

EMPLOYEES' PROACTIVE BEHAVIOR AND INNOVATION PERFORMANCE: EXAMINING THE MODERATING ROLE OF INFORMAL AND FORMAL CONTROLS

Abstract

Purpose. This study aims to analyze the degree to which employees' proactive behavior contributes to innovation performance in firms operating in high technology sectors. Despite the benefits of these behaviors for individuals and organizations, few studies have analyzed the contextual conditions that enable firms to capture their value in order to improve innovation performance. Drawing on the interactionist perspective, we also examine the extent to which informal and formal controls, such as perceived support for innovation and innovation process formalization, can facilitate the contribution of proactive behaviors to improve innovation performance (product and process innovation).

Design/methodology/approach. Based on an empirical study with a sample of 173 firms operating in chemical and information technology service sectors, hierarchical regression analysis was used to test the relationship between employees' proactive behavior and innovation performance, and the moderating effects of informal and formal controls.

Findings. Our results reveal a positive and significant association between proactive behaviors and product and process innovation performance. Both control mechanisms positively moderate the association between proactive behavior and product innovation, but no moderating role was found for process innovation. Moreover, rather than inhibiting innovation performance, innovation process formalization is positively associated with innovation. More specifically, a curvilinear relationship was found, which implies that when the level of formalization is high it is able to improve product and process innovation.

Practical implications. Our findings suggest that managers should consider proactive behavior in selection processes and performance management, and should cultivate a climate to support innovation and establish formal controls for innovation as a way to channel employees' initiatives into product innovation.

Originality/value. This study contributes to the theoretical and managerial understanding of the extent to which proactive employees and organizational controls are able to enhance innovation in a technologically dynamic context.

Keywords: Proactive behavior; Innovation performance; Organizational control; Perceived support for innovation; Innovation process formalization.

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1. Introduction

Employee proactive behavior refers to pioneering behaviors, taking initiatives to discover opportunities, and try to innovate and lead. This topic has been analyzed in the organizational behavior and innovation literatures, in which proactive behavior guides employees in their search for solutions, in their persistence and in their ability to obtain the desired results (e.g., Grant and Ashford, 2008; Rauch et al., 2009). In this regard, authors such as Seibert et al. (2001) have demonstrated that proactivity improves individual outcomes such as employees' task performance. It can also contribute to organizational innovation, particularly in dynamic technological environments, where pressures for innovation increase and employees with self-starting behaviors and oriented to change take on a more critical role (Covin and Slevin, 1989; Wiklund and Shepherd, 2005; Rauch et al., 2009; Kraus et al., 2012).

Despite the benefits of this type of behavior for both employees and organizations, several questions still remain unanswered regarding the influence of proactive behaviors on innovation performance. Most studies still take a top-down approach to innovation within organizations, while studies that delve deeper into the role of employees in promoting innovation within firms are scarce (Rigtering and Weitzel, 2013). Hence, few studies have explored what contextual conditions enable firms to capture the value of such initiatives and align them with their innovation objectives. The interactionist perspective (Woodman *et al.*, 1993; Oldham and Cummings, 1996) assumes that the interaction between employees' personal factors and the organizational context is core to understanding the consequences of employees' behaviors for the organization. In a

context of innovation, the interactions between contextual and individual factors may enhance or inhibit creativity and innovation at work (Woodman et al., 1993). In this vein, recent studies also suggest taking into account the organizational context to better understand the contribution employees make to innovation performance (e.g., Somech and Drach-Zahavy, 2013; Anderson et al., 2014). A large body of research has focused on the role of organizational controls in innovation performance with diverse results, depending on the type of control and the kind of innovation outcomes (e.g., Amabile et al., 1996; Leung et al., 2011; Arend et al., 2017; Martínez et al., 2019). However, a better understanding of how organizational controls contribute to innovation performance may lie in the complementarity between these controls and employees' proactive behavior. This complementarity may reduce employee uncertainty in the innovation process and guide their initiatives toward organizational innovation objectives. Based on the control transmission channel dimensions (Lange, 2008; Labitzke et al., 2014), which differentiate between social/cultural channels (informal controls) and administrative channels (formal controls), we focus on the role of informal and formal controls as supportive contextual factors for aligning initiatives from employees with organizational innovation aims. The transmission channel dimension is defined according to the level of bureaucracy and the type of formality (Labitzke et al., 2014). On this basis, we examine perceived support for innovation and the formalization of the innovation process as informal and formal control factors that may shed more light on the consequences of employee proactive behaviors on innovation performance.

First, perceived support for innovation refers to the extent to which an organization assists its employees to be creative, flexible and open to change (Scott and Bruce, 1994). People working in a creativity-supportive context are oriented toward and supported in developing useful ideas for innovation (Dul and Ceylan, 2014). Studies such

as West and Richter (2008) suggest that climate for innovation is a supportive contextual factor that stimulates employees' contributions to innovation performance. However, there is scarce evidence on the influence of perceived support for innovation on a firm's innovation performance. For instance, Çokpekin and Knudsen (2012) suggest that the research related to creativity-supporting climates has focused on the influence at the individual and departmental unit level, and recommend addressing it at the level of firms' innovation performance. Our first objective, therefore, is to examine the moderating effect of perceived support for innovation on the relationship between proactive behaviors and innovation performance.

Second, a large body of research has analyzed the influence of formalized innovation processes on innovation performance. Formalized innovation processes refer to the degree to which rules, procedures, goals and responsibilities are clearly specified in the development of innovation activities (Labitzke et al., 2014). Findings regarding the impact of process formalization for innovation performance are mixed (e.g., Im et al., 2013; Labitzke et al., 2014; Arend et al., 2017). High formalization can reduce the number of new product development ideas because they hamper informal communication during the process of developing novel ideas and increase convergent thinking (e.g., Amabile et al., 1996; Jansen et al., 2006). For instance, in high-technology sectors formalization can constrain opportunity recognition of market trends (Arend et al., 2017). Authors such as Amabile et al. (1996), also find that formalization limits employees' freedom by prescribing procedures, thereby curbing their ability to take initiative (Raub, 2008). However, other authors suggest that specific rules, procedures, goals and responsibilities provide employees with structure, reduce ambiguity and improve the efficiency of the innovation process (e.g., Labitzke et al., 2014; Martínez et al., 2019). These arguments lead us to ask whether formalization may be used as a mechanism to turn employee

initiatives into new products and processes for organizations. In this line, our second objective is to analyze the moderating effect of innovation process formalization on the relationship between proactive behaviors and innovation performance.

In sum, this study analyzes the contribution of employees' proactive behavior to innovation performance and, based on the interactionist perspective, delves deeper into this relationship by exploring the moderating role of perceived support for innovation and innovation process formalization as informal and formal organizational controls. We use hierarchical regression analysis to explore these relationships with a sample of 173 firms operating in chemical and information technology sectors. We would expect that employees' proactivity will support innovation performance and that informal and formal controls will positively interact with proactive employees' behaviors and align them with innovation performance.

The paper is structured as follows. First, we present the theoretical framework for the analysis of the relationships between proactive behavior, innovation performance and informal and formal control factors (perceived support for innovation and formalization of the innovation process). After the theoretical review, we outline the methodological aspects of the research and present our results. The paper closes with the discussion of the findings and the main conclusions and implications.

2. Conceptual framework

2.1. Defining proactive behavior

Proactivity refers to self-starting, change-focused, and future-oriented behaviors (Crant, 2000; Frese and Fay, 2001; Unsworth and Parker, 2003). Grant and Ashford (2008: 8) define proactive behavior "as an anticipatory action that employees take to impact themselves and/or their environments". From a person–environment fit perspective, proactivity facilitates employees' capacity to shape their environments, as a

way to highlight individual strengths and improve performance (e.g., Crant, 2000). Previous studies point out the benefits of proactive behaviors for individuals, such as supporting creativity and improving task performance (e.g., Seibert et al., 2001; Hermann and Felfe, 2014), and also for firms' innovation success (e.g., Kickul and Gundry, 2002).

