Growing and aging of entrepreneurial firms: Implications for job rotation and joint reward

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Abstract:

Purpose

The purpose of this paper is to explore whether job rotation strategies and joint reward systems are equally effective in encouraging cross-functional collaboration (CFC) under all organizational contexts, ranging from young and small firms to mature and large ones.
Design/methodology/approach

To ensure a wide applicability of findings in this study, the research model and hypotheses were tested with a sample of 232 Canadian firms active in a variety of industrial sectors. A survey instrument that comprised all the questionnaire items corresponding to the examined constructs is the foundation of the data used in this contribution.

Findings

This study shows that job rotation and joint rewards are strong and positive drivers of interdepartmental collaboration, which subsequently enhance firm performance. However, this illustration must be considered in the context of the firm shaped by its size and age because these two variables strongly and negatively moderate the relationships between CFC and its two antecedents.

Research limitations/implications

The study was limited to Canadian firms only. The manufacturing sector was not differentiated into subsectors, such as technology. Future studies could compare subsectors of manufacturing to see if there is any correlation between types of industries, age, and size.

Originality/value

Not all firms will be able to take advantage of the widely accepted values of job rotation and joint reward systems in generating CFC. Firms, to an extent, appear to be confronted with the liability of aging but not with the liability of smallness.

Keywords: Innovation | Growth | SMEs | Small firms

Article:

Introduction

In view of increasing globalization, firms around the world need to be innovative to respond to continuous threats and opportunities stemming from dynamic business environments (Donate et al., 2016). A firm's ability to innovate is closely related to its intellectual capital (Subramaniam and Youndt, 2005; Swart and Kinnie, 2010). This asset is a part of the intangible resources of the firm embedded in its employees, organizational procedures, and culture (Donate et al., 2016; Kong, 2009). Firms integrate the specialized knowledge of employees in order to co-generate new knowledge to produce offerings (Grant, 1996b) and achieve a competitive advantage (Reed et al., 2006). To achieve this goal, firms encourage interdepartmental integration through knowledge sharing across various functions (Magnusson et al., 2014; Strese et al., 2016).

Research emphasizes the importance of the relationships between the demand side (marketing and sales) and supply side (R&D) in the firm in the creation of value for customers (Esper et al., 2010; Piercy and Ellinger, 2015). By integrating the marketing and R&D sides, firms encourage the creation of new knowledge (De Clercq et al., 2011; Korhonen-Sande and Sande, 2014). The creation of knowledge is developed through knowledge exchange and knowledge combination (Nahapiet and Ghoshal, 1998). Knowledge creation relies on the exchange of previously unconnected information that resides in different functional areas (Cabrera and Cabrera, 2002). Cross-functional integration is critical for creation of new knowledge. Nevertheless, this integration can face many challenges that stem from the variations in the "thought-worlds" (Griffin and Hauser, 1996), cultures, and attitudes (Korhonen-Sande and Sande, 2014) between the marketing and R&D departments. Therefore, it is important for the organizations to understand how to facilitate integration among firm functions to create new knowledge and offerings through innovation and entrepreneurial activities.

Further research is necessary to advance our understanding of how and when to encourage collaboration between marketing and R&D functions. Empirical research on antecedents of interactions between the firm's departments is scarce (Strese et al., 2016). Cross-functional collaboration (CFC) is treated as an exogeneous element of organizational behavior, and there is no clear evidence that addresses how to achieve it (Piercy and Ellinger, 2015). On the other hand, only few studies in the literature consider the cross-functional relationships as an outcome or an intermediate variable related to various organizational antecedents (Korhonen-Sande and Sande, 2014; Strese et al., 2016; Xie et al., 2003). Therefore, the purpose of this study is to fill this gap by advancing research on the factors that determine the CFC process in particular, using the knowledge-based view (KBV). According to KBV, the firm's sustainable competitive advantage is driven by integration across functional units (Grant, 1996a). The firm tranforms

knowledge entrenched in cross-functional teams into new products that form its competitive advantage (De Luca and Atuahene-Gima, 2007).

Various integration mechanisms have addressed these issues. In line with the KBV, two critical mechanisms that can enable CFC have been identified: job rotation strategies, and joint reward systems (Tan et al., 2014). As Xie et al.(2003) noted, the simple application of job rotation systems is not enough by itself to realize an efficient collaboration between marketing and R&D; firms must also provide motivation for the functions to collaborate by installing joint reward systems. Thus, it is critically important to simultaneously study joint reward and job rotation systems. In line with this area of research, this study argues that job rotation and joint reward systems are indispensable antecedents of CFC. Job rotation strategies address the building of mutual knowledge and understanding between the two functions, while joint reward systems offer the motivation for CFC (Hong and Vai, 2008).

