Organizational antecedents of exploration and exploitation in SMEs: The role of structural and resource attributes

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Résumé :

Plusieurs études suggèrent que les attributs structurels (en termes de structure hiérarchique formelle) et les attributs de ressources (en termes de slack de ressources) soient au cœur des enjeux spécifiques des PME pour atteindre l'ambidextrie. Toutefois, rares sont les études empiriques qui ont analysé dans quelle mesure ces attributs sont associés à l'exploration et à l'exploitation dans les PME. Cette communication propose ainsi d'examiner les effets de deux attributs structurels (la formalisation et l'empowerment structurel) et de deux attributs de ressources (le slack financier et le slack de ressources humaines) sur l'exploration et l'exploitation dans les PME. Elle s'appuie sur une enquête réalisée auprès des dirigeants de 530 PME françaises. Les données ainsi collectées ont permis de tester un ensemble d'hypothèses de recherche par le biais de la méthode SUR (*Seemingly Unrelated Regressions*). Les résultats montrent que l'influence des attributs structurels est plus importante sur l'exploitation que sur l'exploration, tandis que celle des attributs de ressources est plus importante sur l'exploration que sur l'exploitation. De plus, ils révèlent que l'empowerment structurel et le slack financier peuvent favoriser tant l'exploration que l'exploitation, favorisant ainsi l'ambidextrie. En revanche, la formalisation et le slack de ressources humaines ont un effet significatif que sur l'une ou l'autre de ces orientations : la formalisation peut être un levier à l'exploitation, tandis que le slack de ressources humaines contribue à l'exploration. Cette étude permet donc de discuter des effets variables que peuvent avoir plusieurs antécédents organisationnels sur l'exploration et l'exploitation, dans le contexte spécifique des PME. Elle ouvre alors la voie à de futures recherches sur l'exploration et l'exploitation dans les PME, visant à examiner comment ces antécédents organisationnels peuvent interagir et se renforcer mutuellement.

Mots-clés : exploration, exploitation, structure organisationnelle, slack, PME.

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INTRODUCTION

The seminal paper of March (1991) on organizational learning has opened the way for extensive research on the idea that a firm's success depends not only on its ability to explore new competencies and prospective opportunities, but also to exploit its existing skills and capabilities (Lavie *et al.*, 2010; Raisch *et al.*, 2009). The literature has thus widely recognized that both exploration and exploitation are necessary for the performance and survival of firms (Filippini *et al.*, 2012; Gupta *et al.*, 2006; Lavie *et al.*, 2010). In fact, firms should "*engage in enough exploitation to ensure the organization's current viability and engage in enough exploration to ensure its future viability*" (Levinthal and March, 1993, p. 105). The concept of ambidexterity, used to describe firms that are able to both explore and exploit (Simsek *et al.*, 2009), is thus still a subject of great interest to researchers (Koryak *et al.*, 2018).

While a key research stream has focused on the performance implications of ambidexterity (*e.g.* Cao *et al.*, 2009; Heavey *et al.*, 2015; He and Wong, 2004; Lubatkin *et al.*, 2006), scholars have also recognized the need to systematically study the antecedents of exploration and exploitation (Lavie *et al.*, 2010) and ambidexterity (Jansen *et al.*, 2009; Koryak *et al.*, 2018; Raisch and Birkinshaw, 2008). Research on ambidexterity has indeed recognized that exploration and exploitation form "a paradoxical relationship" (Koryak *et al.*, 2018) or "paradoxical challenges" (Jansen *et al.*, 2009), as exploration and exploitation require fundamentally different structures, processes, strategies and capabilities (He and Wong, 2004; Koryak *et al.*, 2018), and generate organizational tensions (Koryak *et al.*, 2018; Lubatkin *et al.*, 2006). For instance, exploration is usually associated with flexibility, organic structures, decentralization, loose cultures, improvisation and autonomy, whereas exploitation is usually associated with efficiency, mechanistic structures, centralization, tight cultures, path dependence and routinization (Benner and Tushman, 2003; He and Wong, 2004; Koryak *et al.*, 2018). Scholars have thus been increasingly interested in organizational antecedents, which differentially influence exploration

and exploitation (Jansen *et al.*, 2006; Lavie *et al.*, 2010). Overall, the literature has suggested that numerous organizational factors can explain heterogeneity in firms' tendencies to explore *versus* exploit, such as slack resources, organizational structure, absorptive capacity, culture, age, and size (Lavie *et al.*, 2010). Focusing on unit ambidexterity, Jansen *et al.* (2012) also highlighted the key role of both structural and resource attributes.

However, the arguments and findings regarding the positive or negative effects of such antecedents on exploration and exploitation are mixed, and our understanding of their role is thus still limited. There is a need to more thoroughly examine antecedents of ambidexterity (Koryak *et al.*, 2018; Raisch and Birkinshaw, 2008). In addition, previous studies that have integrated both structural and resource attributes as organizational antecedents remain scarce. In the specific context of SMEs, which represent a vital component of most countries' economies (Lubatkin *et al.*, 2006; Prajogo and McDermott, 2014), this gap is even more salient. And yet, these firms, that are typically more resource-constrained than large firms, face greater challenges while managing the tensions associated with exploration and exploitation (Abebe and Angriawan, 2014; Bierly and Daly, 2007; Lubatkin *et al.*, 2006). Although the literature has recognized that exploration, exploitation and ambidexterity represent specific issues for SMEs, given their organizational structures and lack of slack resources (Abebe and Angriawan, 2014; Bierly and Daly, 2007; Lubatkin *et al.*, 2006), the effects of these organizational antecedents remain insufficiently explored in SMEs (Prajogo and McDermott, 2014).