Proactive behavior has been mainly analyzed as an individual construct. Some studies, however, suggest the interest of analyzing collective constructs due to their close connection with organizational performance (e.g., Baer and Frese, 2003; Pugh and Dietz, 2008). Hence, we examine collective proactive behaviors displayed by the group of employees from the R&D area. Based on previous studies of proactivity as a collective phenomenon (e.g., Williams et al., 2010; Erkutlu and Chafra, 2012), we define collective proactive behavior as the behavior of employees from the R&D area who, as a group, are able to take initiatives to anticipate and create changes. Several scholars (e.g., Morgeson and Hofmann, 1999; Whitman et al., 2010; Williams et al., 2010; Dawkins et al., 2015) have explained that collective constructs represent the mode of behavior in the area as a whole, the ability to behave collectively derived from the combination of ideas and interactions between the members of the area (i.e. they engage in common processes and events, and share knowledge). These previous contributions suggest that in some way collective proactive behavior gathers the collective mind (Weick and Roberts, 1993) in the R&D area; in other words, there is a behavioral pattern to undertake actions proactively, which may differ in structure from average individual proactive behavior due to the interactions between the members of the area.

2.2. Innovation performance

Innovation begins with the generation of new ideas on how to do things better. Once an idea has been proposed, it must be tried out, and implemented (Frese and Fay, 2001). Innovation is more than the generation of creative ideas; it is the combination of ideas

with resources and expertise in a useful way and the implementation of those ideas in new processes or products (West and Anderson, 1996). As some authors point out (e.g., Fu et al., 2015; Camisón and Puig, 2016), innovation is a general construct which has been studied from different perspectives (i.e. as an organizational capability, as the process of adoption or diffusion of innovation, as a performance variable). Considering the approach of Prajogo and Sohal (2004, 2006), here we focus on innovation as a performance outcome referred to new products and processes developed by the organization to provide new values to the market based on criteria such as the number of innovations, speed of innovation, novelty or being the first in the market. Product innovations refer to new goods and services developed to satisfy customers, and process innovations bring about changes in production or service operations (Damanpour, 1991). Product innovations have an external orientation and focus on customers, whereas process innovations are focused inwards and are mainly oriented toward the effectiveness or efficiency of production (Utterback and Abernathy, 1975). Distinguishing between these two types of innovation performance is important because “it relates to the specific organization strategy that a firm adopts to respond to market demand and opportunities by capitalizing on organizational capability and competence” (Prajogo, 2016: 242).

2.3. Relationship between proactive behaviors and innovation performance

Unsworth and Parker (2003) consider employees as a significant source of knowledge in supporting innovation due to their awareness of customers’ needs or their technical know-how. Drawing on employee-driven innovation, every employee, irrespective of their position or level of education, can contribute to innovation (Kristiansen and Bloch-Poulsen, 2010). Menzel et al. (2007) point to the contribution engineers make in the creation of new products or the improvement of products and processes with the application of their technical expertise. Thus, employees involved in

product/process development can be a critical source of experience-based knowledge for innovation. Although it is recognized that innovation is fostered by employees' behaviors (e.g., Griffin et al., 2007; Parker and Collins, 2010), most studies have focused on implementing innovative projects in a top-down manner. Some authors (e.g., Høystrup, 2010; Rigtering and Weitzel, 2013) suggest analyzing employees' initiatives in promoting innovation in firms, that is, an approach focused on employee behavior and motivation to support innovation. Particularly in high-technology sectors, where technological changes are the norm and there is a constant need to innovate, change-oriented employees with self-starting behaviors become a key resource in organizational success (Covin and Slevin, 1989; Wiklund and Shepherd, 2005; Rauch et al., 2009; Kraus et al., 2012).

From a behavioral perspective, previous studies (e.g., Frese and Fay, 2001; Unsworth and Parker, 2003; Escrig et al., 2018) suggest that collective proactive behavior can be a relevant enabler of innovation. This behavior is characterized by self-starting and change-focused actions in employees' approaches to work, which make it easier to identify problems and propose improvements to enhance product and process innovation performance (Anderson et al., 2014; West, 2002). Proactive behaviors stimulate employees to promote and lead change, and organizations frequently rely on this kind of employee to foster innovation (Grant and Ashford, 2008). Thus, we propose:

Hypothesis 1. There is a positive relationship between employees' proactive behavior and innovation performance.

2.4. Organizational control, proactive employees and innovation performance

Johns (2006: 386) defines context as “situational opportunities and constraints that affect the occurrence and meaning of organizational behavior as well as functional relationships between variables”. Some authors in the proactivity literature have

identified the need to consider the conditions under which proactivity takes place in order to better understand the consequences of this type of behavior (e.g., Frese and Fay, 2001; Thomas et al., 2010). As Erdogan and Bauer (2005: 862) point out, “the extent to which individuals benefit from their own proactivity depends on the context”. In order to explain the relationship between context and behaviors, scholars have identified organizational context as both a moderator and predictor of employees’ behaviors (Bamberger, 2008; Johns, 2018; Cai et al., 2019). As a moderator, organizational context may sustain employees’ behaviors since employee-driven innovation is a bottom-up process that needs to be supported, recognized and organized (Høystrup, 2010). Following an interactionist perspective, innovation may be enhanced through the interaction between employees’ proactive behavior and the organizational context. Although some employees may have a greater predisposition to proactivity than others, the organizational context may facilitate or inhibit the consequences of employee proactive behaviors on innovation performance.

Particularly, some authors consider that the type of organizational control may condition innovation performance (e.g., Cardinal, 2001; Labitzke et al., 2014) and may also interact to align employee’s behavior with innovation results (Leung et al., 2011; Somech and Drach-Zahavy, 2013). Hence, based on the interactionist approach, we focus on two types of informal and formal controls that, together with employees’ proactive behavior, might foster innovation performance. Based on the control transmission channel dimensions (Lange, 2008; Labitzke *et al.* 2014), support for innovation is consistent with more informal controls, such as beliefs, values and norms, associated with low levels of bureaucracy, and transmitted through social channels and a corporate culture that nurtures creativity and change. In turn, formalization of the innovation process is associated with high levels of formality and bureaucracy and can be attributed to

administrative channels that include formal processes, rules, regulations and structures. We specifically examine the moderating role of these two control types in the proactive behavior-innovation performance relationship.

2.4.1. Moderating role of perceived support for innovation

Perceived support for innovation captures an orientation toward creativity and innovation change, and the perception of the organization as open to change (Siegel and Kaemmerer, 1978). A supportive context for innovation is “one where employees perceive that the environment within which they work encourages, recognizes, respects, and rewards those who exhibit creativity” (Shalley, Gilson, and Blum, 2009: 492).

Several authors (Bolino et al., 2010; Strauss et al., 2015) suggest that carrying out proactive behavior involves a number of resources such as time, organizational support or job satisfaction. A work context where creativity is encouraged gives employees the opportunity and the assistance they need to propose new ideas and contribute to innovation performance (Bommer and Jalajas, 2002; Dul and Ceylan, 2014; Tamayo-Torres et al., 2016) and also highlights the value a firm places on creativity (Siegel and Kaemmerer, 1978; Scott and Bruce, 1994; Ford, 1996). In the context of R&D units, perceived support for innovation fosters a collective perception among members of R&D departments that the organization both expects and values their ideas and innovation-related activities (King et al., 1991). This perception forms the basis of a significant motivational state within the team that, in turn, plays an important role in encouraging team innovation (Chen et al., 2013).

The interactionist perspective of innovation assumes that personal and contextual factors interact to encourage employees to generate and promote new and useful ideas, or indeed inhibit them from doing so (Oldham and Cummings, 1996; Woodman *et al.*, 1993). Scholars contributing to the proactivity literature (e.g., Frese and Fay, 2001; Crant,

2000; Thomas *et al.*, 2010) also propose exploring the contextual conditions under which proactivity takes place. In this vein, previous studies show the role of perceived support for innovation as a moderator variable in the relationship between employees' behavior and innovation performance. For instance, Leung *et al.* (2011) found that perceived support for innovation moderated the relationship between role stress and innovative performance. Specifically, they demonstrated that when perceived support for innovation was high, the U-shaped relationship between role stress and innovative performance did not emerge. At the team level, Somech and Drach-Zahavy (2013) demonstrated that climate for innovation moderates the relationship between team creativity and team innovation implementation.

