

Organisational Ambidexterity in SME Context

A Multi-Level Perspective Focused on Portuguese Technological Firms

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Dedicatória

À minha Família, pelo apoio e incentivo. Aos Amigos.

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Resumo

O estudo da ambidextria organizacional tem sido um importante campo de pesquisa para a gestão, sobretudo pela importância que esta temática se reveste para a competitividade das empresas. Neste sentido, esta tese de doutoramento em Gestão possui, como objetivo principal, proporcionar um melhor entendimento acerca da ambidextria organizacional (AO) em contexto de pequenas e médias empresas (PME) portuguesas. O caminho de investigação definido adotou uma abordagem multinível, tendo sido explorados um conjunto de diferentes perspetivas concretizadas através de cinco artigos de investigação: um artigo de revisão de literatura, um artigo teórico e três artigos de natureza empírica.

Assim, o primeiro artigo, é uma revisão da literatura e tem como principal objetivo identificar os fatores que afetam a AO em contexto de PME. Tendo por base 297 artigos publicados entre 2005 e 2020 nas bases de dados Web of Science, Scopus e Science Direct, foi adotada uma perspetiva multinível, abrangendo o nível organizacional, ambiental e individual. Com essa abordagem identificaram-se quatro áreas temáticas com as quais a investigação da AO se encontra relacionada: inovação, aprendizagem organizacional, capacidades dinâmicas e desempenho das PME. O principal contributo desta investigação centra-se na identificação das grandes áreas temáticas de investigação científica em torno da AO, assim como a identificação de um conjunto de fatores contingenciais, situados ao nível organizacional, ambiental e individual, que potencialmente podem influenciar o desenvolvimento da AO em contexto de PME.

O segundo artigo procurou analisar os antecedentes da AO à luz das principais características das PME, como a sua reduzida dimensão ou a sua reduzida estrutura interna. Para esse efeito, e tendo por base a literatura identificada, adotou-se uma abordagem baseada nos antecedentes internos e externos e qual o seu potencial relacionamento com as características das PME sob o prisma dos conceitos de *exploration* e *exploitation*. Com base nesses relacionamentos foram identificadas dez proposições teóricas.

O terceiro artigo tem uma natureza empírica, adota uma perspetiva de nível individual, e teve como objetivo analisar a influência da personalidade dos proprietários-gestores no desenvolvimento da AO em contexto de PME. Para esse efeito foram formuladas

cinco hipóteses baseadas nos traços de personalidade e a sua influência em AO. Recorreu-se a um modelo de equações estruturais de segunda ordem e a um questionário estruturado dirigido aos proprietários-gestores de 224 PME portuguesas do setor das tecnologias de informação (TI), telecomunicações, audiovisual e consultadoria em TI. Os resultados obtidos sugerem a influência positiva dos traços de personalidade da extroversão e conscienciosidade em AO e influência negativa do traço de personalidade de neuroticismo em AO.

O quarto artigo tem igualmente uma natureza empírica e procurou-se estudar a influência do dinamismo ambiental e da capacidade tecnológica em AO e o papel moderador do dinamismo ambiental em AO. Com este objetivo recorreu-se a um modelo de equações estruturais de segunda ordem e a um questionário estruturado dirigido aos proprietários-gestores de 224 PME portuguesas do setor das tecnologias de informação (TI), telecomunicações, audiovisual e consultadoria em TI. Os principais resultados obtidos revelam um efeito positivo da capacidade tecnológica em AO assim como um efeito moderador na relação entre capacidade tecnológica e AO.

Por fim, o quinto e último artigo, adota a perspetiva de nível organizacional e teve como objetivo perceber como os Sistemas de Gestão da Qualidade baseados na ISO 9001 (SGQ) podem ajudar a inibir ou a facilitar a AO em PME. Para este artigo adotou-se uma abordagem qualitativa, com recurso a quatro estudos de caso e a um questionário de entrevista previamente desenvolvido para o efeito. Os resultados obtidos ressaltam a importância das mudanças provocadas pelos SGQ para o desenvolvimento de comportamentos ambidextros nas PME e revela que nem todas as mudanças provocadas pelos SGQ nas PME atuaram como facilitadores da AO.

Os diferentes estudos efetuados no âmbito desta investigação leva-nos a considerar que desenvolvimento da AO no contexto das PME encontra-se dependente de um conjunto de fatores de natureza multinível, nomeadamente ao nível das características específicas deste tipo de empresas, dos traços de personalidade dos seus proprietários-gestores e da influência externa do dinamismo ambiental onde estas empresas se inserem. Esta investigação teve por base um importante conjunto de teorias, como a Teoria Contingencial, a Teoria das Capacidades Dinâmicas, a *Upper Echelons Theory*, ou o modelo dos cinco fatores ou traços de personalidade (*Big-five personality traits*).

Esta tese de doutoramento em Gestão permite sustentar a ideia de que o desenvolvimento da AO nas PME encontra-se dependente do grau de influência das atividades relacionadas com *exploration* e *exploitation*. Este estudo sugere que a AO é

um fenómeno complexo e que exploration e exploitation tenderão a ser difíceis de serem equilibradas, o que nos leva a pensar que, nas PME, essas atividades poderão ser balanceadas alternadamente ou que poderão coexistir de forma complementar e ortogonal.

Neste sentido, este estudo realça o papel das PME no relacionamento com clientes, a influência dos fatores contingenciais como o dinamismo ambiental em exploration e exploitation, a influência externa na construção da AO e na capacidade tecnológica destas empresas, assim como a influência das características de personalidade dos seus gestores-proprietários. Esta investigação também apresenta contributos para a teoria e para a prática, assim como linhas de pesquisa futuras relativas a esta temática.

Palavras-chave

Ambidextria Organizacional; Pequenas e Médias Empresas; Exploration; Exploitation; Traços de Personalidade; Gestão do Conhecimento; Antecedentes; Multinível.

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Abstract

The study of organisational ambidexterity (OA) has been an important field of research for management, especially because of the importance of this theme for the competitiveness of companies. In this sense, this doctoral thesis in Management has, as its main objective, to provide a better understanding of how OA can be developed in the context of Portuguese small and medium-sized enterprises (SME). This study adopted a multilevel perspective, having explored a set of different paths implemented through five research articles: a literature review article, a theoretical article and three empirical articles.

