example, when they are forced to do something—they will be less interested in the task, less motivated to commit to it, and ultimately less satisfied with the work, its processes, and its outcomes (Gagne, Koestner, & Zuckerman, 2000). A high level of control by managers decreases employees’ autonomy (DeHard-Davis et al., 2015), and public sector employees typically have low autonomy as public organizations are subject to red-tape (Rainey, 2009). Because red-tape, low autonomy, and external control reduce employees’ affective organizational commitment (Stazyk, Pandey, & Wright, 2011), morale (DeHard-Davis et al., 2015), and job satisfaction (Chen, 2012; Wright & Davis, 2003),
innovation coming from the federal government and organizational leaders may reduce employees’ autonomy and thus their job satisfaction. In fact, from the SDT standpoint, ideas originating from a hierarchical authority (e.g. from the government and organizational leaders) may hinder employees’ autonomy and thus their satisfaction.

On the other hand, a sense of competence increases job effectiveness (Spreitzer, Kizilos, & Nason, 1997), and effectiveness can increase job satisfaction. The need for competence, according to Weibel and Six (2013), has two parts: “(1) the need to develop new skills and new mental frames; and (2) the need to feel a boost in self-esteem” (p. 63). Likewise, individuals “will more likely adopt and internalize a goal if they understand it and have the relevant skills to succeed at it… [So] competence (e.g., offering optimal challenges and effectance-relevant feedback) facilitate internalization [and job satisfaction]” (Ryan & Deci, 2000, 64). Therefore, if the sources of innovation will enhance employees’ competence, then it will be positively associated with employees’ job satisfaction. The Australian government stresses the importance of employees’ and managers’ skills and competence (APSC, 2011a). Additionally, public managers in Australia are asked to consult with employees about changes (APSC, 2013), which can increase employee competence. Moreover, constructive feedback enhances employee competence and satisfaction (Weibel & Six, 2013). On average, employees believe that the Australian government and supervisors provide constructive feedback to their employees (APSC, 2011a, 2011b).

Participatory decision-making approaches, which have been associated with human resources models of administrative behavior since the 1940s, posit that employees are the most important assets of organizations. Therefore, focusing on employees’ well-
being by providing relevant training and fostering their satisfaction has become a priority for organizations. This is particularly true for the Australian public service, as the Australian government emphasizes training and participation programs. For instance, around 80% of employees participated in off-the-job training activities related to their jobs and interests (e.g. workshops, seminars, and academic study) in 2011 (APSC, 2011a); here, the source of innovation is the government or organizational leaders. In this regard, innovations coming from the government and organizational leaders can increase employee satisfaction and motivation because doing so can increase employees’ competence.

SDT argues that individuals endeavor for relatedness, and that relatedness increases satisfaction (Ryan & Deci, 2000). Interacting with the Australian government (e.g. with politicians and executive directors) and organizational leaders may either increase or decrease relatedness. Employees feel connected if they believe that their job is valued and that they are respected, valued, and supported (Baumeister & Leary, 1995; Weibel & Six, 2013). The Australian government emphasizes diversity, and many disabled people are hired for government jobs. Public organizations organize staff awareness seminars and participate in different programs for diverse workgroups. Moreover, 83% of agencies encourage indigenous employees to participate in cultural events (APSC, 2011a). Additionally, on average, almost 80% of employees indicate that their supervisors demonstrate honesty and integrity, and many employees indicate that their supervisors work sensitively with people from diverse backgrounds (APSC, 2011b). These factors can fulfill employees’ need for relatedness and thus enhance their job satisfaction. On the other hand, the findings of the APSC data show that only 38% of
employees agree that employees in their agencies feel they are valued for their contributions. Similarly, only 35% of employees state that communication between senior leaders and other employees is effective (APSC, 2011b). Thus, the results of the degree of relatedness are mixed.

In this regard, innovative ideas coming from the Australian government and organizational leaders may hinder employees’ autonomy but may enhance their competence and relatedness. For instance, these sources may undermine employees’ autonomy as government and organizational leaders decide on the innovations. However, these sources could also increase the competence of employees via constructive feedback from public managers and employee support programs. Thus, there is a countervailing effect between autonomy and competence, in which the two effects cancel each other out. All these points bring us to the following hypotheses:

H1: If agencies of the Australian government, such as ministries, are the source of innovation, the impact on job satisfaction will not be statistically significant.

H2: If senior agency leaders are the source of innovation, the impact on job satisfaction will not be statistically significant.

Individuals are intrinsically motivated and satisfied when they have autonomy (Deci & Ryan, 1985; Fernandez & Moldogaziev, 2015; Weibel & Six, 2013). If the source of an innovation is an employee or her/his small work group, then employees may be motivated and satisfied to implement it because they are the owners of the idea and
feel responsible for its successful execution. When employees have autonomy and the freedom to make a particular innovation, they tend to feel more satisfied with their efforts. Therefore, even if the idea is not effective, it can still increase employees’ satisfaction because carrying it out is an act of self-determination, particularly with respect to autonomy: “Whilst politicians can dominate administrative actions and exert control over bureaucratic performances, they need to respect the competence and commitment of public sector management and staff and give them control over many aspects of the innovation process” (Torugsa & Arundel, 2016b, 17). In this regard, particularly in today’s environment, organizations are advised to provide employees and their small work groups with as many incentives and as much power as is feasible.

Moreover, Deming (1986) stresses that employees, groups, and teams should provide ideas, be involved in decisions, and help design work practices, which contributes to SDT’s relatedness. Doing so will increase organizational productivity, effectiveness, and success. Organizations focusing on organizational cultures, employees’ well-being, and empowerment can increase relatedness and employee job satisfaction (Moss-Kanter, 1983; Peters, Waterman, & Jones, 1982). In fact, connectedness to colleagues and work groups is associated with individuals’ internal motivation and job satisfaction (Ryan & Deci, 2000).

Employees are satisfied when they feel that they are competent at their jobs (Fernandez & Moldogaziev, 2015). APSC data reveals that on average, employees in the Australian Public Service feel that they have competence in their jobs when they work on their tasks with their work groups. For instance, about 74% of employees believe that their jobs allow them to utilize their skills, knowledge, and abilities, 64% of employees
agree or strongly agree that their job gives them a feeling of personal accomplishment, and 63% of employees believe that their workplace provides opportunities to increase their knowledge of and experience in their job (APSC, 2011b). Because innovative ideas coming from employees enhance their autonomy, competence, and relatedness, this source of innovation is expected to be positively related with job satisfaction.

H3: If employees and their small work groups are the main sources of innovation, the impact on job satisfaction will be positive.

Sources of innovation do not come only from inside the organization and the government (Torugsa & Arundel, 2016b). Industry stakeholders and members of the public are other crucial sources of innovation (APSC, 2011a, 2011b; Dawson & Denford, 2015). Although public sector employees’ engagement with members of the public and industry stakeholders may bring about innovations, we know little about how these sources affect employee attitudes such as their job satisfaction.

Behaviors and ideas coming from external actors are often not interesting to employees unless employees find a connection to the group or society. Ryan and Deci (2000, 64) state, “they [people] are valued by significant others to whom they feel (or would like to feel) connected, whether that be a family, a peer group, or a society.” They continue that this connection “is providing a sense of belongingness and connectedness to the persons, group, or culture disseminating a goal, or what in SDT we call a sense of relatedness.” Because interaction with the public and industry stakeholders can enhance employees’ belongingness and connection to society, employees’ self-determination can
increase. Work and a work environment that enhance self-determination are crucial for higher performance and innovation (Deci et al., 1989), so innovative ideas coming from members of the public and industry stakeholders, which connect employees with groups, are expected to be positively associated with job satisfaction. Additionally, meetings and collaboration between industry stakeholders and employees can increase employees’ competence and introduce soft competition. This can lead to further innovation and more satisfied employees.

In contrast to governments and managers who have direct authority over employees, receiving innovative ideas from members of the public and industry stakeholders will not undermine employees’ autonomy. On the contrary, these sources can enhance employees’ autonomy. Employees in the Australian Public Service (APS) have the autonomy to choose to interact with particular stakeholders (APSC, 2011a). Wilson (2000) states that members of organizations (e.g. employees) prefer autonomy rather than increased budgets and organizational effectiveness. From the SDT standpoint, individuals tend to be satisfied and motivated when they feel that they have autonomy and choice. For instance, Connell and Wellborn (1991) demonstrated that an autonomy-supportive environment increases individuals’ enjoyment of a task, satisfaction, and improves their performance. In contrast, as mentioned earlier, a lack of autonomy reduces individuals’ motivation and satisfaction (Chen, 2012; Gagne, Koestner, & Zuckerman, 2000; Wright & Davis, 2003).

Because employees care about job conditions such as job involvement and satisfaction, Hackman and Oldman (1980) propose that job satisfaction can be increased depending on the skill variety, identity, responsibility, feedback, and significance of the
job. Engaging with industry stakeholders and members of the public can increase employees’ skills, identity, feedback, responsibility, and the significance of the job. For instance, a technological innovation can be developed by an industry, and public employees may learn about this innovation via interacting with industry stakeholders. Similarly, a service innovation may be developed by receiving feedback from citizens. These factors affect employees’ self-determination in terms of SDT’s autonomy (e.g. significance of job and skill variety), competence (e.g. feedback and learning best practices), and relatedness (e.g. identity), and thus enhance their job satisfaction.

Comparing public, private, and hybrid sector managers, Wittmer (1991) has found that while higher pay was the most important reward in the business sector, performing work to help others was the most important reward in the public sector. Public sector employees’ interactions with members of the public and industry stakeholders will not only help the former to receive innovative ideas, but these interaction and intrinsic factors can also increase employees’ job satisfaction. Indeed, intrinsic factors and rewards are more important determinants than extrinsic factors for internal motivation and job satisfaction. Research shows that employees who are self-determined and empowered experience higher job satisfaction (Conger & Kanungo, 1988; Fernandez & Moldogaziev, 2015; Greenberger et al., 1989; Spreitzer, Kizilos, & Nason, 1997). Moreover, involving members of the public in the innovation process is closely related to democratic choice (Bernier & Hafsi, 2007), which can positively affect both citizen and employee satisfaction.

Finally, organizations and industries’ engagement with employees, members of the public, and governments enhances employees’ need for relatedness and encourages
them to behave in responsible ways (Campbell, 2007; Six, 2013). In this regard, when public sector employees interact with members of other industries and the public, they can exchange innovative ideas. Because industry stakeholders and members of the public do not undermine employees’ autonomy but can enhance their competence and relatedness, from the SDT standpoint we predict that this involvement is positively related to employee job satisfaction as expressed in the following two hypotheses:

H4: If industry stakeholders are the source of innovation, the impact on job satisfaction will be positive.

H5: If members of the public are the source of innovation, the impact on job satisfaction will be positive.

Methodology

This section will explain the dependent variable, independent variables, control variables, data, and modeling.

Variables

The dependent variable, job satisfaction, is captured by two survey items (work enjoyment and overall job satisfaction). Other studies have used very similar survey items for the variable of job satisfaction (e.g. Kim & Fernandez, 2015; Taylor, 2014). Because correlational coefficients for these items are 0.76, factor scores are used. In addition to validity, the alpha variables of two items are 0.86, supporting the reliability of the items.
Regarding independent variables, this study identifies the five most important actors involved in the innovation process: the Australian government (e.g. ministers); the agency’s senior leadership (outside an employee’s work group); a person or other members of his/her work group; industry stakeholders (e.g. industry/business groups, individual businesses); and members of the public. The response categories for these five actors ranged from 1=not important, 2=somewhat important, and 3=very important.

A number of recent studies have demonstrated that working hours (Aletraris, 2010; Wang & Yang, 2015), cooperation to get the job done (Fernandez & Moldogaziev, 2015), leadership behavior and leadership quality (Braun et al., 2013; Fernandez, 2008), fairness in the organizational process (Fernandez & Moldogaziev, 2015), support for family and work balance (Lindorff, 2011; Wang & Yang, 2015), and satisfaction with remuneration and pay (Fernandez & Moldogaziev, 2015; Lindorff, 2011) affect job satisfaction. Failing to control for these important variables may result in omitted variable bias, so these variables are controlled. Additionally, because employees’ personal factors and job characteristics—such as employees’ education, work location, size of their organization, and their job tenure, such as the length of their service—can affect employees’ job satisfaction (Aletraris, 2010; Chen & Bozeman, 2013; Fernandez & Moldogaziev, 2015; Taylor, 2014; Wang & Yang, 2015), these variables are also controlled to reduce potential bias.

Research has found that salary has a positive effect on job satisfaction (Steijn, 2004; Wang & Yang, 2015). Although the APSC do not provide any information regarding employees’ salaries, job classification level and employees’ salaries are closely associated in the Australian public service, so job classification level is a valid and strong
proxy variable capturing employees’ salaries. Additionally, using the 2008 State of the Service survey data of the Australian Public Service Commission to investigate factors affecting job satisfaction, Lindorff (2011) has found that employees’ job classification level (APS 1-6 which refers to staff, EL 1-2 which refers to middle managers, and SES which refers to senior executives of agencies and ministries) affects their job satisfaction. Thus, job classification level is controlled.

Data and Modeling

Data for this study comes from the 2010-11 survey of Australian Public Service employees, the State of the Service Report. The level of analysis in this paper focuses on individuals. The survey includes questions about innovation, job satisfaction, commitment, turnover intention, and the leadership characteristics of public sector employees working in the Australian federal government. A stratified random sample of 17,326 Australian Public Service (APS) employees was selected for the survey out of a total population of 164,832 federal government employees. Before the survey was distributed, many individuals from all levels of job classification (APS 1-6, EL, and SES) from the Department of Immigration and Citizenship, Department of Defense, Department of Finance and Regulation, Department of Innovation, Industry, and Science, and the Australian Electoral Commission responded to the questions for pilot testing (APSC, 2011a).

4 For instance, the recent Australian Public Service Remuneration Report (2016) shows that an average base salary for the APS 1=$45,953, APS 2=$53,533, APS 3=$60,696, APS 4=$68,122, APS 5=$74,256, APS 6=$86,869, EL 1=$108,160, EL=$136,322, SES 1=$185,092, SES 2=$238,674, and SES 3=$319,884.
Smaller agencies were excluded due to the APSC’s privacy policy of not sharing information on employees from agencies with fewer than 100 employees. Due to Australia’s 1998 Privacy Act, all individual responses from employees are confidential and cannot be shared (APSC 2011b). The weighting of the sampling process was based on the employees’ level of job classification, size of agency, agency, and location (e.g. ACT) (APSC, 2011a, 2011b). This weighting approach allows responding employees to represent the non-responding employees (APSC, 2011a). APSC has implemented many tools to reduce non-sampling error, such as double-checking the recording and coding of all responses.5

The response rate for the survey was 59%, and 9,518 employees answered the question “In the last 12 months, has your work group implemented any innovations?” Employees who answered this question positively also answered questions about the sources of the innovation. Accordingly, 4,903 employees were asked to identify the sources of the innovation. Since there are no meaningful statistical differences between the analyzed and missing-variables samples and the rate of missing data appears to be consistent across all the variables, 3,625 (74%, out of 4,903) responses are included in the analysis while the remaining observations are dropped.

Because the dependent variable, job satisfaction, consists of two variables (overall job satisfaction and work enjoyment), factor scores are used. Both the ordinal logit

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5 In terms of non-sampling errors, the APSC (2011a, 273) stated, “every effort has been made to minimise the non-sampling errors by careful survey design and efficient implementation. In particular, the online survey design minimised the possibility of errors being made in the recording and coding of responses, as the respondents themselves entered the data when responding. In addition, identifiable errors respondents made while completing the survey were removed from the results database.”
models (OLM) and the ordinary least square (OLS) regression are used for the estimation. To check the robustness of the results, unweighted regression results are calculated, but no meaningful differences exist.

Results

This section will discuss the descriptive statistics and the results of statistical analysis. Table 1 shows descriptive statistics. On average, most employees report that they are satisfied with their jobs. Most employees in the sample work in the larger agencies (agencies in which at least 1,000 employees work). Half of the employees’ work location is the Australian Capital Territory. Most of the employees have at least a college degree. Most employees strongly agree that their work group cooperates to get the job done. Employees typically have positive views regarding leadership quality, remuneration, work-life balance, and fairness.
Table 1: Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Satisfaction</td>
<td>3.91</td>
<td>0.79</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>1. Government</td>
<td>1.57</td>
<td>0.75</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2. Leaders</td>
<td>1.98</td>
<td>0.79</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>3. Work group</td>
<td>2.53</td>
<td>0.65</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>4. Industry stakeholders</td>
<td>1.76</td>
<td>0.79</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>5. Members of public</td>
<td>1.49</td>
<td>0.73</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Size of agency</td>
<td>2.63</td>
<td>0.58</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Working in the capital city</td>
<td>0.50</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Job level</td>
<td>1.51</td>
<td>0.62</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Experience</td>
<td>2.78</td>
<td>1.54</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Education</td>
<td>1.58</td>
<td>0.49</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Leadership quality</td>
<td>3.35</td>
<td>1.06</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Working hours</td>
<td>2.25</td>
<td>0.94</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Remuneration</td>
<td>3.48</td>
<td>1.06</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Work cooperation</td>
<td>4.13</td>
<td>0.72</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Work life balance 1</td>
<td>3.72</td>
<td>0.97</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Work life balance 2</td>
<td>3.71</td>
<td>0.92</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Fairness</td>
<td>3.36</td>
<td>1.04</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

N=3,625

Tables 2 reports the results of the OLS and OLM regressions along with t-values. Minor differences exist between the two models. Results show that work groups and members of the public as sources of innovations have positive and significant effects on employees’ job satisfaction while the government, leaders, and industry stakeholders have no statistically significant effect on employees’ job satisfaction. The results of the OLS show that increasing the value of the work group as a source of innovation by one unit increases the predicted value of job satisfaction by 0.09, while increasing the value of members of the public by one unit increases the predicted value of job satisfaction by 0.05, holding other variables at constant. Employees’ job satisfaction increases when the sources of innovation are the employees and members of the public. In contrast, the
innovation sources of the government, leaders, and industry stakeholders do not have any statistically significant effect on employees’ job satisfaction.