According to Crant (2000), many of the research streams have focused on identifying the situational antecedents that elicit proactive behavior; however, an interactionist perspective between proactive behavior and contextual factors may improve understanding of the consequences of this behavior for organizations. We adopt an interactionist perspective to propose that the link between employee proactive behavior and innovation is most clearly strengthened when perceived support for innovation is stronger. We therefore expect that in an environment where innovation is strongly supported, firms will increase their opportunities for innovation since synergistic effects exist between employees' behaviors and the support from the organization. In contrast, if organizations do not provide support for innovation, proactive behavior is less likely to be translated into innovation performance. Thus, we propose that:

Hypothesis 2. Perceived support for innovation moderates the relationship between employees' proactive behavior and innovation performance, and thus the higher perceived support for innovation is, the stronger this relationship will be.

2.4.2. Moderating role of innovation process formalization

Formalization refers to the extent to which procedures and guidelines are stipulated within the organization (Khandwalla, 1977). There is no consensus in the literature on whether innovation process formalization hinders or helps innovation (e.g., Damanpour, 1991; Cardinal, 2001; Löfsten, 2014; Arend et al., 2017). Innovation process formalization provides performance-enhancing efficiencies such as speeding up new product development cycles (Griffin, 1997) and lowering failure rates (Brown and Eisenhardt, 1995). Recently, Martínez et al. (2019) concluded that systematization contributes to the efficacy of the innovation process by providing data as well as reducing uncertainty and saving time. However, several authors find that the formalization process produces rigidities that form barriers to updating knowledge about market trends (Leonard-Barton, 1992), or that it restricts the search for problems (Nickerson and Zenger, 2004). A high degree of formalization hampers creativity since rigid rules and procedures limit informal communication during the generation of new ideas and increase convergent thinking (Amabile et al., 1996; Brockman and Morgan, 2003), although results have not always been consistent (Damanpour, 1991). As Glaser et al. (2016: 1139) note, “organizations thus face the dilemma of how to exercise control over proactive employees without overly constraining them”.

Drawing on the interactionist perspective, we ask to what extent proactive behavior may be combined with innovation process formalization to improve innovation results. One example of this combination is seen when firms implement formal processes to guarantee that the creative efforts of R&D employees remain aligned and to achieve productive and efficient use of innovations (Cooper, 1990; Schilling, 2010). In this vein, Arend et al. (2017) advocate reaching a balance between autonomy in the search for new ideas and the control of individuals’ innovation efforts toward the objectives of the organization. Organizations must carefully appraise the level of autonomy granted to

R&D employees (Criscuolo et al., 2014), allowing them enough flexibility and autonomy to search for new and unusual ideas, yet formalizing processes sufficiently so that employees have a supportive structure, ambiguity is limited and they are enabled to address novel problems (Bolton, 2004). Thus, we expect that organizations which provide employees with formal controls to ameliorate the inherent uncertainty of the R&D process will enhance the possibility that proactive behaviors lead to an improvement in their innovation performance. Based on these arguments, we posit the following hypothesis:

Hypothesis 3. Innovation process formalization moderates the relationship between employees' proactive behavior and innovation performance, and thus the higher the level of formalization is, the stronger this relationship will be.

The research model used in this study is shown in Figure 1.

[FIGURE 1]

3. Methodology

3.1. Data

To examine the hypotheses we conducted a survey on a sample of firms selected from the SABI (Sistema de Análisis de Balances Ibéricos) database. SABI is an information service that publishes a database of Spanish and Portuguese firms, which can be searched to select general information such as sector or number of employees. The selection provided us with the population of firms from the chemical manufacturing (CNAE 20) and information technology service sectors (CNAE 62). These sectors were selected for the following reasons. First, the 2015 Spanish National Institute of Statistics classifies both of these sectors as highly innovation-oriented based on the percentage of firms considered as innovative and on investments in R&D. Second, the firms to be included in the sample should be over a certain minimum size in order to ensure that there

would be somebody in charge of product/process development who would be capable of answering questions on innovation performance. Following previous contributions (Pekovic and Galia, 2009; Llach et al., 2011), we aimed to select firms with a minimum of 50 employees for the manufacturing sector, and a minimum of 20 employees in the case of the service sector. Data collected from the 2015 Spanish SABI database showed that the chemical and IT services are the sectors that contain the largest number of firms that satisfy these criteria. The resulting population was 337 firms for the chemical sector and 1194 for the IT service sector. Our intention was to approach all the companies in the population, but we were unable to make contact with 31 firms in the chemical sector and 210 firms in the IT sector.

After initial pretesting by managers from five companies, the data were collected in 2016 by means of a survey sent out to participants by e-mail. Following Kumar et al. (1993), to overcome possible problems with a single informant, and taking into account the interviews in the pre-test, the head of the R&D section was assumed to be knowledgeable on the questions in the survey. This is not an uncommon approach in the literature (e.g., Cabello et al., 2011) because this informant interacts with employees and observes their behavior, and the activity and development in the section. Telephone contact was first made with the firms to ask for the name of this person and his/her e-mail address, in order to request their participation. At this point, we confirmed that the firm had specific staff working on product/process development in the same location. The informants then received an e-mail containing information about the research and a link to the corresponding questionnaire. After the data collection process had finished, firms received a report about the results which was intended to serve as additional motivation to participate in the research.

We received usable questionnaires from 173 firms: 84 from the chemical manufacturing sector (CNAE 20) and 89 from the information technology service sector (CNAE 62). The sample error was found to be $\pm 7.02\%$. Of these 173 firms, 20.81% are small companies (<50 employees), 59.54% are medium-sized companies (50 to 249 employees), and 19.65% are large companies (>249 employees). The average size of the firms for the whole sample was 352.35 employees ($SD= 1,049.72$).

3.2. Common method and non-response bias tests

We used various procedures to encourage respondents to answer the questionnaire accurately and thus lessen the likelihood of common method bias (Brannick et al., 2010; Podsakoff et al., 2012). First, a presentation letter and instructions for completing the survey were provided, pointing out to participants that responses would not be considered either 'right' or 'wrong'. Second, we labeled each part of the questionnaire clearly and ensured that the questions for the dependent, moderator and independent variables were separated in order to minimize any influence of proximity. Finally, as noted earlier, online questionnaires were used to collect data rather than face-to-face interviews. Several statistical solutions proposed to deal with common method bias were applied. Thus, we performed a single-factor test (Podsakoff et al., 2003) following earlier studies (e.g., Prajogo and McDermott, 2014; Prajogo, 2016). The results of the confirmatory factor analysis (CFA) with every item loading on a single-factor (S-B $\chi^2_{(299)}=1137.7526$, $p=0.0000$; B-BNFI=0.459; CFI=0.528; RMSEA=0.129) showed an unsatisfactory fit, from which it can be inferred that such bias is not an issue in this analysis.

To address the issue of non-response bias, we compared the operating income and number of employees of the firms in the sample (information provided by SABI) with the same information for firms in the population which did not take part in the study. The

results of the *t*-tests did not reveal any significant differences between the two groups for size ($t=0.32, p>0.05$) or income ($t=0.74, p>0.05$).

3.3. Measurement

Table 1 summarizes the items that were used to measure the variables. In all cases, a five-point Likert scale was used to record the answers.

[TABLE 1]

The seven items proposed by Frese et al. (1997) were used to evaluate proactive behavior in the product/process development section. Although the items of Frese et al. (1997) were initially developed to quantify individual proactive behaviors, they are suitable to assess proactive behaviors at a collective level, as Baer and Frese (2003) showed. Following Prajogo and Sohal (2006), to systematically capture the features of innovation performance we measured product innovation performance (five items) and process innovation performance (four items) as two separate variables, which according to Zeng et al. (2015, 2017), are the two most widely used traditional measures of innovation found in the literature. The informants were asked to give their perceptions of the performance on aspects such as the number and speed of innovations, novelty or being the first in the market for both product and process innovation, as compared to their main competitors. We estimated separate models for each type of innovation performance, in line with other authors such as Martínez and Martínez (2008) and Tomlinson and Fai (2016).

