The impact of proactivity, leader-member exchange, and climate for innovation on innovative behavior in the Korean government sector

Sohee Park
School of Business Administration, Inje University, Gimhae, South Korea, and
Sung Jun Jo
College of Business Administration, Gachon University, Seongnam, South Korea

Received 4 September 2016
Revised 21 January 2017
14 April 2017
8 June 2017
15 September 2017
Accepted 26 October 2017

Abstract

Purpose – In the current business environment, no organization is assured of survival without continuous innovation. Employees' innovative behavior is critical to enhance the innovation of an organization. While most literature on innovative behavior has focused on employees in the private sector, the purpose of this paper is to explore the factors that affect innovative behaviors in the government sector. In particular, it examines how proactivity, leader-member exchange (LMX), and climate for innovation affect employees' innovative behavior in the Korean government sector, which is generally characterized as highly hierarchical, structured, and formalized.

Design/methodology/approach – The authors selected a sample of government employees in the Ministry of Education in Korea. Through the researchers' contacts, ten government agencies agreed to recruit their employees to participate in the study. Data from 1,011 respondents were analyzed in two steps using structural equation modeling. First, to examine the construct validity of the measures, the authors examined the measurement model using the confirmatory factor analysis. Second, the interrelationships among the four variables were assessed. The hypothesized structural model was examined and compared to several alternative models to explore the best model fit to the data. The authors then examined the regression coefficients to determine the hypothesized relationships in the final structured model.

Findings – The results revealed the following: proactivity and climate for innovation had positive relationships with innovative behavior; LMX had a positive relationship with proactivity although it did not have a direct relationship with innovative behavior; and organizational climate for innovation did not ensure proactivity of employees.

Originality/value – The antecedents included in this research have been studied in relation to innovative behavior in several studies, but studies have called for further study. Few studies have examined innovative behavior in the public sector and they have examined innovation in the public sector which has mostly been focused on environmental factors surrounding government organizations or policy choices of government leaders while ignoring the individual traits of public workers, relational dynamics among people, and the cultural aspects of the organizations. This study investigated the interrelationships among the antecedents in the process of impacting innovative behavior in the public sector in Korea. In addition, little research has examined the antecedents of innovative behavior together. This study expands our knowledge of the roles and interrelationships of proactivity, LMX, and organizational climate for innovation as they relate to innovative behavior.

Keywords LMX, Proactivity, Innovative behaviour, Climate for innovation, Government sector
Paper type Research paper

Introduction

In the current business environment, no organization is assured of survival without continuous innovation. Innovation has been identified as an imperative for prosperity, particularly in the rapidly changing and uncertain world of business. Repeating past successes is insufficient for maintaining sustainable competitiveness. To provide products and services that exceed customers' expectations and needs, employees must devote

Leadership & Organization Development Journal

0143-7739
DOI 10.1108/LODJ-09-2016-0216

themselves to innovation by generating new ideas and experimenting without the fear of failure (De Jong and Den Hartog, 2007; Yesil and Sozbilir, 2013; Zhang *et al.*, 2012).

Organizations in the public sector like federal or state governments are not exempt from the current climate where innovation is critical for survival, but until quite recently, the public sector has not faced much pressure to innovate. Since the public sector has been a monopolistic provider of goods and services, people in the public sector have traditionally had little incentive to innovate (Kamarck, 2004; Parker and Bradley, 2000). However, in the past decade, governments around the world have been confronted with a strong demand for innovation and been heavily pressured to work more efficiently and effectively like the private sector organizations. Facing these new demands, governments have attempted to find ways to be more innovative such as hiring civilians, renovating operation systems, or selling government property programs (Newman *et al.*, 2001).

Innovation has also become a hot topic in higher education. Since it is evident that traditional education methods are far less effective in developing talented employees who contribute to modern society characterized by rapid change and uncertainty, colleges and universities need to transform the methods and content of their education programs (Lundvall, 2008). For innovation in higher education institutions, Al-Husseini and Elbeltagi (2016) urged educators to train a new type of leadership that encourages people to promote their organizations and to exceed performance expectations.

Despite the increasing demand for innovation in the public sector organizations, some of the distinctive characteristics of government sector organizations may inhibit employees from experimenting with innovative ideas. These characteristics include the hierarchical structure, reliance on strict rules and procedures, avoiding risk, and formalization of work and decision making (Parker and Bradley, 2000). Government sector organizations are known to have a hierarchical structure which can lead to a perceived inertia of governments that fail to adopt new trends and techniques in changing environments (Cameron and Quinn, 2006). In addition, since these organizations are often risk averse, they tend to follow past practices rather than experiment with new ideas (Verhoest *et al.*, 2007). Another characteristic of the public sector is a higher level of rigid formalization that relies heavily on rules, procedures, and regulations, which might prevent workers from exercising discretion to change the way they perform their duties (Fernandez and Moldogaziev, 2012; Parker and Bradley, 2000). Thus, researchers need to pay special attention to the government sector when studying innovation in organizations.

Demand for innovation within the government sector has increased as enlightened citizens no longer allow government agencies to remain unchanged. Moreover, the recent political scandal in South Korea (Korea hereafter) resulting in impeaching the president has increased pressure to address the customary ills and adopt innovation within both the government and public sectors. Innovation and change have emerged as a mantra that government agencies can no longer ignore. However, government agencies in Korea remain highly structured and formalized as evidenced by the large number of standardized procedures, multiple levels, and an emphasis on rule reinforcement. Employees in these agencies rarely have incentives to implement new and innovative ideas to change current practices (Kim and Lee, 2009). In addition, external and internal stakeholders put pressure on these government agencies to maintain their traditional systematic attributes to sustain operations, creating considerable tension between the public's severe demand for innovation and the traditional stakeholders' desire to maintain the status quo. A key to successful innovation is determining how to overcome the systematic attributes of government agency centralization, lack of transparency, rigidity, and low competitiveness (O'Byrne *et al.*, 2014). This challenge is the primary motivation for our study.

This study explores innovation in the government sector in Korea. Innovation cannot be successful without the cooperation of individual workers in the government sector.

Organizational performance is a product of the behaviors of individuals and the interactions among the behaviors. Innovative behavior can enhance performance by deviating from organizational inertia and attempting to create and apply new ideas to perform their duties (Janssen, 2000; Kleysen and Street, 2001; Xerri and Brunetto, 2013). Since innovative behavior has been identified as beneficial for organizational performance (Janssen, 2000; Janssen *et al.*, 2004), many studies have examined the factors that influence innovative behavior. For example, they have focused on individual characteristics such as problem-solving styles (Scott and Bruce, 1994), self-efficacy (Axtell *et al.*, 2006; Carmeli and Schaubroeck, 2007; Li and Wu, 2011), personality (George and Zhou, 2001; Li and Wu, 2011; Yesil and Sozbilir, 2013), relational characteristics such as team-member exchange and leader-member exchange (LMX) (Basu and Green, 1997; Jaussi and Dionne, 2003; Scott and Bruce, 1994), organizational characteristics such as a climate for innovation (Scott and Bruce, 1994), and organizational resources (Spreitzer, 1995; Choi, 2004; Madjar, 2008). As Woodman and Schoenfeldt (1990) purported, we can argue that innovative behavior is based on the interaction of those antecedents at the individual, relational, and organizational levels.

Employees' innovative behavior is critical to enhance innovation in the government sector in Korea (Kim *et al.*, 2008). However, most previous literature on innovative behavior has focused on employees in the private sector (Kim *et al.*, 2008). Theories and methods used to study organizational behavior have rarely been applied to public and government organizations. The few studies that have examined innovation in the public sector have focused on environmental factors surrounding government organizations (Fishenden and Thompson, 2013; Patanakul and Pinto, 2014) or policy choices of government leaders (Keller and Block, 2013), whereas they have ignored the individual traits of public workers, relational dynamics among people, and the cultural aspects of the organizations.