Table 2: Unstandardized coefficients for ordinary least squares (OLS) and ordinal logit models (OLM). Dependent variable: job satisfaction

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>t value</th>
<th>OLM</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Government</td>
<td>0.011</td>
<td>[0.54]</td>
<td>0.036</td>
<td>[0.58]</td>
</tr>
<tr>
<td>2. Leaders</td>
<td>-0.016</td>
<td>[-0.81]</td>
<td>-0.027</td>
<td>[-0.48]</td>
</tr>
<tr>
<td>3. Work group</td>
<td>0.090***</td>
<td>[4.19]</td>
<td>0.224***</td>
<td>[3.90]</td>
</tr>
<tr>
<td>4. Industry stakeholders</td>
<td>-0.021</td>
<td>[-1.17]</td>
<td>-0.068</td>
<td>[-1.30]</td>
</tr>
<tr>
<td>5. Members of public</td>
<td>0.051**</td>
<td>[2.61]</td>
<td>0.126*</td>
<td>[2.17]</td>
</tr>
<tr>
<td>Size of agency</td>
<td>0.022</td>
<td>[0.93]</td>
<td>0.064</td>
<td>[0.98]</td>
</tr>
<tr>
<td>Capital city</td>
<td>-0.037</td>
<td>[-1.35]</td>
<td>-0.114</td>
<td>[-1.49]</td>
</tr>
<tr>
<td>Job level</td>
<td>0.038</td>
<td>[1.40]</td>
<td>0.139</td>
<td>[1.80]</td>
</tr>
<tr>
<td>Experience</td>
<td>0.002</td>
<td>[0.20]</td>
<td>0.002</td>
<td>[0.08]</td>
</tr>
<tr>
<td>Education</td>
<td>-0.014</td>
<td>[-0.50]</td>
<td>-0.029</td>
<td>[-0.36]</td>
</tr>
<tr>
<td>Leadership quality</td>
<td>0.151***</td>
<td>[9.19]</td>
<td>0.418***</td>
<td>[9.09]</td>
</tr>
<tr>
<td>Working hours</td>
<td>0.155***</td>
<td>[9.63]</td>
<td>0.445***</td>
<td>[9.56]</td>
</tr>
<tr>
<td>Remuneration</td>
<td>0.02</td>
<td>[1.36]</td>
<td>0.05</td>
<td>[1.22]</td>
</tr>
<tr>
<td>Work cooperation</td>
<td>0.184***</td>
<td>[8.10]</td>
<td>0.572***</td>
<td>[9.49]</td>
</tr>
<tr>
<td>Work life balance 1</td>
<td>0.144***</td>
<td>[7.56]</td>
<td>0.427***</td>
<td>[7.98]</td>
</tr>
<tr>
<td>Work life balance 2</td>
<td>0.117***</td>
<td>[5.75]</td>
<td>0.328***</td>
<td>[5.69]</td>
</tr>
<tr>
<td>Fairness</td>
<td>0.058***</td>
<td>[3.65]</td>
<td>0.156**</td>
<td>[3.29]</td>
</tr>
<tr>
<td>Constant</td>
<td>0.729***</td>
<td>[4.76]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F                     | 48.892       |         | 45.559       |
R²                    | 0.295        |         | 0.1 (pseudo) |
Number of Observations | 3,625        |         | 3,625        |

Note: *** p<0.001, ** p<0.01, * p<0.05

Regarding control variables, the variables leadership quality, working hours, work-life balance, work cooperation, and fairness have high standardized coefficients, suggesting that they have the largest influence on job satisfaction of all the variables in the model. Increasing the value of leadership quality by one unit increases the predicted value of job satisfaction by 0.15, holding other variables constant. Interestingly, on average, the more hours employees work, the higher satisfaction they have. Variables size
of agency, working in the capital city, job level, experience, education, and remuneration do not have statistically significant effects on employees’ job satisfaction.

Finally, to check whether multicollinearity is an issue, the variance inflation factor (VIF) scores are calculated. A multicollinearity problem does not exist as long as the VIF scores are less than 10. The results show that the mean VIF score is 1.31. The highest VIF scores are 1.71 for work-life balance 2, 1.66 for job level, and 1.61 for work-life balance 1. The rest of the VIF scores are less than 1.5, indicating that VIF is not an issue in this study.

**Discussion**

Research on public sector innovation is still limited. To the best of our knowledge, this article is the first large-scale empirical study focused on public organizations to link the sources of innovation with employee attitudes (e.g. job satisfaction). Results show that ideas for innovation coming from employees and members of the public are positively associated with employee job satisfaction. These findings are consistent with self-determination theory (SDT) because these two sources enhance employees’ self-determination (e.g. their autonomy). Ideas for innovation coming from the government, organizational leaders, and industry stakeholders do not meaningfully affect employee job satisfaction.

Research on public management and public sector innovation have not made much use of theory and have made few theoretical contributions. However, Bloch and Bugge (2013, 134) suggest, “despite the scarcity of literature on innovation in the public sector, the insights derived from other strands of theory may be relevant and help shape
thinking about public sector innovation.” In this regard, SDT may provide insight into the relationship between sources of innovation and employees’ job satisfaction. SDT suggests that individuals seek to satisfy three psychological needs: autonomy (referring to control by individuals themselves); competence (referring to the experience of mastery); and relatedness (referring to interacting and connecting with other people). SDT states that an individual’s motivation and satisfaction is higher as long as their autonomy, relatedness, and competence are enhanced. This paper claims that sources of innovation affect employee job satisfaction because the different sources impact employee self-determination differently.

Empirical results show that employee work groups and members of the public as sources of innovation increase employee job satisfaction because these sources enhance employees’ autonomy, competence, and relatedness. The Australian government and organizational leaders as sources of innovation do not statistically impact innovation because while these sources may hinder autonomy, they may enhance competence and relatedness. Industry stakeholders as sources of innovation do not statistically affect employee job satisfaction. It may be the case that if employees feel that they are forced to connect with industry stakeholders, reducing their self-determination, than their satisfaction does not increase. Unfortunately, the documents published by the Australian government do not provide much information about the nature of industry stakeholders as a source of innovation. Therefore, we need more studies regarding industry stakeholders as a source of innovation.

Overall, one of the biggest challenges for organizations and organizational leaders is how to motivate and satisfy employees. Since the early twentieth century, scholars
have made proposals and suggestions in terms of how to improve employees’ motivation and satisfaction in the workplace. Because public organizations are bound by rules in terms of human resource policies and the structures of public organizations are more rigid than those of private organizations (e.g. the pay system in public organizations does not offer monetary rewards and attractive salaries to outstanding employees) (Kelman, 2007; Wilson, 2000), public organizations need to find methods to increase employees’ satisfaction other than external rewards. While focusing on SDT, this paper finds that employees’ work groups are very effective sources of innovation for increasing employee job satisfaction. Likewise, intrinsic factors are more effective tools to increase employees’ satisfaction, particularly considering that using external approaches to improve employees’ motivation and satisfaction are limited. For instance, results from Table 2 show that remuneration, which is an external factor, does not statistically affect employee job satisfaction, which is consistent with the SDT. Likewise, leadership quality, work-life balance, work cooperation, and fairness are internal factors, and all of these factors positively impact employee satisfaction, which is also consistent with SDT.

Increasing employees’ self-determination, such as their autonomy and participatory decision-making, does not conflict with management and control. Providing employees with autonomy and participation in decision-making can help to build trust, cooperation, and even democracy. Kearney and Hays (1994, 50) state, “By fostering a new cooperative spirit between public management and public employees, organizational democracy becomes a natural extension of dominant societal values, and represents a promising new chapter in the American democratic experience.” As a result, future studies may continue analyzing the effects of self-determination on other interesting
variables, such as performance. Future studies on innovation may also use other theoretical frameworks (e.g. self-efficacy and goal setting theories) to explain the relationships of innovation, innovation types, barriers to innovation, and sources of innovation to individual and organizational outcomes.

This study has several limitations. First, this research uses the SDT as a framework rather than testing it. Actually, as mentioned earlier, most previous research using SDT has not tested the SDT framework. It is also true for that the data received from the APSC are not sufficient to test the SDT (e.g. the components of autonomy, competence, and relatedness). Thus, instead of testing it, the SDT perspective is used to develop hypotheses. Nevertheless, as Deci, Connell, and Ryan (1989, 583) state, “in the degree to which facilitating autonomy, providing noncontrolling feedback, and acknowledging the subordinates’ perspective are implicit in that response,” suggesting that not testing SDT is not problematic. For more rigorous analysis, researchers may develop extensive data to include survey items capturing autonomy, competence, and relatedness to test SDT in a public organizational setting. Likewise, qualitative studies, such as in-depth interviews, may be conducted with employees and managers about these five sources to determine how and why sources of innovation affect self-determination and thus job satisfaction.

Second, like other studies using cross-sectional data, this study does not make any causal claims. Although correlations exist between some sources of innovation and job satisfaction, we cannot make an argument that some sources of innovation cause job satisfaction. Future research may use panel data to test causal claims. Third, this study is conducted in the Australian Public Service sector; therefore, the findings would be
different if the study was conducted in the public service sector in another country, or in the non-public sector. Future research may use other data from other countries to test hypotheses. Fourth, although several procedural (e.g. efforts by the APSC regarding survey development and design, such as the anonymity of responses) and statistical remedies (e.g. Harman’s single factor test, which shows that one single factor does not emerge in this study) are employed and reveal little evidence of common method bias, it is impossible to eliminate all concern for this bias because only one set of self-reported data (APSC, 2011) are used.

Despite these limitations, the topic of sources of innovation is a relatively unexplored area that is important for innovation research. This is an original empirical study linking studies of innovation and employee attitudes. As Arundel and Huber (2013, 149) explain, “An important issue… [is] where the ideas come from…This question…involves the activities of different levels of staff, ranging from front-line staff to top-level management.” Due to its importance, we need more studies on the sources of innovation. The source of an innovation may affect the success, efficiency, and timeliness of an innovation. Additionally, a particular source may affect employees’ commitment to their organization, their performance, and their job satisfaction, among many other employee attitudes. This paper’s focus was job satisfaction. Future studies may analyze how sources of innovation affect other employee attitudes, such as their affective commitment.
Conclusion

This paper has analyzed the effects of five important sources of innovation on employees’ job satisfaction in the Australian government using self-determination theory (SDT) as a framework. Employees in the Australian public sector have stated that they are the most important source of innovation in Australia. According to employees, the second most important source for innovation comes from their agencies’ senior leadership. After that, industry stakeholders, the Australian government, and members of the public are other important sources of innovation. It is hypothesized that the innovation sources of the Australian government and agencies’ senior leadership do not have any statistical effect on employees’ job satisfaction, because while these sources potentially undermine employees’ autonomy, they can enhance their competence. In contrast, other sources of innovation (such as an employee or her/his work group, industry stakeholders, and members of the public) have a positive effect on employees’ job satisfaction because these sources potentially enhance employees’ self-determination (autonomy, competence, and relatedness). Overall, the findings support all hypotheses, except that it was found that industry stakeholders as a source of innovation do not have any statistical effect on employee job satisfaction. In particular, an employee or her/his work group is a crucial determinant of employee job satisfaction. In sum, while the innovation sources of employees or their work groups and members of the public have a positive effect on employees’ job satisfaction as expected, other sources do not have a statistically meaningful effect on employees’ job satisfaction.
Chapter 4: 3rd Essay

The Effects of Innovation Climate on Turnover Intention: Evidence from the Australian Public Service

Abstract

This paper analyzes the effects of an innovation climate on employee turnover intention in the Australian public service. Turnover is one of the biggest problems for organizations and governments around the world, so governments are seeking strategies to reduce turnover. In this regard, this paper analyzes whether innovation climate can be a solution to reduce turnover. The empirical results of the generalized structural equation models show that without mediators (job satisfaction and affective commitment), an innovation climate has a statistically significant and negative effect on turnover intention. Overall, the findings support the partial mediation models, indicating that an innovation climate has both direct and indirect effects on turnover intention. This paper suggests that policy makers improve the workplace climate to emphasize innovation because doing so can reduce turnover in the public sector and increase the job satisfaction and affective commitment of employees.

Key words: public sector innovation, innovation climate, turnover intention, job satisfaction, affective commitment, Australia, public organizations.
Introduction

Innovation is not an end in itself. Nevertheless, innovation can be a very important means for achieving an end, which in this case would be reducing turnover intention and increasing job satisfaction and affective commitment in organizations. Because innovation is expected to increase performance, governments all over the world have aimed to establish an innovation culture and climate to enhance the performance and effectiveness of governments (Park, Lee, & Kim, 2016). Although only a handful of studies have analyzed the effects of innovation or innovativeness on performance in public organizations (e.g. Damanpour & Evan, 1984; Damanpour, Walker, Avellaneda, 2009; Park, Lee, & Kim, 2016; Walker, 2004), studies of the effects of innovativeness on employee attitudes in the public sector are even more rare. In particular, the importance and effects of innovation climate⁶ remain unknown. For instance, the relationship between innovation climate and turnover intention has not been explored.

Analyzing employee attitudes (e.g. job satisfaction and turnover intention) as outcome (dependent) variables is crucial. For instance, a goal of reforms and innovations in the public sector is to recognize that employees “are not only machine-like parts of the system but more importantly human beings… who implement the reforms and whose knowledge, attitudes, and emotions greatly influence the fate of the reforms” (Yang & Kassekert, 2010, 431). Likewise, Wilson (2000) states that “It is not the organization that’s important, it’s the people in it” (p. 24). Hence, instead of solely focusing on organizational efficiency and performance, organizations must develop humane conditions of work via enriching jobs, providing interesting workplaces, empowering employees, and establishing a climate for innovation. We need studies on how those

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⁶ Although innovative climate is more correct in English than innovation climate, literature on innovation particularly the Australian public service uses “innovation climate” rather than “innovative climate.” Thus, innovation climate is used in this study.
practices affect employee attitudes, such as how an innovation climate affects employees’ commitment to their organization and their turnover intention.

This paper makes at least three contributions. First, one of the biggest problems for the public sector in general and Australia in particular is turnover, due to the financial and unexpected consequences of turnover (Australian Government, 2010; APSC, 2011a, 2012c; 2014a). In this regard, studies have examined for decades how to manage and reduce turnover (Bertelli, 2007; Bluedom, 1982; Bright, 2008; Hur, 2013). Although turnover is a major problem in the public sector, so far no studies have explored the relationship between innovation climate in the workplace and turnover. Thus, this paper tests whether innovation climate may be a solution for reducing turnover in the public sector. It is hypothesized that innovation climate has direct and negative effects on turnover intention.

Second, because turnover and turnover intention can be reduced when employees have high intrinsic motivation (Bertelli, 2007; Kim, 2005), it is possible that innovation climate may not influence turnover intention directly when affective commitment and job satisfaction are present in a model with the roles of mediators. Research suggests that affective commitment and job satisfaction are mediating (or intervening variables) between different independent variables and turnover intention (Currivan, 1999; Iverson, 1992; Kim & Fernandez, 2015; Liu, Liu, & Hu, 2010; Price & Mueller, 1986). For instance, Liu, Liu, and Hu (2010) found that job satisfaction is a mediator between person-organization (P-O) fit and turnover intention, while Kim and Fernandez (2015) found that job satisfaction is a mediator between empowerment and turnover intention. Although more studies exist using job satisfaction as a mediator, only a few papers (e.g. Currivan, 1999) use affective commitment as a mediator. Thus, this paper examines the effects of affective commitment in addition to job satisfaction and tests the effects of two
mediators—job satisfaction and affective commitment—to analyze whether innovation climate is still meaningful and statistically significant when these mediators are present. Thus, this research explores the direct effects of innovation climate on employees’ turnover intention as well as the indirect effects (via job satisfaction and affective commitment) on turnover intention.