Thus, the first article is a literature review, and its main objective is to identify the factors that affect OA in SMEs. Based on 297 articles published between 2005 and 2020 in the Web of Science, Scopus and Science Direct databases, a multilevel perspective was adopted, covering the organisational, environmental, and individual levels. With this approach, four thematic areas were identified with which the OA investigation is related: innovation, organisational learning, dynamic capabilities, and SME performance. The main contribution of this research focuses on the identification of thematic areas of scientific research around OA, as well as the identification of a set of contingent factors, located at the organisational, environmental, and individual levels, which can potentially influence the development of OA in the context of SMEs.

The second article sought to analyse the antecedents of OA considering the main characteristics of SMEs, such as their small size or their reduced internal structure. For this purpose, and based on the identified literature, an approach was adopted based on internal and external antecedents and what is its potential relationship with the characteristics of SMEs from the perspective of the exploration and exploitation concepts. Based on this relationship, ten theoretical propositions were identified.

The third article is empirical in nature and adopts an individual-level perspective and aimed to analyse the influence of owner-managers' personality in the development of OA in the context of SMEs. For this purpose, five hypotheses based on personality traits and their influence on OA were formulated. A second-order structural equation model was used, and a structured questionnaire addressed to the owner-managers of 224 Portuguese SMEs in the information technology (IT), telecommunications, audio-visual

and IT consulting. The results obtained suggest the positive influence of the personality traits of extraversion and conscientiousness in OA and the negative influence of the personality trait of neuroticism in OA.

The fourth article is also empirical in nature and sought to study the influence of environmental dynamism and technological capability in OA and the moderating role of environmental dynamism in OA. With this objective, a second-order structural equation model was used, and a structured questionnaire addressed to the owner-managers of 224 Portuguese SMEs in the information technology (IT), telecommunications, audio-visual and IT consulting sector. The main results obtained reveal a positive effect of technological capability in OA as well as a moderating effect on the relationship between technological capability and OA.

Finally, the fifth and last article adopts an organisational level perspective and aimed to understand how Quality Management Systems based on ISO 9001 (QMS) can help inhibit or facilitate OA in SMEs. In this article, a qualitative approach was adopted, using four case studies and a interview protocol previously developed for this purpose. The results obtained highlight the importance of the changes caused by the QMS for the development of ambidextrous behaviours in SMEs and reveal that not all the changes caused by the QMS in SMEs acted as facilitators of the OA.

The different studies carried out within the scope of this research lead us to consider that the development of OA in the context of SMEs is dependent on a set of factors of a multilevel nature, namely in terms of the specific characteristics of this type of companies, personality traits of the owner-managers and the external influence of the environmental dynamism in which these companies operate. This study was based on an important set of theories, such as the Contingency Theory, the Dynamic Capabilities Theory, the Upper Echelons Theory, or the model of the five factors or personality traits (Big-Five personality traits).

This PhD thesis in Management supports the idea that the development of OA in SMEs is dependent on the degree of influence of activities related to exploration and exploitation. This study suggests that OA is a complex phenomenon, and that exploration and exploitation will tend to be difficult to balance, which leads us to think that in SMEs these activities can be balanced alternately or that they can coexist in a complementary and orthogonal way.

In this sense, this study highlights the role of SMEs in customer relationships, the influence of contingent factors such as environmental dynamism in exploration and exploitation, the external influence on OA and in the technological capacity of these companies, as well as the influence of the characteristics of the personality of its owner-managers. This investigation also presents contributions to theory and practice, as well as future lines of research related to this theme.

Keywords

Organisational Ambidexterity; Small and Medium Enterprises; Exploration; Exploitation; Personality Traits; Knowledge Management; Antecedents; Multilevel.

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List of Acronyms

CEO	Chief Executive Officer
HR	Human Resources
ISO	International Organisation for Standardization
IT	Information Technology
OA	Organisational Ambidexterity
OCDE	Organisation Economic Co-operation and Development
QMS	Quality Management System
RBV	Resource-Based View
SME	Small and Medium-Sized Enterprises

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CHAPTER 1

Introduction

1. Justification and motivation for choosing the research topic and aim of the research

Organisational ambidexterity (OA) has been one of the research fields that has attracted the most attention of researchers in recent years. The OA paradigm appears in the literature as a capacity that allows firms to achieve superior performance (Cao, Gedajlovic, & Zhang, 2009), enhancing a new way of observing the internal dynamics that form due to the characteristics and influence of employees, external environments, contexts, and existing resources. The importance of OA for management lies in the fact that firms can combine exploration and exploitation activities to be more competitive (Lin, Hsu, Hsu, & Chung, 2020), respond better to market requirements, and be more adaptable and flexible to markets (Dolz, Iborra, & Safón, 2019).

The concept of OA contains within itself the principle of balance between apparently antagonistic activities: exploration and exploitation. Thus, exploration means search, discovery, autonomy, and innovation. The exploration activities require investments in new capabilities in order to ensure their long-term success. Exploitation means control, efficiency, continuity, and reduced variability. Exploitation activities imply the efficient use of existing resources with a view to achieving short-term success. Both exploration and exploitation are also learning processes (March, 1991). Ambidextrous firms are able to simultaneously manage exploitation and exploration, meaning they can analyse their current portfolio of skills and knowledge and explore new domains with equal dexterity (Andriopoulos & Lewis, 2009).

The literature has tried to understand how exploration and exploitation can be combined with each other. In this sense, Gupta, Smith and Shalley (2006) question whether exploration and exploitation represent a continuum or, on the other hand, are articulated in an orthogonal way. The approach of a continuum between the two concepts is presented as an alternating sequence between exploration and exploitation, and the orthogonal view interprets exploration and exploitation as two concepts characterized by independent activities and in which both activities can reach high

levels in firms (Dolz, Safón, Iborra, & Dasí, 2014). Cao et al. (2009) advocates this last perspective, when conceiving OA as a dynamic capability and suggesting a way to evaluate the concept through two notions: the notion of balancing OA and the notion of combining OA. The first refers to the operationalization of the difference between exploration and exploitation or symmetry between them (Dolz et al., 2014); the second notion refers to the exploration and exploitation product achieved by firms (Dolz et al., 2014).