This study examines the factors that may affect innovative behavior in the Korean Government sector including climate for innovation, LMX, proactivity, and innovative behavior in the government sector of Korea. Organizational climate affects the way individuals perceive the personal impact of their work environment on themselves (Glisson and James, 2002). Organizational climate for innovation represents an organization's openness to change and its provision of resources for innovation (Sarros *et al.*, 2008). The other constructs used in this study are defined as follows: LMX refers to a dyadic relationship between the leader and followers (Graen and Uhl-Bien, 1995; Zhang *et al.*, 2012). Proactive behavior refers to anticipatory action that employees take to impact themselves and/or their environments (Grant and Ashford, 2008). Additionally, in this study, innovative behavior of employees refers to the intentional creation, introduction, dissemination, and application of new ideas within a work role, group, or organization (Agarwal *et al.*, 2012; Parzefall *et al.*, 2008; Yuan and Woodman, 2010). This concept embraces not only the creation of new ideas but also the organization's proactive activities such as advertising and implementing good ideas within the organization (Scott and Bruce, 1994).

This study also aims to find common features of governmental organizations that are different from private organizations in pursuing innovation. To achieve the purposes, we organize the paper as follows. First, we review previous literature that has examined the key constructs of this paper. Although the context of our focus is governmental organizations in Korea, our review covers a wide range of contexts to find consistent relationships among the constructs. Second, based on the literature review, we propose a research model with five hypotheses. Third, we report the results of the tests of the hypotheses using structural equation modeling (SEM). Finally, after summarizing the key findings of the study, we discuss the implications of the results for theory and practice in management.

Literature review and hypotheses

Innovative behavior

Innovative behavior is described as a process in which new ideas are generated, created, developed, applied, promoted, realized, and modified by employees to benefit their role performance within the organization (Thurlings *et al.*, 2015). Role performance is an important capability of human capital for organizational competitiveness because employees are the agents who initiate and implement innovation (Hsu *et al.*, 2011; Yuan and Woodman, 2010). It has been seen as a type of behavior of individual workers that enhances organizational performance with increased efficiency and effectiveness (Kleysen and Street, 2001; Xerri and Brunetto, 2013). By deviating from organizational inertia, innovative workers attempt to create and apply new ideas to perform their duties (Janssen, 2000).

Parzefall *et al.*'s (2008) comprehensive literature review concluded that innovative work behavior requires the willingness and ability to take risks and seek innovation. The ability to be innovative includes cognitive intellect, task-specific knowledge, and an understanding of how to develop innovativeness. It also includes the inclination to accept the possibility of failing because innovation inevitably involves risk (Parzefall *et al.*, 2008).

Innovative behavior has been recognized as a type of out-role behavior because innovation is above and beyond the required responsibilities in a job description. Performance appraisals to determine pay increases, and promotions focus mainly on how well an employee performs within the pre-specified standards established with existing work processes and responsibilities rather than on how innovative employees are. Given that the incentive for individuals to voluntarily engage in innovative activities is low, it is important to understand how managers can encourage and motivate employees to be innovative. As the significance of innovation for competitiveness and survival of organizations increases, innovative behavior and discovering its antecedents have recently been topics of high interest among researchers (Yuan and Woodman, 2010).

Climate for innovation and innovative behavior

Organizational climate matters for innovation since organizations create the overall context in which employees perform their work. The perception of having an organizational climate that allows for innovation has been identified as a critical antecedent of innovative behavior because it signals the expectations and potential outcomes of the innovative behavior (Scott and Bruce, 1994). The organizational climate is a factor that affects individual behavior by influencing employees to develop an optimistic or pessimistic forecast about the outcomes of their behavior (Yuan and Woodman, 2010). As Yuan and Woodman (2010) discovered, the expectation of the potential outcomes of innovative behavior determines whether employees are willing to engage in innovative behavior. Consistent with the Vroom's (1982) expectancy theory, employees are willing to engage in innovation when they believe that the consequences of their behavior produce significant benefits for them. Thus, if an organization is uncooperative or indifferent about innovation, employees are not likely to be motivated to take risks.

An organizational climate for psychological safety is another factor for employee innovativeness (Parzefall *et al.*, 2008). Psychological safety refers to a shared belief that it is safe to take risks in an organization without fear of negative consequences if they fail (Edmondson, 1999). Employees will not experiment with new ideas if there is a possibility that any failure of innovative experimentation will be punished. In such an atmosphere, the proactive inclination and voluntarism of employees would be restrained and their attitudes toward their jobs would be passive.

It is within an organization's supportive climate for innovation that individual and relational factors have an impact on employees' innovative behavior. Once a creative idea is presented, innovative employees will try to increase the likelihood of the realization of the

idea by disseminating, applying, and implementing the idea throughout the organization if they are encouraged or rewarded to do so. The leader's role is critical to create an environment that supports creativity and innovation (Rigolizzo and Amabile, 2015). Leaders can establish a policy that encourages employees to present their innovative ideas by recognizing and rewarding the ideas even when those ideas turn out to be failures.

The type of organizational climate is also a critical prerequisite for sharing ideas throughout an organization (Ardichvili *et al.*, 2003; Bock *et al.*, 2005). A cooperative climate strengthens owners' belief that their benevolence will be reciprocated or rewarded later (Reagans and McEvily, 2003). Barua *et al.* (1997) asserted that trust that creates an idea-sharing relationship is embedded in the organizational culture and it improves a sense of reciprocity. Ideas shared with others could contribute to organizational innovation when the idea is successfully implemented through innovative behaviors (Shalley *et al.*, 2004):

H1. A perceived work climate for innovation is positively related to an employee's innovative behavior.

LMX and innovative behavior

The relationship with leaders and group members is another factor related to innovation. By integrating a set of proven antecedents with innovative behaviors, Scott and Bruce (1994) contended that personal characteristics that promote innovation are not sufficient to produce innovative behavior. Even individuals with a strong propensity for innovation are likely to be frustrated and abandon their innovative ideas when they are rejected or unsupported by their leaders or peers. They also contended that leadership and work-group relations are critical factors in addition to personal characteristics to accomplish innovation. Relationships that promote the ability to share ideas without fear of being rejected or having the ideas stolen are formed through a sense of trust that their efforts will be reciprocated. The norm of reciprocity leads individuals to establish relations only with those who can be trusted (Gouldner, 1960).

Existing studies on LMX, which conceptualizes the way a leader and a follower build a dyadic relationship, have focused on the relationship that a leader has with one follower and differentiates it from the relationships with other followers (Fisk and Friesen, 2012; Henderson *et al.*, 2009). LMX literature has classified relationships between the leader and followers into high-quality and low-quality relationships. A high-quality relationship refers to an interactional relationship based on trust, respect, loyalty, and mutual obligation, while a low-quality relationship refers to a transactional exchange based on an employment contract (Graen and Uhl-Bien, 1995; Zhang *et al.*, 2012). As Graen and Uhl-Bien (1995) noted, a high-quality relationship builds a strong partnership where individual partners are willing to accept extra roles to achieve mutual interest. Therefore, each partner in a high-quality relationship tends to look for a way to proactively help accomplish higher level goals beyond his or her own duties.

Employees who have high-quality relationships with their leaders are likely to be awarded a high level of autonomy by the leaders so they can experiment with innovative ideas more easily using their own discretion compared to their counterparts who have low-quality relationships (Parzefall *et al.*, 2008). These high-quality relationships would be destroyed if trust were lost. Employees who have built strong trust relationships with their leaders are likely to generate and propose new ideas more actively so the leaders will tend to retain trust in their abilities, dedication, and commitment to the work. Thus, proactive and innovative behaviors can be observed more often in high-quality relationships than in low-quality relationships.

Analyzing data collected from a high-tech company in Germany, Volmer *et al.* (2012) found that LMX is positively related to creative job involvement. This relationship was stronger when there was a high level of job autonomy. With respect to the relationship

between LMX and job autonomy, Graves and Luciano (2013) used a data set from 283 US workers to confirm the facilitating effects of LMX to raise the self-determination of employees. This result implies that a high-quality leader-member relationship facilitates employees' autonomous motivation since leaders with this type of relationship tend to trust the abilities of their subordinates and allow more autonomy than those with lower-quality relationships with their subordinates. Trusted employees feel that they have a psychological safety net and autonomy, both of which are essential elements for performing innovative behaviors without the fear of consequences. This leads to the following hypothesis:

H2. Perceived LMX quality is positively related to an employee's innovative behavior.