Third, innovation and innovation climate in the public sector are very relevant for several reasons. Governments are promoting innovation all around the world. Nasi et al. (2015, 111) states that public sector innovation matters for “the present economic and social crisis, which requires public sector organizations to cope with wicked societal challenges and an increasing demand for high-quality public services, while facing a reduction of available resources.” The Australian government emphasizes innovation in public service more than ever (APSC, 2011a). Via innovation, costs may be reduced, procedures may become more effective, quality may increase, citizens may be more satisfied, collaboration among government agencies may be strengthened, individual and organizational performance may improve, and the job satisfaction of civil servants could improve. There are also innovation awards, consistent with a climate that encourages public sector employees to innovate in the Australian government. Nevertheless, the effects of innovation climate have not yet been explored. Therefore, this study offers at least two insights on the effects of an innovative climate: the effects of innovation climate on turnover intention and the effects of innovation climate on job satisfaction and affective commitment. In fact, we do not know the effects of an innovative climate on employee attitudes such as job satisfaction and affective commitment. This paper also explores the effects of innovation on these outcomes.

Improving conditions for employees in an organization has been a major theme for management scholars since the 1930s, as organizations seek out tools and strategies to improve
employees’ satisfaction and commitment to their organizations (Barley & Kunda, 1992; McGregor, 2006; Patterson et al., 2005). Particularly, organizational commitment, job satisfaction, and organizational culture have been major concerns for organizations since the 1980s (Barley & Kunda, 1992; Judge & Klinger, 2008; Peters & Waterman, 1982). Regarding the elements of human behavior and organizational culture, Wilson (2000, 91) states that all types of organizations have their own culture and climate: “that is, a persistent, patterned way of thinking about the central tasks of and human relationships within an organization…Like human culture generally, it is passed on from one generation to the next…slowly.” As Barley and Kunda (1992, 383) point out, “strong cultures were said to actually enhance autonomy, since well-socialized employees could be trusted to act in the organization's best interest.” In this regard, focusing on employee attitudes is crucial, and this paper aims to link innovation climate and employee attitudes.

The remainder of this research paper is organized into six sections. The following two sections describe innovation climate and turnover intention, respectively. This is followed by hypotheses developed about the relationships among the concepts of innovation climate, job satisfaction, affective commitment, and turnover intention. Then, methods used in the research and the findings of the analysis will be reported. Finally, the last section of the paper discusses results and implications for research and practice.

**Innovation Climate**

Innovation climate is different from whether an organization adopts innovations or not. While the latter is very specific, the former is broader and provides information about whether there are established processes for evaluating ideas, enough budget for innovation, and
organizational and leadership support for innovation. Regarding the latter aspects (whether there is an innovation or not), despite high efforts and a very supportive climate, some innovations may fail, so the ultimate outcome would be no innovation at all. On the other hand, although the organization may adopt an innovation, the innovation may be trivial such that it may not reduce costs, improve process and quality of services, or increase employees’ job satisfaction. In other words, while the adoption of innovation is an important concept and demonstrates an actual innovation, it is very narrow; it does not explain the process of innovation, climate for innovation, the importance placed on innovation, and the individual and contextual roles in innovation. Therefore, this research focuses on the effects of innovation climate instead of the specific innovation itself.

Although “innovation culture” and “innovation climate” can be used interchangeably, they are different concepts. While the former refers to shared values, beliefs, and assumptions that are not clearly measurable, the latter is behaviorally-oriented and measurable (Patterson et al., 2005). For instance, Rainey and Steinbauer (1999, 17) argue that “Culture can be manifest in, and influenced by, symbols, ceremonies, statements, and actions of leaders,” which cannot be clearly measured. Likewise, APSC (2011a, 216) states that an organizational culture typically includes deeper and hidden meanings, in contrast to an organizational climate, which can be measured. Climate also refers to the subjective perceptions and beliefs of employees (Seibert, Silver, & Randolph, 2004), consistent with other employee attitudes. Likewise, while qualitative studies are best to research organizational culture, quantitative studies (e.g. questionnaires) are best for researching organizational climate (Lee, Chen, Tsui, & Yu, 2014). In fact, climate focuses on rewards, supports, expectations (Schneider, 1987, 448) which can be measured by the
battery of survey questions. Thus, this paper’s focus is on innovation climate rather than innovation culture.

Schneider (1975) suggests that management scholars need to find climates for specific aspects of organizations: “[t]he term ‘organizational climate’ should be supplanted by use of the word ‘climate’ to refer to a climate for something…Within the general research area, there may be any number of kinds of climates identified depending upon the criterion of interest” (Schneider, 1975, 472). Although researchers have identified climates for service, procedural justice, safety, and empowerment (see Seibert Silver, & Randolph, 2004), the concept of a climate for innovation has not been well-established despite the importance and necessity of innovation. Hence, there is a need for establishing and analyzing the effects of innovation climate. Innovation climate can reveal employees’ perceptions about organizational and leadership approaches toward innovation. In addition, innovation climate is an organizational characteristic that can be manipulated to reduce turnover and increase job satisfaction. The following section will discuss turnover and turnover intention.

**Turnover Intention**

Turnover is considered a crucial organizational problem, so it is believed that it needs to be reduced in organizations and the OECD countries (APSC, 2012c; Äijälä, 2001; Bertelli, 2007; Hur, 2013; Staw, 1980). Whereas turnover is expected in any kind of organization (Kellough & Osuna, 1995), predicting employee turnover is crucial for employee planning at all levels of government (APSC, 2012c; Cohen, Blake, & Goodman, 2015; Jung, 2010). According to Hur (2013), turnover has become an important problem in the public sector since baby boomers have started retiring, and human capital is considered a significant issue. Turnover was not considered
a major threat to organizations until the 1980s. In fact, the importance of performance and
innovation have been studied since early organizational theory and in the work of early
organizational behavior scholars (e.g. Burns & Stalker, 1961; Lawrence & Lorsch, 1969;
Thompson, 1967), yet turnover is a relatively recent topic of study, which suggests that more
studies on turnover are needed simply because we do not yet have much knowledge of turnover.

Organizational behavior scholars consider turnover as a consequence of organizational
and individual employee characteristics (e.g. Kellough & Osuna, 1995; Mobley, 1982; Price,
1977). Although in some cases turnover might be beneficial for minimum wage service jobs due
to low salaries, low training costs, and part-time opportunities (Bluedom, 1982), most scholars
have discussed the negative impacts of turnover. For instance, turnover has organizational costs,
including costs for hiring and training, as well as reducing the productivity of employees (APSC,
Bluedorn (1982) in particular discusses three reasons why managers consider turnover
problematic: manager socialization (e.g. managers learn from their training, experiences, or
books that turnover is bad for the organization); the social meaning of turnover (e.g. the
employee has rejected the organization, and managers do not want to be rejected); and the
economic cost (e.g. severance pay to the employee who left, replacement costs such as
advertising, orientation, training, and low productivity until the new employee learns the job).
Likewise, according to Bertelli (2007, 236), “The costs of designing and operating a selection
procedure as large as that in the U.S. federal government are certainly consequential, and
turnover thus represents lost investment.” Additionally, turnover may cause turmoil and service
cuts in organizations (Pitts, Marvel, & Fernandez, 2011).
The Australian government aims to reduce turnover in the public sector. Documents published by the Australian government emphasize not only attracting high-quality employees but also reducing turnover and retaining employees (e.g. Australian Government, 2010, APSC, 2011a, 2012c, 2013a). For instance, a report argues that “the private sector is now much more aggressively competing for top end talent which means that the APS has to work harder to secure the best thinkers, managers, regulators and implementers” (Australian Government, 2010, 12) while another states, “Turnover statistics and intention to leave are important lead indicators for assessing future SES capacity” (APSC, 2011a, 15). Finally, “the high cost of replacing employees [average cost is $4,511 and the rage goes up to $11,076] makes it important for agencies to have strategies in place to keep valuable employees” (APSC, 2012c, 174).

Because turnover seems problematic and the Australian government focuses on reducing turnover in the public sector, this paper aims to contribute to turnover research via testing the effects of innovation climate. The annual turnover rate for organizations are on average between 15% and 20% in the Australian public service and the Australian government emphasizing reducing it (APSC, 2012c). Appendix 1 shows engagements (joining the Australian public service) and separations (turnover, or leaving the Australian public service). The figure shows that turnover rate looks stable, but as low as the years of 2001-2004. The following section will present hypotheses.

**Hypotheses**

This paper hypothesizes that innovation climate has direct and indirect effects—mediated by job satisfaction and affective commitment—on turnover intention in the Australian public service. Figure 1 shows the theoretical model of the paper. Innovation climate, job satisfaction,
and affective commitment are treated as latent indicators, meaning they are unobservable constructs; between two to five Likert scale (1 = strongly disagree to 5 = strongly agree) observable survey questions measure them. The turnover intention is treated as an observable binary variable (whether employees intend to leave their organizations). Both of the concepts are employee attitudes.

**Figure 1: Theoretical Model**

![Figure 1: Theoretical Model](image)

This paper uses the framework of innovation climate based on the APSC, which also provides this study’s data. Australia’s 2011 State of the Service Report defines innovation climate as “the opportunity to be innovative, understanding the processes supporting innovation, the leadership climate, and the individual’s contribution to workplace innovation” (APSC, 2011a, 214). According to the APSC (2012a), innovation climate has five elements: managers’
support of employees when employees suggest new ideas, established processes for evaluating employees’ ideas, providing employees with enough resources and time to try new ideas, encouraging innovation and creativity in the workplace, and a workplace that shares and distributes employees. Each of these five elements are crucial for innovation. For instance, Klein and Sorra (1996) state that a supportive organizational climate include organizational process, activities, and behaviors which are rewarded and expected. APSC’s five elements are consistent with Klein and Sorra’s arguments (e.g. established processes for evaluating employees’ ideas). In fact, a supportive innovation climate includes leadership support, incentives, recognition, and resources (Torugsa & Arundel, 2016; see also Lee, Chen, Tsui, & Yu).

From a practical viewpoint, Chenok et al. (2013) suggest that to foster an innovative climate, organizations and organizational leaders need to appeal to internal and external stakeholders for innovations, offer incentives for trying, allow people to fail, create mechanisms for innovation, and institutionalize innovations. In this regard, the APSC’s criteria for an innovation climate are consistent with practitioners’ perspectives; all five steps are crucial for innovation climate and innovative behavior. Likewise, Doug McTaggart, the Chairman of the Queensland Public Service Commission in Australia, states that without explicit support from politicians and the government, innovations and reforms cannot occur (McTaggart & O’Flynn, 2015). Thus, providing resources and support are very important for creating an innovation climate, and an innovation climate is very important for employees’ job satisfaction and affective commitment. Innovation climate, in this regard, is crucial for organizational success because an innovative climate will lead to productivity and effectiveness (Wynen et al., 2014). Higher productivity and effectiveness tend to increase satisfaction and commitment.
Although there are fewer studies linking innovation climate and employee attitudes, many studies exist analyzing the relationship between innovation climate items and employee attitudes. Borins (2002, 475) states that “Creating a supportive climate would entail consulting staff, instituting formal awards and informal recognition for innovators, promoting innovators, protecting innovators from control-oriented central agencies, and publicly championing bottom-up innovations that have proven successful and have popular appeal.” When organizations and organizational leaders support employees when employees suggest new ideas, share employees’ ideas, encourage innovation, and provide enough resources and time, employees tend to report higher satisfaction with their jobs and higher commitment to their organizations. In fact, theoretical frameworks of perceived organizational support (POS) and employee engagement claim that when organizations value employees’ contribution, care about them, provide access to resources and the opportunities, employees become more satisfied with their jobs and have higher commitment to their organizations (Harter, Schmidt, & Hayes, 2002; Rhoades, Eisenberger, & Armeli, 2001), consistent with the dimensions of innovation climate.

Investigating 8,126 employees in a large government agency in the United States, Johnson and McIntyre (1998) have found that different elements and aspects of organizational culture and climates such as job involvement, recognition, creativity, innovativeness, and effective communication are positively and strongly correlated with employees’ job satisfaction. Similarly, climate elements such as fairness, autonomy, recognition, leadership support, and innovative behavior can positively affect job satisfaction (Koys & DeCotiis, 1991). One study has found that the nature of work and professional development opportunities such as creativity, exciting and innovative work, established and clear organizational processes, and providing enough time and resources for trying new ideas determine job satisfaction (Abdulla, Djebarni, &
Mellahi, 2011). An innovative and group-oriented organizational climate (e.g. managers and organizations encourage a focus on innovation, new management processes are tried and used in the organization, resources are provided for innovation) increases both internal and external job satisfaction of employees (Lee & Chang, 2008). Lee, Chen, Tsui, and Yu (2014) have found that innovation climate positively influenced employee job satisfaction for employees working in international hotels in Taiwan. In fact, innovation climate is an important (if not the only) factor determining job satisfaction (Lee, Chen, Tsui, & Yu, 2014).

An organizational climate that increased employees’ job satisfaction also increased employees’ organizational commitment and their willingness to contribute to the organization’s success (Johnson & McIntye, 1998, 849). A positive psychological climate including receiving support from managers and resources and encouragement for innovation can also increase organizational commitment (Koys & DeCotiis, 1991). Another study found that an innovation climate can increase affective, normative, and continuance commitments to the organization as well as innovation (Cantwell, 2010). An ethical work climate, effective employee communication, and trust among organizational members can be positively correlated with commitment (Ruppel & Harrington, 2000). Researching the organizational commitment of K-12 teachers in the United States, Holliman (2013) has found that innovation characteristics such as rewards, resources, time, recognition, and creativity are positively associated with the organizational commitment of teachers.

As a result, innovation climate can be a meaningful tool for the public sector to improve employee conditions because via innovation, jobs can be enriched, employees are empowered, and work becomes more interesting. Employee empowerment as a cognitive state (i.e. meaning, self-determination, competence, and impact) can lead job satisfaction and commitment
Thus, employees tend to have higher job satisfaction and commitment to their jobs when a supportive climate for innovation exists. Finally, because innovation climate is consistent with participative management, the latter tends to increase personal development, employee satisfaction, and organizational commitment (Kearney & Hays, 1994). These ideas lead to the following hypotheses:

**H1:** Innovation climate has a positive effect on job satisfaction.

**H2:** Innovation climate has a positive effect on affective commitment.

Although there is a limited literature suggesting that actual innovation can impact employee turnover (e.g. Avgar, Givan, & Liu, 2011), we know little about the effects of innovation climate on turnover intention in the public sector. Little research about the effects of innovation climate on turnover exists, so we can make predictions based on the effects of the elements of an innovation climate. Innovation and a supportive climate for innovation in an organization can reduce economic, political, and social problems and even make corrective actions (Rowe & Boise, 1973). The elements of an innovation climate such as participatory management, opportunities for advancement (e.g. providing enough time and resources), and supportive leadership can help to reduce turnover in the public sector (Kim, 2005). From the employee engagement and job engagement frameworks, when employees have support, resources, and opportunities, they tend to engage to their work and thus lower level of turnover (Harter, Schmidt, & Hayes, 2002). Employee empowerment practices which include whether employees receive information, support, and rewards negatively impact turnover intention (Kim
& Fernandez, 2015). In fact, supportive organizational climate and leadership support for employees tend to reduce turnover, conflict, and absences (Kearney & Hays, 1994). Likewise, when organizations focus on their employees’ well-being and development—a part of innovation climate—employees tend to stay in their jobs (e.g. Arthur, 1994; Jiang et al., 2012; Knox, 2014). Last but not least, predictability, such as establishing processes for evaluating employees’ ideas, can also reduce turnover. Thus, the following hypothesis:

H3: Innovation climate has a negative effect on turnover intention.

Research on organizational behavior consistently shows that job satisfaction tends to reduce turnover intention (Bright, 2008; Hom, Katerberg, & Hulin, 1979; Hulin, 1966, 1968; Hur, 2013; Locke, 1976; Mobley, 1977; Kim & Fernandez, 2015; Pitts et al., 2011; Vroom, 1994). Likewise, most studies demonstrate that commitment and turnover are negatively correlated (Angle & Perry, 1981, 1983; Meyer et al., 2002; Steers, 1977; Kim & Fernandez, 2015) and that commitment is a good predictor of employee turnover (Koch & Steers, 1978; Steers, 1977; Meyer, Becker, & Vandenberghhe, 2004; Meyer et al., 2002). From the frameworks of self-determination theory (SDT) and job engagement, when work becomes more interesting and meaningful and employees have autonomy, employees tend to have higher satisfaction with the job and commitment to the organization. In fact, organizational commitment and job satisfaction can enhance employee self-determination, which in return reduce turnover intention (Cuskelley & Boag, 2001; Knox, 2014). Similarly, employee engagement framework supports that when employees have satisfaction and commitment to their organizations, they tend to stay in their organizations instead of leaving their organizations (Harter, Schmidt, Hayes, 2002).
Testing the exit-voice-loyalty-neglect framework, researchers have found that dissatisfied and employees are expected to leave their organizations (e.g. Rusbult, Farrell, Rogers, & Mainous, 1988; Withey & Cooper, 1989). Harrison, Newman, & Roth’s meta-analysis (2006) and Canterelli et al.’s meta-analysis demonstrate that both job satisfaction and organizational commitment reduce turnover. Bowen and Lawler (1992, 33) state that “when employees have a sense of control and of doing meaningful work they are more satisfied which leads to less absenteeism and lower turnover.” One meta-analysis of commitment shows that affective commitment and absenteeism is negatively and strongly correlated (Meyer, Stanley, Hrecovich, & Topolnytsky, 2002). Williams and Hazer’s causal models (1986) also support the view that commitment reduces turnover intention. Morrison (1993) has found that job satisfaction and turnover intention are highly correlated and that the former reduces the latter. As a result, employees who have an affective commitment to their organizations tend to stay in their organization because they think of their organization as a family and feel connected to their organization. Thus, higher satisfaction and commitment can reduce turnover intention.