In order to deepen the knowledge of management about OA, the literature has focused, above all, on large firms. However, small and medium-sized enterprises (SMEs) are different from large firms, as they have more resources, technological, human, and financial, providing researchers with ample research possibilities (Franco & Haase, 2010). In SMEs, on the contrary, due to their reduced hierarchical structure, with a low level of formality, the entrepreneur assumes a closer role in relation to daily operations, thus their influence is more visible, making these firms more flexible and with a great capacity for adaptation (Franco & Haase, 2010). Large firms have denser and more hierarchical internal organisational structures. In large firms, the degree of direct influence of top management has a slower impact and these firms are not so agile in reacting and adapting. However, large firms can influence markets by conditioning the main distribution and logistics channels, unlike SMEs that are strongly conditioned by global transformations, technological competitiveness, and the intrinsic dynamism that affect markets (Franco & Haase, 2010). However, in the Portuguese case (as well in many other countries), SMEs have a great impact on the economy and represent a high percentage of the universe of firms in Portugal. SMEs are critically important to the country's economy (Franco & Haase 2010) because of the number of jobs they can create and their ability to provide greater social integration and stability of the workforce. SMEs are also more versatile in reacting to market changes (Fernandes, 2009; Franco & Haase, 2010).

With regard to OA and its relationship with the performance of SMEs, it is also worth considering that this relationship is more evident in these firms than in large firms. According to Lubatkin, Simsek, Ling, and Veiga, (2006), in large firms, this relationship is more subject to influences that escape the direct action of the top management. In this sense, it should also be noted that research on OA in SMEs has been largely based on prescriptions in the literature on the subject, but in the context of large firms (Chang & Hughes, 2012). In SMEs, factors such as small size, availability of resources, or reduced bureaucracy end up influencing the potential of OA and its

impact is reflected in the challenges these firms face in managing exploration and exploitation activities (Andriopoulos & Lewis, 2009).

Thus, there are several studies that seek to understand the potential factors, internal and external, at different levels, that influence OA in firms. Thus, studies that seek to identify effects on OA, at the individual level and that cover different themes such as leadership (Mihalache et al., 2014) or the cognitive styles of managers (Lin & McDonough, 2014). Mom et al., (2009) suggest the existence of a behavioural orientation associated with the owner-manager that combines exploration with exploitation in a given period, and Bonesso et al. (2014) argue that, on the basis of the owner-managers strategic options, find patterns of individual perceptions. From an organisational point of view, the literature points to innovation (Blindenbach-Driessen & Van Den Ende, 2014; Groysberg & Lee, 2009; Jansen et al., 2009) or to human resource management practices (Swart & Kinnie, 2010). From the point of view of the influence of the environmental context on organisational ambidexterity, Hill and Birkinshaw (2012) highlight the impact of networks and external partnerships of firms to enhance the development of OA.

However, there is still no consensus in the literature regarding how small and medium-sized enterprises (SMEs) can achieve OA. It is our belief that the understanding of OA in the context of SMEs must be placed on two levels. First, it must consider the unique characteristics of SMEs, such as their small size and their internal structure, and identify the factors that can influence the development of OA, knowing that SMEs are sensitive to their external environment. Second, considering its importance to the Portuguese economy, the need for a multilevel approach should be considered, located at the individual level, at the environmental level, and at the organisational level. At the individual level, it is important to understand how the individual characteristics of Portuguese SMEs managers can influence OA. At an environmental level, since SMEs are sensitive to external influences, it is equally important to understand the role of environmental dynamism and technological capacity in OA in SMEs. Finally, it is equally important to consider the development of OA at the organisational level, focusing on organisational systems that can facilitate or inhibit OA in small and medium-sized enterprises (SMEs).

In this sense, considering the growing importance of the OA paradigm for the literature and its potential positive impact on the performance of SMEs (Jansen et al., 2006), and considering the manifest scarcity of studies on the subject, the way in which OA can be achieved in SMEs needs to be further explored.

Based on what was exposed in the previous section, the reason for carrying out a study on organisational ambidexterity in Portuguese SMEs in the field of information technology, telecommunications, audio-visual, and IT consulting is centred on deepening the knowledge about this paradigm and, more specifically, on knowing if it is possible the development of OA in SMEs.

A solid basis to carry out this investigation is related to the growing demand of the markets, which implies that SMEs must be able to respond to the opportunities that present themselves, as well as to the risks that arise. In this sense, managers should be aware of how their firms align, with the ideal result of OA being the level of excellence both in exploration and exploitation (Andriopoulos & Lewis, 2009).

Thus, it is important to better understand the phenomenon of OA in the context of SMEs, considering, for example, their specific characteristics such as their small size or their scarcity of resources. SMEs are more sensitive to the influence of markets, more dependent on the strategic options of their managers, and conditioned by the availability of resources and their organisational context. In this sense, these and other significant differences lead us to seek to understand which factors can influence OA in SMEs, circumscribing this approach through the individual perspective, the influence of their managers, but also through the organisational and environmental perspective, through the identification of factors potentially influencers, internal and external, within a multilevel perspective.

Given the above, the main objective of this research is to provide a better understanding of how OA can be developed in SMEs. Thus, the following specific objectives for this research are considered below:

- To identify, in the literature, the main theoretical approaches related to OA in the context of SMEs.
- To identify the factors that could potentially affect OA in SMEs.
- To analyse the influence of SMEs' owner-manager personality characteristics on OA.
- To study the influence of environmental dynamism and technological capacity on OA as well as the moderating role of environmental dynamism in SMEs.
- To know potential facilitating and inhibiting factors of OA in an SME context through an organisational perspective.

This study focuses on SMEs in the information technology, telecommunications, and IT consulting. These SMEs are traditionally dedicated to developing new products and new technology, being firms that adapt to technological development. In this sense, this type of firm is considered the appropriate context to carry out this doctoral thesis on OA, since it is not possible to separate exploitation from exploration in order to remain competitive (Chandrasekaran, Linderman & Schroeder, 2012). These are firms that need to survive in environments where technological changes require constant learning, which is reflected both at the level of exploitation processes and at the level of exploration processes.

In this scenario, this study can benefit SME managers by contributing to generate the necessary knowledge for the development of OA in this type of firm and also helping to introduce the theme into the common management lexicon. Thus, this study not only contributes to the literature but also provides clues for the development of OA in SMEs.

2. Research Design and Methodology

This doctoral thesis in management consists of five articles/studies, each with its specific methodological approach. Thus, this investigation comprises a systematic literature review, a theoretical article, as well as three empirical studies, being two quantitative studies and one qualitative study. According to Dixon-Woods, Agarwal, Jones, Young, and Sutton (2005), the adoption of this type of approach, qualitative and quantitative (mixed), provides a global, complementary, and more understandable view of the results achieved.

The quantitative approach aims to expose the concepts and variables through which the data obtained can be objectively analysed through statistical treatment (Dixon-Woods et al., 2005; Judge et al., 2002). The qualitative approach is a type of research that allows for a deeper approach to the topic under investigation and allows for strengthening the external validity of the obtained facts (Gibbert & Ruigrok, 2010), revealing trends that help to clarify the phenomenon under analysis (Yin, 2009).