Climate for innovation and proactivity

Innovation would not take place without freedom. Innovative behaviors are incompatible with an environment where conventional management practices prevail such as top-down decision making, tight control from management, and a precise definition of tasks based on narrow job designs. To increase innovativeness, employee behaviors should not be tightly controlled or restricted, but employees should be given autonomy to change how their tasks are done, develop their own solutions for the problems they face, and apply innovative ideas to actual work processes without any obstruction.

In an organizational climate that abhors mistakes, employees tend not to seek innovation because it inevitably brings risks and changes (Yuan and Woodman, 2010). People who desire the status quo tend to be pessimistic about or resist innovative changes. They tend not to initiate innovative ideas or actions, so it is challenging for managers to handle those employees and motivate them to change their attitudes.

Crant (2000) synthesized the findings of existing studies and contended that leaders who champion innovation encourage employees to promote their innovative ideas and to improve performance beyond their formal job requirements. Parker *et al.* (2006) also found that environmental factors such as job autonomy and coworker trust were associated with proactive behavior through flexible role orientation in their research in the UK. These examples from literature confirm the relationship between work climate and employees' proactivity:

H3. A perceived work climate for innovation is positively related to an employee's proactivity.

LMX and proactivity

Leaders play a critical role in supporting employees' innovative behavior (Zhang *et al.*, 2012). According to the job-demand resource theory, support from organizations and leaders can motivate employees to better engage in their jobs by stimulating voluntary efforts to work (Agarwal *et al.*, 2012). This stimulus, in turn, fosters employees' innovative behavior resulting in desirable performance.

The leader-member relationship is associated with proactivity. Li *et al.* (2010) contended that proactive employees tend to seek social exchanges with their supervisors more frequently to discuss and learn how to avoid potential problems and identify opportunities to improve their work situations. LMX is also recognized as a predictor of attitudinal variables (Janssen and Van Yperen, 2004). A meta-analytic study paid attention to the effects of LMX on employees' behavior that aims to bring about change without the supervisor's direction (Chiaburu *et al.*, 2014). They found that a positive relationship between the supervisor and employee tends to increase mutual trust, respect, and obligation (Janssen and Van Yperen, 2004). Employees who are trusted by their supervisors and are

given autonomy and power look for opportunities and take action to change their situations more actively without concrete direction from above.

Burris *et al.* (2008) also suggested that LMX raises employees' motivation to improve their work environment. Employees who feel strong support from their supervisors tend to perceive an obligation to reciprocate what they received. In contrast, when the relationship with their supervisor is poor, employees tend to invest less energy in improving their performance because the poor relationship reduces their emotional attachment with the organization. Chiaburu *et al.* (2014) also indicated that the effect of LMX on proactivity is stronger in a collectivistic culture than an individual one. In a collectivistic culture, employees tend to feel obliged to reciprocate because they are interested in a harmonious relationship and social exchange:

H4. Perceived LMX quality is positively related to an employee's proactivity.

Proactivity and innovative behavior

Individual characteristics such as proactivity can be considered a direct variable for innovative behavior. Proactivity has been identified as a desired quality for many jobs that require innovation (Janssen and Van Yperen, 2004; Zhang *et al.*, 2012). Proactivity refers to the enduring behavioral tendency to take action to influence the person's environment (Bateman and Crant, 1993; Zhang *et al.*, 2012). Proactive behavior is stimulated by the need to manipulate and control the person's environment (Bateman and Crant, 1993). Such a disposition to change the environment is highly associated with innovative behavior. Innovation would not be possible with passive employees who always behave as directed. In traditional organizations with a strong and rigid hierarchy, employees are not usually expected to be proactive. However, there is increasing demand for proactivity in today's organizations because of the rapid changes and uncertainty in the current business environment. To be innovative, employees need to generate better ideas and solutions by themselves without any external pressure (Zhang *et al.*, 2012).

Previous studies have also demonstrated a positive relationship between employees' proactivity and their innovative behavior. For example, Bateman and Crant (1993) found that individual proactivity is positively associated with changes in their study on MBA students. Kim *et al.* (2009) also showed a positive association between proactivity and idea generation. In Seibert *et al.*'s (2001) study, proactive employees received higher ratings from their supervisors on their innovativeness. Because proactive employees tend to take initiative and action to change their environment, they are likely to try to find better ways to change or improve the status quo and pursue implementation of their ideas. Therefore, we predict a positive relationship between proactivity and innovative behavior:

H5. Proactivity is positively related to innovative behavior.

Our research model that integrates the above hypotheses is illustrated in Figure 1.

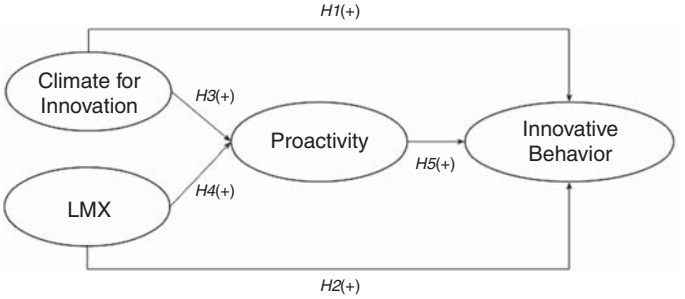

Figure 1.
Hypothesized research model of the study

Methods

Participants and procedure

The participants in this study were government officials in the Ministry of Education in Korea. Numerous reports have identified the need to enhance innovation in the Ministry of Education in Korea (Ju and Cho, 2011); thus, we targeted Ministry of Education officials to understand how to encourage innovative behavior. We contacted human resource managers in the organizations under the Ministry of Education selected through convenience sampling and elicited their sponsorship of the current study. Once they agreed to participate in the study, they distributed the paper-and-pencil study questionnaires to the employees they had recruited. The completed questionnaires were sent back to the researchers. A total of ten government agencies agreed to participate in the study. Among the 1,400 questionnaires sent out, a total of 1,166 questionnaires were returned to the researchers (response rate of 83.3 percent). Although there was no incentive or pressure on the participants, the response rate was quite high, which is not uncommon in studies on the Korean government agencies once the managers agree to sponsor a study (cf. 80.1 percent in Kim, 2009; 80.0 percent in Lee *et al.*, 2010). Incomplete questionnaires reduced the usable responses to 1,011.

The average age of the respondents was 38.84, with an average total duration of 12.71 years of service. Of the participants, 48.3 percent were male and 50.2 percent were female. In Korea, government officials are arranged in a nine-tiered system ranging from grade 1 for assistant ministers to grade 9 for the newest and lowest level employees. The participants' level included 136 (13.5 percent) with a grade 9 level, 230 (22.7 percent) with a grade 8 level, 397 (39.3 percent) with a grade 7 level, 185 (18.3 percent) with a grade 6 level, 25 (2.5 percent) with a grade 5 level, and 38 (3.7 percent) with other.

Measures

The questionnaire included measures for innovative behavior, climate for innovation, LMX, and proactivity. All of the measures had previously been validated and utilized in earlier empirical research. Surveys were translated from English and administered in Korean. To ensure consistency of the translation, the translated Korean versions were reviewed by two Korean university professors in the fields of business and social science, and then back translated into English by two bilingual native English speakers who held graduate degrees in business and social science. All of the measures incorporated a five-point Likert type scale (1: strongly disagree to 5: strongly agree).

Innovative behavior. To measure innovative behavior, we utilized six items developed by Scott and Bruce (1994). Examples of the items include, "I search out new technologies, processes, techniques and/or product ideas," and "I generate creative ideas." Cronbach's α on this scale in Scott and Bruce's (1994) study was 0.89. In this study, Cronbach's α was 0.90.

Climate for innovation. Climate for innovation was measured based on the scale developed by Scott and Bruce (1994). The scale had two factors: support for innovation, assessing how much individuals viewed the organization as open to change, supportive of new ideas from members, and tolerant of member diversity; and resource supply, measuring how much individuals viewed the organization as open to change, supportive of new ideas from members, tolerant of member diversity, and resource supply measuring the degree to which resources were perceived as adequate in the organization (Scott and Bruce, 1994). This study used six items based on the Kim and Yoo's (2012) questionnaire which included three items with the highest loadings per factor for their study on Korean employees. An example of the items measuring support for innovation is, "This place seems to be more concerned with the status quo than with change (reverse)." An example measuring resource supply is, "There are adequate resources devoted to innovation in this organization."