H4: Job satisfaction has a negative effect on turnover intention.

H5: Affective commitment has a negative effect on turnover intention.

Commitment and job satisfaction are positively and very strongly correlated (Canterelli et al., 2015). More specifically, this paper argues that job satisfaction causes affective commitment but that organizational commitment does not cause job satisfaction, because both theoretically and conceptually job satisfaction causes commitment rather than the other way around (see
Buchanan, 1974; Currivan, 1999; Ho, Chang, Shih, & Liang, 2009; Lincoln & Kalleberg, 1985; Williams & Hazer, 1986). Investigating organizational change, job satisfaction, and organizational change in employees working in 30 different organizations in the United Arab Emirates, Yousef (2000)’s path analysis reveals that affective commitment mediates the influence of job satisfaction and organizational change. A classic study shows that job satisfaction is a very strong determinant and causality of commitment (Buchanan, 1974). Hur (2013, 9) states that “when job satisfaction is at a lower level, employees tend to quit and organizational performance will decrease due to low organizational commitment.” Finally, job satisfaction has a shorter timespan than commitment, meaning that employees can express their job satisfaction more immediately than their commitment because the latter takes more time. Thus, job satisfaction increases organizational commitment.

H6: Increased job satisfaction has a positive effect on affective commitment.

Methodology

Variables and Measures

The dependent variable, turnover intention, is operationalized as a binary survey item to capture whether employees want to leave the agency in a year or otherwise. The original survey item is the following: “Which of the following statements best reflects your current thoughts about working for your agency?” Responses include 1 = “I want to leave my agency as soon as possible”, 2 = “I want to leave my agency within the next 12 months”, 3 = “I want to stay working for my agency for the next one to two years”, and 4 = “I want to stay working for my agency for the next two years”.
agency for at least the next three years.” Since the paper’s focus is to measure the turnover intention within a year, the response categories of 1 and 2 are combined and considered as “Yes”, and the response categories of 3 and 4 are combined and considered as “No.”

Instead of turnover, turnover intention is used for the analysis due to data limitations. However, most of the turnover studies in the public sector measure turnover intention instead of actual turnover due to the privacy concerns of the APSC and a lack of longitudinal data (e.g. Bright, 2008; Kim & Fernandez, 2015; Pitts et al., 2011). Nevertheless, research consistently shows that turnover intention and actual turnover are highly correlated; turnover intention is a very good proxy capturing actual turnover, and the former is the best predictor of the latter (Currivan, 1999; Harrison, Newman, & Roth, 2006; Mobley et al., 1979; Morrison, 1993; Jung, 2010; Pitts et al., 2011). Thus, turnover intention is also a valid and reliable variable.

The independent variable, innovation climate, is operationalized as five five-scale (from 1 = strongly disagree to 5= strongly agree) survey items. These items are “I receive support from my manager when I suggest new ideas”, “There are established processes for evaluating my ideas”, “Employees in my workplace are provided with enough time and resources to try out new ideas”, “My workplace encourages innovation and the development of new ideas”, and “My workplace shares its ideas and encourages their wider use.” The alpha variables are close to 0.9, suggesting that the scales have high reliability.

This study uses two mediator variables. As mentioned in the introduction part, it has been found that job satisfaction and affective commitment are mediating between different

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7 For sensitivity analysis, the dependent variable is also treated as ordinal (From 1 = I want to leave my agency as soon as possible to 4 = I want to stay working for my agency for at least the next three years). Results show that each of the ordinal models gives poorer fit statistics, so we opt to use turnover as a binary variable. Previous studies also use turnover intention as a binary variable rather than as an ordinal variable (e.g. Kim & Fernandez, 2015; Pitts et al., 2011).
independent variables and turnover intention. In other words, there is a strong theoretical support for using job satisfaction and affective commitment as mediating variables. Additionally, in this study, job satisfaction and affective commitment serve to clarify the relationship between innovation climate and turnover intention. That means innovation climate positively affect these two mediators, which in turn affects turnover intention.

The first mediator, job satisfaction, is operationalized as two five-scale (from 1 = strongly disagree to 5 = strongly agree) survey items. According to Judge and Klinger, “Job satisfaction is also a latent variable in that it is likely that people's overall attitude toward their job or work causes specific satisfactions to be positively correlated” (Judge & Klinger, 2008, 395). Because two survey items measuring job satisfaction are more reliable than a single survey item of global measure (Kim & Fernandez, 2015; Judge & Klinger, 2008), this paper uses two items, measuring overall job satisfaction and overall job enjoyment. Previously, Currivan (1999) and Kim and Fernandez (2015) have used almost the same two items measuring job satisfaction as this paper, suggesting that these items are already validated and reliable. The scale reliability coefficient is close to 0.9, suggesting that the scales of the two items are very reliable.

The second mediator, affective commitment, is operationalized as three five-scale survey items. Most of the research on organizational commitment focuses on affective commitment because affective commitment is more easily measurable than normative and continuance commitment. In addition, affective commitment and organizational commitment are used interchangeably. Moreover, affective commitment and other employee attitudes such as job satisfaction are strongly correlated whereas normative and continuance commitments and other employee attitudes are not strongly correlated (Jung & Ritz, 2014; Meyer et al., 2002). This paper also uses affective commitment and uses the following three survey items: “I feel a strong
personal attachment to my agency”, “When someone praises the accomplishments of my agency, it feels like a personal compliment to me”, and “I am proud to work in my agency.” The alpha variables are close to 0.9, suggesting that the scales of all three items are reliable.

Previously, Allen and Meyer (1990) have used similar survey items as this paper and Jaros (2007) confirms the validity of these survey items. Jung and Ritz (2014, 472) consider these two items as measuring and capturing affective commitment: “I feel a strong sense of belonging to my agency” and “The fate of my agency is important to me.” Hence, these items are also validated and reliable.

Data

Data comes from the Australian Public Service Commission (APSC)’s 2012 State of the Service Employee Census. A total of 87,214 valid responses were received, representing a response rate of 55%. Since 2012, the APSC has used census (e.g. all public sector employees are asked to participate the survey) instead of random samples from Australian Public Service employees. The APSC states that “The advantages of the census model [APSC 2012 data] was that it included employees from all agencies, provided a comprehensive view of the APS (Australian Public Service) and ensured no eligible respondents were omitted from the survey sample, which removed sampling bias and reduced sample error” (APSC, 2012b, 1). Because this paper’s focus is to determine employees’ turnover intention, employees answering the following question (80,701 employees) are used for the analysis: “Which of the following statements best reflects your current thoughts about working for your agency?” Because there are random missing variables, the final sample is reduced to 74,571 employees. In other words, 92.5% of responses (74,571 out of 80,701 employees) are used for analysis.
Australian public agencies have been using the State of the Service Employee Survey/Census for a decade to monitor and manage agencies’ human talents and employee views. Specifically, the census provides data on employee attitudes to working conditions in the public sector, including leadership, job satisfaction, turnover intention, affective commitment, and innovation. The data are expected to help public sector leaders and managers in Australia to “develop targeted and measurable strategies to improve innovative performance” (APSC, 2011).

**Modeling**

Because the dependent variable, turnover intention, is a binary, generalized structural equation models (GSEM) are used instead of structural equation models (SEM). Modeling a binary variable as continuous could result in biases and out-of-range predictions that would damage the validity of the model. As a result, GSEM needs to be used due to the unbiasedness, quality, and integrity of the research. The measurement model includes both observed indicators (survey items) and latent (theoretical) constructs. Latent variables (intelligence and happiness are common ones in the social sciences) are not directly observable, and several survey items (observed, manifest, or indicator variables) capture the meanings of the constructs (Cho, 2008; Huck, 2011). While confirmatory factor analyses (CFA) show associations between observed and latent factors, SEM or GSEM show hypothesized relations among latent variables (Currivan, 1999).

SEM or GSEM consist of two sub-models. First, the measurement model, which “posits the existence of the study’s latent variables… and asserts that these latent variables manifest themselves in the study’s observed variables” (Huck, 2011, 508). Second, the structural model, which “posits the way in which the latent variables are related to each other… [and] stipulates
which pairs of latent variables have a causal connection” (Huck, 2011, 509). DeHart-Davis (2015) argues that using CFA and SEM has at least two important benefits compared to other techniques. First, measuring latent constructs (in this study, innovation climate, job satisfaction, and affective commitment) corrects for measurement errors. Second, SEM can deal with indirect effects (mediators) effectively and consistently. Additionally, according to Cho (2008, 75), SEM “is a method that effectively incorporates…causal relationship. SEM tests the model by setting up multiple equations, and provides the model fit indices that evaluate whether a given model fits the empirical data well.” Overall, SEM and GSEM are very powerful and effective techniques when the model includes mediators (Kim, 2015; Kline, 2016). Thus, in this study, using GSEM has many advantages compared to other models such as logit models.

**Data Analysis and Results**

Descriptive statistics are reported in Table 1. The mean value of turnover intention is 0.22, showing that most of the employees are not planning to leave their agencies in a year. The mean variables of job satisfaction and affective commitment items are above 3, indicating that employees tend to have more positive thoughts about their job and affective commitment. The mean value of the innovation climate’s third aspect, resource, is 2.83, indicating that employees may not have enough resources for innovation although the value is very close to 3. Most of the employees believe that they receive support when they suggest new ideas.
Table 1: Descriptive Statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnover intention</td>
<td>0.22</td>
<td>0.41</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>IC-support</td>
<td>3.66</td>
<td>0.89</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>IC-process</td>
<td>3.04</td>
<td>0.92</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>IC-resource</td>
<td>2.83</td>
<td>0.99</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>IC-encourage</td>
<td>3.27</td>
<td>0.97</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>IC-share</td>
<td>3.25</td>
<td>0.95</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>JS-overall</td>
<td>3.70</td>
<td>0.92</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>JS-enjoyment</td>
<td>3.76</td>
<td>0.91</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>AC-attachment</td>
<td>3.43</td>
<td>1.04</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>AC-praise</td>
<td>3.29</td>
<td>0.97</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>AC-proud</td>
<td>3.69</td>
<td>0.90</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

IC=Innovation Climate; JS=Job Satisfaction; AC=Affective Commitment

Because Pearson’s correlations assume that the variables in the model are continuous and have a normal distribution, SEM or GSEM having categorical variables violates the assumptions of normal and continuous distribution. Thus, to obtain unbiased and robust estimates, instead of Pearson’s correlation matrix, the polychoric correlation matrix is suggested (Bollen, 2014; Bruin, 2006; Fernandez & Moldogaziev, 2013; Jöreskog & Sörbom, 1996). Polychoric correlations are “especially relevant in confirmatory factor analysis (CFA) when investigating the relationships between ordinal variables using structural equation models” (Holgado–Tello et al., 2010, 154). Likewise, Bartholomew et al. (2008, 257) state that “polychoric correlations are better when the underlying variable model holds, and are generally larger than the Pearson product moment correlations.” On the other hand, polychoric correlations are not perfect, as model assumptions may not be appropriate if a latent variable is entirely discrete (Uebersax, 2015). Holgado–Tello et al. (2010) state that although polychoric correlations are preferable, exploratory factor analysis...
and confirmatory factor analysis conducted with Pearson correlation matrices are also valid. As a result, both Pearson and polychoric correlations are reported in this paper.

**Table 2: Pearson Correlation Scores**

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnover intention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC-support</td>
<td>-0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC-process</td>
<td>-0.22</td>
<td>0.50</td>
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<tr>
<td>IC-resource</td>
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<td>0.45</td>
<td>0.54</td>
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<td></td>
</tr>
<tr>
<td>IC-encourage</td>
<td>-0.28</td>
<td>0.58</td>
<td>0.56</td>
<td>0.63</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IC-share</td>
<td>-0.27</td>
<td>0.53</td>
<td>0.54</td>
<td>0.59</td>
<td>0.77</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>JS-overall</td>
<td>-0.45</td>
<td>0.41</td>
<td>0.31</td>
<td>0.34</td>
<td>0.41</td>
<td>0.38</td>
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</tr>
<tr>
<td>JS-enjoyment</td>
<td>-0.39</td>
<td>0.37</td>
<td>0.27</td>
<td>0.30</td>
<td>0.36</td>
<td>0.33</td>
<td>0.79</td>
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</tr>
<tr>
<td>AC-attachment</td>
<td>-0.39</td>
<td>0.31</td>
<td>0.26</td>
<td>0.28</td>
<td>0.35</td>
<td>0.34</td>
<td>0.50</td>
<td>0.49</td>
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</tr>
<tr>
<td>AC-praise</td>
<td>-0.31</td>
<td>0.27</td>
<td>0.28</td>
<td>0.28</td>
<td>0.33</td>
<td>0.33</td>
<td>0.42</td>
<td>0.40</td>
<td>0.69</td>
</tr>
<tr>
<td>AC-proud</td>
<td>-0.38</td>
<td>0.33</td>
<td>0.28</td>
<td>0.31</td>
<td>0.38</td>
<td>0.36</td>
<td>0.54</td>
<td>0.51</td>
<td>0.73</td>
</tr>
</tbody>
</table>

IC=Innovation Climate; JS=Job Satisfaction; AC=Affective Commitment

**Table 3: Polychoric/Polyserial Correlation Matrix**

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnover intention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC-support</td>
<td>-0.35</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC-process</td>
<td>-0.33</td>
<td>0.56</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC-resource</td>
<td>-0.33</td>
<td>0.52</td>
<td>0.60</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>IC-encourage</td>
<td>-0.39</td>
<td>0.65</td>
<td>0.63</td>
<td>0.71</td>
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<td></td>
</tr>
<tr>
<td>IC-share</td>
<td>-0.38</td>
<td>0.60</td>
<td>0.60</td>
<td>0.66</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>JS-overall</td>
<td>-0.61</td>
<td>0.48</td>
<td>0.36</td>
<td>0.40</td>
<td>0.47</td>
<td>0.44</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JS-enjoyment</td>
<td>-0.53</td>
<td>0.43</td>
<td>0.31</td>
<td>0.34</td>
<td>0.41</td>
<td>0.38</td>
<td>0.87</td>
<td></td>
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</tr>
<tr>
<td>AC-attachment</td>
<td>-0.53</td>
<td>0.35</td>
<td>0.29</td>
<td>0.31</td>
<td>0.39</td>
<td>0.37</td>
<td>0.58</td>
<td>0.56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC-praise</td>
<td>-0.43</td>
<td>0.31</td>
<td>0.31</td>
<td>0.32</td>
<td>0.37</td>
<td>0.37</td>
<td>0.49</td>
<td>0.46</td>
<td>0.75</td>
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</tr>
<tr>
<td>AC-proud</td>
<td>-0.52</td>
<td>0.38</td>
<td>0.32</td>
<td>0.35</td>
<td>0.43</td>
<td>0.41</td>
<td>0.62</td>
<td>0.59</td>
<td>0.81</td>
<td>0.75</td>
<td>1</td>
</tr>
</tbody>
</table>

IC=Innovation Climate; JS=Job Satisfaction; AC=Affective Commitment

Table 4 shows factor analysis while Table 5 shows convergent and discriminant validity assessments. Factor loadings support three separate latent constructs: innovation climate, job
satisfaction, and affective commitment. There are no problems with convergent and discriminant validity.