Thus, the aim of this paper is to analyze the effects of both structural and resource attributes on exploration and exploitation in SMEs. In that perspective, the remainder of this paper is organized as follows. We first provide theoretical and conceptual developments that lead to a set of research hypotheses that focus, on the one hand, on formalization and structural empowerment (as structural attributes) and, on the other hand, on financial slack and human resource slack (as resource attributes). Then, we explain the performed methodology that allowed us to test these hypotheses on a sample of 530 CEOs. Before concluding with a discussion of limitations and future research directions, we present and discuss the results obtained.

1. THEORY AND RESEARCH HYPOTHESES

1.1. EXPLORATION, EXPLOITATION AND AMBIDEXTERITY CHALLENGES IN SMES

Following March (1991), two generic knowledge strategies, namely exploration and exploitation, have usually been distinguished in the literature. According to this author, exploration "*includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation*"; while exploitation "*includes such things as refinement, choice, production, efficiency, selection, implementation, execution*" (p. 71). In his view, both exploration and exploitation are associated with organizational learning and innovation, albeit of different types (Gupta *et al.*, 2006).

On the one hand, firms that focus on exploration "*strive to develop capabilities to excel at the creation or acquisition of new knowledge*" (Bierly and Daly, 2007, p. 494). The aim is to create new knowledge, through experimental and exploratory actions (Sirén *et al.*, 2012). It involves pursuing business opportunities that are radically new for the firm (Gedajlovic *et al.*, 2012; Sirén *et al.*, 2012). Exploration can thus manifest in the use of unfamiliar technologies and the creation of new products for which the demand is still unknown (Greve, 2007) or in new markets (Lubatkin *et al.*, 2006). Its key outputs are, therefore, often associated with radical innovations (Atuahene-Gima, 2005; Bierly and Daly, 2007). On the other hand, firms that focus on exploitation "*develop capabilities to excel at the ability to leverage existing knowledge to rapidly create new organizational products and processes*" (Bierly and Daly, 2007, p. 494). Exploitation refers to the efficient employment of current skills and capabilities of the firm (Gilsing and Nooteboom, 2006), and is mainly interested in refining and extending them (Auh and Menguc, 2005). Here, firms seek to maintain and refine their current competitive advantages (Gedajlovic *et al.*, 2012) by efficiently managing the existing resources and capabilities (Sirén *et al.*, 2012). Exploitation can thus lead to improvements in existing technologies or product features to meet the needs of existing customers (Lubatkin *et al.*, 2006), or to increase efficiency and productivity (Atuahene-Gima, 2005). Its key outputs are, therefore, often associated with incremental innovations (Atuahene-Gima, 2005; Bierly and Daly, 2007).

While both exploration and exploitation are necessary for the success and survival of firms (Filippini *et al.*, 2012; Gupta *et al.*, 2006; Lavie *et al.*, 2010), they can be viewed as two fundamentally different strategies that involve different goals (Bierly and Daly, 2007; Sirén *et al.*, 2012). They rely on different routines, processes and skills (O'Reilly and Tushman, 2008)

and compete for firms' scarce resources (He and Wong, 2004; March, 1991). The tensions and trade-offs associated with exploration and exploitation have thus become a central issue in the literature (He and Wong, 2004; O'Reilly and Tushman, 2013). However, several authors regret that the focus has been on large firms and not on SMEs, which are, yet, typically more resource constrained and consequently face greater challenges while managing the tensions and trade-offs associated with exploration and exploitation (Abebe and Angriawan, 2014; Bierly and Daly, 2007; Lubatkin *et al.*, 2006). In particular, little is known about the antecedents of a SME's ability to pursue both exploration and exploitation and, thus, attain ambidexterity (Lubatkin *et al.*, 2006; Prajogo and McDermott, 2014).

In fact, the issues of exploration and exploitation in SMEs differ from those in large firms, given their structural and resource attributes. For instance, Prajogo and McDermott (2014, p. 522) suggested that "*differences in such factors as slack resources or hierarchical administrative systems create for these firms a very different landscape from that faced by their larger counterparts*". The kind of formal hierarchical systems in SMEs and their lower level of slack resources have often been seen as factors that restrain them in their ability to both explore and exploit (Abebe and Angriawan, 2014, Bierly and Daly, 2007; Lubatkin *et al.*, 2006; Prajogo and McDermott, 2014).

1.2. ORGANIZATIONAL ANTECEDENTS OF EXPLORATION AND EXPLOITATION IN SMES

Several studies have recognized that both structural attributes (in terms of formal hierarchical structure) and resource attributes (in terms of slack resources) are at the core of the SMEs' specific issues to attain ambidexterity (*e.g.* Abebe and Angriawan, 2014; Lubatkin *et al.*, 2006; Prajogo and McDermott, 2014). Surprisingly, there is a lack of empirical studies in SMEs aiming at analyzing the extent to which these attributes are associated with exploration and exploitation. The recent study of Prajogo and McDermott (2014) provides some answers to the question of whether organizational structure has different effects on exploratory and exploitative innovations in SMEs. But its focus was on innovation in services, and resource attributes were not considered. In addition, while its findings confirmed that structural attributes had different effects on exploration and exploitation, certain expected effects were however not proved.

Thus, there is a need to better understand these relationships in the specific context of SMEs. We hence propose to examine the different effects of hierarchical structures (as structural attributes) and slack resources (as resource attributes) on exploration and exploitation in SMEs.

1.2.1. Structural attributes: formalization and structural empowerment

Two structural antecedents of exploration and exploitation are included in this research: (1) degree of formalization and (2) structural empowerment to capture a level of decentralization.