Management practices are not necessarily directly related to the firm's outcomes (Donate et al., 2016). Rather, an internal "black box" seems to exist in the connections between these input and output variables. The research design of this study considers the factors of organizational processes (job rotation strategies and joint reward systems) to be directly related to human cognition and social relations and further reflected in intermediate variables such as CFC. This study also incorporates the size and age of the firm as factors that typically affect innovation and entrepreneurial activities (Donate et al., 2016; Scheepers et al., 2014). The study is structured as follows: First, the conceptual framework is presented. Subsequently, the methods of data collection, data analysis, and results are described. In the discussion section, the interpretations of our findings are discussed and followed by a summary of the key findings, limitations, and future research.

Theoretical background and hypotheses development

Direct effects of job rotation on CFC

Job rotation refers to mobilizing managers across functional departments (Tan et al., 2014). As Campion et al. (1994) noted, job rotation is distinguished from job promotion, as the former does not usually involve a change in compensation. Job rotation introduces employees to a broader set of tasks and personnel, which augments the understanding and shared practices between functions (Gherardi et al., 1998). Job rotation also enables enhanced learning and skill acquisition of employees in addition to allowing them to better understand the capabilities and challenges of other departments (Campion et al., 1994). Job rotation, as a factor of organizational climate, encourages information exchange and is conducive of cross-functional trust (Fain and Wagner, 2014). Thus, job rotation can assist in developing a deeper and broader understanding of another functional department. This is achieved as the rotating employee becomes privy to the other department's "thought-world" and knowledge domain during the time of rotation within the other function. Thus, job rotation allows the rotating employee to better understand the extent of knowledge, its sources, and the correct approach to access the needed knowledge from the right person. This, in turn, can lead to higher levels of CFC.

While understanding the organization's knowledge is crucial to CFC, it is also very important to understand who possesses the various sources of specific knowledge within the other departments (Grant, 1996b). Organizations and their departments are composed of knowledge "specialists" who possess very specific knowledge. Thus, a key aspect of CFC is to identify and understand who owns the specific knowledge within each function. Innovation and creation of new knowledge are achieved when department managers are able to recognize whom to approach for a specific complementary knowledge that they need. Job rotation has been shown to positively impact socialization and interfunctional network development (Campion et al., 1994). Upon rotating across various functions, managers build relationships with various members and develop a better understanding of who owns the different specific knowledge components within each department. Therefore, job rotation enables CFC by knowing whom to consult when specific knowledge is needed.

Finally, while perceiving the extent of knowledge and its sources is important, realizing the approach to work with other department is also vital to ensuring CFC between marketing and R&D. Job rotation enables members from various functions to co-participate (Gherardi et al., 1998), which increases their familiarity and experiences of dealing with each other to reduce learning barriers that arise from lack of trust and confidence (Andrews and Delahaye, 2000). This further promotes the development of joint knowledge transfer (Lagerstrom and Andersson, 2003). Moreover, establishing a shared understanding and developing a cross-functional network of contacts can enable CFC only if the rotating managers understand the subcultures, norms, and procedures used by the other departments. Indeed, different functions tend to develop their own subcultures as a result of the specialization of knowledge within each department. Differences in subcultures can be a major source of conflicts and can establish barriers that inhibit the teamwork between functions (Leveson, 1996). Job rotation can expose managers from various departments to other subcultures, which can help establishing a shared understanding of how to approach and work in a cross-functional manner. This should encourage CFC between marketing and R&D by understanding how to approach the right person for the right knowledge within each department. Therefore, it is hypothesized that (Figure 1):

Hypotheses

*H1.*Job rotation is positively related to CFC.

Direct effects of joint reward on CFC

While job rotation strategies are said to address the challenges of encouraging shared knowledge and understanding, it is argued here that joint reward systems offer the appropriate levels of mutual motivation between marketing and R&D functions to collaborate in an effort to achieve superordinate goals (Hong and Vai, 2008; De Clercq et al., 2015). As Xie et al. (2003) explicate, installing job rotation strategies in the firm is a necessary but not a sufficient integration mechanism that enables CFC. They find that establishing shared understanding and knowledge is complemented by addressing the issues of motivation to engage in CFC when joint reward systems are used. Therefore, it is important for CFC research concerning job rotation strategies

to include joint reward systems in the same model considering their complementary effects (and vice versa).

Joint reward systems are conceptualized here as mechanisms that offer economic incentives to functional managers to focus on firm level rather than functional or individual goals (De Clercq et al., 2013, 2015; Magnusson et al., 2014). Incentives such as joint rewards offer employees motivation by linking the effort to a reward (Pearsall et al., 2010; Tan et al., 2014). Studies show that employees often exert a persistent, concentrated cognitive, and behavioral effort toward the realization of their objectives once rewards and goals are aligned (Cong et al., 2017; Rynes et al., 2005). Similar to job rotation systems, joint reward structures are also factors of organizational climate, and therefore they boost information sharing and encourage cross-functional trust (Fain and Wagner, 2014). Research has also shown the consistent effectiveness of joint reward systems for interdependent teams, such as marketing and R&D, which depend on high levels of interaction and extensive knowledge sharing (Piercy and Ellinger, 2015). Contrariwise, mutually exclusive reward schemes are frequently associated with poor cross-functional relationships.