The Cronbach's αs for each subscale in Scott and Bruce's (1994) study were 0.92 and 0.77, respectively. In the current study, Cronbach's α for the support for innovation subscale was 0.71 and for the resource supply subscale, it was 0.84.

LMX. LMX was measured using the seven items from the LMX-7 scale (Graen and Uhl-Bien, 1995). The scale assesses various aspects of working relationships between supervisors and subordinates including effectiveness of the relationships, understanding of job problems and needs, recognition of potential, and willingness to support. Cronbach's αs have been consistently reported in the 0.80-0.90 range, indicating that it is sufficiently reliable (Graen and Uhl-Bien, 1995). Examples of the items include, "My leader recognizes my potential well," and "I have enough confidence in my leader that I would defend and justify his/her decision if he/she were not present to do so." Cronbach's α in this study was 0.87.

Proactivity. We used the ten-item version (Seibert *et al.*, 1999) of the proactive personality measure originally developed by Bateman and Crant (1993). Seibert *et al.* (1999) created a shortened version of the scale by selecting the ten items with the highest average factor loadings reported by Bateman and Crant (1993). An example item is, "I am constantly on the lookout for new ways to improve my life." Crobach's α in the shortened version was 0.86 (Seibert *et al.*, 1999). Cronbach's α in this study was 0.85.

Assessment of common method variance (CMV)

Since a number of the subjective measures used in this study were gathered from the same source in the same questionnaire, we introduced Harman's one-factor test to address potential risks for CMV. Podsakoff and Organ (1986) suggested that a single factor would emerge from a factor analysis or one general factor would account for most of the covariance in the independent and criterion variables if CMV was a serious problem. All four variables were entered into an exploratory factor analysis with a principle axis factoring analysis, extracting seven factors, with factor 1 accounting for only 28.76 percent of the variance. The results indicated that no single factor emerged and no one general factor accounted for the majority of the covariance among the latent factors. Therefore, CMV was unlikely to be a serious issue in this study.

Analyses

To test the hypotheses, we adopted SEM, which enables researchers to examine the estimation of multiple and interrelated dependence relationships with the ability to represent unobserved concepts in these relationships and account for measurement errors in the estimation process (Hair *et al.*, 1995). SEM was the appropriate method for this research because it allowed the researchers to examine the hypothesized model with the interrelated relationships among climate for innovation, LMX, proactivity, and innovative behavior. In addition, all four main variables in this research were latent variables which were estimated by observable variables.

This study followed a two-step approach to SEM (Anderson and Gerbing, 1988). First, to examine the construct validity of the measures, we examined our measurement model using the confirmatory factor analysis (CFA). The fit indices of the hypothesized measurement model were compared with those of three alternative measurement models. In the second step, the interrelationships among the four variables were assessed. The hypothesized structural model was examined and compared using two alternative models to explore the best model fit to the data. We then examined the regression coefficients to determine the hypothesized relationships in the final structured model.

To evaluate the fit of the proposed models, this study employed the following indices: χ^2 goodness of fit to degrees of freedom ratio, the incremental fit index (IFI), the Tucker-Lewis index (TLI), the comparative fit index (CFI), the normed fit index (NFI), and the root mean

square error of approximation (RMSEA). It would be considered a good fit with an IFI, TLI, CFI, and NFI of 0.90 or higher, RMSEA values no higher than 0.08, and a χ^2 goodness of fit to degrees of freedom ratio no greater than 3 (Bollen, 1989; Browne and Cudeck, 1992; Hu and Bentler, 1998; Kline, 2005). The AMOS 16.0 program was used to conduct the SEM analyses.

We also adopted bootstrapping techniques to further examine the indirect effects of proactivity in the relationships among LMX, climate for innovation and innovative behavior which were included in the hypothesized model. The bootstrapping approach was chosen because it allowed the researchers to examine the indirect effects with no assumptions about the shape of the distributions of the variables or the sampling distribution of the statistics (Efron and Tibshirani, 1993; Preacher and Hayes, 2004). Relevant studies have also reported that the bootstrapping procedure outperforms other approaches for examining the indirect effects of relationships (Hayes, 2009; Preacher and Hayes, 2008). We used the AMOS 16.0 program to conduct the bootstrapping analysis.

Results

The means, standard deviations, Cronbach's αs, and correlations of the variables in this study are presented in Table I. The Cronbach's αs of all of the measures were between 0.74 and 0.90. While the Cronbach's αs of climate for innovation were relatively low (0.74), they were still within the realistically expected ranges (> 0.70, Kline, 2005). All of the correlations between the variables were significant at $p < 0.01$. The correlation analyses indicated that bivariate multicollinearity was not a problem in this study because all correlation coefficients were below 0.70 (Tabachnick and Fidell, 1996).

We also checked the skewness and kurtosis of the data. The results showed that skewness ranged from −0.50 to 0.24 and kurtosis ranged from −0.37 to 0.58, which were in an acceptable range between −2 and 2, in order to prove normal distribution (Hair *et al.*, 1995). Therefore, we determined that there would be no issues to assume a normal distribution of the data.

CFAs

A series of CFAs were conducted to examine the discriminant and convergent validity of the measures. Several fit indices were chosen to compare the four measurement models: a one-factor model, a three-factor model, and a four-factor model. As shown in Table II, the CFA results indicated that the four-factor model provided a more adequate fit.

Variables	Means	SD	1	2	3	4
1. Climate for innovation	2.90	0.48	(0.74)			
2. Leader-member exchange (LMX)	3.36	0.56	0.31**	(0.87)		
3. Proactivity	3.33	0.51	0.10**	0.41**	(0.85)	
4. Innovative behavior	3.10	0.66	0.14**	0.35**	0.64**	(0.90)

Table I. Descriptive statistics

Notes: $n = 1{,}011$. Scale reliabilities are shown in parentheses along the diagonal. $^{**}p < 0.01$

Models	df	χ^2	IFI	TLI	CFI	NFI	RMSEA
One-factor model[a]	375	4,842.44	0.66	0.63	0.66	0.64	0.11
Three-factor model[b]	373	2,148.98	0.86	0.85	0.86	0.84	0.07
Four-factor model[c]	367	1,524.78	0.91	0.90	0.91	0.91	0.06

Table II. Fit indices of the measurement models

Notes: [a]Equating LMX, climate for innovation, proactivity, innovative behavior; [b]equating LMX and climate for innovation; [c]LMX, climate for innovation, proactivity, innovative behavior

All of the fit indices of the four-factor model were at or above 0.90, and the RMSEA was the smallest (0.06). Therefore, we concluded that the four-factor model fit the data better for the sample, indicating the distinctiveness of the four-construct measure in the study. The factor loadings of all items in the four-factor model ranged from 0.72 to 2.23 and were statistically significant ($p < 0.001$), suggesting that the convergent validity of all measures was reasonable for the sample in this study.

We additionally examined the average variance extracted (AVE) to further establish the discriminant and convergent validity. AVE is the average amount of the shared or common variance in a latent variable (Fornell and Larcker, 1981). The AVE statistics in our study were 0.61, 0.52, 0.55, and 0.53 (innovative behavior, climate for innovation, LMX, and proactivity, respectively). The results were all above 0.50, indicating adequate discriminant and convergent validity (Fornell and Larcker, 1981).

Estimation of the hypothesized structural model

SEM analyses were conducted to compute the overall fit and parameter estimates of the hypothesized model. To select the best model for the data, we compared the hypothesized model with the two plausible alternative models. The first alternative model (A1) had only direct effects on innovative behavior, with no indirect effects through proactivity. The second alternative model (A2) had only indirect effects of proactivity with no direct effects on innovative behavior.