This study measures perceived support for innovation with six items from Scott and Bruce (1994), which were originally devised by Siegel and Kaemmerer (1978) to evaluate support for change and creativity. Informants indicated their perception on the

extent to which the organization is open to new ideas. Innovation process formalization was operationalized following the four items from Labitzke et al. (2014), who developed a measure of the formal mechanisms and regulations applied by an organization to direct its attention toward innovation.

Taking into account previous research (e.g., Sadikoglu and Zehir, 2010; Camisón and Puig, 2016), size (taken as the logarithm of the number of employees) and sector (dummy variable, where 1=chemical sector and 0=IT service sector) were introduced as control variables because of their potential association with innovation performance.

3.4. Analytical procedure

Before testing the hypotheses, following Bagozzi and Yi (2012) we used structural equations models (SEM) to perform a CFA to analyze the dimensionality, reliability and validity of the measurement model, using EQS 6.2 statistical software (Bentler, 2006). A hierarchical moderated regression analysis (Cohen et al., 2003) was then carried out to examine the hypotheses. As recommended by Aiken and West (1991), we centered the independent and moderator variables to prevent multicollinearity problems. Multicollinearity was also ruled out, as the highest variance inflation factors (VIFs) within the models was 1.547, thus below the cut-off value of 10 (Field, 2009). Several models were estimated separately for product innovation performance (models 1 to 4) and for process innovation performance (models 5 to 8) (see Table 3). Models 1 and 5 consider only the control variables, while models 2 and 6 add the independent and moderator variables. Finally, models 3 and 7, and models 4 and 8 examine the moderation of perceived support for innovation and innovation process formalization, respectively.

4. Results

4.1. Measurement model

The measurement model included five correlated latent variables: proactive behavior, product innovation performance, process innovation performance, perceived support for innovation and innovation process formalization. The goodness-of-fit indices for the CFA ($S-B\chi^2(287)=356.59$ $p=0.00$; $B-BNFI=0.956$; $CFI=0.961$; $RMSEA=0.038$) confirm the presence of these five correlated factors.

Following Hair et al. (2010) and Bagozzi and Yi (2012), we examined the reliability of the individual items, taking into account the size of the factor loading estimates, as well as construct reliability. All items load on their respective construct; there are no symptoms of poor fit such as negative error variances, standardized coefficients greater than 1, or very high standard errors; and the loadings are significant and higher than 0.5 as suggested by Hair et al. (2010). Moreover, the composite reliability (Fornell and Larcker, 1981) and Cronbach's alpha (Cronbach, 1951), shown in Table 1, demonstrate satisfactory reliability since both are greater than 0.7 for all the measures.

Regarding convergent validity, following Anderson and Gerbing (1988), all the items display significant standardized loadings on their corresponding constructs, the lowest being 0.558. Moreover, the AVE (average variance extracted) values in Table 1 approach or are higher than 0.5, demonstrating that the average communality is satisfactory (Fornell and Larcker, 1981). Only in the case of product innovation is the value 0.45; however, we decided to keep the original scale since the value can be still considered acceptable as it is close to the threshold and the other assessments of reliability, convergent and discriminant validity are suitable.

Following Bagozzi and Phillips (1982), we performed a pair-wise test to examine discriminant validity. For all the possible pairs of factors in our measurement model, we compared a CFA where the correlation between the two factors was set to 1 against a

model in which the correlation was free. The difference in the chi-square values for each pair of factors ($p < 0.05$) demonstrates the presence of discriminant validity.

Having examined the measurement model, no items were deleted from the proposed scales since the measures were found to be reliable and valid. The mean of the indicators used to measure each construct was calculated in order to test the hypotheses. The descriptive analyses of the constructs are shown in Table 2.

[TABLE 2]

4.2. Hypotheses examination

The findings from the hierarchical regression analyses for both product and process innovation performance as dependent variables are reported in Table 3. The models are found to have a good overall explanatory power ($R^2 > .23$), and explained variance is significantly increased on adding the independent variables and interaction terms. Model 2 and model 6 assess the direct association between proactive behavior and product and process innovation performance, respectively. As observed in Table 3, proactive behavior is positively associated with product ($\beta = 0.247$, $p < .01$) and process ($\beta = 0.224$, $p < .01$) innovation performance; H1 is therefore supported. These models also showed that the chemical sector exhibits a significant lower level of process innovation performance ($\beta = -0.161$, $p < .05$) compared to the IT service sector, while the effect of size is not significant.

[TABLE 3]

Hypothesis 2 was partially supported since different findings are obtained when product and process innovation performance are considered as dependent variables. A positive relationship was found between perceived support for innovation and product and process innovation performance, as reported in Table 3. However, the interaction between proactive behavior and perceived support for innovation was only found to be

significant for product innovation performance (model 3), with a beta coefficient of 0.129 ($p < .1$). For process innovation performance (model 7), the beta coefficient of the interaction terms (0.09) failed to achieve statistical significance and, thus, no moderation was found.

To enhance interpretation of the moderation of perceived support for innovation when product innovation performance is taken as the dependent variable, we followed Aiken and West's (1991) recommendation to graphically represent the simple regression line of the independent variable (proactive behavior) on the dependent variable (product innovation performance), according to the moderator (perceived support for innovation). To this end, the moderating variable was dichotomized based on one standard deviation above (high) and below (low) its mean value. The interaction plot (Figure 2) shows the product innovation performance values estimated from the higher and lower values of proactive behavior, previously defined by a standard deviation above (0.61) and below (-0.61) its mean value, respectively. From the calculated slopes we deduce that in a situation of high perceived support for innovation, the positive influence of proactive behavior for the improvement of product innovation performance is boosted.

[FIGURE 2]

Similarly, a positive significant interaction was found between proactive behavior and innovation process formalization ($\beta = 0.153$, $p < .05$) only when product innovation performance is taken as the dependent variable (model 4). Conversely, innovation process formalization did not play a moderating role in the relationship between proactive behavior and process innovation performance (the coefficient of the interaction term, 0.099, is not significant in model 8), which provides partial support for H3.

Following the same technique explained above, the positive moderation of innovation process formalization when product innovation performance is considered as the

dependent variable is also graphically represented (Figure 3). The more pronounced slope in the high formalization scenario indicates that innovation process formalization boosts the power of proactive behavior to enhance product innovation performance.

[FIGURE 3]

Table 3 reveals that the link between formalization of the innovation process and product innovation performance is not significant ($\beta=0.1$, $p>.1$, in model 2). However, as explained before, model 4 shows that when innovation process formalization is coupled with proactive behavior, synergistic effects appear that boost product innovation performance. The models for process innovation performance as the dependent variable show a different pattern of relationships since the direct connection between formalization and process innovation performance is positive and significant ($\beta=0.154$, $p<.05$) (model 6), although no moderation effect is observed ($\beta=0.099$, $p>.05$) (model 8). These findings, together with the lack of consensus in previous contributions about the role that formalization plays in innovation performance, led us to ask whether a different pattern of relationships may exist between innovation formalization process and the two types of innovation performance (product and process innovation).

4.3. Supplemental analysis

Consequently, we conducted additional hierarchical regression analyses to explore the potential curvilinear relationship between innovation process formalization, and both product and process innovation performance. Table 4 reports the findings from the quadratic models in the case of product innovation (model 9) and process innovation (model 10) performance as separate dependent variables, in which we added the squared term for innovation process formalization to models 2 and 6 in Table 3.

[TABLE 4]

We note that formalization squared was positive and significant in the model for product innovation performance ($\beta=0.234$, $p<.01$) (model 9) and for process innovation performance ($\beta=0.189$, $p<.01$) (model 10) (see Table 4), suggesting a curvilinear association (U-shaped) between formalization of the innovation process and both product and process innovation performance. The plots of the regression equations are presented in Figure 4. For both product and process innovation performance, when formalization is low (set at 2SD below the mean) an increase in formalization does not translate in an increase in the level of innovation performance (product or process); in fact, we observe a slight decline in the level of product innovation performance. In contrast, when formalization is high, an increase in formalization derives in an increase of both product and process innovation performance. That is, product and process innovation performance initially decline as innovation process formalization increases, but then they increase continuously. Therefore, it is important to take into account the critical point of formalization levels, since high levels allow the results of product and process innovation to improve.