Joint reward systems are closely aligned with the concept of "stretch" as outlined by Gibson and Birkinshaw (2004). "Stretch" can be conceptualized as the common ambition shared by functional managers to focus on the overall success of their firm rather than focusing on individual departmental interests. According to Xie and colleagues (2003), joint rewards act via the expected outcome of the intergroup process, creating the motivation to work together, which leads to higher levels of goal congruity between marketing and R&D functions. In line with this reasoning, it is argued here that joint reward systems can align goals between different departments and encourage employees to work together toward a common goal.

According to De Clercq et al. (2015), functional departments must integrate their existing activities in order to collaborate. Joint reward systems can motivate functional managers to place further emphasis on collaborative as opposed to individual efforts of departments by shifting their commitment toward firm-level goals (Collins and Clark, 2003). Joint reward systems can also augment the probability of knowledge exchange across functions (Lee and Ahn, 2007), a critical component to CFC. Therefore, it is hypothesized that:

Hypotheses

*H2.*Joint reward systems are positively related to CFC.

Moderating effects of firm size on the job rotation-CFC relationship

Firm size is associated with the extent of the firm's resources, existence of internal procedures, market presence and network effects, and competitive strength (Aldrich and Auster, 1986; Strese et al., 2016). Firm size should have a significant impact on its ability to behave in a collaborative manner across its functions (Magnusson et al., 2014). It is still unclear how the size of a firm impacts the effectiveness of job rotation strategies on CFC between marketing and R&D.

Large firms face critical barriers to knowledge exchange due to organizational inertia (Acs and Audretsch, 1991; Tan et al., 2014). The greater the number of firm employees, the more complex the firm management is; larger firms are forced to develop bureaucratic levels of hierarchy and layers of formal reporting lines (Terrien and Mills, 1955). This bureaucratic climate can enable organizations to become more efficient with their current technologies and customer base (Ranger-Moore, 1997). Nevertheless, high levels of bureaucracy can also cause large firms to become slow responders and more resistant to change (Chandy and Tellis, 2000). Specifically, large firms can have great difficulties in creating new offerings through exchange and combination of knowledge across functional departments due to the bureaucracy caused by multiple layers of administration and reporting lines. These layers can impede knowledge flow, suppressing new ideas and generating several barriers to innovation and entrepreneurial activities (Sharma, 1999).

According to the KBV, the creation of new knowledge across departments is critical to innovation, but this process does not occur automatically (Grant, 1996b). Firms must enable CFC between marketing and R&D to foster innovation (De Luca and Atuahene-Gima, 2007).
As Hong and Vai (2008) show, the use of job rotation strategies is a mechanism that encourages CFC. They find that a lack of shared understanding and knowledge is one of the key barriers of CFC between marketing and R&D. Although job rotation can enable CFC, it can also add costs and implementation challenges (Campion et al., 1994). These include additional training, heightened error rates, increasing costs and expenses, as well as decreasing efficiency. In addition, job rotation systems may encourage short-sighted behaviors.

One critical question is whether job rotation strategies are equally effective in all organizational contexts. As a firm grows, its complexity increases. When knowledge, its sources, and methods of its access become extremely complex and bureaucratic, the effectiveness of job rotation systems to enable CFC between marketing and R&D may be diminished. This is because the benefits of job rotation are supressed and costs are amplified in such situations. Specifically, employee learning will become less effective in more complex firms with higher levels of distal and varietal knowledge due to bounded rationality (Chidambaram and Tung, 2005). The complex environment of larger firms creates larger variations in specialized knowledge. According to the KBV, common knowledge is critical to the integration of knowledge bases, which can enable CFC among functions (Hong and Vai, 2008). Rotating employees may add to the complexity of the firm. Job rotation systems may be less effective in enabling CFC between marketing and R&D functions in larger firms than in smaller firms. Therefore, it is hypothesized that:

Hypotheses

*H3a.*Firm size negatively moderates the job rotation-CFC relationship such that, the larger the size of the firm, the less positive the relationship between job rotation and CFC is.

Moderating effects of firm size on the joint reward-CFC relationship

Joint reward systems offer the motivation for functional department managers across the firm to create new knowledge by CFC (Xie et al., 2003). Similar to job rotation, it is unclear whether joint reward systems are effective and efficient in all contexts.