As Table III shows, the hypothesized model revealed χ^2 (361) = 1262.58 ($p < 0.01$), IFI = 0.93, TLI = 0.92, CFI = 0.93, NFI = 0.91, and RMSEA = 0.05 with factor loadings between −0.09 and 0.80. All of the goodness-of-fit statistics were higher than 0.90 and the RMSEAs were smaller than 0.08, indicating that the hypothesized model provided a good fit to the data (Bollen, 1989; Browne and Cudeck, 1992; Hu and Bentler, 1998; Kline, 2005). A χ^2 goodness of fit to degrees of freedom ratio for the hypothesized model was 3.50. Although it exceeded 3, which was the desired threshold (Hair *et al.*, 1995), χ^2 relevant fit indices are known to be sensitive to large sample sizes (Byrne, 2001). Therefore, we performed a holistic fit evaluation and determined that the hypothesized model was a reasonable model fit.

Additionally, we compared the results of the hypothesized model with the two alternative models to assess the suitability of the hypothesized model. As Table III shows, the two alternative models also provided a reasonable fit. However, alternative models 1 and 2 had slightly lower fit indices compared to the hypothesized model. The χ^2 difference statistics also indicated that alternative model 1 ($\Delta = 134.28$, $\Delta df = 2$), and alternative model 2 ($\Delta = 15.55$, $\Delta df = 2$) did not lead to a significantly better fit than the hypothesized model. Based on these results and theoretical considerations of the relationships among the variables, we concluded that the hypothesized structural model provided the best representation of the data.

Tests of the hypotheses

To test the hypotheses, we first examined the regression coefficients in the final structured model. The parameter estimates and results of the significant tests for the hypotheses are summarized in Table IV. The parameter estimates in the measurement model are also

Model	df	χ^2	IFI	TLI	CFI	RMSEA	Δdf	$\Delta\chi^2$
Hypothesized	361	1,262.58	0.93	0.92	0.93	0.050	–	–
Alternative 1	363	1,396.86	0.92	0.91	0.92	0.053	2	134.28
Alternative 2	363	1,278.13	0.92	0.91	0.92	0.051	2	15.55
Alternative 3	362	1,262.90	0.93	0.92	0.93	0.051	1	103.92

Table III. Fit indices for the hypothesized and alternative models

provided in Table V. As expected, climate for innovation was found to be significantly and positively associated with innovative behavior ($\beta = 0.14$, $p < 0.01$). LMX was also found to be significantly related to proactivity ($\beta = 0.40$, $p < 0.001$), and proactivity was significantly related to innovative behavior ($\beta = 0.72$, $p < 0.001$). However, there was no significant direct impact of LMX on innovative behavior ($\beta = -0.04$, $p > 0.05$). Climate for innovation and proactivity were not significantly associated, contrary to our hypothesis ($\beta = 0.03$, $p > 0.05$).

Mediation test

To examine the specific indirect effects of the hypothesized model, we also conducted bootstrapping analyses to examine the mediation effects. The indirect paths were included in the hypothesized structural model and were also tested through the SEM for the overall model. Cheung and Lau's (2008) simulations revealed that bias-corrected (BC) confidence intervals performed the best in testing the indirect effects. As Cheung and Lau recommended, we resampled 1,000 times and used the BC method to produce 95 percent confidence intervals. The bootstrapping results demonstrated that the indirect effect of LMX on innovative behavior through proactivity was significant ($\beta = 0.29$ [0.21, 0.37], $p < 0.01$). Since there was no significant direct effect of LMX on innovative behavior, we concluded that proactivity fully mediated the relationships between LMX and innovative behavior. There was no

Table IV.
Path estimates in the final structural model

Paths	Standardized	SE	*t*-values
Climate for innovation → Innovative behavior	0.14**	0.38	3.02
LMX → Innovative behavior	−0.04	0.09	−0.96
Climate for innovation → Proactivity	0.03	0.34	0.57
LMX → Proactivity	0.40***	0.10	7.65
Proactivity → Innovative behavior	0.72***	0.05	16.97

Notes: **$p < 0.01$; ***$p < 0.001$

Table V.
Path estimates in the measurement model

Parameter estimates	Standardized	Parameter estimates	Standardized
Climate for Innovation → SI	0.36	Proactivity → P1	0.62
Climate for innovation → RS	0.81	Proactivity → P2	0.74
SI → CI1	0.39	Proactivity → P3	0.64
SI → CI2	0.63	Proactivity → P4	0.64
SI → CI3	0.81	Proactivity → P5	0.57
RS → CI4	0.73	Proactivity → P6	0.46
RS → CI5	0.77	Proactivity → P7	0.53
RS → CI6	0.91	Proactivity → P8	0.62
LMX → L1	0.41	Proactivity → P9	0.52
LMX → L2	0.58	Proactivity → P10	0.54
LMX → L3	0.58	Innovative behavior → IB1	0.77
LMX → L4	0.82	Innovative behavior → IB2	0.83
LMX → L5	0.79	Innovative behavior → IB3	0.79
LMX → L6	0.82	Innovative behavior → IB4	0.69
LMX → L7	0.71	Innovative behavior → IB5	0.78
		Innovative behavior → IB6	0.76

Notes: SI (support for innovation) and RS (resource supply) are indicators of climate for innovation. CI1, CI2, and CI3 are indicators of SI, and CI4, CI5, and CI6 are indicators of RS. L1-L7 are indicators of LMX. P1-P10 are indicators of proactivity. IB1-IB6 are indicators of innovative behavior. The full items are provided under the Appendix

significant relationship between climate for innovation and proactivity, so the mediation effect of proactivity on the relationships between climate for innovation and innovative behavior was not examined.

Conclusion

Discussion

The aim of this study was to examine the impact of climate for innovation, LMX, and proactivity on innovative behavior in regards to the interrelationships among the variables. Our results confirmed that climate for innovation had a positive impact on employees' innovative behavior. This result suggests that employees' perception that their organizations' climate for innovation may encourage or motivate them to be engaged in innovative behavior. This result is consistent with previous research emphasizing the role of organizational climate in innovative behavior (e.g. Ardichvili *et al.*, 2003; Bock *et al.*, 2005).

This study also suggested a direct impact of employees' proactivity on innovative behavior in organizations. This finding confirmed the results from previous studies on the positive association between employees' proactivity and innovative behavior (e.g. Bateman and Crant, 1993; Kim *et al.*, 2009; Seibert *et al.*, 2001). This finding also demonstrates that proactive employees who are willing to manage and change their environments are more willing to engage in activities to change the current procedures or suggest new ways for improvement (Graen and Scandura, 1987; Janssen and Van Yperen, 2004).

This study revealed that LMX has a positive association with proactivity, and proactivity has a positive relationship with innovative behavior. High LMX is based on trust, respect, loyalty, and a mutual obligation between managers and employees (Graen and Uhl-Bien, 1995; Zhang *et al.*, 2012). Employees can be more proactive in performing their jobs when they have more autonomy based on good relationships with their supervisors. Increased proactivity, in turn, can encourage more innovative behavior.

Unlike our expectation, however, this study did not show a direct relationship between LMX and innovative behavior. This result indicates that a strong connection with supervisors may not always contribute to employees' innovative behavior. Instead, as our results reveal that strong LMX has an indirect effect on innovative behavior through personal orientation such as proactivity. Among the factors at the three levels described in Scott and Bruce's (1994) study, both individual and organizational factors had direct effects on innovative behaviors but the relational factor failed to do so. Our finding is consistent with that of Liden *et al.* (2006) indicating that LMX does not produce main effects on individual performance. Considering the nature of the public sector, leaders' strong relationships with subordinates based on mutual trust may not directly lead to employees' motivation to engage in innovation and change. According to Cameron and Quinn (2006), managers in hierarchical organizations such as government agencies are highly regarded when they are good at maintaining the status quo while managers in organizations in a rapidly changing and uncertain business environment are considered successful when they work as innovators and entrepreneurs. Therefore, even with high LMX, the managers in government agencies in this study may be less likely to focus on encouraging employees' innovative behaviors than managers in private organizations.

This study also did not prove a significant relationship between climate for innovation and proactivity. Instead, the study indicated that an organizational climate for innovation plays an important role in employees' innovative behavior since the results showed a direct relationship with innovative behavior. Nevertheless, the results indicated that proactivity was significantly influenced by relational factors such as LMX rather than the organizational climate, and LMX indirectly affected innovative behavior through proactivity, which is consistent with the findings of Zhang *et al.* (2012).