Indeed, the traditional attributes the most often used to describe a formal hierarchical structure are formalization and centralization (*e.g.* Caruana *et al.*, 1998; Jansen *et al.*, 2006; Jung *et al.*, 2008; Wang, 2001). As argued by Wang (2001, p. 431), "*although they are not the only structural factors effecting organization design, they may often be the vital ones and are the two fundamental elements in control and coordination*". Regarding centralization, the concept of structural empowerment has been sometimes used to capture its inverse or decentralization (Huang *et al.*, 2011). We chose to rely on this concept, because it permits a more encompassing view than the traditional one of centralization: it is "*broader than the traditional concepts of delegation, decentralization, and participatory management as the responsibility for the decision-making process is stretched beyond a mere contribution to a specific decision area*" (Ford and Fottler, 1995, p. 22).

Formalization is the extent to which a firm regulates work-related activities of employees with written rules and formal procedures, to prescribe behavior (Fredrickson, 1986; Jung *et al.*, 2008). It thus relates to the degree to which rules, procedures and instructions are codified, formalized or written down in the firm (Jansen *et al.*, 2006; Prajogo and McDermott, 2014).

According to Damanpour (1991), the literature posits that formalization impedes innovation and that, conversely, low formalization, high flexibility and low emphasis on work rules facilitate innovation and authorize openness that can lead to new ideas and behaviors. In fact, the excess of rules and procedures can constrain deviations from established practices and hinder fluid work processes (Jung *et al.*, 2008). It thereby may limit the chances of generating new knowledge and the creation of new opportunities, innovations or products (Espinosa and Lindahl, 2016). Indeed, high formalization does mainly support reactive behaviors, rather than proactive behaviors searching for opportunities (Fredrickson, 1986). As remarked by Pertusa-

Ortega *et al.* (2010), some authors have thus considered that rules restrain the creation of knowledge and the range of new ideas, and that, on the contrary, high flexibility and informal behavior within an organizational structure can help creating knowledge. In line with this statement, however not consensual in the literature (*e.g.* Chang and Hughes, 2012; Pertusa-Ortega *et al.*, 2010), it has been suggested that formalization may act as a frame of reference that restrains exploration (*e.g.* Jansen *et al.*, 2006; Prajogo and McDermott, 2014). In spite of this argument, empirical findings remain mixed. For instance, Prajogo and McDermott (2014) found a non-significant relationship between formalization and exploration, while they expected a negative one.

On the other hand, formalization is usually established to act in a known way (Jansen *et al.*, 2006). For instance, "*formalized search procedures increase the likelihood that information will be sought from areas previously utilized*" (Fredrickson, 1986, p. 287). Formalization can benefit the use and application of knowledge (Pertusa-Ortega *et al.*, 2010). The literature has suggested that it helps reinforcing the efficiency and the improvement of existing activities by establishing ingrained patterns of behavior (Chang and Hugues, 2012) and that it positively correlates with the quality of the products or services offered by the firm (Pertusa-Ortega *et al.*, 2010). Some authors thus argued that there is a positive relationship between formalization and exploitation (*e.g.* Chang and Hugues, 2012; Jansen *et al.*, 2006; Prajogo and McDermott, 2014).

In sum, "*formalization is expected to constrain exploration and facilitate exploitation via incremental improvements in processes and products*" (Lavie *et al.*, 2010, p. 122-123). From the above, we may hypothesize opposite influences of formalization on exploration and exploitation. Notwithstanding, while the literature seems to debate in terms of positive and negative influences, it also embodies strong underlying comparative assumptions. Regardless of signs in the relationship, formalization may have a greater positive impact on exploitation than on exploration. We therefore posit the following complementary hypotheses.

> ***Hypothesis 1a, b.*** The higher the formalization's degree in a SME, ***(a)*** the lower its level of exploration, and ***(b)*** the higher its level of exploitation.
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> ***Hypothesis 1c.*** The positive influence of formalization is higher on exploitation than on exploration.

Structural empowerment, or empowerment climate, is "*the extent to which an organization makes use of structures, policies, and practices supporting employee empowerment*" (Seibert *et al.*, 2004, p. 334). It refers to the process by which a leader or a manager shares his/her own power (*i.e.* formal authority or control over organizational resources) with subordinates (Conger and Kanungo, 1988). Structural empowerment thus concerns the policies and practices of delegation and decentralization (Conger and Kanungo, 1988; Ford *et al.*, 1995; Lin and Rababah, 2014) and takes place in participative work environments (Conger and Kanungo, 1988; Ford *et al.*, 1995). In particular, three key organizational practices are usually identified as practices that support employee empowerment: autonomy through boundaries, information sharing, and team accountability (Nauman *et al.* 2010; Randolph, 1995; Seibert *et al.*, 2004).

The literature has suggested that a high level of centralization (the inverse of empowerment – see Huang *et al.*, 2011) hinders innovation, as the concentration of decision-making authority hampers innovative solutions (Damanpour, 1991). It restrains innovativeness, risk-taking, and proactiveness (Caruana *et al.*, 1998), which are associated with exploration. Conversely, a low level of centralization may encourage creativity (Pertusa-Ortega *et al.*, 2010). Moreover, when employees work in a high task autonomy environment, the most creative ideas are also generated (Zhou, 2003), knowledge creation is promoted (Pertusa-Ortega *et al.*, 2010), and the likelihood of new opportunities increases (Espinosa and Lindahl, 2016). Empowerment has thus been considered as an antecedent of creative processes in firms (Zhang and Bartol, 2010) and innovation capability (Cakar and Ertürk, 2010). Consequently, some authors argued that the relation between empowerment, or decentralization, and exploration is positive (*e.g.* Jansen *et al.*, 2006; Prajogo and McDermott, 2014).