While joint rewards encourage knowledge creation and innovation by CFC (Xie et al., 2003), they have challenges and costs (Latane and Nida, 1981). A recent review of the literature (Pearsall et al., 2010) have found that joint reward systems may lead to a phenomenon called "social loafing" due to the associated decrease in accountability and effort levels of individuals within a team (Karau and Williams, 1993). Firm size has been shown to increase the likelihood of social loafing within groups (Chidambaram and Tung, 2005). That is, individuals in group settings may feel as though they can "hide in the crowd" when they are not held accountable for their individual performance. Additionally, individuals within group dynamics may not feel that their efforts will significantly impact the overall performance and outcomes of the team regardless of their contributions (Rynes et al., 2005). Joint reward systems can lead to a lower sense of accountability and to an increase in dispensability of effort since they do not directly reward the efforts of individuals (Latane and Nida, 1981).

Additionally, the issue of fairness in appropriating the rewards to the deserved people and groups becomes more challenging as the firm complexity increases. Liden et al. (2004) pointed out that unfair distribution of rewards and compensation appears to increase employees' social loafing. Individuals are more likely to decrease their efforts if they perceive that they are receiving an inequitable portion of resources and/or rewards from the organization in comparison to their inputs (Tyler, 1994). Additionally, perceptions of fairness in the policies used to make human resource decisions, such as allocation of rewards, may have an impact on performance-to-outcome expectancies. This has been shown to encourage the amount of effort dedicated to task behaviors (Karau and Williams, 1993).

This study posits that joint reward systems will be less effective in offering motivation to collaborate between marketing and R&D in larger firms. The perception that there are enough employees to pick up the slack is amplified, which enhances the effects of "social loafing." Such enhanced "free-riding" effect due to increased firm size will likely lead to less motivation and effort by each employee. Therefore, it is hypothesized that:

Hypotheses

*H3b.*Firm size negatively moderates the joint rewards-CFC relationship such that the larger the size of the firm, the less positive the relationship between joint rewards and CFC is.

Moderating effects of firm age on the job rotation-CFC relationship

Firm age – the number of years since the inception of the firm – is a suitable proxy for external firm legitimacy, existence of established external relationships, resiliency, and/or pervasiveness of internal processes and routines (Gopalakrishnan and Bierly, 2006; Strese et al., 2016). With regard to organizational change and innovation, mature firms suffer from the liabilities associated with the aging process (Dougherty and Hardy, 1996). Thus, organizational inertia constrains the firm's ability to change and adapt, with core organizational functions being the least probable to change (Baum, 1996).

Firms must install knowledge sharing mechanisms in order to encourage knowledge sharing (Grant, 1996b). Of interest in this study is the effectiveness of job rotation systems in enabling

CFC between marketing and R&D functions. While job rotation is demonstrated to be an effective mechanism to enable shared knowledge and understanding (Campion et al., 1994), and thus CFC between functional departments (Hong and Vai, 2008), it is not an easy mechanism to effectively and efficiently manage. The development of common knowledge by job rotation strategies can only happen if the employees are able to exchange knowledge that is different from what they currently know. This can be the case in mature organizations in particular. As the existing R&D's or marketing's "thought-worlds" and routines become entrenched within the respective domain, the injection of the knowledge base of the rotating employee may be stifled and blocked by the forces of inertia and organizational rigidity (Dougherty and Hardy, 1996). Thus, developing a shared understanding and common knowledge base may be impeded if either the rotating employee or the host department is inflexible and unable to accept the possibility of different and divergent knowledge that may change their routines, thoughts, and processes. In this case, the effectiveness of job rotation in enabling a shared or common knowledge domain between marketing and R&D functions may be prohibited or supressed by the forces of inertia and rigidity in more mature organizations (Dougherty and Hardy, 1996). This will likely reduce the effectiveness of job rotation strategies in enabling CFC. Hence, it is hypothesized that:

Hypotheses

*H4a.*Firm age negatively moderates the job rotation-CFC relationship such that the greater the age of the firm, the less positive the relationship between job rotation and CFC is.

Moderating effects of firm age on the joint reward-CFC relationship

While reward interdependence is known to encourage knowledge creation and innovation by CFC (Xie et al., 2003), it faces increasing challenges and costs as firms age (Latane and Nida, 1981) (i.e., depletion of resources, established internal routines, process formalization, or managerial mindset). These characteristics are likely to burden the organization's ability to utilize a joint reward system. When competition for internal resources is increased, the attractiveness of joint rewards is reduced in individual cross-functional areas. Thus, the level of CFC among departments is decreased (Buchanan and Badham, 2008). This situation is worsened in aging firms as resources and knowledge slowly decline with time in value and usefulness toward the unavoidable obsolescent conditions. This is paralleled by less willingness to share and exchange potentially valuable resources by cross-functional managers despite the presence of a joint reward system (Ranger-Moore, 1997).