The first article consists of a systematic literature review that seeks to identify the factors that can potentially affect OA in SMEs, through a multilevel approach. The results reveal a set of contingency factors grouped into three levels of analysis (organisational level, environmental level, and individual level).

The second article is a theoretical article and presents an analysis of OA in the SME context, considering its unique characteristics, including size, internal structure, low level of use of management practices, and a great capacity for introducing innovative products. In order to understand how the characteristics of SMEs influence, or not, OA, this article proposes a theoretical model explaining this relationship.

The third and four articles consist of quantitative empirical studies. The third article is a study that aims to analyse the individual influence of top management in exploration and exploitation through the study of the personality traits of owner-managers of SMEs on OA. Based on the existing literature, five hypotheses were formulated about the relationships between the Big-Five personality traits and OA. A second-order structural equation model was used in a sample of 224 Portuguese SMEs from the information technology, telecommunications, audio-visual, and IT consulting. The fourth article is also a quantitative empirical study and aimed to study the influence of environmental dynamism and technological capacity on OA and the moderating role of environmental dynamism in SMEs. For this purpose, a structural equation model was applied to a sample of 224 SMEs in the information technology (IT), telecommunications, audio-visual, and IT consulting sector.

Finally, the fifth article, empirical but qualitative in nature, seeks, through an organisational level approach, to understand how quality management system (QMS) based on ISO 9001 can facilitate or inhibit OA in SMEs. The approach adopted in this study identified a set of changes caused by QMS in SMEs with an effect on OA. Using four case studies in Portuguese SMEs from the field of information technology, telecommunications, audio-visual, and IT consulting, this study showed that QMS caused ambidextrous behaviour in SMEs, but not all changes caused by QMS in SMEs acted as OA facilitators. Table 1 summarises the chapters of this doctoral thesis, their titles and objectives, the methodological approach used, and the perspective adopted on the OA.

Table 1. Synthesis of the doctoral thesis chapters

Chapter 2	Article 1
Title	A Multi-Level Approach to Organisational Ambidexterity in the Sme Context: Integrative Systematic Literature Review and Agenda For Future Research
Objective	To Identify, Explore and Systematize the Main Themes Regarding the Research on Organisational Ambidexterity in Small and Medium-Sized Enterprises (SME)
Methodological approach	Systematic Literature Review
Data collection	ISI Web of Science, Scopus, and Science Direct
Sample	297 articles
OA perspective	Conceptual
Chapter 3	Article 2
Title	Facilitating and Inhibiting Effects of Organisational Ambidexterity in SME: An Analysis Centred on SME Characteristics
Objectives	To identify, explore and relate the characteristics of SME with organisational ambidexterity through a multi-level perspective
Methodological approach	Theoretical approach
OA perspective	Conceptual
Chapter 4	Article 3
Title	The Effect of Owner-managers' Personality Traits on Organisational Ambidexterity in SME' Context
Objectives	To analyse the influence of owner-managers personality traits on organisational ambidexterity in SME' context
Methodological approach	Quantitative through a questionnaire
Sample	224 Portuguese SME
OA perspective	Individual level
Chapter 5	Article 4
Title	Technological Capacity and Organisational Ambidexterity: The Moderating Role of Environmental Dynamism On Portuguese Technological SMEs
Objectives	To study the influence of environmental dynamism and technological capacity on organisational ambidexterity (OA) and the moderating role of environmental dynamism in SME
Methodological approach	Quantitative through a questionnaire
Sample	224 Portuguese SME
OA perspective	Environmental level
Chapter 6	Article 5
Title	The Influence of ISO 9001-based Quality Management Systems in SME' Organisational Ambidexterity: An Exploratory Multiple- Case Approach
Objectives	To understand how Quality Management Systems based on ISO 9001 (QMS) can facilitate or inhibit organisational ambidexterity (OA) in small and medium-sized enterprises (SMEs)
Methodological approach	Qualitative based on interviews
Sample	4 technological Portuguese SME
OA perspective	Organisational level

3. Theoretical Foundation

The present study was developed based on a set of fundamental theories that contribute to a better understanding of OA in the context of SMEs. These theories emphasise its multilevel character, in an organisational, environmental, and individual perspective: The Resource-Based View, the Contingency Theory, the Upper Echelons Theory, Theory of Dynamic Capabilities, Behavioural Theory of the Firm, and Big-Five personality traits.

3.1. Resource-Based View

The Resource-Based View (RBV) (Barney, 1991; Wernerfelt, 1984) suggests that resources contribute to a firm's competitive advantage by acquiring and combining resources and capabilities in unique ways to achieve superior performance (Barney, 2001). These unique, rare, and inimitable resources explain the ability of firms to be competitive in static business environments and may include organisational processes, company attributes, information, or knowledge (Barney, 2001). This theory holds that firms should base their competitive capacity on internal resources rather than focusing on the external environment. In this sense, the resources existing in firms have the role of helping them to achieve better organisational performance rather than seeking to develop new capabilities in view of the opportunities that arise. This is a theory with relevance to OA considering the trade-offs of organisational resources required for exploration and exploitation.

3.2. Contingency Theory

According to the Contingency Theory (Donaldson, 2001), the performance and effectiveness of firms are influenced by specific organisational factors and by the characteristics of the market where these firms operate (Reisinger & Lehner, 2015; Taylor & Taylor, 2014). Thus, the performance of SMEs depends on how they adjust to the contingencies that reflect their situation, being equally sensitive to changes in the environment (Woodward, 1965; Donaldson, 2001). This argument is echoed in the contingency theory, where the action of leaders is framed in the business strategy and in the way these firms position themselves in the market. Ghofar and Islam (2015) identify a wide range of contingency factors related to the managers' leadership

behaviour, their personality, their entrepreneurial spirit, their style of strategic planning, collaborative practices, knowledge management and Simsek (2009) highlights the importance of the contingency perspective in the development of OA.

3.3. Upper Echelons Theory

The Upper Echelons Theory proposes that the characteristics of the top managers influence the way in which firms operate. In this sense, top managers tend to analyse management situations and problems from their personal perspectives. Hambrick and Mason (1984) and Finkelstein and Hambrick (1990) refer that the differences between certain individual characteristics, as well as the personal experiences or values, differentiate the strategic decisions and results of their firms. Different studies evidenced a distinct set of characteristics of managers that influence the performance of firms. Thus, Liu, Fisher, and Chen (2018) highlight the effect of CEO emotion and cognition on organisational processes, highlighting the effect of these CEO attributes on company performance, and Gupta, Nadkarni, and Mariam (2019) highlight the effect of CEO traits. CEO's personality in firms' strategies.