However, previous empirical studies lead to less obvious conclusions when it comes to exploitation. If "*it is commonly argued that a centralized organizational structure is needed to facilitate exploitation*" (Boumgarden *et al.*, 2012, p. 593), this statement was not systematically proved. For instance, although Jansen *et al.* (2006) and Prajogo and McDermott (2014) hypothesized that decentralization and exploitation are negatively associated, both found a non-significant relation. In addition, while Jansen *et al.* (2005) suggested that participation in decision-making hinders information processing efficiency and slows down transformation and exploitation of knowledge, their empirical results did not confirm that. On the other hand, Ebers and Maurer (2014) showed that structural empowerment, in terms of greater discretion in

decision-making and training, increases employee's commitment, which in turn leads to greater effort to transform and exploit relevant knowledge. This last study is in line with studies on ambidexterity that suggested that empowerment may be conducive to both exploration and exploitation (Chang, 2016).

Although the literature tends to support the argument of a positive influence of structural empowerment on both exploration and exploitation, some uncertainties still exist, especially regarding exploitation. Consequently, we may contend that empowerment is more beneficial to exploration than to exploitation. We therefore propose the following complementary hypotheses.

> ***Hypothesis 2a, b.*** The higher empowerment in a SME, ***(a)*** the higher its level of exploration, and ***(b)*** the higher its level of exploitation.
>
> ***Hypothesis 2c***. The positive influence of empowerment is higher for exploration than for exploitation.

1.2.2. Resource attributes: financial slack and human resource slack

Slack is defined as "*the pool of resources in an organization that is in excess of the minimum necessary to produce a given level of organizational output*" (Nohria and Gulati, 1996, p. 1246). It is "*potentially utilizable resources that can be diverted or redeployed for the achievement of organizational goals*" (George, 2005, p. 661). Following Singh (1986), slack has often been conceptualized as absorbed *versus* unabsorbed (Huang and Li, 2012; Sidhu *et al.*, 2004). Unabsorbed slack refers to excess uncommitted liquid resources (Damanpour, 1991; Sidhu *et al.*, 2004). Firms can easily redeploy and use unabsorbed slack, which can include, for instance, the level of cash on hand, liquid assets, reserve funds, or retained earnings (Huang and Li, 2012; Tan and Peng, 2003). In contrast, absorbed slack refers to excess costs, staff and salaries (Sidhu *et al.*, 2004) that are more difficult to redeploy (Huang and Li, 2012; Tan and Peng, 2003).

For several decades, scholars have been interested in the implications of slack in terms of performance (*e.g.* Bromiley, 1991; George, 2005; Lecuona and Reitzig, 2014; Tan and Peng, 2003), firms' growth (*e.g.* Bradley *et al.*, 2011; Mishina *et al.*, 2004), innovation (*e.g.* Damanpour, 1991; Nohria and Gulati, 1996), exploratory and/or exploitative activities (*e.g.* Jansen *et al.*, 2012; Josephson *et al.*, 2016; Voss *et al.*, 2008). Positive implications have been

however subjected to debate. On the one hand, it is widely recognized that slack can provide resources for innovation and allow failures to be absorbed (Adams *et al.*, 2006; Damanpour, 1991) and, consequently, create both incentives and means for development (Bradley *et al.*, 2011). On the other hand, slack can be seen as a waste or a cost to be eliminated (Adams *et al.*, 2006; Nohria and Gulati, 1996), "*as an inefficiency resulting from an organization's failure to use resources optimally that results in performance that does not meet the full potential of the available resources*" (Nohria and Gulati, 1997, p. 604). Definitely, there is no unique answer to the question of whether slack has positive or negative effects on performance (Lecuona and Reitzig, 2014; Tan and Peng, 2003) or on innovation (Marlin and Geiger, 2015). Previous studies on exploration and exploitation also produced mixed results. For instance, the literature has suggested that both slack and lack of slack may encourage exploration (He and Wong, 2004), or that slack may both facilitate and hinder exploration (Lavie *et al.*, 2010).

To better understand the effects of slack, the literature has notably recommended to distinguish different types of slack, which may impact firm behavior in different ways (Geiger and Makri, 2006; Wang *et al.*, 2016). For instance, some scholars argued that financial slack and human resource slack may have different implications (*e.g.* Mishina *et al.,* 2004; Voss *et al.,* 2008; Wang *et al.,* 2016). And yet, slack has been quite often limited to financial measures in empirical studies (Adams *et al.,* 2006; Damanpour, 1991; Vanacker *et al.*, 2013). Hence, we here propose to take into account (1) financial slack and (2) human resource slack, as antecedents of exploration and exploitation.

Financial slack usually refers to unabsorbed and easy-to-deploy liquid assets (Wang *et al.*, 2016). When such slack exists, "*managers may feel free to pursue more risky but potentially novel projects*" (Geiger and Makri, 2006, p. 99). In fact, they are less likely to worry about projects' failure risk when this type of slack is capable to buffer the potential losses of projects (Huang and Li, 2012). In that perspective, slack encourages risk-taking and experimentation, thus invoking exploration (Sidhu *et al.*, 2004). Firms that possess high level of financial slack may tend to deploy slack to risky exploration, which can in turn reinforce their long-term position, when low levels of financial slack may tend to hinder exploration (Voss *et al.*, 2008). In other words, financial slack represents a level of financial flexibility that helps firms to deal with issues or search for opportunities, thus supporting exploration activities (Josephson *et al.*,

2016). For instance, such flexibility makes expansion into new and uncertain businesses less problematic (Mishina *et al.*, 2004).