The maturity of a firm is translated in increasing the efficiency, predictability, and reproducibility of its routines, processes, and practices. This can escalate the costs of identifying the contributions of each department to CFC (Hauptman and Hirji, 1999). Moreover, a differential hierarchical status among organizational departments is likely to deflate the effectiveness of a joint reward system in the facilitation of CFC (Pearce, 1993). This status is commonly found in many established firms whereby some departments appear more instrumental than others in their contributions to overall performance. As a firm ages, the emerging organizational schemas – including the managerial mindsets, dominant logics

(Prahalad, 2004), and interconnected choices (Siggielkov, 2001) reduce the ability of a reward system to unite areas in collaborative work. Therefore, it is hypothesized that:

Hypotheses

*H4b.*Firm age negatively moderates the joint reward-CFC relationship such that, the greater the age of the firm, the less positive the relationship between joint rewards and CFC is.

Methodology

Sample and data collection

The authors tested the hypotheses with 1,500 randomly selected representative Canadian firms from a private market research company with respondents in R&D or marketing. A survey instrument was then sent to one randomly selected functional manager per firm. To examine and validate the clarity of the survey, informal interviews were undertaken with six randomly chosen functional managers (three R&D and three marketing). These six interviews were not included in the initial sample. They included the discussion of the survey instrument and the challenges associated with cross-functional cooperation in the selected firms. This input helped us improve the readability and relevance of our survey instrument. The data collection relies on Dillman's (1978) total design method. Of the 950 potential respondents, 232 (24 percent) completed the surveys, which are consistent with other studies (Aiken and Bousch, 2006). The responding firms operate in manufacturing, non-financial services, mining, construction, transportation, wholesale, retail, and finance. There were no substantial differences between respondents or non-respondents, early or late respondents (Armstrong and Overton, 1977). Following prior research (De Clercq et al., 2011, 2013), the validity of the key constructs of the study was tested by administering a follow-up survey six months after the initial one. In the follow-up survey, a shortened format of the original questionnaire was used; for each construct, one proxy item was chosen – different from the specific items in the original survey – that best captured the content domain of the construct. In total, 78 responses to the follow-up survey were received and all validation items were found to correlate positively with the original measures.

Measures of constructs

The scales used to measure the constructs came from extant literature. All items were assessed on five-point Likert scales, ranging from 1 (strongly disagree) to 5 (strongly agree), and were normally distributed. In Table I, the measures used in the analyses are listed, detailing their individual items, overall reliability estimates (Cronbach's α, composite reliability), and average variance extracted (AVE). In line with the research focus, the measures assess the perceptions of respondents about the relationship between the R&D and marketing-related functions in their organizations. In addition, the questions in the survey were designed to capture phenomena that take place at the firm level rather than at the functional manager level.

CFC is measured in a manner similar to that used by prior research on functional managers' development of harmonious relationships with peers in other departments (Kahn, 1996; Song et al., 2000). For instance, respondents assessed whether other functional departments carried out their responsibilities and commitments or whether it was worthwhile to spend time and effort to

develop and maintain a relationship with other functions. The measure (α=0.80) correlates positively with its single-item counterpart from the follow-up survey (r=0.41, p<0.001).

Joint reward is measured with three items that assessed the interdependence of functional areas' rewards (Xie et al., 2003). For example, respondents indicated the extent to which managers were evaluated on their joint performance instead of separate area performance and whether they shared the rewards of successfully commercialized new products. The measure (α=0.78) correlated positively with its single-item counterpart from the follow-up survey (r=0.46, p<0.001).

Job rotation was based on three measurement items adapted from Xie et al. (2003); respondents thus indicated the extent to which employees rotated across functional areas or if people in a given functional unit sometimes took on roles in another functional unit. The measure (α=0.80) also correlated positively with its single-item counterpart from the follow-up survey (r=0.33, p<0.01).

In terms of the two moderating variables in the proposed model, firm size is measured as the log transformation of the number of full-time employees, and firm age is assessed as the number of years the company had been in business.

Control variables

To account for the variations across industries in terms of their maturity and propensity for innovation and entrepreneurial activities, the firm's industry is controlled for. Additionally, the study also controls for the functional area (R&D or marketing). To determine if the results might be influenced by the background of the respondents, two separate sets of regressions for the R&D and marketing-related functions are run as a post-hoc test. The results are consistent with the reported regression results.