[FIGURE 4]

5. Discussion and conclusion

5.1. Research contributions

First, our study contributes to the limited research conducted to date on the relationship between proactive behavior and innovation from an employee-driven innovation perspective. Some authors (e.g., Rigtering and Weitzel, 2003; Høystrup, 2010) note the lack of studies exploring initiatives by employees to promote innovation. Research is therefore needed to explore in greater depth the role of employee behavior in

driving innovation (Høyrup, 2010; Kesting and Ulhøi, 2010). This study goes some way to bridging this gap in the literature by indicating that proactive behaviors have a positive influence on innovation performance in firms operating in high-technology sectors, where proactivity and innovation are paramount. These results tally with previous contributions by Crant (2000), Grant and Ashford (2008) and Anderson et al. (2014), who also found that proactive behavior leads employees to search for change and innovation. Benefits from proactive behavior are particularly relevant in high-technology sectors where rapid changes in technologies and market preferences are commonplace (Unsworth and Parker, 2003). These spontaneous and voluntary behaviors go beyond the obligations of the position, and it is precisely in changeable and uncertain environments that organizations need employees to exceed their obligations and perform tasks for which they receive no remuneration so that organizations can achieve their objectives (Griffin et al., 2007).

Second, in relation to whether informal and formal control mechanisms condition the connection between proactive behaviors and innovation performance, this paper contributes to an interactionist perspective on proactive behavior (Crant et al., 2017) by showing the synergistic effect between the context and employees' behaviors. The analysis of the moderating role of control mechanisms helps to unveil "where" the association between proactive behavior and product and process innovation performance could take place and thus, following Whetten (1989), sheds light on the limits of the generalizability of a theoretical relationship. As Sousa and Voss (2008) highlight, the study of the conditions in which the actions could produce the desired results is a way to anchor research in operations management.

Third, regarding the interaction between proactive behavior and informal control mechanisms, we find that perceived support for innovation positively moderates the link between employee proactive behavior and product innovation performance. Although

earlier studies such as Cai et al. (2019) have analyzed support for an innovation climate as a predictor of proactive behavior, this paper contributes to the analysis of this contextual factor as a moderator. Chen et al. (2013) also suggested that perceived support for innovation is a supportive contextual factor that can provide the necessary resources to transform employees' behaviors into innovations. Firms with a work context supportive of innovation recognize employees as a key source of innovation (Scott and Bruce, 1994). In this context, employees' initiative is more likely to effectively derive in product innovation performance since the potential risk of taking initiatives is low and their perception of the success of initiating changes is high. Thus, a supportive context for innovation is more favorable for managing bottom-up initiatives from employees that extend the opportunities for product innovation, and also for aligning employees' efforts to achieve firms' innovation objectives. Although we find proactive behavior has a positive link with product innovation performance, if there is no medium- or long-term supportive context to align these proactive behaviors with the company's results, individual employee efforts may not be reflected in product innovation results. Longitudinal studies would therefore be useful to learn the extent to which proactive behaviors can be reflected in the company's product innovation results over time.

Fourth, our results also shed light on the role that formalization plays in enhancing innovation performance. On the one hand, the study reveals that formalization of the innovation process positively moderates the relationship between proactive behavior and innovation performance in terms of new products. Hence, in a context with a highly formalized innovation process, the benefits of employee proactive behavior will be higher for product innovation than in a low formalization context. This tallies with Criscuolo et al.'s (2014) reasoning that formal processes contribute to partially ameliorate the uncertainty of the R&D process, and help to shape and structure the R&D process by

channeling proactive and creative efforts in project management structures. Kleinschmidt et al, (2007), and Labitzke et al. (2014) also underscore how innovation process formalization provides employees with a base and structure to support and direct ideas toward effective innovations.

On the other hand, although authors such as Benner and Tushman (2002) find that the formalization process may constrain creativity and flexibility and limit the scope for experimentation, our results showed that formalization of the innovation process can be positively related to the development of new products and processes, in line with previous contributions such as Ruiz et al. (2011) and Labitzke et al. (2014). Specifically, we found a U-shaped curvilinear relationship, which implies that formalization can positively and negatively influence product and process innovation performance depending on the degree of formalization, such that when the degree of formalization is high, it is able to improve innovation. This U-shaped curvilinear relationship was also found by Labitzke et al. (2014) in the context of hospitals, and suggests that formalization can be effective only if it is put in place comprehensively. Conclusions from Arend et al. (2017) could help to explain this finding. These authors suggest that a trade-off can arise when a firm introduces formalization: while the efficiencies that can enhance the firm's performance increase with formalization, the rigidities introduced lead to a loss in innovative outcomes. However, as formalization increases and becomes more established and accepted in the organization, it is able to encourage flexibility and innovation by making the firm better prepared to respond through efficiencies generated in certain processes. When formalization is well established, as Criscuolo et al. (2014) highlight, it can improve innovation performance by reducing task ambiguity, clarifying processes and providing rules. In this same regard, as Jansen et al. (2006) discussed, formalization makes knowledge explicit and helps the diffusion of best practices, which in turn may

derive in innovations. However, as our results show, formalization can only achieve this enabling role when it is high enough to actually facilitate the codification of knowledge. Hence, by considering nonlinearities in the formalization-innovation performance relationship, our study provides an explanation to reconcile previous mixed conclusions on the relationship between formalization and product and process innovation performance.

Fifth, it is worth noting that the moderating role of the two contextual variables (perceived support for innovation and innovation process formalization) was only observed in the case of product innovation performance. The findings for process innovation performance indicate that proactive behavior can contribute to process innovation irrespective of the support for innovation and the formalization of the innovation process. Nevertheless, boosting product innovation performance through proactive behavior is more dependent on the organizational context: the greater the support for innovation and the formalization of the innovation process, the stronger the effect of proactive behavior on product innovation performance will be. These findings suggest the convenience of taking into account the different types of innovation when investigating the moderating role of contextual variables on innovation performance, since the kind of innovation considered may lead to different conclusions. For instance, Kleinschmidt et al. (2007), Kahn et al. (2012) and Labitzke et al. (2014) also recognize the role that formalization can have in enhancing new product development. However, this formalization does not seem to be so prevalent when it comes to process innovation performance, where employee involvement and autonomy are central to enhancing processes and developing new ones. The explanation of such an absence of moderation for process innovation performance could be related to the fact that in this case, the success factors are inside the “company machinery”, in the operations, processes, and in

the search for a greater efficiency. This perhaps does not need so much extra help, such as formalization or support, since innovating in processes depends to a greater extent on the know-how of the members of the R&D units, who because of their proactivity, as well as other attributes like creativity, analysis capability, and problem-solving behaviors (Ford, 1996), are central to the effectiveness of the process (Yun and Lee, 2017).

5.2. Managerial implications

Our findings suggest that managers should encourage proactive behaviors at work as a way to promote product and process innovation performance. Hence, high-tech firms need to consider this kind of behavior in selection processes and take it into account in performance appraisal, as a way to incentivize a kind of behavior that is favorable to innovation. Managers may shape employees' proactivity by modifying their own behavior, since most previous research (e.g., Cai et al., 2019) points to leader-related factors (i.e., leadership styles or the quality of the relationship with leaders) as important antecedents of proactive behavior in employees.

Given that the higher the support for innovation, the more likely proactive employees are to contribute to product innovation performance, managers are advised to actively create an organizational climate that encourages innovation, by allowing and accepting employees' ideas for improvement so that they perceive their contributions are acknowledged as valuable to the organization. Thus, managers are urged to take an initiating approach to increase climate factors when employee-driven product innovation performance is intended. Moreover, managers need to be conscious that the formalization of process innovation is not a drawback for innovation. On the contrary, formal specifications for innovation even in high-tech sectors may be established as a way to channel employees' innovative efforts. This is especially relevant for organizations that aspire to compete on product innovation. As process innovation is less dependent on the

contextual variable, managers should be aware that regardless of the formal and informal control mechanisms the organization has, proactive behavior of R&D employees by itself could lead to process innovation performance.