From the point of view of OA, studies are scarce. However, the study by Cao, Simsek, and Zhang (2010) is noteworthy, which builds and tests a model that suggests that the extension of the CEO's information network can allow OA, but also polarize the firm's tendency towards exploitation and exploration.

3.4. Dynamic Capabilities Theory

Dynamic Capabilities Theory focuses on the ability of firms to combine, develop, and reconfigure external and internal resources in order to respond quickly to environmental dynamism (Teece, Pisano, & Shuen, 1997). In the view of Dynamic Capabilities Theory (Teece & Pisano, 1994) there is an exchange of information between the environment and SMEs, which reflects the way in which this information is integrated and adapted into internal routines and processes to increase the efficiency of firms. Unlike the Resource-Based View Theory, the Dynamic Capabilities Theory explains the ability of firms to be competitive in a dynamic business environment through the development of specific capabilities and continuous learning (Prado, Longo-Somoza, & Fischer, 2013). In this sense, certain capabilities, such as technological capability, imply a considerable effort on the part of SMEs and a long-term commitment. In the context of OA, the Dynamic Capabilities Theory reinforces

the idea that ambidextrous firms have a better ability to adapt to environmental changes and their complexity (Hsu, Lien, & Chen, 2013).

3.5. Behavioural Theory of the Firm

The Behavioural Theory of the Firm fits into strategic decision-making in firms, as it sees change as the result of an interaction (Greve, 2003). The theory specifies how firms respond to low performance and suggest how top managers perceive and respond to competition as it affects organisational performance (Cyert & March, 1963). The organisational approach adopted by the theory emphasises decision-making processes with a view to achieving strategic decision-making behaviours towards the goals to be achieved (Cyert & March, 1963). The theory can be applied to a wide range of strategic behaviours, namely at the level of innovation (Greve, 2003) or OA. Syrigos et al. (2015) state that human resources (HR) can develop exploitation and exploration behaviours and thus achieve OA. In this sense, the learning process is linked to how existing resources affect the exploration and exploitation trade-offs (Lavie, Stettner, & Tushman, 2010; Kyriakopoulos & Moorman, 2004; March, 1991). The theory argues that small businesses operated under the guidance of the top manager. Individual characteristics are important antecedents to the development of organisational capabilities (Bonesso et al., 2014). Furthermore, recent reviews of the literature on OA highlight the scarcity of studies covering several levels of analysis, namely the individual level (Raisch et al., 2009).

3.6. Big-Five Personality Traits

The Big-Five personality traits is a taxonomy that identifies a set of predictive factors of human behaviour: neuroticism, extroversion, agreeableness, openness to experience and conscientiousness. A personality trait is a consistent pattern that regulates an individual's action in response to a stimulus (Leutner et al., 2014). This set of factors are used to describe the subject (John & Srivastava, 1999) and are dynamically organized, acting in interaction with the context, considering their previous experiences (McCrae & John, 1992). This taxonomy assumes four assumptions of human nature that summarise the perspective of personality traits: knowledge, rationality, variability, and proactivity (McCrae & John, 1992). The relationship with OA lies in the fact that each of these factors or personality traits can favour or inhibit both exploration as exploitation (Herrmann & Nadkarni, 2014) Table 2 presents a synthesis of the theories that supported the elaboration of this doctoral thesis in Management.

Table 2. Synthesis of theories supporting doctoral thesis

Theory	Author(s)	Constructs / Rational
Resource Based-View (RBV)	Barney (1991)	Resources
Contingency Theory	Woodward (1965)	Leadership, environmental circumstances
Upper Echelons Theory	Hambrick and Mason (1984)	Organisational outcome and managerial background characteristics
Dynamic Capabilities Theory	Teece, Pisano and Shuen, (1997)	Organisation's strategies and abilities
Behavioural Theory of the Firm	Cyert and March (1963)	Process of decision making, organisational goals, organisational slack, rules
Big Five Personality Traits	McCrae and John (1992)	Neuroticism, extroversion, agreeableness, conscientiousness, and openness to experience

4. Structure of the Thesis, Publications and Presentations at Conferences

This doctoral thesis in management consists of five articles and is structured into 7 chapters. The first chapter, the introduction, presents a description of the elements that are part of the thesis structure. This chapter refers to the motivation and justification for the development of this doctoral thesis in management, its objectives, and used methodologies.

The second chapter, based on the article “A Multi-Level Approach to Organisational Ambidexterity in The SME Context: Integrative Systematic Literature Review and Agenda for Future Research”, consists of a literature review with the objective of exploiting factors that can influence OA in SMEs through a multi-level approach. This article was presented at the international conference “XXVIII Jornadas Luso-Espanholas de Gestão Científica - Interioridade e Competitividade: Desafios Globais da Gestão”, held in Guarda (Portugal) from 7 to 10 February 2018 and promoted by Unidade Técnico Científica de Gestão e Economia da Escola Superior de Tecnologia e Gestão do Instituto Politécnico da Guarda. This article was submitted to the Management and Organization Review.

The third chapter based on the article “Facilitating and Inhibiting Effects of Organisational Ambidexterity in SME: An Analysis Centred on SME Characteristics” consists of a theoretical article that seeks to explore the literature in order to understand how the characteristics of SMEs can influence organisational ambidexterity. This article was presented as a poster in the “Encontro com a Ciência e Tecnologia em Portugal”, from 3rd to 5th July 2017, in Centro de Congressos de Lisboa (Portugal). This article has been accepted for publication in the Journal of Knowledge Economy.

The fourth chapter contains the empirical article “The Effect of Owner-Managers’ Personality Traits on Organisational Ambidexterity In SME’ Context” which seeks to test the influence of SME managers' personality traits on OA. This article was submitted to the International Studies of Management and Organization Journal.

The fifth chapter contains the article “Technological Capacity and Organisational Ambidexterity: The Moderating Role of Environmental Dynamism in Portuguese Technological SMEs”, whose main objective is to study the influence of environmental dynamism and technological capacity on organisational ambidexterity in SMEs. This article was published in the Review of Managerial Science: Andrade, J., Franco, M., & Mendes, L. (2020). Technological capacity and organisational ambidexterity: the moderating role of environmental dynamism on Portuguese technological SMEs. *Review of Managerial Science*. <https://doi.org/10.1007/s11846-020-00416-x>

The sixth chapter is based on the article “The Influence of ISO 9001-based Quality Management Systems in SME' Organisational Ambidexterity: An Exploratory Multiple-Case Approach” which follows an organisational approach and whose main objective is to understand how quality management systems, based on ISO 9001 international standards, can facilitate or inhibit the development of ambidextrous behaviour in the context of SMEs. This article was submitted to the International Journal of Operations and Production Management.