Assessing the reliability and validity of measures

Following Anderson and Gerbing (1988), a five-factor measurement model that includes the key constructs of the conceptual model, using AMOS 6.0, was estimated. The confirmatory factor analysis (CFA) revealed factor loadings greater than 0.40, normalized residuals less than 2.58 and modification indices less than 3.84 (Anderson and Gerbing, 1988). No deletions of scale items were needed to improve the model fit. The authors have found that the measurement model fits the data well: $\chi^2_{(57)}$=95.824, goodness-of-fit index (GFI)=0.94, Tucker-Lewis index (TLI)=0.97, confirmatory fit index (CFI)=0.98, and root mean squared error of approximation (RMSEA)=0.05. The convergent validity of the scales is affirmed with the significant factor loadings in the measurement model (t=2.0; Gerbing and Anderson, 1988) and the magnitude of the AVE estimates (equal to or greater than 0.50, Bagozzi and Yi, 1988). Assessment criteria support the discriminant validity of the constructs. None of the confidence intervals for the correlations between constructs includes 1.0 (p<0.05) (Anderson and Gerbing, 1988), and the AVE estimates of the constructs are greater than the squared correlations between the corresponding pairs of constructs (Fornell and Larcker, 1981). The authors have found significant differences between the unconstrained model and a constrained model (Anderson and

Gerbing, 1988) for all 10 pairs of constructs. Diagnostic analyses were conducted to rule out the possibility of common method bias. A CFA for a single-factor model was conducted and a poor fit with the data was found ($\chi^2_{(65)}$=563.010, GFI =0.72, TLI =0.62, CFI =0.69, RMSEA =0.18), significantly worse ($\Delta\chi^2_{(8)}$=467.186, p<0.001) than the fit of the five-factor model. The authors compared several pairs of structural equation models (SEM) where the authors paired a model that includes an interaction term with another model in which a common method factor is added (Podsakoff et al., 2003). The χ^2 difference between the two models was not significant ($\Delta\chi^2_{(1)}$=0.012; ns), and only small changes in the size and significance of the paths across the two models emerged. The same pattern of results emerged for the SEM equivalents of the models in which the other two-way interactions were included. These results, together with arguments that common method bias is less prevalent in studies using highly educated respondents and multi-item scales (Bergkvist and Rossiter, 2007) and for moderating effects rather than main effects (Simons and Peterson, 2000), alleviate concerns related to the use of a common respondent. The study used a proxy item in the follow-up survey. This approach increases confidence that the positive and significant correlations between the original and follow-up items can be interpreted as evidence contrary to the presence of common method bias.

Analysis and results

The correlations and descriptive statistics are provided in Table II. Moderated hierarchical regression analysis is used to test the hypotheses of the study (Cohen and Cohen, 1983). After mean-centering the interacting variables, the variance inflation factor values are far below the threshold of 10, which suggests that multicollinearity is not a problem (Aiken and West, 1991). In Table III, the regression results are provided. Model 1 contains only the control variables, Model 2 adds the effect of joint reward and job rotation, Model 3 adds firm size, and Model 4 includes its moderating effects. In Model 2, the positive effects of job rotation (β=0.119, p<0.001) and joint reward (β=0.416, p<0.05) on CFC are found – supporting H1 and H2, and the two variables explain additional variance (ΔR^2=0.343, p<0.001). In Model 3, firm size has no significant direct effect on CFC. Model 4 shows the significant presence of the negative moderating influences of firm size on the job rotation-CFC relationship (β=−0.101, p<0.01) and joint reward-CFC relationship (β=−0.065, p<0.05) – supporting H3a and H3b, and explaining additional variance (ΔR^2=0.053, p<0.001). Model 5 shows that firm age has no significant direct effect on CFC. Model 6 reveals a significant interaction effect between job rotation and firm age on CFC (β=−0.005, p<0.05), which provides weak support for H4a, with no significant interaction effect between joint reward and firm age on CFC. H4b is not supported.

Discussion

This study examined the direct impact of job rotation and joint reward systems on CFC between R&D and marketing departments with the moderating effects of the firm's size and age on these relationships. According to the applied KBV framework, the firm's sustainable competitive advantage is propelled by integration across the firm's functional units (Grant, 1996a). The firm tranforms knowledge embedded in cross-functional teams into new offerings which are crucial to competitive advantage (De Luca and Atuahene-Gima, 2007).

Research on antecedents of collaboration across the firm's departments is scant (Strese et al., 2016). CFC is considered only as an exogenous predictor in modeling firm performance (Donate et al., 2016; Piercy and Ellinger, 2015). Literature does not explain what factors enhance or impede successful collaboration across departments. This study attempts to fill this gap by looking at the factors that impact CFC, either directly (job rotation and joint reward systems) or indirectly (firm size and age).

CFC is affected by a number of drivers. Research treats it as an exogenous factor without looking deeper into its nature and antecedents. This study shows that job rotation and joint rewards are strong, positive drivers of collaboration, which may enhance the firm performance. Our research shows significant and positive effects of job rotation and joint reward system on CFC, which endorses our expectations formulated in H1 and H2, respectively. Due to employee learning effects (Campion et al., 1994), job rotation systems help managers across various departments to acquire an understanding of what is known, by whom, and how to access the right person for the right knowledge, which inspires CFC. Joint reward systems help different departments in aligning goals and working together for a common target (Magnusson et al., 2014). However, this observation must be considered in the firm's context shaped by its size and age, as our study shows that these variables strongly and negatively moderate the relationships between CFC and its antecedents (following the H3a, H3b, and H4a).