On the other hand, firms with poor financial slack may tend to "*focus on capturing and harvesting existing value, causing a stronger shift toward exploitation*" (Josephson *et al.*, 2016, p. 542-543). As recalled by Voss *et al.* (2008), exploitation is less demanding on financial resources, while promising smaller returns but more certain. Instead of focusing on generating future capabilities, firms with low financial slack may tend to put the emphasis on their current operations, strategies and capabilities, thus invoking exploitation (Josephson *et al.*, 2016). To the contrary, firms with increasing financial resources perceive the modest returns promised by exploitation as less attractive, compared to the higher returns that could be obtained thanks to exploration (Voss *et al.*, 2008).

In sum, the literature has suggested that increased financial slack may be associated with increased exploration, whereas decreased financial slack may lead to a shift toward exploitation (Josephson *et al.*, 2016; Voss *et al.,* 2008). The negative effect of this type of slack on exploitation is however subjected to debate, as one may suggest that financial slack can also be used to optimize current processes and refine current market positions (Bradley *et al.*, 2011), thus encouraging exploitation. Besides, Voss *et al.* (2008) did not find support for their hypothesis that predicts a negative association. The fact remains that a higher positive influence of financial slack on exploration than exploitation may be expected. Hence, we propose the following complementary hypotheses.

> ***Hypothesis 3a, b.*** The higher financial slack in a SME, ***(a)*** the higher its level of exploration, and ***(b)*** the lower its level of exploitation.
>
> ***Hypothesis 3c.*** The positive influence of financial slack is higher on exploration than on exploitation.

Human resource slack is "*the amount of human resources in excess of what is required*" (Wang *et al.*, 2016, p. 506). It can be thought of as absorbed slack, when a firm has more employees than necessary to operate effectively, thus having expenses which are greater that those needed (Geiger and Makri, 2006). Such absorbed resources are however already committed to a specific use (Voss *et al.*, 2008). The literature has thus recognized that human resource slack is mostly path-dependent and, therefore, mainly dependent on existing conditions (Mishina *et al.*,

2004; Wang *et al.*, 2016). It concerns with existing organizational arrangements, thus invoking exploitation (Mishina *et al.*, 2004; Voss *et al.*, 2008; Wang *et al.*, 2016). Indeed, human resource slack can be seen as "*a pool of expansion-consistent talent that can be allocated in ways that build upon what an organization has already done*" (Mishina *et al.*, 2004, p. 1184).

Consequently, this type of slack cannot be easily and flexibly allocated in opportunistic ways that are not connected to prior organizational routines (Mishina *et al.*, 2004). Besides, human resource slack "*might be associated with political and cognitive inertia that make expansion into new product domains risky or unpopular*" (Mishina *et al.*, 2004, p. 1184). It tends to limit the propensity to act in new areas that would require skills other than those available (Mishina *et al.*, 2004; Voss *et al.*, 2008). As the skills of human resources available in the firm are likely to be most applicable to incumbent product domains (Voss *et al.*, 2008), firms with high level of human resource slack are less willingness to follow a product expansion strategy (Mishina *et al.*, 2004) or to explore novel contexts (Voss *et al.*, 2008).

Hence, the literature has suggested that human resource slack may be negatively associated with exploration but positively associated with exploitation (Mishina *et al.*, 2004; Voss *et al.,* 2008). Empirical findings are however mixed, especially when considering the expected negative association with exploration. For instance, Voss *et al.* (2008) found a nonsignificant relationship between human resource slack and exploration. From the above, one may however suggest that this type of slack may be more beneficial to exploitation than exploration. We therefore posit the following complementary hypotheses.

> ***Hypothesis 4a, b.*** The higher human resource slack in a SME, ***(a)*** the lower its level of exploration, and ***(b)*** the higher its level of exploitation.
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> ***Hypothesis 4c.*** The positive influence of human resource slack is higher on exploitation than on exploration.

2. RESEARCH METHOD

2.1. SAMPLE AND DATA COLLECTION

Data were gathered from a survey that involved face-to-face interviews based on a questionnaire (closed-ended questions) with the chief executive officers (CEOs) of 530 French SMEs. These CEOs were contacted by the administration of a French district and had to respond

to the questionnaire as a prerequisite for entering a SME-dedicated training program that they had applied to.

The firms in our sample are rather small: 41.3% have fewer than 10 employees; 46.3% have between 10 and 49 employees; and 12.4% have more than 50 employees. However, the profile of firms is diversified. They are operating in a wide range of economic sectors. 40.6% of them offer a combination of products and services; 28.5% offer manufactured goods only; 18% offer services only; and 12.9% offer mainly services completed by a few number of products. 24.9% of the CEOs consider themselves to be leaders on their market and 46.5% to be on a niche market. Consequently, the size and variety of the sample confer considerable interest for an empirical analysis.

2.2. MEASURES

The scales used in this survey were mainly adapted from the prior literature. The survey was first pilot-tested with seven CEOs during informal interviews, to ensure that questions were clear and easy to understand. This pre-test allowed us to obtain feedback and qualitative comments about the questions and the scale items, and led to some minor improvements in the questionnaire.

2.2.1. Exploration and exploitation

Exploration and exploitation were measured using the two multi-item scales developed by Bierly and Daly (2007). Respondents indicated on a 5-point scale (1=strongly disagree to 5=strongly agree) how accurately each statement described their firm. The four items in the exploration scale focus on the extent to which the SME excels at developing radically new knowledge, while the three items in the exploitation scale focus on the extent to which it successfully exploits existing knowledge areas. These scales were chosen because they allowed us to focus on exploration and exploitation as firms' strategic orientations, rather than attempting to measure their specific acts. All indicators (see Table 1) confirm the validity and the reliability of the scales.