The seventh chapter presents the conclusions and contributions to theory and practice, as well as the limitations of the investigation and future lines of research.

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CHAPTER 2

A Multi-Level Approach to Organisational Ambidexterity in the SME Context: Integrative Systematic Literature Review and Agenda for Future Research

Abstract

Small and medium-sized enterprises' (SME) ability to achieve organisational ambidexterity (OA) has been an important paradigm for management research and a subject of special attention in the literature. Considering that there is no consensus yet on how SME can achieve OA and that SMEs are very sensitive to internal and external factors (e.g., small size or market dynamism), a systematic literature review was developed to better understand the relationship between contingency factors and OA. This study fills two major gaps in the literature: first, concerning which contingency factors may affect OA in SMEs and second, concerning the scarcity of OA-based research in the context of SMEs through a multilevel analysis (Chang et al., 2011; Simsek, 2009). This study contributes significantly to literature through a new perspective on OA, i) introducing the theoretical framework of contingency factors (organised into three levels of analysis: organisational, environmental, and individual) as factors that may affect OA's development in SME, and ii) proposing a set of management implications and lines for future research.

Keywords: SME; small and medium-sized firms, contingency factors, organisational ambidexterity, literature review.

1. Introduction

Among the areas of research in management that have attracted the most attention from researchers, organisational ambidexterity (OA) emerges as one of the theoretical fields with a more rich and diverse production of research. This set of research covers theoretical fields as diverse as leadership (Li et al., 2014), innovation (Tan & Liu, 2014), inter-organisational networks (McAdam et al., 2015), or managers' characteristics (Kammerlander et al., 2015; Håkonsson et al., 2012). OA is an important paradigm in management research because this concept allows a new way of observing the internal dynamics in firms, especially when the concept is broken down into its dichotomous activities, exploitation, and exploration (Andrade et al., 2016).

In March's conceptualization (1991), OA is the firms' capacity to balance simultaneously exploration and exploitation. Exploitation refers to efficiency, selection, implementation, and execution in the organisational context, while exploration refers to search, variation, risk-taking, experimentation, flexibility, discovery, and innovation. To be ambidextrous, firms must conciliate the tensions emerging between exploration and exploitation activities (Raisch & Birkinshaw, 2008). Those tensions arise from exploitation and exploration as a response to the need for adaptability to the environment in which SMEs operate (Gupta et al., 2006; Lavie et al., 2010). The OA dilemma (Andrade et al., 2016) arises from such adaptability (O'Reilly & Tushman, 2008), which results from firms' efforts to compensate the trade-off between available resources (Chang & Hughes, 2012), as human or financial resources (March, 1991). According to Raisch and Birkinshaw (2008), firms seek to be competitive through efficient and incremental exploitative processes, while maintaining effective and flexible responsiveness through decisive exploratory processes.

A considerable number of OA research has focused on large organizations (Jansen et al., 2009) emphasizing the ability to articulate both exploitation and exploration, as a result of having more resources and greater capacities when compared with SMEs (O'Reilly & Tushman, 2013). However, SMEs are of the utmost importance for the economy (Franco & Haase, 2010). Due to their specific characteristics, such as their adaptability, size, or internal structure, SMEs are less bureaucratic, more flexible than large firms and they have a major effect on the economy (Franco & Haase, 2010; Franco, 2003; Dankbaar, 1998; Schmiemann, 2009).

Previous studies on SMEs have shown that these firms can succeed in different fields such as quality management (Mendes, 2012), technological capabilities (Bianchi et al., 2016) or innovation (Madrid-Guijarro et al., 2016). However, with regard to the study of OA in SMEs, there are still several paths to follow. Thus, one of the paths of investigation still to be covered concerns contingency factors and their potential effect on OA. As far as we know, this is the first study that focuses particularly on this field of research. The starting point for this study lies in knowing the relevance of contingency factors for OA. The literature suggested that there are contingency factors related to a set of specific characteristics in SMEs, which can be the cause of poor performance, weaknesses, or limitations (Franco & Haase, 2010). Contingency factors are internal and external attributes of SMEs such as resources, size, dimension, or environmental dynamism (Ghofar & Islam, 2015). The combination of contingency factors and SME's characteristics may influence their performance (Taylor & Taylor, 2014). However, in the scope of OA, it is important to know how this subject has been approached by literature. According to Simsek (2009), studies on OA lack greater depth about the identification of contingencies that help to clarify the OA paradigm. To Ghofar and Islam (2015), a contingency is any variable that moderates the effect of organisational characteristics on performance. These internal and external contingency factors are related to the characteristics of SMEs and environmental dynamism with influence on OA (Simsek, 2009). This is shown through several studies. For Lin et al., (2020) contingency factors are uncertainties incorporated in the context that affect ambidextrous diversification and the firm results. In turn, for Mihalache et al. (2014) contingency factors are conditions that shape the effectiveness of leadership and are related to the internal structure of firms. Contingency factors, as suggested by Cao et al. (2009), have significant theoretical importance since OA-performance linkage depends on available resources, firm size, or access to external resources. Contingency factors can even lead to conflicting results. For example, Lavie et al. (2010) argued that resources can benefit or mitigate exploration, depending on the environment's competitive intensity.

This study draws on contingency theory (Donaldson, 2001) and states that the performance and effectiveness of firms are influenced by their specific organisational factors and the characteristics of the market where they operate (Reisinger & Lehner, 2015; Taylor & Taylor, 2014). Also, this study responds to Simsek's (2009) call for a more integrative and comprehensive multilevel analysis in the context of SMEs and sheds light on the aspects highlighted by the author about contingency factors on OA.

Therefore, the main research objective of this study is to investigate which contingency factors present in literature have related to OA in SMEs.

Building on these considerations, a review of the literature on OA in SMEs was performed from a multilevel perspective. Findings allowed us to demonstrate internal and external contingency factors under SMEs configuration, according to Raisch and Birkinshaw's (2008) conceptual view. The diverse research on OA was synthesized into an organizing framework of levels of analysis, following the perspective of March (1991), organisational level, environmental level, and individual level. However, this study goes a little further, and obtains a more detailed description of contingency factors found for each level of analysis. This explanatory model allowed us to acquire a clearer understanding and comprehensive view of OA in SMEs. This study also provides critical insights into the construction of a more complete theory of OA, by adopting Simsek's (2009) recommendation to identify contingency factors that may need management attention in the practice of OA to improve performance in SMEs.