Table 4: Factor Scores

<table>
<thead>
<tr>
<th>Variables</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC-support</td>
<td>0.604</td>
<td>0.1581</td>
<td>0.2477</td>
</tr>
<tr>
<td>IC-process</td>
<td>0.6633</td>
<td>0.1424</td>
<td>0.1143</td>
</tr>
<tr>
<td>IC-resource</td>
<td>0.7001</td>
<td>0.148</td>
<td>0.132</td>
</tr>
<tr>
<td>IC-encourage</td>
<td>0.843</td>
<td>0.1892</td>
<td>0.1525</td>
</tr>
<tr>
<td>IC-share</td>
<td>0.7958</td>
<td>0.1927</td>
<td>0.1332</td>
</tr>
<tr>
<td>JS-overall</td>
<td>0.2664</td>
<td>0.3106</td>
<td>0.8178</td>
</tr>
<tr>
<td>JS-enjoyment</td>
<td>0.2089</td>
<td>0.3143</td>
<td>0.7756</td>
</tr>
<tr>
<td>AC-attachment</td>
<td>0.1838</td>
<td>0.8083</td>
<td>0.2536</td>
</tr>
<tr>
<td>AC-praise</td>
<td>0.2048</td>
<td>0.7568</td>
<td>0.1588</td>
</tr>
<tr>
<td>AC-proud</td>
<td>0.2228</td>
<td>0.7638</td>
<td>0.2958</td>
</tr>
</tbody>
</table>

IC=Innovation Climate; AC=Affective Commitment; JS=Job Satisfaction

Table 5: Convergent and Discriminant Validity Assessment

Convergent and Discriminant Validity Assessment

| Squared correlations (SC) among latent variables |
|-----------------------------------------------|---------------------------------|-------------------------------|
| Innovation Climate                           | Job Satisfaction                | Affective Commitment         |
| Innovation Climate                           | 1                               |                               |
| Job Satisfaction                             | 0.255                           | 1                             |
| Affective Commitment                         | 0.236                           | 0.417                         | 1                             |

Average variance extracted (AVE) by latent variables

<table>
<thead>
<tr>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation Climate: 0.578</td>
</tr>
<tr>
<td>No problem with discriminant and convergent validity</td>
</tr>
<tr>
<td>Job Satisfaction: 0.788</td>
</tr>
<tr>
<td>No problem with discriminant and convergent validity</td>
</tr>
<tr>
<td>Affective Commitment: 0.696</td>
</tr>
<tr>
<td>No problem with discriminant and convergent validity</td>
</tr>
</tbody>
</table>

Note: when AVE values >= SC values there is no problem with discriminant validity when AVE values >= 0.5 there is no problem with convergent validity
To test the theoretical model shown in the Figure 1, the generalized structural equation model (GSEM) has been analyzed (Table 6; Figure 2). Innovation climate, affective commitment, and job satisfaction are latent variables whereas turnover intention is a binary observable indicator. Because the dependent variable is binary, the weighted least squares mean and variance adjusted (WLSMV) estimator is used. Comparing maximum likelihood (ML) estimation with simulations, Beauducel and Herzberg (2006) have found that WLSMV is superior to ML, particularly when the dependent variable has a few categories. Additionally, “CFI, TLI, and RMSEA indicated superior model fit when based on WLSMV and two and three categories” (Beauducel & Herzberg, 2006, 200). Figure 2 shows all relationships, and Table 6 also reports both standardized and unstandardized coefficients of this model.
Table 6: Results of the Theoretical Model

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unstandardized coefficient</th>
<th>Standardized coefficient</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor loadings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC--&gt; IC 1</td>
<td>1*</td>
<td>0.713</td>
<td>***</td>
</tr>
<tr>
<td>IC--&gt; IC 2</td>
<td>0.979</td>
<td>0.675</td>
<td>***</td>
</tr>
<tr>
<td>IC--&gt; IC 3</td>
<td>1.105</td>
<td>0.712</td>
<td>***</td>
</tr>
<tr>
<td>IC--&gt; IC 4</td>
<td>1.311</td>
<td>0.855</td>
<td>***</td>
</tr>
<tr>
<td>IC--&gt; IC 5</td>
<td>1.212</td>
<td>0.811</td>
<td>***</td>
</tr>
<tr>
<td>JS --&gt; JS 1</td>
<td>1*</td>
<td>0.929</td>
<td>***</td>
</tr>
<tr>
<td>JS --&gt; JS 2</td>
<td>0.899</td>
<td>0.848</td>
<td>***</td>
</tr>
<tr>
<td>AC--&gt; AC 1</td>
<td>1*</td>
<td>0.851</td>
<td>***</td>
</tr>
<tr>
<td>AC--&gt; AC 2</td>
<td>0.841</td>
<td>0.765</td>
<td>***</td>
</tr>
<tr>
<td>AC--&gt; AC 3</td>
<td>0.904</td>
<td>0.888</td>
<td>***</td>
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<td><strong>Effects</strong></td>
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<td></td>
</tr>
<tr>
<td>IC--&gt;JS</td>
<td>0.701</td>
<td>0.52</td>
<td>***</td>
</tr>
<tr>
<td>IC--&gt;AC</td>
<td>0.308</td>
<td>0.221</td>
<td>***</td>
</tr>
<tr>
<td>JS--&gt;AC</td>
<td>0.547</td>
<td>0.532</td>
<td>***</td>
</tr>
<tr>
<td>JS--&gt;Turnover</td>
<td>-0.361</td>
<td>-0.309</td>
<td>***</td>
</tr>
<tr>
<td>IC--&gt; Turnover</td>
<td>-0.215</td>
<td>-0.136</td>
<td>***</td>
</tr>
<tr>
<td>AC--&gt;Turnover</td>
<td>-0.317</td>
<td>-0.28</td>
<td>***</td>
</tr>
</tbody>
</table>

* = The parameter is fixed and not tested. *** p < 0.001

IC=Innovation Climate; JS=Job Satisfaction; AC=Affective Commitment

$X^2=8,470.29$, df $= 39$, RMSEA $= 0.054$, CFI $= 0.951$, TLI $= 0.931$
Chi-square statistic depend on sample size, so when sample size is large, chi-square statistic tests will be significant (Byrne, 2013; Cho, 2008; Morrison, 1993). The sample size of the study is 74,571, which is very high. As a result, instead of chi-square tests, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI) provide more accurate information about fits. Overall, a CFI value higher than 0.9 indicates a good fit while a CFI value higher than 0.95 indicates an excellent fit. Likewise, a RMSEA below 0.08 indicates good fit while a RMSEA below 0.05 indicates excellent fit (Hu & Bentler, 1999; see also Broeck et al., 2010; Fernandez & Moldogaziev, 2013; Kim, Egan, & Moon, 2014). Thus, the selective model (Table 6 & Figure 2), which is supported theoretically,
has very good fit. Additionally, the coefficients are well-supported. Innovation climate increases
the affective commitment and job satisfaction of employees as well as reducing turnover
intention. The effects of innovation climate are higher for job satisfaction than for affective
commitment. Job satisfaction has a higher impact on reducing turnover intention than other latent
variables in the model.

Model Comparisons and Post-Hoc Analysis

The previous section shows that findings of the main (selective) model justify the model
selection as it confirms all the hypotheses and have excellent fit. However, there would be other
models which may fit better than the theoretical model. To test this, different models are
compared and tested. Some of the models include the direct effects of an innovation climate on
turnover intention without job satisfaction, the effects of innovation climate on turnover intention
without direct effects, and the effects of innovation climate with one or both mediators. Different
control variables (e.g. gender, tenure, and education) are also added to the analyses. Results
show that the theoretical model explained in the previous section has better fits, suggesting that
the selective model (Figure 1, 3; Table 6) is preferable to others. Due to page limitations, only
two models will be briefly explained. The first model (Figure 3) does not have direct effects on
turnover intention but includes mediators. The second model (Figure 4) omits the relationship
between job satisfaction and affective commitment. The model fit became worse in these
models.
Figure 3: Without Direct Effect

- Innovation Climate to Job Satisfaction: 0.54***
- Affective Commitment to Turnover Intention: -0.42***
- Job Satisfaction to Affective Commitment: 0.54***

X² = 9,016.435
df = 40
RMSEA = 0.055
CFI = 0.950
TLI = 0.930

Figure 4: Without effect from job satisfaction to affective commitment

- Innovation Climate to Affective Commitment: 0.67***
- Affective Commitment to Turnover Intention: -0.44***
- Job Satisfaction to Turnover Intention: -0.41***

X² = 64,611.171
df = 40
RMSEA = 0.147
CFI = 0.630
TLI = 0.490
Adding and testing different control variables (types of public organizations, tenure, job level, gender, and education) has not improved the theoretical model; on the contrary, the model fits became worse. This is not surprising, because adding control variables in SEM and GSEM models usually does not improve the model fit. For instance, Kim and Fernandez (2015, 13) state that “In our SEM analysis, we were able to statistically control for several variables such as work location, age, gender, minority status, supervisory level, and tenure and found that the results remained the same while the model fit became worse.” In sum, adding control variables does not improve the models in this study, but comparing different subgroups can improve the model fits. Appendix 3 discusses the results of different subgroups (types of public organizations, tenure, job level, gender, and education).

**Discussion**

This study has aimed to test the direct and indirect effect of an innovation climate on turnover intention. GSEM shows that without mediators (job satisfaction and affective commitment), innovation climate has a statistically significant and negative effect on turnover intention. On the other hand, with the mediators, the effects of innovative climate on turnover intention decline, but are still significant and meaningful. The empirical results show that innovation climate can reduce employees’ turnover intention, but that job satisfaction and affective commitments are the main factors influencing employees’ turnover intention. In other words, while innovation climate has a mostly indirect effect on turnover intention via job satisfaction and affective commitment, innovation climate still has an economically meaningful and statistically significant effect on turnover intention. Innovation climate increases both job satisfaction and affective commitment, and job satisfaction and affective commitment reduce turnover intention. The results support the view that innovation climate has both direct and
indirect effects, suggesting that a climate of innovation within an organization can help retain employees directly as well as indirectly through increasing job satisfaction and affective commitment. Thus, this paper supports the partial mediation model.

Considering the size, power, effect, prestige, and budget of public organizations and the concerns of the legitimacy, efficiency, and effectiveness of public services, public sector innovations become crucial. To achieve innovation, innovation climate is necessary, but the latter has a broader scope than the former as the effects of established processes for evaluating ideas and leadership support go beyond innovation. In fact, innovation climate has several dimensions, including leader and organizational support for employees’ innovative ideas, established processes for sharing employees’ ideas, and having enough resources and time for innovation (APSC, 2011a, 2011b, 2012a). All these dimensions are necessary to create innovation climate in an organization. More research is needed not only about public sector innovation in general but also about creating innovation climate in particular.

The findings of this study have several theoretical, practical, and methodological implications. First, one theoretical implication is that innovation climate is consistent with self-determination theory (SDT), empowerment, employee engagement, job engagement, and perceived organizational support (POS), because these theoretical frameworks capture whether employees are given enough time, resources, and support from managers. For instance, SDT suggests that employees need autonomy, competence, and relatedness, so an organization should support these factors (employees’ self-determination) to increase motivation and job satisfaction. Spreitzer, Kizilos, and Nason (1997) argue that work and job satisfaction are probably the earliest outcomes of psychological empowerment and autonomy. An innovation climate that enables employees’ self-determination and empowerment is thus crucial for increasing employee
job satisfaction and affective commitment and reducing employee turnover. Overall, SDT, empowerment, employee engagement, job engagement, and POS support hypothesis 1 (innovation climate → job satisfaction), hypothesis 2 (innovation climate → affective commitment), and hypothesis 3 (innovation climate → turnover). Additionally, the exit-voice-loyalty-neglect framework support hypothesis 4 (job satisfaction → turnover) and hypothesis 5 (affective commitment → turnover). Future search can continue analyzing how innovation climate and these theoretical frameworks are related.

Second, turnover is one of the biggest problems in the Australian public service (Australian Government, 2010; APSC, 2011a, 2012c, 2013a). An important practical implication is that when organizations and organizational leaders focus on creating a supportive innovative climate by providing resources for innovation and supporting employees who give ideas, employees will have higher job satisfaction and commitment to their organizations. Additionally, establishing a climate of innovation can reduce employees’ turnover. Higher job satisfaction and lower turnover relates to higher organizational performance (Hur, 2013), so innovation climate can also improve organizational performance. Thus, politicians and public managers should find ways to reduce turnover, and encouraging innovation climates in organizations can be one solution to this problem.

Third, methodologically, this study is also important for the development of reliable measures of job satisfaction, affective commitment, and—in particular—for measuring innovation climate. For instance, Allen and Meyer (1990) show that their main contribution to research was the improvement of reliable measures of commitment because scholars have paid very little attention to commitment, particularly to measures of affective commitment. Similarly, this paper claims that innovation climate is crucial, and one of the contributions of this paper is
suggesting reliable and validated measures for measuring innovation climate. Thus, the higher alpha values and convergent and discriminant validity assessments of the three latent concepts used in this study (innovation climate, job satisfaction, and affective commitment) show that these concepts and their measures are reliable and valid. As a result, this study validates the constructs of innovation climate, affective commitment, and job satisfaction.

This study is not without limits. One of the limitations of the paper is lack of causality. Because this paper uses cross-sectional data (APSC, 2012a) and no longitudinal data are available due to the privacy concerns of the APSC, one cannot make strong claims about causal inferences. Nevertheless, even if making strong claims about causality is not possible, if hypotheses and the direction of the associations come from theoretical arguments and empirical support exists, the model can be valid (Sun et al., 2012; Wynen et al., 2014). Fortunately, empirical findings support the theoretical framework. Additionally, because SEM and GSEM models are robust and designed for causality, results from SEM are considered valid (Kim & Fernandez, 2015). Thus, future studies can use longitudinal data to make claims about causality.

Second, because APSC’s 2012 data are the only source for the empirical analysis of the paper, common method bias may be an issue. Procedural steps such as the quality of survey, clear survey questions, and confidentiality of respondents are crucial steps to reduce common method bias (Podsakoff et al., 2003). The APSC has made many efforts in census design, census delivery, privacy, anonymity, and confidentiality to make sure that any type of bias is minimized (APSC, 2012b). In addition, “Evidence of discriminant validity provides stronger evidence against the presence of common method variance” (Kim & Fernandez, 2015, 13). Likewise, Sun et al. (2012, 63) state that “the results of the CFAs provide a compelling case for the empirical distinctiveness among variables in the study, and they can mitigate such concerns [common
source bias].” The results show that no problems exist in terms of convergent and discriminant validity (Table 5). Finally, although it is a weak test, Harman’s one-factor test was conducted, showing that a single factor has not emerged from the factor analysis. Despite all efforts, common method bias cannot be eliminated entirely, but it is not a major concern.

Third, the study was conducted within the Australian public service. Public sector employees who work at one of the 101 APS agencies or semi-autonomous public organizations with at least 20 staff were asked to respond to the census (APSC, 2012b). Although the sample size is huge and representative among APS agencies, the findings of this study may not be generalizable to other contexts, including public service in developing countries and private organizations in Australia and other countries. More studies need to be conducted in other settings to see how innovation climate may affect employee attitudes and turnover intention in other settings.

Finally, although many researchers treat turnover intention as a proxy and predictor of actual turnover, turnover intention and actual turnover are different concepts (Cho & Lewis, 2012; Cohen, Blake, & Goodman, 2015; Jung, 2010). Thus, future research may look at actual turnover. However, due to the privacy concerns of public sector organizations, collecting data on actual turnover is a big challenge. Despite the limitations of this research, this study shows the significance of innovation climate for employee attitudes and turnover intention. Future studies can test the effects of innovation climate for other employee attitudes and individual, team, and organizational performance.
Conclusion

This study has examined how innovation climate within an organization could help retain employees directly as well as indirectly through the influence of innovation climate on work-related attitudes. The results show that innovation climate has both direct and indirect effects on turnover intention, suggesting for policy makers that innovation climate can reduce turnover in the public sector. Additionally, an innovation climate has positive and statistically significant effects on both job satisfaction and affective commitment. Therefore, policy makers can use an innovation climate to improve employees’ job satisfaction and commitment to their organizations.
Chapter 5: Conclusion and Future Research

This dissertation includes three empirical essays on public sector innovation. These essays use data from the 2011 and 2012 Australian Public Service Commission (APSC)’s State of the Service Report (APSC 2011b, 2012a). As discussed in the introduction, Australia is an interesting and meaningful setting for exploring public sector innovation because, since the 1980s, the Australian government has emphasized innovation in the public sector. In fact, the Australian government is unique in that it includes a Department of Industry, Innovation, and Science, which coordinates activities to encourage innovation in governments and firms. Furthermore, both government documents (e.g. Australian National Audit Office, 2009; APSC, 2011a, 2012c, 2013; Australian Government, 2009, 2010, 2011) and articles published in the last decade (e.g. Albury, 2011; Bankins et al., 2016; Fernandez & Pitts, 2011; Torugsa & Arundel, 2015, 2016) demonstrate that the Australian federal government and its agencies focus on innovation, creating an innovation climate, and innovativeness.

The level of analysis for each paper is at the individual/group level. The first essay treats innovation as a binary, and innovation complexity as a count variable; this first essay explores five conditions leading to innovation and greater innovation complexity in the public sector. This essay’s framework comes from Sahni, Maxwell, and Christensen’s Unleashing Breakthrough Innovation in Government (2013). The five conditions tested in this paper are experimentation, responding to low-performers, feedback, motivation for a service improvement, and budget constraints. The results confirm all the hypotheses, except for the finding that budget constraints do not affect innovation but do affect innovation complexity. In particular, the conditions for innovation that are controlled by individuals (experimentation and motivation for service improvement) have a high effect on innovation and innovation complexity.
The second essay focuses on the origins of innovative ideas and on how these origins affect employees’ job satisfaction. The source of an innovation is a topic that has not been studied by scholars of management and innovation in relation to employee attitudes. This paper explores the relationship between five different sources of innovation (the government, agency leadership, employees’ work group, industry stakeholders, and a member of the public) and employees’ job satisfaction. This study uses the self-determination theory (SDT) framework to develop and test hypotheses. Innovation originating from employees and members of the public positively affected employee job satisfaction because these sources enhance employees’ autonomy, competence, and relatedness. On the other hand, government and organizational leaders as sources of innovation did not statistically or meaningfully impact employee job satisfaction because these sources hinder employees’ autonomy although they increase their competence.