Table 1. The scales of exploration and exploitation

	Component Coeff. Pattern Matrix (Principal Comp. Analysis; rotation Oblimin Kaiser Normalization)	
Items	**Fact. 1**	**Fact. 2**
Exploration		
We frequently experiment with radical new ideas	0.796	
At our company, employees frequently come up with creative ideas	0.705	
Compared to our principal competitors, a high percentage of our company sales come from new products launched within the past 3 years	0.762	
We are usually one of the first companies in our sector to use new, breakthrough technologies	0.779	
Exploitation		
At our company, a strong emphasis is placed on improving efficiency		0.841
Our company excels at refining existing technologies		0.761
We frequently adjust our procedures, rules, and policies to make things work better		0.807
% of variance	45.842	15.671
Cronbach's alpha	0.760	0.726
KMO	0.817	
Sig. Bartlett's test of sphericity	0.000	

2.2.2. Organizational antecedents: formalization, empowerment and slack

To measure the degree of formalization, we adapted three items from the scale used by Nohria and Gulati (1996; 1997). Each respondent were asked to indicate the extent (1=definitely false to 5=definitely true) to which some conditions applied to his/her firm. As expected, the three items load on a single factor (see Table 2).

Table 2. The scale of formalization

Items	**Loading**
For most jobs there are well-developed rules	0.768
Decisions are closely monitored to ensure that rules and policies are followed	0.733
For most situations, there are manuals that define the course of action to be taken	0.618
% of variance	70.661
Cronbach's alpha	0.789
KMO	0.683
Sig. Bartlett's test of sphericity	0.000

To measure structural empowerment, nine items were extracted and adapted from the scale of empowerment climate proposed by Nauman *et al.* (2010). The 5-point scale (1=strongly disagree to 5=strongly agree) takes into account organizational aspects related to three dimensions, as usually done in the literature (Nauman *et al.*, 2010; Randolph, 1995; Seibert *et*

al., 2004): (1) information sharing (item example: '*Easy access to information and data on firm's projects*'), (2) autonomy through boundaries (item example: '*Clear understanding of individual roles and responsibilities'*), and (3) responsibility and accountability (example item: '*Delegate responsibilities*'). As expected, these three components form a single unidimensional construct (Nauman *et al.*, 2010; Seibert *et al.*, 2004) and all items load on a single factor (see Table 3).

Table 3. The scale of empowerment

Items	**Loading**
Easy access to information and data on firm's projects	0.747
Easy circulation of project documentations to facilitate discussion	0.753
Collaboration between the members of the management team	0.694
Clear understanding of individual roles and responsibilities	0.750
Open communication among firm members	0.804
Delegate responsibilities	0.724
Team work important for the firm	0.795
Encourage professional growth of employees and training	0.575
Encourage participative decision-making	0.732
% of variance	53.730
Cronbach's alpha	0.889
KMO	0.915
Sig. Bartlett's test of sphericity	0.000

Financial slack represents the cushion of resources that a firm may allocate to new activities without divesting the existing ones. In SME contexts, traditional measures of financial slack may be of little relevance. Indeed, usual measures, such as cash reserves (George, 2005; Voss *et al.*, 2008), provide a poor measure of slack resource in SMEs, as most of them have seldom this kind of slack. Rather, some SMEs may have potential access to supplementary financial sources in case of need. Given that rationale, we measured financial slack as the variety of sources that a firm considered as easily available. The respondents were asked to indicate the source(s) of financing that they could easy mobilize, in their opinion, if an opportunity occurred. Eight sources were proposed to them: (a) self-financing, (b) current shareholders, (c) new shareholders, (d) venture capital, (e) credit loans, (f) leasing, (g) cash credit, (h) public funding and public grants. Each source of financing was rated "yes" (1) or "no" (0). Then, to estimate the variety of sources, the responses were added for a summative measure ranging from 0 to 8.

Human resource slack refers to the surplus of resources in an organization as regards to ongoing activities (Wang *et al.*, 2016). The capability to undertake further projects with the same

workforce is therefore a sharp indicator of this type of slack. As a consequence, we measured human resource slack as the growth in turnover that an organization could sustain without increasing its size. Two questions that referred to this phenomenon were asked to respondents (see Table 4). While it could be useful to distinguish different types of workers (Lecuona and Reitzig, 2014), we only focus on overall employees on the one hand, and on management supervisors on the other hand. To standardize the variables that varied greatly with size, we used the logs of the answers, divided by the actual size of the firm in number of employees. The items load on a single factor, and this scale exhibits good consistency.

Table 4. The scale of human resource slack

Items	**Loading**
Which percentage of growth in turnover could your firm sustain…	
...without increasing the global number of employees *[log, divided by size]*	0.955
...without increasing the number of managers (management supervisors) *[log, divided by size]*	0.952
% of variance	84.804
Cronbach's alpha	0.897
KMO	0.691
Sig. Bartlett's test of sphericity	0.000

2.2.3. Control variables

We controlled for possible alternative explanations by including firm size and firm age, as usually done in previous studies that focused on the antecedents of exploration and exploitation in SMEs (Koryak *et al.*, 2018; Prajogo and McDermott, 2014). First, firm size is potentially important as it is supposed to have direct effects on innovation activities. For instance, larger companies tend to adopt more structured processes which are likely to influence exploitation activities. As usually done, firm size was measured through the natural logarithm of number of employees. Second, firm age was included as it is often considered as a proxy for experience, which may affect substantially organizational structure and resource development.