The firm size and age have typically been used in previous research only as control variables, but with mixed results. For example, Engelen et al. (2015) found the two variables positively affecting firm performance. Conversely, Donate et al. (2016) and Tsai et al. (2014) found no significant effects of size and age in their research models. There have only been a few past studies in which firm size and age were used as moderating variables. For example, BarNir et al.(2003) hypothesized that firm size and age would negatively moderate the relationships among their model's variables. However, their results were only partially significant as none of the interaction terms impacted the overall significance of the model nor was the added variance significant. Size and age and their impact on firm performance were also investigated as explanatory variables by Ranger-Moore (1997). In line with our results, his study showed that increased age worsens firm performance, which suggests liability of aging. However, his study found that increased size appears to improve firm performance, which suggests liability of smallness, contrary to our findings.

With respect to our research findings, while job rotation can help employees from various functions develop a shared understanding with each other, the rotating of multiple employees across different knowledge domains may introduce significant levels of complexity and difficulty as firms become larger (Atuahene-Gima, 2005). Moreover, in larger firms, the perception that there are enough employees to pick up the slack is amplified, which enhances the effects of "social loafing" and "free-riding," making joint reward systems less effective or even ineffective in promoting CFC. Our findings also suggest that the effectiveness of job rotation in enabling a shared or common knowledge domain between marketing and R&D functions may be prohibited or suppressed by the forces of inertia and rigidity in more mature organizations (Dougherty and Hardy, 1996). Additionally, as firms' age, the organizational schemas that

emerge through time are likely to lower the ability of a joint reward system to unite functional areas to work collaboratively. In short, contributing to the work of Soetanto's (2017) and Scheepers et al.'s (2014), firms that increase collaboration across departments appear to face the liability of aging but not the liability of smallness as they apply these mechanisms.

Conclusion

In summary, this study contributes to existing theories and current practices in the entrepreneurship fields (e.g., Strese et al., 2016; Donate et al., 2016; Piercy and Ellinger, 2015; Fain and Wagner, 2014; Korhonen-Sande and Sande, 2014; Xie et al., 2003) by illustrating that CFC is a complex construct affected by a number of drivers. Extant research typically treats it as an exogeneous factor without any attempts to look deeper into its nature and antecedents. This study reaffirms that two such factors, job rotation and joint rewards, are strong and positive drivers of the interdepartmental collaboration, which subsequently may enhance the firm's performance. However, this observation must be considered in the firm's context shaped by its size and age, as these two variables strongly and negatively moderate the relationships between CFC and its antecedents. Not all firms will be able to take advantage of this seemingly positive influence of job rotation and joint reward systems on CFC. Rather, only firms that are both small and young will be able to benefit from such HR practices. Thus, firms that strive to increase collaboration across various departments face liability of aging but no liability of smallness.

Limitations and future studies

There are a number of limitations to our study. The sample includes only Canadian firms, and the manufacturing sector was not differentiated into subsectors, such as technology. Another limitation is that the industries were not analyzed in manufacturing to gage the extent to which parts were manufactured elsewhere and assembled in Canada, which could bias the results. Future studies could compare subsectors of manufacturing to examine if there is any correlation between types of industries, age, and size. The sample could be expanded to include other countries. Industry sectors could be compared between countries. The results indicate that start-ups and entrepreneurial firms may have a strategic advantage in implementing job rotation and joint reward systems over older and larger firms. Future studies could focus on the optimal firm size and age for engaging CFC and on the optimal level of job rotation and amount of joint reward systems.