Implications

The research findings in this study extend our knowledge of employees' innovative behavior in the government sector in several ways. This study examined the relationships among climate for innovation, LMX, proactivity, and innovative behavior in the government sector. The antecedents included in this research have been studied in relation to innovative behavior in several studies, but they have called for further study (e.g. Li and Wu, 2011). This study investigated the interrelationships among the antecedents in the process of impacting innovative behavior. Although Woodman and Schoenfeldt (1990) argued that innovative behavior is based on a complicated interaction between people and situations, little research has examined the antecedents of innovative behavior together. This study expands our knowledge of the roles and interrelationships of organizational climate for innovation, LMX, and proactivity as they relate to innovative behavior.

This study also extends our knowledge of the factors affecting individual innovative behavior in the government sector. Most studies on innovative behavior have only dealt with organizations in the private sector (Kim *et al.*, 2008). Government agencies in many societies face the need to change and innovation. Likewise, government agencies in Korea have attempted to respond to the considerable pressures to promote innovation due to the rapid changes inside and outside of the country (Kim, 2006). However, government agencies have been maintaining the status quo rather than pursuing change since it has been the most common norm in these organizations (Cameron and Quinn, 2006). However, the government sector no longer enjoys a high degree of stability and cannot avoid the wave of change. This study examined some necessary conditions that must exist to encourage employees to participate in the change process by increasing their innovative behavior.

The current study provides several implications for practice. First, this study suggests that organizations in the government sector should encourage a climate for innovation to increase innovative behavior. Scott and Bruce (1994) found that organizations with a strong climate for innovation are open to change, supportive of new and different ideas, and willing to provide resources for innovation. Therefore, government organizations need to increase the level of climate for innovation by encouraging tolerance of diverse ideas and by providing necessary resources such as equipment, facilities, and time for innovative ideas and implementation.

The second implication of the current study is that the leader-member relationship plays an important role in employees' innovative behavior by having a positive impact on their proactivity. Organizations in the government sector should pay attention to establishing a robust connection between managers and employees to increase employees' proactivity. Traditionally, the vertical relationship of command and control has been a prominent characteristic of the public sector. The result of this study indicating that LMX affects innovative behavior through proactivity demonstrates that the vertical relationship is still critical but the nature of the relationship is quite different. Organizations can convey the message of the important role of strong relationships between managers and employees for innovation, and provide training sessions for managers to build positive relationships with their employees. Managers' efforts to build trust and offer autonomy in their relationships with their employees will help employees become more proactive which, in turn, will encourage them to behave innovatively.

The study results also demonstrate that individuals' proactivity is critical for innovation in the government sector. This finding highlights the importance of individuals' proactivity in many human resource practices. For example, organizations may want to consider the levels of candidates' proactivity during the hiring process. Leadership training can emphasize the roles of managers to encourage and support proactive employees. Organizations can also include employees' proactivity as part of the evaluation criteria. By considering employees' proactivity through various human resource activities, organizations can increase their innovative behaviors in the government sector.

Limitations and suggestions for future research

There are several limitations in this study. First, this study is based on self-reported data. Although our CMV results indicated that the potential CMV effect is not a concern in the present study, future research would be strengthened if the researchers collected data from various sources such as from managers on their employees' innovative behavior in addition to self-reports to reduce potential bias.

A second shortcoming is the cross-sectional design of our research. Despite the theory-driven approach, the results do not provide definitive proof of causality due to the nature of the cross-sectional design. Therefore, future studies can utilize longitudinal or experimental designs to examine the causal links of the variables tested in this study.

The current study is an initial attempt to investigate the interrelationships among the study variables with a particular sample from employees in the government sector in Korea. Further exploration on the relationships from different countries or other public organizations will provide opportunities for us to compare the various results and expand our knowledge of innovative behavior in the public sector.

We considered climate for innovation, LMX, and proactivity as the antecedents of innovative behavior. Future studies may include other variables such as individual characteristics (e.g. self-efficacy, hope, resiliency, psychological empowerment, feelings of meaning at work, and intrinsic motivation) and leadership behaviors, organizational context, or task characteristics to explain how such variables interactively affect innovative behavior. More research is needed to offer a model where individual and contextual resources interact in the relationship with innovative behavior in organizations.

We also suggest that further studies for innovation and innovative behavior examine actual processes in managing public sector organizations. Concrete cases of success and failure for innovation and change initiatives in non-profit organizations need to be explored to identify facilitators and inhibitors of innovation. In addition, through future research, desirable leadership attributes in the public sector that might contribute to successful innovation can be identified and can be used for leadership development. Such studies will provide organizational leaders with valuable advice for securing growth and survival in this rapidly changing world with continuous innovation.

References

Agarwal, U., Datta, S., Blake-Beard, S. and Bhargava, S. (2012), "Linking LMX, innovative work behaviour and turnover intentions: the mediating role of work engagement", *Career Development International*, Vol. 17 No. 3, pp. 208-230.

Al-Husseini, S. and Elbeltagi, I. (2016), "Transformational leadership and innovation: a comparison study between Iraq's public and private higher education", *Studies in Higher Education*, Vol. 41 No. 1, pp. 159-181.

Anderson, J. and Gerbing, D. (1988), "Structural equation modeling in practice: a review and recommended two-step approach", *Psychological Bulletin*, Vol. 103 No. 3, pp. 411-423.

Ardichvili, A., Page, V. and Wentling, T. (2003), "Motivation and barriers to participation in virtual knowledge-sharing communities of practice", *Journal of Knowledge Management*, Vol. 7 No. 1, pp. 64-77.

Axtell, M., Holman, D. and Wall, T. (2006), "Promoting innovation: a change study", *Journal of Occupational and Organizational Psychology*, Vol. 79 No. 3, pp. 509-516.

Barua, A., Ravindran, S. and Whinston, A. (1997), "Effective intra-organizational information exchange", *Journal of Information Science*, Vol. 23 No. 3, pp. 239-248.

Basu, R. and Green, S. (1997), "Leader-member exchange and transformational leadership: an empirical examination of innovative behaviors in leader-member dyads", *Journal of Applied Social Psychology*, Vol. 27 No. 6, pp. 477-499.

Bateman, T. and Crant, J. (1993), "The proactive component of organizational behavior: a measure and correlates", *Journal of Organizational Behavior*, Vol. 14 No. 2, pp. 103-118.

Bock, G., Zmud, R., Kim, Y. and Lee, J. (2005), "Behavioral intention formation in knowledge sharing: examining the roles of extrinsic motivators, social-psychological forces, and organizational climate", *MIS Quarterly*, Vol. 29 No. 1, pp. 87-111.

Bollen, K. (1989), *Structural Equations with Latent Variables*, Wiley, New York, NY.

Browne, M. and Cudeck, R. (1992), "Alternative ways of assessing model fit", *Sociological Methods & Research*, Vol. 21 No. 2, pp. 230-258.

Burris, E.R., Detert, J.R. and Chiaburu, D.S. (2008), "Quitting before leaving: the mediating effects of psychological attachment and detachment on voice", *Journal of Applied Psychology*, Vol. 93 No. 4, pp. 912-922.

Byrne, B.M. (2001), *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*, Lawrence Erlbaum Associates, Mahwah, NJ.

Cameron, S. and Quinn, R. (2006), *Diagnosing and Changing Organizational Culture: Based on the Competing Values Framework*, Jossey-Bass, San Francisco, CA.

Carmeli, A. and Schaubroeck, J. (2007), "The influence of leaders' and other referents' normative expectations on individual involvement in creative work", *The Leadership Quarterly*, Vol. 18 No. 1, pp. 35-48.

Cheung, G.W. and Lau, R.S. (2008), "Testing mediation and suppression effects of latent variables: bootstrapping with structural equation models", *Organizational Research Methods*, Vol. 11 No. 2, pp. 296-325.

Chiaburu, D.S., Smith, T.A., Wang, J. and Zimmerman, R.D. (2014), "Relative importance of leader influences for subordinates' proactive behaviors, prosocial behaviors, and task performance", *Journal of Personnel Psychology*, Vol. 13 No. 2, pp. 70-86.