2.3. DESCRIPTIVE STATISTICS AND CORRELATIONS

Table 5 displays the main descriptive statistics and correlations among variables. We observe that exploration and exploitation are strongly correlated, thereby justifying a simultaneous estimation of both.

Financial and human resource slack are also strongly correlated. We therefore performed factor analyses to determine whether the two variables could be gathered. Financial slack proved to be a distinct construct. As a consequence, we maintained financial and human resource slack as separate variables, as recommended by some authors (Voss *et al.,* 2008; Wang *et al.*, 2016).

It is noteworthy that human resource slack is negatively correlated to age and size, indicating that it is more prevalent in young and small firms. Older and larger firms could thus be more able to actually meet the full potential of their available human resources. Human resource slack is also negatively but weakly correlated with formalization. In contrast, formalization and structural empowerment are positively associated. Therefore, firms can simultaneously pursue both without being in contradiction. All the other correlations are much lower, suggesting that no collinearity concern should arise.

Table 5. Descriptive statistics and correlations

	Mean (sd)	Exploration	Exploitation	Empowerment	Formalization	Fin. slack	HR slack	Size (log)
Exploration	2.745 (1.017)							
Exploitation	3.440 (0.892)	0.492***						
Empowerment	3.773 (0.734)	0.275***	0.355***					
Formalization	2.981 (1.029)	0.132**	0.340***	0.249***				
Fin. slack	4.091 (1.057)	0.148***	0.135**	0.056	0.101*			
HR slack	0.518 (1.641)	0.079	-0.110**	-0.017	-0.245***	-0.092*		
Size (log)	2.693 (1.006)	0.040	0.108*	0.092*	0.265***	0.051	-0.661***	
Age (log)	2.762 (1.046)	-0.152***	-0.033	-0.166***	0.137**	-0.044	-0.465***	0.321***

****p < 0.001, **p < 0.01, *p < 0.05*

3. RESULTS AND DISCUSSION

Our hypotheses rely on the assumption that several organizational characteristics have varying impacts on exploration and exploitation. Therefore, we need to discriminate the influences that a given explanatory organizational antecedent may have on these two different dependent variables. To this end, we built two models that were estimated simultaneously following the

seemingly unrelated equation method. This method has two main advantages. First, it permits to take into account the correlation that exists between the dependent variables. In that case, the correlation between the errors of the two equations is used to correct the estimation of covariates coefficients. Second, simultaneous estimation allows flexible hypothesis testing with coefficients of the two equations, which provides straightforward contrasts estimations.

The models estimated with this method are presented in Table 6. The models 1 and 2 aim at explaining exploration and exploitation, respectively.

Table 6. Seemingly unrelated regressions

	Model 1 Exploration	**Model 2 Exploitation**
(Intercept)	0.25	0.88**
	(0.36)	(0.29)
Empowerment	0.33***	0.35***
	(0.06)	(0.05)
Formalization	0.06	0.21***
	(0.04)	(0.03)
Financial slack	0.08**	0.05*
	(0.03)	(0.02)
HR Slack	0.22***	0.07
	(0.05)	(0.04)
Size (log)	0.34***	0.21**
	(0.08)	(0.06)
Age (log)	-0.12**	-0.07
	(0.05)	(0.04)
R2	0.14	0.23
Adj. R2	0.13	0.22

****p < 0.001, **p < 0.01, *p < 0.05*

3.1. EFFECTS OF STRUCTURAL ATTRIBUTES ON EXPLORATION AND EXPLOITATION

Regarding formalization, results show that it positively influences exploitation, thus supporting H1b. However, while formalization does not seem to favor exploration, it does not impede it either. We therefore reject H1a which predicted a negative relationship. Besides, a Theil's F-test between the coefficients confirms that the effect on exploitation is higher than on exploration ($F=17.238$, $p<0.001$). The comparative hypothesis H1c therefore receives support. This is in line with findings of previous studies that did also provide no support for the expected

negative effect of formalization on exploration, while providing support for the expected positive effect on exploitation (*e.g.* Jansen *et al.*, 2006; Prajogo and McDermott, 2014). As Chang and Hughes (2012, p. 4) suggested, "*one would expect formalization to positively affect exploitative innovation but the state of evidence is such that one could not predicted beyond a 'no effect' relationship with explorative innovation*". Formalization may be a powerful lever for exploitation without being at the expense of exploration. While it might not be harmful to exploration (Jansen *et al.*, 2006; Pertusa-Ortega *et al.*, 2010), the fact remains that it is clearly more beneficial to exploitation. Hence, one may however suggest that it might ultimately contribute at causing a "competence trap" (Levinthal and March, 1993) or "exploitation trap" (Sirén *et al.*, 2012), at the expense of exploration and thus of ambidexterity, in the long run.

Regarding structural empowerment, this antecedent is strongly and positively associated with both exploration and exploitation. H2a and H2b therefore find sharp support. The F-test proves, nonetheless, that these influences cannot be considered as equivalent. Empowerment has a greater impact on exploitation than on exploration ($F=56.419$, $p<0.001$). Our comparative hypothesis H2c, which posits the contrary, is thus rejected. Even if structural empowerment contributes more to exploitation comparatively to exploration, our findings suggest that it can be a successful lever for ambidexterity, given its significant positive effects on both exploration and exploitation. These results are in line with previous studies that pointed to the importance of decentralization and worker training as key facilitators of ambidexterity (Gibson and Birkinshaw, 2004). They also bear similarities with the recent study of Ebers and Maurer (2014), which showed that empowerment (in terms of discretion in decision-making and training) is positively associated with both potential absorptive capacity (*i.e.* capacity to acquire and assimilate external knowledge) and realized absorptive capacity (*i.e.* capacity to transform the knowledge and exploit it) of the firm.