This study fills two major gaps: first, concerning which contingency factors are related to OA in SMEs, (O'Reilly & Tushman, 2013, Senaratne & Wang, 2018; Simsek, 2009), through the identification of a set of contingency factors and second, concerning the scarcity of OA-based research in the context of SMEs through a multilevel analysis (Chang et al., 2011; Simsek, 2009). This study also brings some important contributions to the literature: i) through identifying a set of contingency factors related with OA in SME' context; ii) through the organisation of those factors into three levels of analysis (organisational, environmental, and individual); and iii) by organising the main literature found related with OA into theoretical fields. The practical results of this study allow managers to gain a broad view of the existing contingency factors that are related to OA in SME and shed light on the conditions for SMEs to achieve OA.

This study is organised as follows: the first part is devoted to the methodology adopted, followed by a section on the results obtained, a section on the study's contribution to OA in the SME context, the main conclusions, and finally, is suggested an agenda with some lines of future research.

2. Methodology

2.1. Methodological Approach

According to Tranfield et al. (2003), the literature review is an important part of any research, since this allows a traceable replication of decisions and paths, procedures, and conclusions.

As a systematic literature review, the methodology followed here will cover the generality of studies published. According to Dixon-Woods et al. (2005), different literature review strategies may be used in descriptive data analyses: narrative summaries, thematic analysis, content analysis, case studies, and others. The aim of this study was not to carry out a sophisticated review based on data from different origins (quantitative studies and qualitative studies), but rather to develop a descriptive data analysis based on the studies identified.

For this review, we followed the methodology suggested by Tranfield et al. (2003), organized into three sequential stages: i) *Planning the Review* (defining the scope of the review and designing a review protocol to support the process); ii) *Conducting the Review* (searching, applying the inclusion and exclusion criteria and synthesis); iii) *Reporting* (descriptive analysis of the field, and thematic analysis).

Table 1 summarises the main literature reviews focused on the OA phenomenon, published between 2005 and 2020, and indexed in the ISI Web of Science, Scopus, or Science Direct. Those studies seek to contextualize ambidexterity in conceptual terms (O'Reilly & Tushman, 2013), antecedents and moderators (Raisch & Birkinshaw, 2008) or its characteristics (Stokes et al., 2015).

Table 1. Main literature reviews on the phenomenon of organisational ambidexterity

Authors (year)	Focus of study	Orientations for future research
Mu et al., (2020)	The study advances towards a better understanding about the importance of individual ambidexterity to the competitive advantage of organizations, especially small and medium enterprises	This review identifies different types of individual ambidexterity and links the concept to the context of SMEs and proposes future research concerning HR practices.
Brix (2019)	The study advances current understanding of exploration and exploitation by building a new model for organisational ambidexterity that consider multiple levels of learning, perspectives from absorptive capacity and inter-organisational learning	The multilevel perspective concerning the individual, group/team and organisational levels of analysis from organisational learning allows for a more nuanced view of exploration and exploitation within established organisations.
Snehvrat et al. (2018)	The study reports the main issues concerning the state of the art of Ambidexterity through a bibliometric analysis.	The research proposes other analysis levels, beyond the organisational level.
Prasad and Prabhudesai (2018)	The study combines SME' alliances perspective with exploitation-exploration issues through an integrative model.	Future research should focus on identifying potential determinants in the relationship between SME' alliances and exploitation-exploration strategies.
Alcaide-Muñoz and Gutierrez-Gutierrez (2017)	The study explores the use of Six Sigma in the OA context	The study proposes intervention suggestions for firms concerning the use of Six Sigma in exploitation-exploration orientations.
Stokes et al. (2015)	This study analyses the literature on organisational ambidexterity and emphasises a set of recurrent concerns including definition of the nature, characteristics, and normative borders of organisational ambidexterity	Future research should focus on the importance of the role of sense-making at the micro level (individuals and small groups), and its influence in the context of organisational ambidexterity
O'Reilly and Tushman (2013)	Summarise the main contributions towards understanding the concept of OA and identify future research areas.	Need for more studies on how managers act regarding activities of exploration and exploitation in firms. Need for more qualitative studies;
Turner et al. (2013)	Suggest mechanisms associated with organisational ambidexterity from a multi-level view	Longitudinal studies of organisational ambidexterity Studies focused on the micro level in organizations
Birkinshaw and Gupta (2013)	Present the evolution of the concept of organisational ambidexterity, analysing the diversity of perspectives	Need for studies centred on exploration and exploitation and on the conditions of resource efficiency they imply;
Boumgarden et al. (2012)	Analyse the decision processes related to OA	Research should focus on a time perspective related to decision processes in ambidexterity
Marabelli et al. (2012)	Identify the main models to apply in banking services	Research should focus on dynamic ambidexterity models
Lavie et al. (2010)	Make a critical review of the topic of ambidexterity and present a framework of the <i>Exploration vs. Exploitation</i> dichotomy	Need for more studies about the mechanisms associated with the balance between exploration and exploitation in SMEs at various levels of analysis.
Carmeli and Halevi (2009)	Present a model that, through the behavioural perspective of the Management team, can help in developing ambidexterity	Research should focus on other studies in the conditions by which ambidexterity arises, based on the characteristics of the management teams

2.2. Research Protocol Development, Classification and Study Selection.

The search strategy was based on three selected databases (ISI Web of Science, Scopus, and Science Direct), considered the most relevant for this systematic review for the period ranging from 2005 to 2020. The key reason for selecting 2005 as a starting point for this review was based on the literature itself. In fact, some of the main literature on OA refers that research focused on this phenomenon began in 2005. Significant authors such as O'Reilly and Tushman (2013) and Turner et al. (2013) highlight this year, although the concept of OA appears in 1996. and other important related concepts have emerged before, (e.g., exploitation – March, 1991). Thus, in the searching phase, we applied four different queries and a procedural test.