Choi, J. (2004), "Individual and contextual dynamics of innovation-use behavior in organizations", *Human Performance*, Vol. 17 No. 4, pp. 397-414.

Crant, J.M. (2000), "Proactive behavior in organizations", *Journal of Management*, Vol. 26 No. 3, pp. 435-462.

De Jong, J. and Den Hartog, D. (2007), "How leaders influence employees' innovative behavior", *European Journal of Innovation Management*, Vol. 10 No. 1, pp. 41-64.

Edmondson, A. (1999), "Psychological safety and learning behavior in work teams", *Administrative Science Quarterly*, Vol. 44 No. 2, pp. 350-383.

Efron, B. and Tibshirani, R.J. (1993), *An Introduction to the Bootstrap*, Springer, Boca Raton, FL.

Fernandez, S. and Moldogaziev, T. (2012), "Using employee empowerment to encourage innovative behavior in the public sector", *Journal of Public Administration Research and Theory*, Vol. 23 No. 1, pp. 155-187.

Fishenden, J. and Thompson, M. (2013), "Digital government, open architecture, and innovation: why public sector IT will never be the same again", *Journal of Public Administration Research and Theory*, Vol. 23 No. 4, pp. 977-1004.

Fisk, G. and Friesen, J. (2012), "Perceptions of leader emotion regulation and LMX as predictors of followers' job satisfaction and organizational citizenship behaviors", *The Leadership Quarterly*, Vol. 23 No. 1, pp. 1-12.

Fornell, C. and Larcker, D. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.

George, J. and Zhou, J. (2001), "When openness to experience and conscientiousness are related to creative behavior: an interactional approach", *Journal of Applied Psychology*, Vol. 86 No. 3, pp. 513-524.

Glisson, C. and James, L.R. (2002), "The cross-level effects of culture and climate in human service teams", *Journal of Organizational Behavior*, Vol. 23 No. 6, pp. 767-794.

Gouldner, A. (1960), "The norm of reciprocity: a preliminary statement", *American Sociological Review*, Vol. 25 No. 2, pp. 161-178.

Graen, G. and Uhl-Bien, M. (1995), "Relationship-based approach to leadership: development of leader-member exchange (LMX) theory of leadership over 25 years: applying a multi-level multi-domain perspective", *The Leadership Quarterly*, Vol. 6 No. 2, pp. 219-247.

Graen, G.B. and Scandura, T.A. (1987), "Toward a psychology of dyadic organizing", *Research in Organizational Behavior*, Vol. 28, pp. 3-34.

Grant, A.M. and Ashford, S.J. (2008), "The dynamics of proactivity at work", *Research in Organizational Behavior*, Vol. 28, pp. 3-34.

Graves, L. and Luciano, M. (2013), "Self-determination at work: understanding the role of leader-member exchange", *Motivation and Emotion*, Vol. 37 No. 3, pp. 518-536.

Hair, J.F. Jr, Anderson, R.E., Tatham, R.L. and Black, W.C. (1995), *Multivariate Data Analysis*, Prentice Hall, Englewood Cliffs, NJ.

Hayes, A.F. (2009), "Beyond Baron and Kenny: statistical mediation analysis in the new millennium", *Communication Monographs*, Vol. 76 No. 4, pp. 408-420.

Henderson, D., Liden, R., Glibkowski, B. and Chaudhry, A. (2009), "LMX differentiation: a multilevel review and examination of its antecedents and outcomes", *The Leadership Quarterly*, Vol. 20 No. 4, pp. 517-534.

Hsu, M., Hou, S. and Fan, H. (2011), "Creative self-efficacy and innovative behavior in a service setting: optimism as a moderator", *The Journal of Creative Behavior*, Vol. 45 No. 4, pp. 258-272.

Hu, L. and Bentler, P. (1998), "Fit indices in covariance structure modeling: sensitivity to under parameterized model misspecification", *Psychological Methods*, Vol. 3 No. 4, pp. 424-453.

Janssen, O. (2000), "Job demands, perceptions of effort-reward fairness and innovative work behavior", *Journal of Occupational and Organizational Psychology*, Vol. 73 No. 3, pp. 287-302.

Janssen, O. and Van Yperen, N.W. (2004), "Employees' goal orientations, the quality of leader-member exchange, and the outcomes of job performance and job satisfaction", *Academy of Management Journal*, Vol. 47 No. 3, pp. 368-384.

Janssen, O., van de Vliert, E. and West, M. (2004), "The bright and dark sides of individual and group innovation: a special issue introduction", *Journal of Organizational Behavior*, Vol. 25 No. 2, pp. 129-145.

Jaussi, K. and Dionne, S. (2003), "Leading for creativity: the role of unconventional leader behavior", *Leadership Quarterly*, Vol. 14 Nos 4-5, pp. 475-498.

Ju, H. and Cho, J. (2011), "Analyzing the types of organizational culture on the educational administration organization: organizational culture assessment instrument (OCAI) approach", *The Journal of Vocational Education Research*, Vol. 30 No. 4, pp. 113-127.

Kamarck, E. (2004), *Government Innovation Around the World*, Ash Institute for Democratic Governance and Innovation, John F Kennedy School of Government, Harvard University, Boston, MA, available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=517666

Keller, M.R. and Block, F. (2013), "Explaining the transformation in the US innovation system: the impact of a small government program", *Socio-Economic Review*, Vol. 11 No. 4, pp. 629-656.

Kim, E. (2009), "A study on the perceived glass ceiling and job attitude for female public servants in local government", *Korean Association of Governmental Studies*, Vol. 21 No. 4, pp. 1337-1367.

Kim, E. and Yoo, T. (2012), "Emotional intelligence and adaptive performance: the mediating effect of self-efficacy and the moderating effects of change leadership and climate for innovation", *Korean Journal of Industrial and Organizational Psychology*, Vol. 25 No. 1, pp. 239-263.

Kim, E., Kim, H. and Park, H. (2008), "The effect of organizational environment characteristics on civil servants' innovative work behavior in local government", *The Korean Journal of Local Government Studies*, Vol. 12 No. 4, pp. 7-32.

Kim, J.J. (2006), "The influence of leadership toward organizational effectiveness", *The Korean Journal for Corruption Studies*, Vol. 11 No. 3, pp. 37-64.

Kim, S.E. and Lee, J.W. (2009), "The impact of management capacity on government innovation in Korea: an empirical study", *International Public Management Journal*, Vol. 12 No. 3, pp. 345-369.

Kim, T.Y., Hon, A.H.Y. and Crant, J.M. (2009), "Proactive personality, employee creativity, and newcomer outcomes: a longitudinal study", *Journal of Business and Psychology*, Vol. 24 No. 1, pp. 93-103.

Kleysen, R.F. and Street, C.T. (2001), "Toward a multi-dimensional measure of individual innovative behavior", *Journal of intellectual Capital*, Vol. 2 No. 3, pp. 284-296.

Kline, R. (2005), *Principle and Practice of Structural Equation Modeling*, Guildford Press, New York, NY.

Lee, Y.A., Kang, J.S. and Lee, L.H. (2010), "The effects of women-friendly personnel policies on job motivation and organizational commitment: with focus on the central government female officials' perceptions", *Korean Policy Sciences Review*, Vol. 14 No. 4, pp. 173-194.

Li, C. and Wu, J. (2011), "The structural relationships between optimism and innovative behavior: understanding potential antecedents and mediating effects", *Creativity Research Journal*, Vol. 23 No. 2, pp. 119-128.

Li, N., Liang, J. and Crant, M. (2010), "The role of proactive personality in job satisfaction and organizational citizenship behavior: a relational perspective", *Journal of Applied Psychology*, Vol. 95 No. 2, pp. 395-404.

Liden, R., Erdogan, B., Wayne, S.J. and Sparrowe, R. (2006), "Leader-member exchange, differentiation, and task interdependence: implications for individual and group performance", *Journal of Organizational Behavior*, Vol. 27 No. 6, pp. 723-746.

Lundvall, B.A. (2008), "Higher education, innovation and economic development", in Lin, J.Y. and Plescovic, B. (Eds), *Higher Education and Economic Development, World Bank*, Washington, DC, pp. 201-228.