3.2. EFFECTS OF RESOURCE ATTRIBUTES ON EXPLORATION AND EXPLOITATION

On the one hand, financial slack positively influences exploration as expected, but also exploitation. H3a is hence validated, whereas H3b that predicted a negative relationship is rejected. Nevertheless, the F-Test shows that the effects of financial slack are stronger on exploration than on exploitation ($F=11.294$, $p<0.001$). The comparative hypothesis H3c is thus supported. These findings suggest that financial slack may be a lever for ambidexterity in

SMEs. While financial slack, as unabsorbed slack that is easily deployable, is mostly seen as a lever for exploration (Josephson *et al.*, 2016; Voss *et al.,* 2008), it may also contribute, however to a lesser extent, to exploitation. These results are in agreement with Jansen *et al.* (2012, p. 1291), who suggested that "*uncommitted financial resources within organizations […] are highly flexible and provide opportunities for ambidextrous units*". Deploying excess financial resources could thus help to mitigate potential adverse consequences when facing paradoxical tensions encountering by exploration and exploitation (Cao *et al.*, 2009; Jansen *et al.*, 2012).

On the other hand, human resource slack has a positive impact on exploration, while its effect on exploitation is non-significant. Hence, H4a and H4b are rejected. The F-test shows comparatively that the influence on exploration is stronger than exploitation, leading to reject H4c. The results about human resource slack thus bear similarities with those concerning financial slack, given their stronger effects on exploration than on exploitation. And yet, contrary assumptions were expected, given that absorbed resources such as human resource slack are more difficult to redeploy and reallocate to exploration in novel contexts, comparatively to unabsorbed resources such as financial slack (Voss *et al.*, 2008). However, all human resources in excess may be not difficult to redeploy in novel contexts. Certainly, it may depend on the types of employees concerned and the different types of knowledge they hold (Lecuona and Reitzig, 2014). The fact remains that, contrary to that expected, our findings demonstrate that human resource slack can be a powerful lever for exploration, without impacting exploitation. One may therefore suggest that this type of slack, because of its positive effect on exploration only, might ultimately contribute at causing a "failure trap" (Levinthal and March, 1993), at the expense of exploitation and thus of ambidexterity, in the long run.

3.3. EFFECTS OF CONTROL VARIABLES ON EXPLORATION AND EXPLOITATION

Possible alternative explanations of exploration and exploitation were also controlled by including firm size and firm age. First, firm size has a significant positive association with exploration and exploitation. While conflicting findings exist concerning the impact of organizational size on the tendency to explore *versus* exploit (Lavie *et al.*, 2010), this result highlights the explanatory effects of firm size on both. Second, firm age has a significant negative association with exploration, and a no significant relationship with exploitation. These findings are in line with previous studies that have suggested that young firms are more likely

to invest in exploration (Lavie *et al.*, 2010). To the contrary, "*older firms are supposed to be more resistant toward new and innovative ideas*" (Ebers and Maurer, 2014, p. 324).

4. CONCLUSION

While the kind of formal hierarchical systems in SMEs and their lower level of slack resources have often been seen as factors that restrain them in their ability to simultaneously explore and exploit (Abebe and Angriawan, 2014, Bierly and Daly, 2007; Lubatkin *et al.*, 2006), there is a lack of empirical studies aiming at testing the effects of these organizational antecedents in SMEs (Prajogo and McDermott, 2014). This study therefore proposes to examine whether hierarchical structure and slack resources have different effects on exploration and exploitation in SMEs.

This study thus contributes to the literature on antecedents of exploration and exploitation, by highlighting the varying impacts of both structural and resources attributes in the specific context of SMEs. The results show that the influences of structural attributes are greater on exploitation than exploration, whereas the influences of resources attributes are greater on exploration than exploitation. In addition, they reveal that structural empowerment and financial slack may be conducive to both exploration and exploitation, thus in favour of ambidexterity. On the other hand, formalization and human resource slack have a significant effect only on one of these two variables: the former may be a powerful lever for exploitation, while the latter may be a powerful lever for exploration. This study hence provides empirical evidence to the important role of hierarchical systems and slack resources, when considering exploration and exploitation in SMEs. In particular, the key role of structural empowerment and financial slack, as key facilitators of both exploration and exploitation, is highlighted.

This research has however some limitations suggesting opportunities for future research. First, it would be useful to include complexity as another structural attribute. Indeed, some recent studies in organizational learning have also examined this attribute, in addition to formalization and (de)centralization, to describe organizational structure (*e.g.* Espinosa and Lindahl, 2016; Pertusa-Ortega *et al.*, 2010). In the same vein, it would be interesting to include the traditional concept of centralization. While structural empowerment has been used to capture the inverse of centralization (Huang *et al.*, 2011) in a broader view (Ford and Fottler, 1995), centralization and empowerment however remain two distinct concepts (Jung *et al.*, 2008). Hence, it could be

useful to compare their effects on exploration and exploitation. Another limit concerns the measures of slack. In particular, the measure of human resource slack used in this study might not capture all the complexity of this concept. This can explain why the results about the effects of human resource slack do not support any of our hypotheses. More generally, the choice of the most appropriate operationalization of slack is difficult and strongly debated subject (Mishina *et al.*, 2004; Nohria and Gulati, 1996). Thus, a reflection should be conducted about the appropriate measures of slack (human and financial) in the specific context of SMEs. Finally, we recognize that organizational antecedents do not work in isolation when impacting exploration and exploitation. As recommended in the literature (Koryak *et al.*, 2018; Raisch and Birkinshaw, 2008), it would be therefore useful to examine how such antecedents interact and complement each other.

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