Regarding the role of formalization in innovation, our findings suggest that managers should fully implement innovation process formalization in order to reap all its potential benefits, since half-hearted formalization efforts are unlikely to bring about improvements in product and process innovation performance.

5.3. Limitations and future lines of research

While this study has addressed the difference between product and process innovation performance, future research could extend our contributions by exploring the degree of innovation novelty (radical and incremental). Continuing with the question of innovation performance, this study only used survey-based measures to assess product and process innovation performance, that is, the perceptions of the manager in charge of the R&D section. Although past research has demonstrated the high correlation between actual performance innovation and perceived measures (e.g., Calantone et al., 1996), future research could introduce objective measures of performance innovation such as statistical reports from official bodies, for example. In addition, although it may be envisaged that common method bias could affect our findings, the analyses we performed allay any such fears. Nonetheless, future research could minimize this concern further by addressing multiple sources of information. Additionally, the cross-sectional design of this research prevented us from inferring causality, and further longitudinal studies are encouraged to test our model.

Furthermore, a qualitative analysis in organizations belonging to high-tech sectors could complement the survey and enhance understanding of how product and process

innovation performance can be improved through proactive behaviors. Moreover, as our study focused on two specific sectors, the findings cannot be generalized to all high-tech sectors, this is an additional avenue for future research.

References

- Aiken, L.S. and West, S.G. (1991), *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, CA: Sage Publications.
- Amabile, T.M., Conti, R., Coon, H., Lazenby, J. and Herron, M. (1996), "Assessing the work environment for creativity", *Academy of Management Journal*, Vol. 39 No.5, pp.1154-1184.
- Anderson, J.C. and Gerbing, D.W. (1988), "Structural equation modeling in practice: a review and recommended two-step approach", *Psychological Bulletin*, Vol. 103 No.3, pp.411-423.
- Anderson, N., Potočnik, K. and Zhou, J. (2014), "Innovation and Creativity in Organizations A State-of-the-Science Review, Prospective Commentary, and Guiding Framework", *Journal of Management*, Vol. 40 No.5, pp.1297-1333.
- Arend, R.J., Zhao, Y.L., Song, M. and Im, S. (2017), "Strategic planning as a complex and enabling managerial tool", *Strategic Management Journal*, Vol. 38 No.8, pp.1741-1752.
- Baer, M. and Frese, M. (2003), "Innovation is not enough: climates for initiative and psychological safety, process innovations, and firm performance", *Journal of Organizational Behavior*, Vol.24 No.1, pp.45-68.
- Bagozzi, R.P. and Phillips, L.W. (1982), "Representing and testing organizational theories: a holistic construal", *Administrative Science Quarterly*, Vol. 27, pp.459-489.
- Bagozzi, R.P. and Yi, Y. (2012), "Specification, evaluation, and interpretation of structural equation models", *Journal of the Academy of Marketing Science*, Vol.40, No.1, pp. 8-34.
- Bamberger, P. (2008), "From the editors beyond contextualization: Using context theories to narrow the micro-macro gap in management research", *Academy of Management Journal*, Vol. 51, pp.839-846
- Benner, M.J. and Tushman, M. (2002), "Process management and technological innovation: A longitudinal study of the photography and paint industries", *Administrative Science Quarterly*, Vol. 47 No.4, pp.676-707.
- Bentler, P.M. (2006), *EQS 6 Structural Equations Program Manual*. Encino (California): Multivariate Software. Inc.
- Bolino, M., Valcea, S. and Harvey, J. (2010), "Employee, manage thyself: The potentially negative implications of expecting employees to behave proactively", *Journal of Occupational and Organizational Psychology*, Vol. 83 No.2, pp.325-345.
- Bolton, S.C. (2004), "A simple matter of control? NHS hospital nurses and new management", *Journal of Management Studies*, Vol. 41 No.2, pp.317-333.
- Bommer, M. and Jalajas, D. (2002), "The innovation work environment of high-tech SMEs in the USA and Canada", *R&D Management*, Vol. 32 No.5, pp.379-386.
- Brannick, M.T., Chan, D., Conway, J.M., Lance, C.E. and Spector, P.E. (2010), "What is method variance and how can we cope with it? A panel discussion", *Organizational Research Methods*, Vol. 13 No.3, pp.407-420.
- Brockman, B.K. and Morgan, R.M. (2003), "The role of existing knowledge in new product innovativeness and performance", *Decision Sciences*, Vol. 34 No.2, pp.385-419.
- Brown, S.L. and Eisenhardt, K.M. (1995), "Product development: Past research, present findings, and future directions", *Academy of Management Review*, Vol. 20 No.2, pp.343-378.

- Cabello-Medina, C., López-Cabrales, A. and Valle-Cabrera, R. (2011), "Leveraging the innovative performance of human capital through HRM and social capital in Spanish firms", *The International Journal of Human Resource Management*, Vol. 22 No.4, pp.807-828.
- Cai, Z., Parker, S. K., Chen, Z., and Lam, W. (2019), "How does the social context fuel the proactive fire? A multilevel review and theoretical synthesis", *Journal of Organizational Behavior*, Vol.40 No.2, pp.209-230.
- Calantone, R.J., Schmidt, J.B. and Song, X.M. (1996), "Controllable factors of new product success: A cross-national comparison", *Marketing Science*, Vol. 15 No.4, pp.341-58.
- Camisón, C. and Puig, A. (2016), "Are quality management practices enough to improve process innovation?", *International Journal of Production Research*, Vol. 54 No.10, pp.2875-2894.
- Cardinal, L.B. (2001), "Technological innovation in the pharmaceutical industry: The use of organizational control in managing research and development", *Organization Science*, Vol. 12 No.1, pp.19-36.
- Chen, G., Farh, J.L., Campbell-Bush, E.M., Wu, Z. and Wu, X. (2013), "Teams as innovative systems: Multilevel motivational antecedents of innovation in R&D teams", *Journal of Applied Psychology*, Vol. 98 No.6, pp.1018-1027.
- Cohen, J., Cohen, P., West, S.G. and Aiken, L.S. (2003), *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. New Jersey: Lawrence Erlbaum Associates.
- Çokpekin, Ö. and Knudsen, M.P. (2012), "Does organizing for creativity really lead to innovation?", *Creativity and Innovation Management*, Vol. 21, No.3, pp.304-314.
- Cooper, R.G. (1990), "Stage-gate systems: A new tool for managing new products", *Business Horizons*, Vol. 33 No.3, pp.44-54.
- Covin, J.G. and Slevin, D.P. (1989), "Strategic management of small firms in hostile and benign environments", *Strategic Management Journal*, Vol. 10 No.1, pp.75-87.
- Crant, J.M. (2000), "Proactive Behavior in Organizations", *Journal of Management*, Vol. 26 No.3, pp.435-462.
- Crant, J. M., Hu, J. and Jiang, K. (2017), *Proactive Personality*. In S. K. Parker, and U. K. Bindl (Eds.), *Proactivity at work* (pp. 193-225). Oxford, OX: Routledge.
- Criscuolo, P., Salter, A. and Ter Wal, A.L. (2014), "Going underground: Bootlegging and individual innovative performance", *Organization Science*, Vol. 2 No.5, pp.1287-1305.
- Cronbach, L.J. (1951), "Coefficient alpha and the internal structure of tests", *Psychometrika*, Vol. 16 No.3, pp.297-334.
- Damanpour, F. (1991), "Organizational innovation: a meta-analysis of effects of determinants and moderators", *Academy of Management Journal*, Vol. 34 No.3, pp.555-90.
- Dawkins, S., Martin, A., Scott, J. and Sanderson, K. (2015), "Advancing conceptualization and measurement of psychological capital as a collective construct", *Human Relations*, Vol.68, No.6, pp.925-949.
- Dul, J. and Ceylan, C. (2014), "The Impact of a Creativity-supporting Work Environment on a Firm's Product Innovation Performance", *Journal of Product Innovation Management*, Vol. 31 No.6, pp.1254-1267.
- Erdogan, B. and Bauer, T.N. (2005), "Enhancing career benefits of employee proactive personality: The role of fit with jobs and organizations", *Personnel Psychology*, Vol. 58 No.4, pp.859-891.
- Erkutlu, H. and Chafra, J. (2012), "The impact of team empowerment on proactivity: The moderating roles of leader's emotional intelligence and proactive personality", *Journal of Health Organization and Management*, Vol. 26 No.5, pp.560-577.
- Escrig, A. B., Segarra, M., García, B. and Beltrán, I. (2018), "The impact of hard and soft quality management and proactive behaviour in determining innovation performance", *International Journal of Production Economics*, Vol. 200, pp. 1-14.
- Field, A. (2009), *Discovering Statistics Using SPSS*. London: Sage Publications.