Madjar, N. (2008), "Emotional and informational support from different sources and employee creativity", *Journal of Occupational and Organizational Psychology*, Vol. 81 No. 1, pp. 83-100.

Newman, J., Raine, J. and Skelcher, C. (2001), "Developments: transforming local government: innovation and modernization", *Public Money and Management*, Vol. 2 No. 1, pp. 61-68.

O'Byrne, L., Miller, M., Douse, C., Venkatesh, R. and Kapucu, N. (2014), "Social innovation in the public sector: the case of Seoul metropolitan government", *Journal of Economic and Social Studies*, Vol. 4 No. 1, pp. 53-71.

Parker, R. and Bradley, L. (2000), "Organisational culture in the public sector: evidence from six organisations", *International Journal of Public Sector Management*, Vol. 13 No. 2, pp. 125-141.

Parker, S., Williams, H. and Turner, N. (2006), "Modeling the antecedents of proactive behavior at work", *Journal of Applied Psychology*, Vol. 91 No. 3, pp. 636-652.

Parzefall, M., Seeck, H. and Leppänen, A. (2008), "Employee innovativeness in organizations: a review of the antecedents", *Finnish Journal of Business Economics*, Vol. 2 No. 8, pp. 165-182.

Patanakul, P. and Pinto, J.K. (2014), "Examining the roles of government policy on innovation", *The Journal of High Technology Management Research*, Vol. 25 No. 2, pp. 97-107.

Podsakoff, P. and Organ, D. (1986), "Self-reports in organizational research: problems and prospects", *Journal of Management*, Vol. 12 No. 4, pp. 531-544.

Preacher, K.J. and Hayes, A.F. (2004), "SPSS and SAS procedures for estimating indirect effects in simple mediation models", *Behavior Research Methods, Instruments, & Computers*, Vol. 36 No. 4, pp. 717-731.

Preacher, K.J. and Hayes, A.F. (2008), "Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models", *Behavior Research Methods*, Vol. 40 No. 3, pp. 879-891.

Reagans, R. and McEvily, B. (2003), "Network structure and knowledge transfer: the effects of cohesion and range", *Administrative Science Quarterly*, Vol. 48 No. 2, pp. 240-267.

Rigolizzo, M. and Amabile, T. (2015), "Entrepreneurial creativity: the role of learning processes and work environment supports", in Shalley, C., Hitt, M. and Zhou, J. (Eds), *The Oxford Handbook of Creativity, Innovation, and Entrepreneurship*, Oxford University Press, New York, NY, pp. 61-78.

Sarros, J.C., Cooper, B.K. and Santora, J.C. (2008), "Building a climate for innovation through transformational leadership and organizational culture", *Journal of Leadership & Organizational Studies*, Vol. 15 No. 2, pp. 145-158.

Scott, S. and Bruce, R. (1994), "Determinants of innovative behavior a path model of individual innovation in the workplace", *The Academy of Management Journal*, Vol. 37 No. 3, pp. 580-607.

Seibert, S.E., Crant, J.M. and Kraimer, M. (1999), "Proactive personality and career success", *Journal of Applied Psychology*, Vol. 84 No. 3, pp. 416-427.

Seibert, S.E., Kraimer, M.L. and Crant, J.M. (2001), "What do proactive people do? A longitudinal model linking proactive personality and career success", *Personnel Psychology*, Vol. 54 No. 4, pp. 845-874.

Shalley, C., Zhou, J. and Oldham, G. (2004), "The effects of personal and contextual characteristics on creativity: where should we go from here?", *Journal of Management*, Vol. 30 No. 6, pp. 933-958.

Spreitzer, G. (1995), "An empirical test of a comprehensive model of intrapersonal empowerment in the workplace", *American Journal of Community Psychology*, Vol. 23 No. 5, pp. 601-629.

Tabachnick, B. and Fidell, L. (1996), *Using Multivariate Statistics*, Harper Collins, New York, NY.

Thurlings, M., Arnoud, E. and Vermeulen, M. (2015), "Toward a model of explaining teachers' innovative behavior: a literature review", *Review of Educational Research*, Vol. 85 No. 3, pp. 430-471.

Verhoest, K., Verschuere, B. and Bouckaert, G. (2007), "Pressure, legitimacy, and innovative behavior by public organizations", *Governance*, Vol. 20 No. 3, pp. 469-497.

Volmer, J., Spurk, D. and Niessen, C. (2012), "Leader-member exchange (LMX), job autonomy, and creative work involvement", *The Leadership Quarterly*, Vol. 23 No. 3, pp. 456-465.

Vroom, V. (1982), *Work and Motivation*, Robert E. Krieger Publishing Company, Malabar, FL.

Woodman, R. and Schoenfeldt, L. (1990), "An interactionist model of creative behavior", *The Journal of Creative Behavior*, Vol. 24 No. 4, pp. 279-290.

Xerri, M.J. and Brunetto, Y. (2013), "Fostering innovative behaviour: the importance of employee commitment and organisational citizenship behavior", *The International Journal of Human Resource Management*, Vol. 24 No. 16, pp. 3163-3177.

Yesil, S. and Sozbilir, F. (2013), "An empirical investigation into the impact of personality on individual innovation behaviour in the workplace", *Procedia-Social and Behavioral Sciences*, Vol. 81 No. 1, pp. 540-551.

Yuan, F. and Woodman, R. (2010), "Innovative behavior in the workplace: the role of performance and image outcome expectations", *Academy of Management Journal*, Vol. 53 No. 2, pp. 323-342.

Zhang, Z., Wang, M. and Shi, J. (2012), "Leader-follower congruence in proactive personality and work outcomes: the mediating role of leader-member exchange", *Academy of Management Journal*, Vol. 55 No. 1, pp. 111-130.

Further reading

Bharadwaj, S. and Menon, A. (2000), "Making innovation happen in organizations: individual creativity mechanisms, organizational creativity mechanisms or both?", *Journal of Product Innovation Management*, Vol. 17 No. 6, pp. 424-434.

Joo, B.K., McLean, G. and Yang, B.Y. (2013), "Creativity and human resource development: an integrative literature review and a conceptual framework for future research", *Human Resource Development Review*, Vol. 12 No. 4, pp. 390-421.

Appendix. Survey items

Innovative behavior
IB1: I search out new technologies, processes, techniques and/or product ideas.
IB2: I generate creative ideas.
IB3: I promote and champion ideas to others.
IB4: I investigate and secure funds needed to implement new ideas.
IB5: I develop adequate plans and schedules for the implementation of new ideas.
IB6: I am innovative.

Climate for innovation
Support for innovation
CI1: the main function of members in this organization is to follow orders which come down through channels.
CI2: around here, a person can get is a lot of trouble by being different.
CI3: this place seems to be more concerned with the status quo than with change (reverse).

Resource supply
CI4: there are adequate resources devoted to innovation in this organization.
CI5: there is adequate time available to pursue creative ideas in my company.
CI6: this organization gives me free time to pursue creative ideas during the workday.

LMX
L1: I usually know how satisfied my leader is with what I do.
L2: my leader understands my job problem and needs well.
L3: my leader recognizes my potential well.
L4: regardless of how much formal authority my leader has built into his/her position, he/she would use his/her power to help me solve problems in my work.
L5: regardless of the amount of formal authority my leader has, I believe that he/she would "bail me out," at his/her expense.
L6: I have enough confidence in my leader that I would defend and justify his/her decision if he/she were not present to do so.
L7: I have a good working relationship with my leader.

Proactivity
P1: I am constantly on the lookout for new ways to improve my life.
P2: wherever I have been, I have been a powerful force for constructive change.
P3: nothing is more exciting than seeing my ideas turn into reality.
P4: if I see something I do not like, I fix it.
P5: no matter what the odds, if I believe in something I will make it happen.
P6: I love being a champion for my ideas, even against others' opposition.
P7: I excel at identifying opportunities.
P8: I am always looking for better ways to do things.
P9. If I believe in an idea, no obstacle will prevent me from making it happen
P10: I can spot a good opportunity long before others can.

Corresponding author
Sung Jun Jo can be contacted at: sungguri@gachon.ac.kr