The third essay examines how a climate of innovation within an organization affects employee turnover intention directly and indirectly through the influence of job satisfaction and affective commitment. Employee turnover is one of the biggest problems for governments, including for the Australian government, so governments around the world are looking for ways to reduce turnover in the public sector. Using Generalized Structural Equation Modeling (GSEM) techniques, this essay tested different causal models for the impact of an innovative climate (independent variable) on two mediators (job satisfaction and affective commitment) and turnover intention (dependent variable). The results show that an innovation climate has an important effect on turnover intention: it reduced turnover intention while increasing the job satisfaction and affective commitment of public sector employees.
**Contribution**

All three essays emphasize the importance of public sector innovation and argue that we need more studies of public sector innovation. Early organizational theorists state that organizations need to be innovative in order to survive and flourish (e.g. Burns & Stalker, 1961; Lawrence & Lorsch, 1969; Thompson, 1967). From an institutional theory perspective, organizations, and particularly public organizations, need to innovate to remain legitimate (Verhoest, Verschuere, Bouckaert, 2007). The innovations and innovative behavior of public employees can also increase trust (Ellonen, Blomqvist, & Puumalainen, 2008) because stakeholders may consider that innovative public organizations are making good use of taxpayers’ money. However, despite the importance of innovation for the survival, performance, and legitimacy of public sector organizations, the factors affecting innovation, innovation complexity, sources of innovation, and an institution’s innovation climate in the public sector are not well-known. In this regard, this dissertation makes several theoretical, practical, contextual, and methodological contributions to the existing knowledge of public administration in general and to the knowledge of public sector innovation in particular.

First, despite increasing research on innovation, most innovation studies do not use a theory or test a theoretical framework. Indeed, many public administration scholars argue that original or interesting theories have not been developed or adopted in the field of public administration/management, highlighting the need for public administration scholars to focus on developing, using, or testing theoretical frameworks (e.g. Bernier & Hafsi, 2007; Denhardt & Catlaw, 2014; Groeneveld et al., 2014; Kelman, 2007; Lynn, 1996; Pollitt & Bouckaert, 2011; Savoie, 1999). All three essays in this dissertation have aimed at making theoretical contributions to the fields of innovation and public administration. The first essay uses and tests
Sahni, Maxwell, and Christensen’s *Unleashing Breakthrough Innovation in Government* (2013) framework. This framework states that experimentation, responding to low performers, feedback, motivation to improve performance, and budget constraints are necessary for innovation. The second essay uses SDT to frame how and why particular innovation sources in the Australian Public Service (APS) impact employee job satisfaction differently. Finally, the third essay uses SDT, empowerment, employee engagement, job engagement, perceived organizational support (POS), and the exit-voice-loyalty-neglect frameworks to develop hypotheses.

Second, this dissertation’s findings can be of use to practitioners. The first essay shows that experimentation, responding to low-performers, feedback, and motivation for a service improvement can increase employees’ innovativeness and help them to implement complex innovations. Particularly, the effects of experimentation and motivation for service improvement are high, suggesting that managers should focus on these two practices to improve innovation in their agencies. The findings of the second essay demonstrate that employees and their workgroups are crucial sources for innovation and that this source can positively affect employee job satisfaction, suggesting that organizational leaders should encourage their employees to be closely involved in organizational innovations. Additionally, ideas coming from members of the public can improve employee job satisfaction, so organizational leaders may encourage public sector employees to communicate with members of public. The findings of the third essay reveal that an innovation climate—the dimensions of which include receiving support from managers when employees suggest new ideas, established processes for evaluating employees’ ideas, having enough time and resources to try new ideas, being encouraged to innovate and develop new ideas, and employees throughout the workplace sharing ideas—can increase employee job satisfaction and commitment as well as reduce employees’ turnover intention. Thus, policy
makers and organizational leaders can work to create an innovation climate (e.g. encouraging employees to innovate) in order to reduce turnover and increase employee satisfaction and commitment to their job and organizations.

Third, this dissertation focuses on innovation in the Australian Public Service (APS). Most public administration and management studies are conducted in the United States or Europe, so there is less attention paid to other contexts such as Australia. The same is true for studies on public sector innovation. This situation is very unfortunate because, as discussed earlier, since the 1980s all levels of the Australian government and public organizations have been emphasizing innovation in the public sector. For instance, the Australian government created the Department of Innovation, Industry, Science, and Research in 2007, which shows that innovation is a priority for the Australian public sector (e.g. Albury, 2011). Likewise, the APSC distributes annual surveys (State of the Service Series) that include questions on innovation and innovation climate. The APSC provides this raw data to the public, yet these surveys have not garnered enough attention from scholars and practitioners. This dissertation not only contributes to empirical studies on innovation within an Australia context, but it also introduces and extends the discussion of innovation in Australian to other settings, so that other scholars and practitioners can learn from the Australian experience (e.g. the reasons why public sector innovations are successful in Australia); the findings of the Australian survey and census provide insights for scholars and practitioners in other countries. Additionally, the introductory chapter of the dissertation discusses and analyzes the significance of the Australian context, explaining the roots of public sector innovation systematically. For instance, this chapter examines the major steps regarding innovation that were taken by the Australian government in response to historical developments.
The findings from the introductory chapter and the three essays are not just unique and insightful; they are also consistent with the existing literature. Australia is a pioneer in implementing public sector innovations and market-based reforms. It is also an English language speaking country and culturally similar to Anglo-Saxon and American traditions, so these countries have similar understandings of and practices for management reforms and innovations. Proposing theoretical reasons for why Australia is very active in the pursuit of innovation is outside of the scope of this dissertation. One possible reason might be that because Australia is geographically isolated from other countries, the country may consider that innovation is more necessary for survival and increased government performance; resource-dependency theory and institutional theories may offer some insights.

Finally, this dissertation makes several contributions in terms of methodologies, including in survey design and the measurement of concepts. Despite the potential of the APS data—in which survey questions capture innovation, innovation climate, employee attitudes (e.g. job satisfaction and affective commitment), performance measurement, performance management, job stress, ethics, bullying, work-life balance, and organizational change—very few empirical studies exist that make use of the APS Employee Survey and APS Employee Census. In this regard, the three essays in this dissertation have developed, measured, used, and tested interesting and meaningful concepts including innovation, innovation complexity, sources of innovation, job satisfaction, affective commitment, innovation climate, and turnover intention by making use of this under-studied data. Other studies using APSC data (e.g. Lindorff, 2011; Taylor, 2016; Torugsa & Arundel 2016a, 2016b) have already validated some of these concepts using the same or very similar survey instruments.
Overall, despite the importance of innovation complexity, sources of innovation, and an innovation climate, few empirical studies that use and test these concepts exist. For instance, on public sector innovation, Torugsa and Arundel (2016b) state, “this paper is the first large-scale empirically based study that explores the nature and incidence of innovation implemented at the workgroup level in the Australian public sector… [and] uses a statistical analysis technique” (Torugsa & Arundel, 2015, 18). Therefore, this dissertation aims to contribute to the methodology of the study of public sector innovation; the three essays in this dissertation aimed to analyze APSC data in meaningful ways using different statistical techniques (e.g. Generalized Structural Equation Models [GSEM]). This aspect is also important because, as Gill and Meier (2000, 195) argue, “Public administration is out of balance relative to other social sciences, and in general it is quite far behind with regard to analyzing data in meaningful ways.” In this regard, theoretically, practically, contextually, and methodologically, this dissertation contributes the field of public administration and to the study of public sector innovation.

**Common Problems and Potential Remedies**

As in many other quantitative studies, five common problems exist throughout these three essays: (1) lack of causality, (2) endogeneity, (3) external validity, (4) common-source bias, and (5) lack of enough contextual variables. First, this dissertation has not been designed as an experimental study (which involves randomization and intervention), or quasi-experimental study (which is similar in experimental design except that they lack the element of random assignment to treatment and control). For instance, the lack of panel data indicates that we cannot measure time-varying changes on an outcome (e.g. innovation and turnover intention). In
fact, this dissertation has not been designed as a program evaluation (e.g. whether introducing a new policy, or changing a policy [intervention] may cause a desired or unexpected outcome).

Likewise, the three empirical essays in this dissertation have not aimed to make statements about causality. Using 2012 APSC cross-sectional data (for the first and third essay) and 2011 APSC cross-sectional data (for the second essay), this dissertation aims to find the relationship between conditions for innovation and innovation complexity (first essay), sources of innovation and employee job satisfaction (second essay), and innovation climate and turnover intention of public sector employees in the APS (third essay). Thus, the results in the essays are not causal, but correlational.

Nevertheless, correlational studies have many advantages over causational studies. Karl Pearson (1900), who invented the Pearson correlation coefficient, argued that causality is an old concept and restricts scholars’ attention to causal events. However, correlational studies make science more useful, applicable, practical, and easy to calculate, and lead to broader scholarship (e.g. the correlation between weight and height seems more interesting than focusing only on the question of which causes which). Therefore, we also need more correlational analyses when the effects of one variable on another variable are not well known (e.g. the effects of sources of innovation on employee job satisfaction).

Second, similar to the first issue, the problem of endogeneity occurs when an explanatory variable (independent variable) is correlated with the error term, which is usually the case when only cross-sectional data is used for analysis. Omitted variable bias, simultaneity, and measurement error are the three most common issues of endogeneity. In either case, when an explanatory variable is correlated with the error term in a regression model, the estimate of the regression coefficients in an estimated model regression (e.g. Ordinary Least Squares) is biased,
meaning that the coefficients (and thus results) may not be correct. Like most other correlational studies, the three essays in this dissertation are also subject to endogeneity, particularly because a strong and valid instrumental variable is not present in the models. Fortunately, theory and theoretical frameworks can handle omitted variable bias. All of the three essays have relied on theory or theoretical models to develop hypotheses which reduces the omitted variable bias. Likewise, all potential variables available in the dataset that may affect the dependent variables in the three essays are added as control variables (e.g. demographics), further reducing the omitted variable bias.

In addition, there could be a problem of simultaneity throughout the essays. For instance, while it is expected that motivation to improve performance is positively associated with innovation in the first essay, innovation can also affect motivation to improve performance. However, similar to the omitted variable bias, simultaneity can also be handled by relying on a theoretical model, at least to some degree. Moreover, measurement error suggests that random and systematic errors that are present and which may affect the coefficients. Random errors do not affect the average value of the variable, so it does not affect the bias. However, systematic errors (e.g. imagine that employees in particular agencies in Australia have just learned that they are unemployed. Then, the APSC starts distributing a survey asking employee to rate their satisfaction with their jobs. This unexpected event in the APS affects employees’ responses in a negative way and may likely causes bias are the errors that may cause bias in measurement. It appears that no major changes in the Australia public service occurred during the time of the survey. For instance, there were no elections or major reorganizations in the Australian government during the survey distribution in 2011 and 2012. More importantly, the APSC, which organizes and distributes the surveys, tested the survey items before distributing them and
hired many economists, econometricians, psychologists, psychometricians, and civil servants with different backgrounds to evaluate and double check the survey instruments, data entry, and all the other statistical procedures, suggesting that measurement error is not an issue in this study. Furthermore, APSC has confirmed that they do not expect any major bias to be present in the surveys and census (e.g. APSC, 2011a, 2012b, 2012c).

Longitudinal analysis can be helpful to establish causality and reduce endogeneity problem. Unfortunately, government data such as the APSC and Federal Employee Viewpoint Surveys (FEVS) in the United States are cross-sectional instead of panel. Regarding FEVS data, Fernandez et al. (2015, 10) state:

To this point, it appears that all of the FEVS have been structured as unrelated cross-sectional surveys. It is unclear whether it is possible to link individual respondents across points in time in the different waves of the FEVS. Most organizational phenomena are processes that span more than a single calendar year, often with feedback loops of various intensities… Longitudinal surveys that generate panel data are almost always superior to cross-sectional surveys for making causal inferences.

This statement is also true for the APSC data. Because the data is not longitudinal in nature, we cannot make causal claims about the findings. Privacy is an important concern for the Australian government, so the APSC may not want to share longitudinal data (APSC, 2011a, 2012b, 2012c). However, “Concerns about confidentiality can be addressed through the
A combination of randomly assigned identification codes” (Fernandez et al., 2015, 10). Thus, the APSC may design longitudinal data for rigorous and causal analyses.

Third, regarding the external validity of the results, this study is conducted in the APS, so the results from these essays may not be generalizable to other settings, particularly to private and non-profit organizations and public organizations in other countries. However, with a very representative and large sample size (representative of the entire public service in Australia), this study is at least generalizable to the entire Australian public service (not only to one agency). Likewise, due to a common language and socio-political heritage, as well as adopting similar types of NPM reforms and innovations, the results of the dissertation may be applicable to the United Kingdom, New Zealand, the United States, and Canada. In other words, some of the findings from the dissertation can be generalizable and insightful for understanding innovation patterns in other settings, perhaps for NPM style reform as these countries share a similar culture, language, level of economic development and financial situation, and adopted similar types of innovations and reforms. Finally, the public and private sectors have a very high level of interaction in Australia; for example, many of the SES come from the private sector or academia. Thus, if these studies were conducted in private organizations in Australia, I expect that the results would not have been very different.

Fourth, because the data are cross-sectional—meaning the date were compiled from one survey (APSC) and was self-reported—common method bias may be a problem for all three essays (Jakobsen & Jensen, 2015; Meier & O’Toole, 2013; Podsakoff et al., 2003; Podsakoff, MacKenzie, & Podsakoff, 2012; Williams & McGonagle, 2016). Common method bias exists because of the way the survey questions are constructed or the way they are asked, so bias is due to the measures of the study itself. Thus, when common source bias is present in a study, the
variance is not from the constructs the measures represent. The question, however, is how severe the common method bias is and how likely it is to affect the results of the three essays. Remedies to minimize the problems of this bias include ex ante and ex post analysis (Podsakoff et al., 2003; Podsakoff, MacKenzie, & Podsakoff, 2012). Regarding the former, the APSC assured the anonymity of respondents, improved the scale items, and validated the survey through hiring econometricians and psychometricians as well as by conducting pilot testing the instrument in several agencies before the survey was distributed to employees (APSC, 2011a, 2012b, 2012c). Regarding the latter, first, Harman’s one factor tests show that a single factor has not emerged from the factor analysis in the essays. Second, higher correlations among variables are typically attributable to the common source bias (Fernandez, 2008). Correlation coefficients in the correlation matrixes in each essay show that correlations among variables are not high, indicating a lack of both multicollinearity and common method bias. Third, the results of the third essay show strong evidence of discriminant and convergent validity. Last but not least, the dependent variables of the second and third essays are employee attitudes and perceptions (job satisfaction and turnover intention), so these are not objective indicators (such as employee performance). In this regard, employee perceptions are less likely to be attributable to the common method bias.

Fifth, another limitation is that the APSC data do not allow the inclusion of many contextual variables (e.g. due to privacy concerns, agency information is not available). Qualitative studies might be helpful here, because qualitative research provides detailed descriptions and in-depth analysis. According to Bamberger (2008), most of management studies lack qualitative data (e.g. interpretative studies and critical postmodern approaches), preventing scholars from generating context theories, such as examining the institutional, organizational, or social factors affecting management research (e.g. change, governance, employee attitudes). He
continues, “For quantitative researchers, this shift might involve giving greater consideration to context oriented, qualitative research and, where relevant, integrating the context-oriented nuances inherent in much of this research into their own theorizing” (Bamberger, 2008, 843). On the other hand, O’Toole and Meier (2015) suggest that scholars of public management can take into account simple/binary contextual factors (e.g. whether a political context is Federalism and whether the bureaucracy is centralized or decentralized) to their quantitative models, without using qualitative methods. The three essays in this dissertation have used several contextual and organizational factors (e.g. organizational size, work location, job classification, types of organizations, and demographics).

Methodologically, studies in the social sciences can be roughly divided into two kinds: empirical and conceptual. Empirical papers can be qualitative, quantitative, or both. The context essay is a conceptual piece of this dissertation. The three essays used in this dissertation have used quantitative methods. Quantitative techniques, particularly statistical analyses, aim to reduce subjectivity by using very representative and large samples, as this dissertation does. Therefore, this study has many advantages over qualitative studies, as the latter use only one or several cases for analysis. However, quantitative techniques do not provide us with in-depth analyses that fully answer the “why” questions. Efforts to analyze innovation using a qualitative approach (e.g. semi-structured interviews) would be very helpful in answering the “why” questions—such as why certain conditions for innovation have a greater effect on innovation complexity, and why different sources of innovation lead to different effects on employees’ job satisfaction—and for understanding more fully how innovation climate affects employee attitudes. Quantitative studies tend to give a broader picture whereas qualitative studies tend to
give detailed answers for narrower research questions. Thus, future research may use qualitative approaches to understand these relationships in greater detail.

Conclusion

Although discussion of public sector innovation exists in the literature, innovation complexity, sources of innovation, and innovation climate have not been studied sufficiently by scholars. The first essay of the dissertation discusses single innovations and innovation complexity. The topic of innovation complexity seems to be a promising research agenda for future work simply because innovations are complex and non-linear; more complex innovations may lead to better outcomes (e.g. higher performance). This essay tests an innovation framework developed by Sahni, Maxwell, and Christensen (2013). Using self-determination theory as a framework, the dissertation’s second essay examines five of the most important sources of innovation. The third essay introduces the concept of innovation climate.