- Ford, C.M. (1996), "A theory of individual creative action in multiple social domains, *Academy of Management Review*, Vol. 21 No.4, pp.1112–1142.
- Fornell, C., and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18, pp.39-50.
- Frese, M., Fay, D., Hilburger, T., Leng, K. and Tag, A. (1997), "The concept of personal initiative: Operationalization, reliability and validity in two German samples", *Journal of Organizational and Occupational Psychology*, Vol. 70 No.2, pp.139-161.
- Frese, M. and Fay, D. (2001), "Personal Initiative: An Active Performance Concept for Work in the 21st Century". In *Research in Organizational Behavior*, eds. B.M. Staw, and R.I. Sutton, Amsterdam: Elsevier Science.
- Fu, N., Flood, P.C., Bosak, J., Morris, T. and O'Regan, P. (2015), "How do high performance work systems influence organizational innovation in professional service firms?", *Employee Relations*, Vol.37 No.2, pp. 209-231.
- Glaser, L., Stam, W. and Takeuchi, R. (2016), "Managing the risks of proactivity: A multilevel study of initiative and performance in the middle management context", *Academy of Management Journal*, Vol. 59, No. 4, pp. 1339-1360.
- Grant, A.M. and Ashford, S.J. (2008), "The dynamics of proactivity at work", *Research in Organizational Behavior*, Vol. 28, pp.3-34.
- Griffin, A. (1997), "PDMA research on new product development practices: Updating trends and benchmarking best practices", *Journal of Product Innovation Management*, Vol. 14 No.6, pp.429-458.
- Griffin, M.A., Neal, A. and Parker, S.K. (2007), "A new model of work role performance: Positive behavior in uncertain and interdependent contexts", *Academy of Management Journal*, Vol.50 No.2, pp. 327-347.
- Hair, J., Anderson, R., Black, B., Babin, B. and Black, W. (2010), *Multivariate Data Analysis*, Pearson Education, London.
- Herrmann, D. and Felfe, J. (2014), "Effects of leadership style, creativity technique and personal initiative on employee creativity", *British Journal of Management*, Vol. 25 No.2, pp.209-227.
- Høyrup, S. (2010), "Employee-driven innovation and workplace learning: basic concepts, approaches and themes", *Transfer*, Vol.16, No.2, pp. 143-154.
- Im, S., Montoya, M.M., and Workman Jr, J.P. (2013), "Antecedents and consequences of creativity in product innovation teams", *Journal of Product Innovation Management*, Vol. 30 No.1, pp. 170-185.
- Jansen, J.J.P., Van Den Bosch, F.A.J. and Volberda, H.W. (2006), "Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators", *Management Science*, Vol. 52 No.11, pp.1661-1674.
- Johns, G. (2006), "The essential impact of context on organizational behavior", *Academy of Management Review*, Vol.31, No. 2, pp. 386-408.
- Johns, G. (2018), "Advances in the treatment of context in organizational research", *Annual Review of Organizational Psychology and Organizational Behavior*, Vol. 5, pp.21-46.
- Kahn, K.B., Barczak, G., Nicholas, J., Ledwith, A. and Perks, H. (2012), "An examination of new product development best practice", *Journal of Product Innovation Management*, Vol. 29 No.2, pp.180-192.
- Kesting, P. and Uhløi, J.P. (2010), "Employee-driven innovation: extending the license to foster innovation", *Management Decision*, Vol. 48, No.1, pp. 65-84.
- Khandwalla, P.N. (1977), *The design of organizations*. Houghton Mifflin: Harcourt P.
- Kickul, J. and Gundry, L. (2002), Prospecting for strategic advantage: The proactive entrepreneurial personality and small firm innovation, *Journal of Small Business Management*, Vol. 40 No.2, pp.85-97.
- King, N., Anderson, N. and West, M.A. (1991), "Organizational innovation in the UK: A case study of perceptions and processes", *Work & Stress*, Vol. 5 No.4, pp.331-339.

- Kleinschmidt, E.J., de Brentani, U. and Salomo, S. (2007), "Performance of Global New Product Development Programs: A Resource-Based View", *Journal of Product Innovation Management*, Vol. 24 No.5, pp.419–441.
- Kraus, S., Rigtering, J.C., Hughes, M. and Hosman, V. (2012), "Entrepreneurial orientation and the business performance of SMEs: a quantitative study from the Netherlands", *Review of Managerial Science*, Vol. 6 No.2, pp.161-182.
- Kristiansen, M., and Bloch-Poulsen, J. (2010), "Employee Driven Innovation in Team (EDIT) – innovative potential, dialogue, and dissensus", *International Journal of Action Research*, Vol 6, Nos 2–3, pp 155–195.
- Kumar, N., Stern, L.W. and Anderson, J.C. (1993), "Conducting interorganizational research using key informants", *Academy of Management Journal*, Vol. 36 No.6, pp.1633-1651.
- Labitzke, G., Svoboda, S. and Schultz, C. (2014), "The Role of Dedicated Innovation Functions for Innovation Process Control and Performance—An Empirical Study among Hospitals", *Creativity and Innovation Management*, Vol. 23 No.3, pp.235-251.
- Lange, D. (2008), "A multidimensional conceptualization of organizational corruption control", *Academy of Management Review*, Vol. 33 No. 3, pp. 710-729.
- Leung, K., Huang, K.L., Su, C.H., and Lu, L. (2011), "Curvilinear relationships between role stress and innovative performance: Moderating effects of perceived support for innovation", *Journal of Occupational and Organizational Psychology*, Vol. 84 No.4, pp. 741-758.
- Leonard-Barton, D. (1992), "Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development", *Strategic Management Journal*, Vol. 13, pp.363-380.
- Llach, J., Casadesus, M., and Marimon, F. (2011), "Relationship between quality-management systems and organizational innovations", *Human Factors and Ergonomics in Manufacturing & Service Industries*, Vol.21, No.1, pp.52-66.
- Löfsten, H. (2014), "Product innovation processes and the trade-off between product innovation performance and business performance", *European Journal of Innovation Management*, Vol. 17 No. 1, pp. 61-84.
- Martínez, M., and Martínez, A.R. (2008), "Does quality management foster or hinder innovation? An empirical study of Spanish companies", *Total Quality Management*, Vol.19 No.3, pp.209-221.
- Martínez, M., Jiménez, D. and Castro, Y.D.P. (2019), "The performance implications of the UNE 166.000 standardised innovation management system", *European Journal of Innovation Management*, Vol. 22 No.2, pp. 281-301.
- Menzel, H.C., Aaltio, I. and Ulijn, J.M. (2007), "On the way to creativity: Engineers as intrapreneurs in organizations", *Technovation*, Vol. 27 No.12, pp.732-743.
- Morgeson, F.P. and Hofmann, D.A. (1999), "The structure and function of collective constructs: Implications for multilevel research and theory development", *Academy of Management Review*, Vol.24, No.2, pp.249-265.
- Nickerson, J.A. and Zenger, T.R. (2004), "A knowledge-based theory of the firm—The problem-solving perspective", *Organization Science*, Vol. 15 No.6, pp.617-632.
- Oldham, G.R. and Cummings, A. (1996), "Employee creativity: Personal and contextual factors at work", *Academy of Management Journal*, Vol.39, No.3, pp. 607-634.
- Parker, S.K. and Collins, C.G. (2010), "Taking stock: Integrating and differentiating multiple proactive behaviors", *Journal of Management*, Vol. 36 No.3, pp.633-662.
- Pekovic, S. and Galia, F. (2009), "From quality to innovation: Evidence from two French Employer Surveys", *Technovation*, Vol.29, No.12, pp.829-842.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y. and Podsakoff, N. P. (2003), "Common method biases in behavioral research: A critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol.88 No.5, pp.879-903.