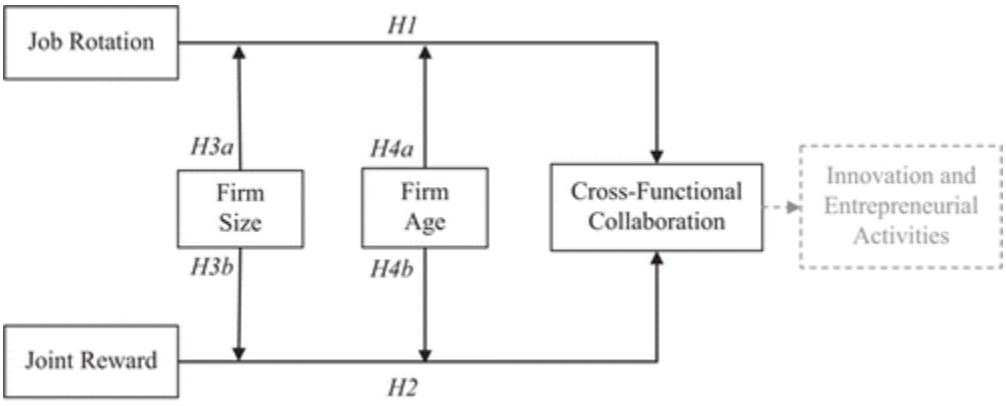

Figure 1 Conceptual model

Table I Constructs and measurement items

	Factor loading	***t*-value**
Cross-functional collaboration (α=0.85; CR =0.92; AVE =0.70)		
There is close interaction and collaboration between people in the two functions	0.945[a]	
There is a high level of knowledge sharing between people in the two functions	0.916	25.482
The other function carries out its responsibilities and commitments most of the time	0.644	11.919
Spending time and effort on developing and maintaining a relationship with the other function is worthwhile	0.840	19.571
People are satisfied with their relationship with the other function	0.811	18.021
Joint Reward (α=0.78; CR =0.78; AVE =0.54)		
In terms of the company's rewards system […]		
Different departments share the rewards of a successfully commercialized new product	0.774[a]	
Individual departments are evaluated on their joint performance instead of separate departmental performance	0.683	9.330
Our senior management promotes cross-functional team cohesion over separate functional loyalty	0.747	9.865
Job rotation (α=0.80; CR =0.84; AVE =0.64)		
In terms of the company's internal functioning […]		
Planned job rotation of employees is emphasized as a device for developing employees' capabilities	0.836	13.485
Employees are rotated across functional areas	0.944[a]	
People in a given functional department (e.g., R&D, marketing) sometimes take on roles in another functional department	0.567	9.163

Notes: CR, construct reliability; AVE, average variance extracted. [a]Initial loading was fixed to 1 to set the scale of the construct

Table II Descriptive statistics and correlations

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
1. Cross-functional collaboration	1												

2. Job rotation	0.356**	1											
3. Joint reward	0.574**	0.430**	1										
4. Company size (log)	−0.074	0.048	−0.042	1									
5. Company age	−0.012	−0.006	−0.051	0.522**	1								
6. Industry: manufacturing	0.162*	−0.019	−0.049	0.108	0.091	1							
7. Industry: services	−0.006	−0.069	−0.003	−0.155*	−0.132*	−0.580**	1						
8. Industry: mining	−0.153*	0.040	0.012	−0.064	−0.100	−0.307**	−0.198**	1					
9. Industry: construction	0.074	0.062	0.154*	0.037	0.046	−0.126	−0.081	−0.043	1				
10. Industry: transportation	−0.116	0.046	−0.017	0.097	0.014	−0.231**	−0.149*	−0.079	−0.032	1			
11. Industry: wholesale	0.018	0.120	0.095	−0.069	−0.084	−0.191**	−0.123	−0.065	−0.027	−0.049	1		
12. Industry: retail	−0.005	−0.039	0.002	0.084	0.345**	−0.155*	−0.099	−0.053	−0.022	−0.040	−0.033	1	
13. Marketing-related function	−0.039	−0.136*	−0.040	0.167*	0.193**	0.034	−0.038	−0.083	0.069	−0.015	0.026	0.003	1
Mean	3.610	2.494	3.269	5.647	32.871	0.474	0.272	0.095	0.017	0.056	0.039	0.026	0.491
Standard deviation	0.710	0.910	0.919	1.991	36.305	0.500	0.446	0.294	0.130	0.230	0.194	0.159	0.501

Notes: *p<0.05; **p<0.01

Table III Regression results (dependent variable: cross-functional collaboration)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Industry: manufacturing[a]	0.509****	0.307	0.301	0.414****	0.334	0.336
Industry: services	0.385	0.188	0.166	0.277	0.189	0.198
Industry: mining	0.071	−0.171	−0.188	−0.099	−0.174	−0.165
Industry: construction	0.938****	−0.015	−0.028	0.198	0.003	0.117
Industry: transportation	0.057	−0.107	−0.099	−0.113	−0.088	−0.087
Industry: wholesale	0.455	−0.117	−0.136	−0.107	−0.123	−0.186
Industry: retail	0.354	−0.197	−0.197	−0.049	−0.176	−0.170
Marketing-related function[b]	−0.063	0.004	0.021	0.034	0.031	0.034
H1: Job rotation		0.119*	0.123*	0.101****	0.116*	0.077
H2: Joint reward		0.416***	0.413***	0.376***	0.420***	0.408***
Firm size (log employed)			−0.022	−0.017		
Firm age (years)					−0.002	−0.003****
H3a: Job rotation × firm size				−0.101**		
H3b: Joint reward × firm size				−0.065*		
H4a: Job rotation × firm age						−0.005*
H4b: Joint reward × firm age						0.000
R^2	0.063	0.406	0.409	0.459	0.411	0.424
ΔR^2		0.343***	0.003	0.053***	0.005	0.018****

Notes: [a]Base case = Industry: finance; [b]Base case = R&D-related function. Unstandardized coefficients (two-tailed *p*-values) *p<0.05; **p<0.01; ***p<0.001; ****p<0.10

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