This dissertation starts with an innovation theory and framework with the first essay, moves to combining innovation research (sources of innovation) and organizational behavior (job satisfaction) with the second essay, and ends with the topics of organizational behavior (innovation climate, turnover, job satisfaction, and affective commitment) with the third essay. As a result, this dissertation is unique in the sense that it combines the topics of organizational theory/strategy and organizational behavior. More specifically, this dissertation combines the study of innovation (a topic of organization theory, organizational structure, and strategy) with the study of employee attitudes (topics of organizational behavior), particularly employee job satisfaction and turnover intention. In this regard, this dissertation offers insights for management studies of the public, private, and nonprofit sectors.
Appendix

First Essay

Appendix 1: Operational Definitions Variables

**Dependent Variables**

1) **Innovation**: "In the last 12 months, has your work group implemented any innovations?" (1=Yes, 0=No)

2) **Innovation Complexity**: Number of dimensions affected by the most significant innovation. (1) “Your policy thinking”, (2) “Your services”, (3) “The way you provide services”, (4) “The way you interact with stakeholders”, (5) “Your administrative or organisational processes”, (6) “The way you look at problems or challenge assumptions” (0 = no innovation through 6 = all six dimensions)

**Independent Variables**

1) **Experimentation**

   1: "I have a choice in deciding how I do my work." (1=never through 5=always)

   2: "Employees are provided with enough time and resources to try new ideas." (1 = strongly disagree through 5 = strongly agree)

   3: "My workplace provides opportunities to increase knowledge and experience." (1 = strongly disagree through 5 = strongly agree)

   Cronbach’s alpha: average interitem covariance = 0.30; Scale reliability coefficient = 0.60

2) **Responding to low performers**

   1: "My supervisor appropriately deals with employees that perform poorly." (1 = strongly disagree through 5 = strongly agree)

   2: "My agency deals with underperformance effectively." (1 = strongly disagree through 5 = strongly agree)

   Cronbach’s alpha: average interitem covariance = 0.45; scale reliability coefficient = 0.63

3) **Feedback**

   1: "I receive adequate feedback on my performance to enable me to deliver required results." (1=strongly disagree through 5=strongly agree)
2: "My supervisor provides me with regular and constructive feedback." (1=strongly disagree through 5=strongly agree)

Cronbach’s alpha: average interitem covariance = 0.71; scale reliability coefficient = 0.81

4) Motivation to Improve Performance

1: "My agency motivates me to help it achieve its objectives." (1 = strongly disagree through 5 = strongly agree)

2: "My agency inspires me to do the best in my job." (1 = strongly disagree through 5 = strongly agree)

Cronbach’s alpha: average interitem covariance = 0.77; scale reliability coefficient = 0.84

5) Budget Constraints

1: "Overall, over the last five years or more, how has the work at your current classification level changed in relation to your size of budget?" (1 = decreased greatly through 5 = increased greatly)

Control Variables

Agency size
Number of people working in the agency. (1=Small (<251), 2=Medium (251-1000), 3=Large (1000+))

Female/Gender
Respondent's gender. (1=female, 0=male)

Work Location
Respondent's workplace (1=Australian Capital Territory, 0=Field Office)

Job Level/Classification
Respondent's substantive classification level (1=Australian Public Service 1-6, 2=Executive)

Education
Respondent's highest completed qualification (1=Completed year 12 or below, 2=Completed vocational qualification, 3= Completed tertiary qualifications)

Employment Status
Respondent's basis of employment status (1=Full-time basis, 0=part-time basis)

Job Satisfaction (10 survey indicators, from 1 = strongly disagree through 5 = strongly agree)
"Overall, I am satisfied with my job."
"I enjoy the work in my current job."
"My job gives me a feeling of personal accomplishment."
"I am satisfied with the recognition I receive for doing a good job."
"I am fairly remunerated for the work, such as salary"
"I am satisfied with my non-monetary employment conditions"
"Overall, I am satisfied with my agency."
"I am proud to work in my agency."
"I am satisfied with the opportunities for career progression in my agency."
"I would recommend my agency as a good place to work"

Cronbach’s alpha: average interitem covariance = 0.47; scale reliability coefficient = 0.89

**Agencies' concern for employees' health and wellbeing** (2 survey indicators, all from 1 = strongly disagree through 5 = strongly agree)
"My agency genuinely cares about employees being healthy and safe at work."
"My agency supports employees who are injured or become ill due to work."

Cronbach’s alpha: average interitem covariance = 0.61; scale reliability coefficient = 0.83

**Organizational Performance**
My agency is well managed (1 = strongly disagree through 5 = strongly agree)

**Barriers to Innovation**
“Do you believe there are barriers to implementing innovations in your work place?” (1=Yes, 0=No)

**Access to training and learning**
“My workplace provides access to effective learning and development, e.g. formal training, learning on the job, e-learning, secondment.” (1 = strongly disagree through 5 = strongly agree)

**Receiving individual performance feedback**
“Have you received formal individual performance feedback in your current agency in the last 12 months?” (1=Yes, 0=No)

**Type of Agencies**
Type of agencies respondent's working. (1=Specialist/Professional, 2=Regulatory, 3=Public policy and program design, 4=Small Operations, 5=Large Operations)

**Job Types**
Respondent's current type of work (1=Accounting and finance, 2=Administration, 3=Communications and marketing, 4=Compliance and regulation 5= Engineering and technical, 6=Information and communications technology, 7= Information and knowledge management, 8= Legal and parliamentary, 9= Monitoring and audit, 10=Organizational leadership, 11=People, 12=Science and health, 13=Service delivery, 14=Strategic policy, research, project and program, 15=Other)
### Appendix 2: Correlational Matrix

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Second Essay

Appendix 1: Measures for dependent, independent, and control variables (Data: 2011 Australian Public Service Commission)

Measures, Dependent variable

- Overall, I am satisfied with my job. (1 = strongly disagree through 5 = strongly agree)
- I enjoy the work in my current job. (1 = strongly disagree through 5 = strongly agree)

Correlation coefficient: 0.76
Cronbach’s alpha test, mean interval covariance: 0.63
Cronbach’s alpha test, scale reliability: 0.86

Measures, Independent variables

Thinking of the most significant innovation that was implemented by your work group in the last 12 months; how important were the following sources of ideas or information: (1 = Not important, 2 = Somewhat important, 3 = Very important)

1. The Australian Government (e.g. Ministers).  
2. Your agency’s senior leadership (outside your work group).  
3. You or other members of your work group.  
4. Industry stakeholders.  
5. Members of the public.

Measures, Control variables

Size of agency
Size of agency (1 = Small: 100-250 employees; 2 = Medium: 251-1,000 employees; 3 = Large: >1,000 employees)

Location: Capital
Where is your workplace? (0 = Not in Australian Capital Territory (ACT); 1 = In ACT)

Job Level/Classification
Respondent’s substantive classification level (1 = Australian Public Service 1-6, 2 = Executive, 3 = Senior Executive)

Experience
What is your total length of service in the APS? (1 = Less than 5 years; 2 = 5-10 years; 3 = 10-15 years; 4 = 15-20 years, 5 = 20 years or more)

Education
What is your highest completed qualification? (1 = Up to vocational school; 2 = Bachelor or post)

_Leadership quality_
In my agency, the leadership is of a high quality (1 = strongly disagree through 5 = strongly agree)

_Working hours_
In the last fortnight, how many hours did you work in your current job? (1 = 75 hours or less, 2 = 75-80 hours, 3 = 80-100 hours, 4 = 100 hours or more

_Remuneration_
I am fairly remunerated (e.g. salary, superannuation) for the work I do. (1 = strongly disagree through 5 = strongly agree)

_Work cooperation_
The people in my work group cooperate to get the job done. (1 = strongly disagree through 5 = strongly agree)

_Work-life balance 1_
Considering your work and life priorities, how satisfied are you with the work-life balance in your current job? 
(1 = very dissatisfied through 5 = very satisfied)

_Work-life balance 2_
My workplace culture supports people to achieve a good work/life balance. (1 = strongly disagree through 5 = strongly agree)

_Fairness_
Recruitment and promotion decisions in my agency are fair. (1 = strongly disagree through 5 = strongly agree)
## Appendix 2: Correlation Matrix

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Third Essay

Appendix 1: Engagements and Separations (Turnover) in the Australian Public Service

Data: APSC (2012c, 255)
Appendix 2: Measures for Variables

**Dependent Variable:** Turnover Intention

Which of the following statements best reflects your current thoughts about working for your agency?

Turnover: Yes
I want to leave my agency as soon as possible
I want to leave my agency within the next 12 months

Turnover: No
I want to stay working for my agency for the next one to two years
I want to stay working for my agency for at least the next three years

**Independent Variable:** Innovation Climate (All from 1=strongly disagree to 5=strongly agree)

IC-support: I receive support from my manager when I suggest new ideas.
IC-process: There are established processes for evaluating my ideas.
IC-resource: Employees in my workplace are provided with enough time and resources to try out new ideas.
IC-encourage: My workplace encourages innovation and the development of new ideas.
IC-share: My workplace shares its ideas and encourages their wider use.

**Mediators:** Job Satisfaction & Affective Commitment

*Job Satisfaction:* (From 1=strongly disagree to 5=strongly agree)
JS-overall: Overall, I am satisfied with my job.
JS-enjoyment: I enjoy the work in my current job.

*Affective Commitment:* (From 1=strongly disagree to 5=strongly agree)
AC-attachment: I feel a strong personal attachment to my agency.
AC-praise: When someone praises the accomplishments of my agency, it feels like a personal compliment to me.
AC-proud: I am proud to work in my agency.

**Control Variables**

**Functions/Types of Agencies**
Type of agencies respondent's working. (1=Specialist/Professional, 2=Regulatory, 3=Public policy and program design, 4=Small Operations, 5=Large Operations)

**Tenure**
What is your total length of service in the APS? (1=Less than 1 year, 2=1 to 5 years, 3=5 years or more)

Job Level/Classification
Respondent's substantive classification level (1=Australian Public Service 1-6, 2=Executive Level 1-2, 3=Senior Executive Service)

Workplace
Respondent's workplace (1=Australian Capital Territory, 0=Field Office)

Female/Gender
Respondent's gender. (1=female, 0=male)

Education
Respondent's highest completed qualification (1=Completed year 12 or below, 2=Completed vocational qualification, 3=Completed tertiary qualifications)
Appendix 3: Post Hoc Analysis

Table 7 shows the results of the model based on different types of agencies or agencies’ functions. Specialist agencies provide “specialist support to Government, business, and the public,” regulatory agencies involve “regulation and inspection,” policy agencies involve “the development of public policy,” and smaller operational agencies are those “with less than 1,000 employees involved in the implementation of public policy,” and larger operational agencies are those “with 1,000 or more involved in the implementation of public policy (APSC, 2012b, 9-10). The Australian National Audit Office, Australian Institute of Health and Welfare, and National Archives of Australia are examples of specialist agencies. Australian Securities and Investment Commission, Clean Energy Regulator, and Australian Competition and Consumer Commission are examples of regulatory agencies. The Attorney-General’s Department, Department of Finance and Deregulation, and the Department of Foreign Affairs and Trade are examples of policy agencies. The Australian Financial Security Authority, Australian Trade Commission, and Comcare are examples of smaller operational agencies. Finally, many departments such as the Department of Human Services, Department of Defense, and the Department of Immigration and Citizenship are examples of larger operational agencies. Table 7 shows that the results are similar to each other and little differences exist in terms of different agencies. In addition to types of agencies, this paper also reports employees’ tenure (length of service in their agencies), job levels (APS 1-6, EL 1-2, and SES), location of work (ACT or field), gender, and education to assess how an innovation climate affects turnover intention within particular groups. The results and fit statistics are also very similar. Tables 8-12 report all of the coefficients and fit statistics.
Table 7: Functions/Types of Public Organizations

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<td>-0.30</td>
</tr>
<tr>
<td>IC-&gt;Turnover</td>
<td>-0.10</td>
<td>***</td>
<td>0.16</td>
<td>***</td>
<td>0.10</td>
</tr>
<tr>
<td>AC-&gt;Turnover</td>
<td>-0.26</td>
<td>***</td>
<td>0.18</td>
<td>***</td>
<td>0.31</td>
</tr>
</tbody>
</table>

X²=6,173.663, df = 251, RMSEA = 0.04, CFI = 0.967, TLI = 0.963.
Factor loadings are not shown
Standardized coefficients are reported
*** p < 0.001

Table 8: Tenure

<table>
<thead>
<tr>
<th></th>
<th>Less than 1 year</th>
<th>1 to 5 years</th>
<th>5 years or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate</td>
<td>Significance</td>
<td>Estimate</td>
<td>Significance</td>
</tr>
<tr>
<td>IC--&gt;JS</td>
<td>0.517</td>
<td>***</td>
<td>0.521</td>
</tr>
<tr>
<td>IC--&gt;AC</td>
<td>0.239</td>
<td>***</td>
<td>0.21</td>
</tr>
<tr>
<td>JS--&gt;AC</td>
<td>0.584</td>
<td>***</td>
<td>0.55</td>
</tr>
<tr>
<td>JS--&gt;Turnover</td>
<td>-0.313</td>
<td>***</td>
<td>-0.328</td>
</tr>
<tr>
<td>IC--&gt; Turnover</td>
<td>-0.082</td>
<td>***</td>
<td>-0.134</td>
</tr>
<tr>
<td>AC-&gt;Turnover</td>
<td>-0.349</td>
<td>***</td>
<td>-0.298</td>
</tr>
</tbody>
</table>

X²=5,659.371, df = 145, RMSEA = 0.039, CFI = 0.968, TLI = 0.963
Factor loadings are not shown
Standardized coefficients are reported
*** p < 0.001
Table 9: Job Level

<table>
<thead>
<tr>
<th>Parameter</th>
<th>APS 1-6 Estimate</th>
<th>APS 1-6 Significance</th>
<th>EL 1-2 Estimate</th>
<th>EL 1-2 Significance</th>
<th>SES Estimate</th>
<th>SES Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC--&gt;JS</td>
<td>0.521 ***</td>
<td>0.516 ***</td>
<td>0.482 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC--&gt;AC</td>
<td>0.218 ***</td>
<td>0.223 ***</td>
<td>0.296 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JS--&gt;AC</td>
<td>0.545 ***</td>
<td>0.492 ***</td>
<td>0.465 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JS--&gt;Turnover</td>
<td>-0.314 ***</td>
<td>-0.309 ***</td>
<td>-0.293 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC--&gt;Turnover</td>
<td>-0.123 ***</td>
<td>-0.165 ***</td>
<td>-0.106 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC--&gt;Turnover</td>
<td>-0.288 ***</td>
<td>-0.27 ***</td>
<td>-0.212 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$X^2 = 5,837.815$, df = 145, RMSEA = 0.04, CFI = 0.969, TLI = 0.965
Factor loadings are not shown.
Standardized coefficients are reported
*** $p < 0.001$

Table 10: Workplace

<table>
<thead>
<tr>
<th>Parameter</th>
<th>ACT-HQ Estimate</th>
<th>ACT-HQ Significance</th>
<th>Field Estimate</th>
<th>Field Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC--&gt;JS</td>
<td>0.521 ***</td>
<td>0.517 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC--&gt;AC</td>
<td>0.214 ***</td>
<td>0.233 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JS--&gt;AC</td>
<td>0.555 ***</td>
<td>0.494 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JS--&gt;Turnover</td>
<td>-0.335 ***</td>
<td>-0.298 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC--&gt;Turnover</td>
<td>-0.136 ***</td>
<td>-0.135 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC--&gt;Turnover</td>
<td>-0.264 ***</td>
<td>-0.296 ***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$X^2 = 7021.74$, df = 92, RMSEA = 0.045, CFI = 0.96, TLI = 0.953
Factor loadings are not shown
Standardized coefficients are reported
*** $p < 0.001$
### Table 11: Gender

<table>
<thead>
<tr>
<th></th>
<th>Male Estimate</th>
<th>Male Significance</th>
<th>Female Estimate</th>
<th>Female Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC--&gt;JS</td>
<td>0.54</td>
<td>***</td>
<td>0.501</td>
<td>***</td>
</tr>
<tr>
<td>IC--&gt;AC</td>
<td>0.21</td>
<td>***</td>
<td>0.231</td>
<td>***</td>
</tr>
<tr>
<td>JS--&gt;AC</td>
<td>0.549</td>
<td>***</td>
<td>0.517</td>
<td>***</td>
</tr>
<tr>
<td>JS--&gt;Turnover</td>
<td>-0.338</td>
<td>***</td>
<td>-0.285</td>
<td>***</td>
</tr>
<tr>
<td>IC--&gt;Turnover</td>
<td>-0.147</td>
<td>***</td>
<td>-0.126</td>
<td>***</td>
</tr>
<tr>
<td>AC--&gt;Turnover</td>
<td>-0.246</td>
<td>***</td>
<td>-0.309</td>
<td>***</td>
</tr>
</tbody>
</table>

Model Fit: $X^2=4,809.156$, df = 92, RMSEA = 0.037, CFI = 0.973, TLI = 0.967  
Factor loadings are not shown  
Standardized coefficients are reported  
*** $p < 0.001$

### Table 12: Education

<table>
<thead>
<tr>
<th></th>
<th>High school or less Estimate</th>
<th>High school or less Significance</th>
<th>Vocational Estimate</th>
<th>Vocational Significance</th>
<th>Tertiary and above Estimate</th>
<th>Tertiary and above Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC--&gt;JS</td>
<td>0.521</td>
<td>***</td>
<td>0.509</td>
<td>***</td>
<td>0.527</td>
<td>***</td>
</tr>
<tr>
<td>IC--&gt;AC</td>
<td>0.224</td>
<td>***</td>
<td>0.228</td>
<td>***</td>
<td>0.218</td>
<td>***</td>
</tr>
<tr>
<td>JS--&gt;AC</td>
<td>0.54</td>
<td>***</td>
<td>0.532</td>
<td>***</td>
<td>0.526</td>
<td>***</td>
</tr>
<tr>
<td>JS--&gt;Turnover</td>
<td>-0.303</td>
<td>***</td>
<td>-0.303</td>
<td>***</td>
<td>-0.318</td>
<td>***</td>
</tr>
<tr>
<td>IC--&gt;Turnover</td>
<td>-0.114</td>
<td>***</td>
<td>-0.144</td>
<td>***</td>
<td>-0.138</td>
<td>***</td>
</tr>
<tr>
<td>AC--&gt;Turnover</td>
<td>-0.296</td>
<td>***</td>
<td>-0.29</td>
<td>***</td>
<td>-0.27</td>
<td>***</td>
</tr>
</tbody>
</table>

$X^2=6,007.826$, df = 145, RMSEA = 0.04, CFI = 0.966, TLI = 0.961  
Factor loadings are not shown  
Standardized coefficients are reported  
*** $p < 0.001$
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Nasi, Greta , Maria Cucciniello, Valentina Mele, Giovanni Valotti, Raffaele Bazurli, Hanna de Vries, Victor Bekkers, Lars Tummers, Mila Gascó, Tamyko Ysa,


Wynen, Jan, Koen Verhoest, Edoardo Ongaro, Sandra Van Thiel, and in cooperation with the COBRA network. 2014. "Innovation-Oriented Culture in the Public Sector: Do managerial autonomy and result control lead to innovation?" *Public Management Review* 16 (1):45-66.