- Podsakoff, P.M., MacKenzie, S.B. and Podsakoff, N.P. (2012), "Sources of method bias in social science research and recommendations on how to control it", *Annual Review of Psychology*, Vol. 63, pp.539-569.
- Prajogo, D.I. (2016), "The strategic fit between innovation strategies and business environment in delivering business performance", *International Journal of Production Economics*, Vol. 171, pp.241-249.
- Prajogo, D. and McDermott, C.M. (2014), "Antecedents of service innovation in SMEs: Comparing the effects of external and internal factors", *Journal of Small Business Management*, Vol. 52, No.3, pp.521-540.
- Prajogo, D. I. and Sohal, A. S. (2004), "The multidimensionality of TQM practices in determining quality and innovation performance-an empirical examination", *Technovation*, Vol.24 No.6, pp.443-453.
- Prajogo, D.I. and Sohal. A.S. (2006), "The integration of TQM and technology/R&D management in determining quality and innovation performance", *Omega*, Vol. 34 No.3, pp.296-312.
- Pugh, S.D. and Dietz, J. (2008), "Employee engagement at the organizational level of analysis", *Industrial and Organizational Psychology*, Vol. 1 No. 1, pp.44-47.
- Raub, S. (2008), "Does bureaucracy kill individual initiative? The impact of structure on organizational citizenship behavior in the hospitality industry", *International Journal of Hospitality Management*, Vol. 27 No.2, pp.179-186.
- Rauch, A., Wiklund, J., Lumpkin, G.T. and Frese, M. (2009), "Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future", *Entrepreneurship Theory and Practice*, Vol. 33 No.3, pp.761-787.
- Rigtering, J.P.C. and Weitzel, U. (2013), "Work context and employee behavior as antecedents for intrapreneurship", *International Entrepreneurship and Management Journal*, Vol. 9 No.3, pp.337-360.
- Ruiz, A., Haro, M.C. and Ortega, T. (2011), "The influence of quality management on orientation to innovation in service firms", *African Journal of Business Management*, Vol. 5 No. 22, pp.8997-9006.
- Sadikoglu, E. and Zehir, C. (2010), "Investigating the effects of innovation and employee performance on the relationship between total quality management practices and firm performance: An empirical study of Turkish firms", *International Journal of Production Economics*, Vol.127 No.1, pp.13-26.
- Schilling, M.A. (2010), *Strategic Management of Technological Innovation*. New York: 3rd ed. McGraw-Hill Education.
- Scott, S.G. and Bruce, R.A. (1994), "Determinants of innovative behavior: A path model of individual innovation in the workplace", *Academy of Management Journal*, Vol. 37 No.3, pp.580-607.
- Seibert, S.E., Kraimer, M.L. and Crant, J.N. (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.E., Gilson, L.L. and Blum, T.C. (2009), "Interactive effects of growth need strength, work context, and job complexity on self-reported creative performance", *Academy of Management Journal*, Vol. 52 No.3, pp. 489-505.
- Siegel, S.M. and Kaemmerer, W.F. (1978), "Measuring the perceived support for innovation in organizations", *Journal of Applied Psychology*, Vol. 63 No.5, pp.553-562.
- Somech, A. and Drach-Zahavy, A. (2013), "Translating team creativity to innovation implementation: The role of team composition and climate for innovation", *Journal of Management*, Vol.39 No.3, pp.684-708.
- Sousa, R. and Voss, C.A. (2008), "Contingency research in operations management practices", *Journal of Operations Management*, Vol. 26 No. 6, pp. 697-713.
- Strauss, K., Griffin, M.A., Parker, S.K. and Mason, C.M. (2015), "Building and sustaining proactive behaviors: The role of adaptivity and job satisfaction", *Journal of Business and Psychology*, Vol. 30 No.1, pp.63-72.
- Tamayo-Torres, I., Gutiérrez-Gutiérrez, L.J., Llorens-Montes, F.J. and Martínez-López, F.J. (2016), "Organizational learning and innovation as sources of strategic fit", *Industrial Management & Data Systems*, Vol. 116 No.8, pp.1445-1467.

- Thomas, J.P., Whitman, D.S. and Viswesvaran, C. (2010), "Employee proactivity in organizations: A comparative meta-analysis of emergent proactive constructs", *Journal of Occupational and Organizational Psychology*, Vol. 83 No. 2, pp.275-300.
- Tomlinson, P.R., and Fai, F. M. (2016), "The impact of deep vertical supply chain relationships upon focal firm innovation performance", *R&D Management*, Vol.46, pp.277-290.
- Unsworth, K.L. and Parker, S.K. (2003), Proactivity and Innovation: Promoting a New Workforce for the New Workplace. In *The New Workplace. A Guide to the Human Impact of Modern Working Practices*, eds. D. Holman, T.D. Wall, C.W. Clegg, P. Sparrow, and A. Howard, West Sussex: John Wiley and Sons, Ltd.
- Utterback, J.M. and Abernathy, W.J. (1975), "A dynamic model of process and product innovation", *Omega*, Vol. 3 No.6, pp.639-656.
- Weick, K.E. and Roberts, K.H. (1993), "Collective mind in organizations: Heedful interrelating on flight decks", *Administrative Science Quarterly*, Vol.38, pp. 357– 381.
- West, M.A. (2002), "Sparkling fountains or stagnant ponds: An integrative model of creativity and innovation implementation in work groups", *Applied Psychology*, Vol. 51 No.3, pp.355-387.
- West, M.A. and Anderson, N.R. (1996), "Innovation in top management teams", *Journal of Applied Psychology*, Vol. 81 No. 6, pp. 680-693.
- West, M.A. and Richter, A. (2008), Climates and cultures for innovation at work. In *Handbook of organizational creativity*, eds. J. Zhou, and C.E. Shalley, Hillsdale, NJ: Erlbaum.
- Whetten, D.A (1989), "What constitutes a Theoretical contribution?", *Academy of Management Review*, Vol.14, No.4, pp. 490-495.
- Whitman, D.S., Van Rooy, D.L. and Viswesvaran, C. (2010), "Satisfaction, citizenship behaviors, and performance in work units: A meta-analysis of collective construct relations", *Personnel Psychology*, Vol. 63, No.1,pp. 41-81.
- Wiklund, J. and Shepherd, D. (2005), "Entrepreneurial orientation and small business performance: a configurational approach", *Journal of Business Venturing*, Vol. 20 No.1, pp.71-91.
- Williams, H.M., Parker, S.K. and Turner, N. (2010), "Proactively performing teams: The role of work design, transformational leadership, and team composition", *Journal of Occupational and Organizational Psychology*, Vol. 83, No.2, pp.301-324.
- Woodman, R.W., Sawyer, J.E. and Griffin, R. W. (1993), "Toward a theory of organizational creativity", *Academy of Management Review*, Vol. 18, No.2, pp.293-321.
- Yun, Y. J., and Lee, K. J. (2017), "Social skills as a moderator between R&D personnel's knowledge sharing and job performance", *Journal of Managerial Psychology*, Vol. 32, No.5,pp. 387-400.
- Zeng, J., Phan, C.A. and Matsui, Y. (2015), "The impact of hard and soft quality management on quality and innovation performance: An empirical study", *International Journal of Production Economics*, Vol. 162, pp.216-226.
- Zeng, J., Zhang, W., Matsui, Y. and Zhao, X. (2017), "The impact of organizational context on hard and soft quality management and innovation performance", *International Journal of Production Economics*, Vol.185, pp.240-251.