Curriculum Vitae

MEHMET AKIF DEMIRCI O GLU
Indiana University, School of Public & Environmental Affairs (SPEA)
Office: 412, 1315 East Tenth Street, Bloomington, IN 47405. USA
mdemirci@indiana.edu

EDUCATION

Indiana University, Bloomington
School of Public and Environmental Affairs
PhD in Public Affairs
Majors: Public Management (SPEA); Public Policy Analysis (SPEA)
Minors: Business (Kelley School of Business); Quantitative Methods (Sociology); Public Policy & International Relations (Political Science)
Dissertation: Three Essays on Public Sector Innovation.
Committee: Sergio Fernandez (Chair), Claudia Avellaneda, Barry Rubin, Lois Wise.

Indiana University, Bloomington
School of Public and Environmental Affairs
Master of Public Affairs
Concentrations: Public Management; Comparative & International Affairs

Kocaeli University, Turkey
BS in Political Science and Public Administration (with Honors) (5 year program)

Anadolu University, Eskisehir, Turkey
Associate Degree in Public Relations (Second Degree)

RESEARCH AND TEACHING INTERESTS

Public management, organization theory, organizational behavior, public sector innovation, employee attitudes, public management reforms, social media in public organizations, quantitative methods.

RESEARCH

Peer-Reviewed Publications


Editor-Reviewed Publications


**Unpublished Reports**


**Other Publications**


**Manuscripts Invited for Revise & Resubmit**

1) Mehmet Akif Demircioglu and David Audretsch. Conditions for Innovation in Public Sector Organizations (Invited to third round of revision by *Research Policy*).

2) Mehmet Akif Demircioglu. The Effects of Innovation Climate on Turnover Intention: Evidence from the Australian Public Service (Revise & Resubmit by *Public Administration Review*).

3) Mehmet Akif Demircioglu. Big Questions in Public Sector Reforms (Revise & Resubmit by *Public Administration*).

4) Mehmet Akif Demircioglu. The Effects of Empowerment Practices on Barriers to Innovation: Evidence from the Australian Public Service (Revise & Resubmit by *Administration & Society*).

**Manuscripts under Review**

1) Mehmet Akif Demircioglu. Examining the Effects of Social Media Use in the Public Sector: Testing Self-Determination Theory (under review by *Public Performance & Management Review*).

2) Mehmet Akif Demircioglu, David Audretsch, and Timothy F. Slaper. The Effects of Sources of Innovation on Innovation Type: Firm-Level Evidence from the United States (under review by the *Industrial and Corporate Change*).

3) Mehmet Akif Demircioglu. How Does Social Media Usage Affect Employees’ Intrinsic Job Motivation? Evidence from the Public Sector? (under review by *Public Personnel Management*).

4) Mehmet Akif Demircioglu and David Audretsch. How Do Universities Affect Innovation Complexity and Perceived Benefits to Innovations in the Public Sector? (under review by *Public Management Review*).
Book Reviews


Working Papers

3) Mehmet Akif Demircioglu. The Effects of Sources of Innovation on Employee Job Satisfaction. Evidence from the Public Sector.
5) Mehmet Akif Demircioglu. Revisiting Public Management Reforms: Why Do Institutional Theories Persist?

TEACHING

SOLE INSTRUCTOR

- V580 (graduate): Research in Public Affairs (Summer 2015)

TEACHING ASSISTANT

- V450/V550 (undergraduate & graduate) SPEA in Turkey: Oversees Program in Turkey, Barry Rubin (Summer 2015). This program was initiated by the former SPEA Dean Charles Bonser and Mehmet Akif Demircioglu
- V336 (undergraduate) Managing Behavior in Public Organizations, Aleksey Kolpakov (Spring 2012)
- V669 (graduate) Economic Development, Globalization, and Entrepreneurship, Samee Desai (Fall 2011)
- V575 (graduate) Comparative Public Administration & Management, John Karaagac (Spring 2011, Spring 2010)
- V669 (graduate) Globalization, Economic Development, and Entrepreneurship, John Karaagac (Spring 2011, Spring 2010)
- V450 (undergraduate) Public Policy and Political Economy, John Karaagac (Fall 2010, Fall 2009)
- V160 (undergraduate) National and International Policy, John Karaagac (Fall 2010, Fall, 2009)
**AWARDS**

David Gould Merit-Based Scholarship, ASPA Section on International and Comparative Public Administration (SICA).  
Mar 2017

The best paper award in public management/administration from SPEA’s Annual Conference.  
Feb 2017

ASPA Founders’ Fellow.  
Mar 2016

SPEA Roy W. Shin Fellowship ($5,000).  
Feb-Mar 2016

ASPA/CIDE Young Scholarship.  
Aug 2015

SPEA Outstanding Associate Instructor Teaching Award.  
Apr 2015

Indiana University Vice President for Research Pre-Dissertation Grant ($3,300).  
Feb-Mar 2015

Lee Kuan Yew School of Public Policy, National University of Singapore travel grant.  
May 2014

The Maxwell School, Syracuse University, NY, USA Qualitative and Multi-Method Research (IQMR) funded by SPEA.  
Jun 2013

The best paper award in public management/administration from SPEA’s Annual Conference.  
Apr 2012

SPEA conference grant (about $6,000).  
2010-Today

SPEA Overseas Fellowship for study abroad in Germany ($1,000).  
May 2010

The Institute of Public Administration, Riyadh, Kingdom of Saudi Arabia, travel grant ($1,275).  
Nov 2009

The Institute of Public Administration, Riyadh, Kingdom of Saudi Arabia, travel grant ($1,300).  
Nov 2009

SPEA Overseas Fellowship for study abroad in France ($2,000).  
May 2009

Best volunteer of the year from the SPEA, Indiana University.  
Apr 2009

Leadership award from Indiana University, Bloomington campus.  
Apr 2009

Leadership recognition from the Asian Cultural Center at Indiana University.  
Apr 2009

Ranked 1% in the public administration field of the Public Personnel Selection Exam in Turkey.  
2006

Dean’s list, Kocaeli University, Turkey.  
2005-2006

Dean’s list, Kocaeli University, Turkey.  
2004-2005

Republic of Turkish Prime Ministry, Undergraduate Education Fellowship.  
2001-2006

Fellowship and award from Turkey Chamber of Commerce and Industry based on national university entrance exam score (ranked in the 1%).  
2001

**ADDITIONAL STUDIES & VISITING SCHOLARSHIPS**

Yonsei University, Department of Public Administration, Seoul, Korea  
Feb-Mar 2016
Visiting Scholar (Hosted by M. Jae Moon)

4th International Young Scholars Workshop in Public Policy and Administration Research. August 2015
Organized by The American Society of Public Administration (ASPA) and Centro de Investigación y Docencia Económicas (CIDE) in Mexico

Institute of Governance and Policy Analysis (IGPA), University of Canberra, Canberra, Australia Feb-Mar 2015
Visiting Scholar (Hosted by John Halligan)

The Maxwell School, Syracuse University, NY, USA June 2013
Qualitative and Multi-Method Research (IQMR)

Università di Bologna, Forli, Italy July 2011
European Summer School on Social Economy: Social Enterprise and Social Innovation

Hertie School of Governance, Berlin, Germany May 2010
Globalization and Public Policy

Ecole Nationale D’Administration (ENA), Paris, France May 2009
EU in the 21st century

University of Pennsylvania, Philadelphia, PA, USA Feb-Dec 2007
English Language Programs and Academic English (5 certificates)

PROFESSIONAL EXPERIENCES

- **Research Assistant/Associate**, Indiana University, Kelley School of Business, Indiana Business Research Center. Bloomington, IN, USA (May 2016-current)
  - Working on innovation in rural areas in the USA, the innovation index, and literature on innovation and patent applications (funded by the United States Department of Agriculture).
- **Intern & Research Assistant**, Urban Institute, Center on International Development and Governance & Metropolitan Housing and Communities Policy Center, Washington DC, USA (June-Aug 2011). Supervisors: Harry Hatry & Kathie Mark.
  - Worked on a USAID project for Africa and evaluating local government performances in the local governments of Rwanda.
- **Intern**, Division of Strategic Policy Planning and Coordination, Seoul Metropolitan Government, Seoul, South Korea (July-August 2010).
  - Worked on human resource management issues of Seoul City Hall employees; strategic management for Seoul city.
- **Researcher**, Department of Legal and Financial Status, Republic of Turkey Prime Ministry State Personnel Presidency (Office of Personnel Management), Ankara, Turkey (June 2010).
  - Researched on the human research management policies in Turkey.
- **Research Assistant**, City of Indianapolis Development Strategies Project, Institute of Development Strategies, School of Public and Environmental Affairs (SPEA), Indiana University, Bloomington, IN, USA (Spring 2010). Supervisor: David Audretsch.
  - Worked on the economic performance and entrepreneurship of cities.

- **Research Assistant** for a) Southeast European Project and b) Public Policy, Woodrow Wilson International Center for Scholars, Washington, DC, USA (July-Aug 2009).
  - Worked on the public policy and international relations issues.

- **Research Assistant** for James L. Perry on the strategic human research management project, SPEA, Bloomington, IN, USA (June 2008-May 2009).

### ORAL PRESENTATIONS AND INVITED TALKS

2017  
Midwest Political Science Association Annual Conference, Chicago, IL;  
American Society of Public Administration (ASPA) Annual Conference, Atlanta, USA; SPEA ASPS Annual Conference, Bloomington, IN, USA

2016  
American Society of Public Administration (ASPA) Annual Conference, Seattle, USA; Department of Public Administration, Yonsei University, South Korea

2015  
Invited as a distinguished speaker for the Teaching Excellence, (September 11, 2015) by SPEA Teaching and Learning Faculty Group, Bloomington, IN, USA; Centro de Investigación y Docencia Económicas (CIDE), Mexico City, Mexico; American Society of Public Administration (ASPA) Annual Conference, Chicago, USA; SPEA ASPS Annual Conference, Bloomington, IN, USA; ANZSOG Institute for Governance, University of Canberra, Canberra, Australia

2014  
Public Policy in Asia PhD conference, Lee Kuan Yew School of Public Policy, National University of Singapore, Singapore; American Society of Public Administration (ASPA) Annual Conference, Washington D.C., USA; SPEA ASPS Annual Conference, Bloomington, Indiana, USA; Annual American Association of Behavioral and Social Sciences Conference (AABS), Las Vegas, Nevada, USA

2013  
American Society of Public Administration (ASPA) Annual Conference, New Orleans, Louisiana; SPEA ASPS Annual Conference, Bloomington, IN, USA

2012  
2012 NASPAA Annual Conference, Austin, Texas, USA; International Conference on Theory and Practice of Electronic Governance, Albany, New York, USA; SPEA ASPS Annual Conference, Bloomington, IN, USA; Middle East Technical University, Ankara, Turkey

2011  
Università di Bologna, Forli, Italy; 2011 NASPAA Annual Conference, Kansas City, Missouri, USA; International Public Affairs Association Conference, Bloomington, IN, USA

2010  
International Conference of Organizational Innovation, Siam University, Bangkok, Thailand; Seoul Metropolitan Government, Seoul, South Korea; Annual Association of SPEA PhD Students Conference, Bloomington, IN, USA
International Public Affairs Association Conference, Bloomington, IN, USA;
Public Performance Measurement and Reporting Conference, Chattanooga,
Tennessee, USA.

2009 International Conference on Social Science Research, Nashville, Tennessee,
USA; The Institute of Public Administration, Riyadh, Saudi Arabia; International
Burch University, Sarajevo, Bosnia Herzegovina.

OTHER

Statistical Program Expertise
Stata, MPlus

Professional Associations
American Society for Public Administration (ASPA), Academy of Management (AoM),
Association for Public Policy Analysis and Management (APPAM), IPSA Structure and
Organization of Government.

ACADEMIC SERVICE

- Panel Moderator/Discussant, ASPA Conference 2017
- Evaluator for the Global E-governance Survey, The E-governance institute,
  Rutgers University, USA 2015-2016
- Ad-Hoc Reviewer, Public Management Review 2015-present
- Ad-Hoc Reviewer, Policy & Society 2015-present
- Initial Fulbright Reviewer (ad-hoc), Indiana University-Bloomington 2015-present
- Panel Chair/moderator, Hutton Honors College Annual Conference 2012, 2013
- Member, Teaching and Learning Faculty Group, SPEA 2013-present

LEADERSHIP & VOLUNTEER SERVICES

- International Student Representative, Graduate Student Association at Indiana University
  (Apr 2009-Apr 2010).
- Founder and the President of Turkish Student Organization (Turkish Speons) at SPEA,
  Indiana University.
- President, Turkish Student Association (TSA) at Indiana University (May 2008- May 2009).
- Secretary, International Public Affairs Association (IPAA) at Indiana University (Apr 2008-
  Apr 2009).
- Vice-President, Student Government & Union, Kocaeli University, Turkey (Oct 2005- Oct
  2006).
- Student Director of Media & International Relations and Orientation Committee, Kocaeli
  University, Turkey (Oct 2005- Sep 2006).
- Student President, School of Economics and Administrative Sciences, Kocaeli University,
  Turkey (Sep 2005- Sep 2006).
- **Co-chairman** of Annual Commission, Kocaeli University, Turkey (Sep 2005- June 2006).
- **Student Vice-President**, School of Economics and Administrative Sciences, Kocaeli University, Turkey (Sep 2004- Sep 2005).
- **Board Member**, The social club of Political Science and Public Administration (2004-2006).
- **President**, Department of Political Science and Public Administration (Sep 2003- Sep 2006).
- **Co-Founder** a social web site of Political Science and Public Administration (2003).
- **Board Member** of the Political Science and Public Administration Journal (Nov 2002- Nov 2004).
- **Class President**, Kocaeli University (Sep 2002- June 2006).
REFERENCES

Sergio Fernandez
Director, Ph.D. Programs in Public Affairs and Public Policy
Associate Professor
School of Public and Environmental Affairs,
Indiana University, Bloomington SPEA 449,
1315 E. Tenth Street, Bloomington, IN, 47405, USA
Phone: +1 (812) 855-4944
Fax: +1 (812) 855-7802
E-mail: sefernan@indiana.edu

David Audretsch
Distinguish Professor
Ameritech Chair of Economic Development
Director, Institute for Development Strategies
Director, SPEA Overseas Education Programs
School of Public and Environmental Affairs,
Indiana University, Bloomington SPEA 211,
1315 E. Tenth Street, Bloomington, IN, 47405, USA
Phone: +1 (812) 855-6766
Email: daudrets@indiana.edu

Claudia N. Avellaneda
Associate Professor
School of Public and Environmental Affairs,
Indiana University, Bloomington SPEA 453,
1315 E. Tenth Street, Bloomington, IN, 47405, USA
Phone: +1 (812) 855-5058
E-Mail: cavellan@indiana.edu

Barry M. Rubin
Professor
Policy Analysis and Public Finance Faculty Chair
School of Public and Environmental Affairs,
Indiana University, Bloomington SPEA 329,
1315 E. Tenth Street, Bloomington, IN, 47405, USA
Phone: +1 (812) 855-4556
Email: rubin@indiana.edu

Lois R. Wise
Professor Emeritus
School of Public and Environmental Affairs,
Indiana University, Bloomington SPEA 410,
1315 E. Tenth Street, Bloomington, IN, 47405, USA
Phone: +1 (812) 855-7980
Email: wisel@indiana.edu