In the first step we searched the three databases using “SME” and “ambidexterity”, or “SME” and “ambidextrous” as simultaneous in the title, abstract, or keywords. In a second step, to identify papers that don't use the specific term of “SME”, we searched again the databases using “small” and “ambidexterity”, or “small” and “ambidextrous”, as simultaneous keywords, in either the title, abstract, or keywords. The purpose was to capture all the papers that refer to terms such as “small firms”, “small and medium-sized firms”, “small businesses”, or similar expressions. In a third step, we searched the three databases using “SME” and “exploitation” and “exploration” as simultaneous keywords, in either the title, abstract, or keywords; the purpose was to capture literature approaching ambidexterity issues, but without using the specific term “ambidexterity”. And finally, in a fourth step, we searched the three databases using “small” and “exploitation” and “exploration” as simultaneous keywords in either the title, abstract, or keywords. According to the protocol designed, the study focused on both articles and conference proceedings, in the field of social sciences, in the categories of business or management. The extraction process, exempted from any temporal boundaries, highlighted a total of 429 preliminary papers focused on OA in SME's context. The test procedure consisted of submitting the bibliography highlighted in Table 1 to a citation mapping through VOSviewer software (Van Eck & Waltman, 2010). The purpose of this procedure was to identify the existence of relevant articles that could have not been included in the research. This bibliography covers articles from literature reviews published between 2005 and 2020. For this purpose, in a first phase, the bibliographic references were organized according to the number of citations: 943 bibliographic references were identified. For parsimony reasons, bibliographical references with less than 5 citations were excluded, and thus 39 references were identified. Then, each one of the remaining bibliographical references

was verified, to identify empirical relevant studies whose focus was the OA in SME's context. One article was identified and was included in the list of relevant peer-reviewed papers that explicitly approach OA in SME's context.

In a further screening phase, was first excluded duplicated articles. Then, based on the abstract and the introduction, was analysed the relevance of each paper, excluding the studies that did not focus explicitly on OA in the SME context. For such purpose, was conducted a confirmatory assessment of the research papers selected through evaluating the methodological procedures (sample, statistical tests, and outcomes), as well as the fit between methodology and the research questions. Thus, papers such as Gerow et al. (2016) were excluded.

The criterion for including SMEs in this study is based on the OECD's concept that considers non-subsidary, independent firms with under a given number of employees that can vary between countries. After applying the above exclusion criteria, the screening phase resulted in a final list of 297 relevant peer-reviewed papers that explicitly approach OA in SME context, over a period of 15 years, published in a variety of countries such as the United States, United Kingdom, and Taiwan. All 297 papers were then analysed in-depth and synthesized to address the underlying research purpose. Figure 1 summarises the main procedures.

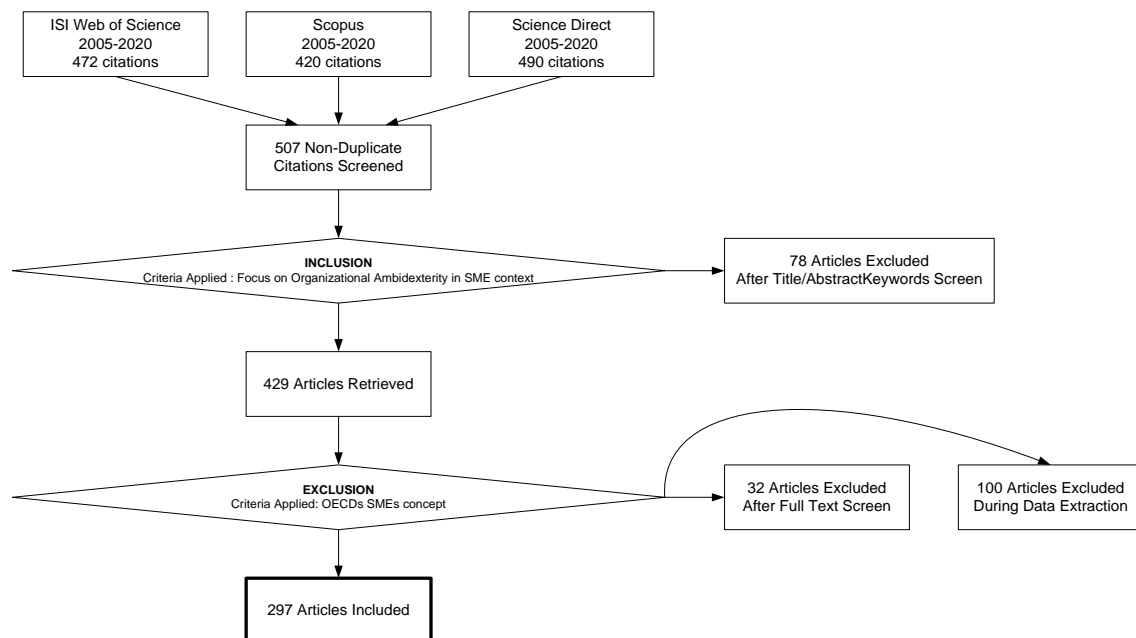


Figure 1. Diagram for included / excluded papers

3. Descriptive Analysis

3.1. Research on OA in SME Across Journals

The 297 articles reviewed were published in 79 interdisciplinary international academic journals and world conference proceedings. Most of the selected papers were contributed by leading journals such as the *International Business Review* (22), *Journal of Business Research* (23), *European Management Journal* (12), or *Journal of Small Business Management* (18). As observed in Table 2, research on OA in SME's context is treated in many journals, very different in nature, including fields such as business strategy, operations management, human research management, innovation, SME performance, and entrepreneurship, among others.

Table 2. Distribution of articles across journals

Journal	Number of papers.
Academy of Management Journal	9
Asia Pacific Journal of Management	7
British Journal of Management	5
Energy Policy	4
European Management Journal	12
Human Resources Management	7
IEEE Transactions on Engineering Management	4
Industrial Marketing Management	12
International Business Review	22
International Journal of Production Economics	4
International Journal of Innovation Management	8
Investigaciones Europeas de Dirección y Economía	3
Journal of Business Research	23
Journal of Business Venturing	7
Journal of Management	8
Journal of Management Studies	11
Journal of Small Business Management	18
Management Decision	12
Organization Science	8
Procedia - Social and Behavioral Sciences	9
Review of Managerial Science	4
Strategic Management Journal	11
Technology Analysis & Strategic Management	12
Technovation	10
Other Journals	67
Total	297

3.2. Scientific Research Evolution

As observed in figure 2, the studies published ranged from 2005 to 2020. Published in the *International Journal of Management Reviews*, the oldest paper identified was Thorpe et al. (2005) and describes the influence and abilities of the entrepreneur to extract, use and develop knowledge resources, as well as firm-wide systems that facilitate knowledge exploration and exploitation and the provision of knowledge and learning experiences through government policy.

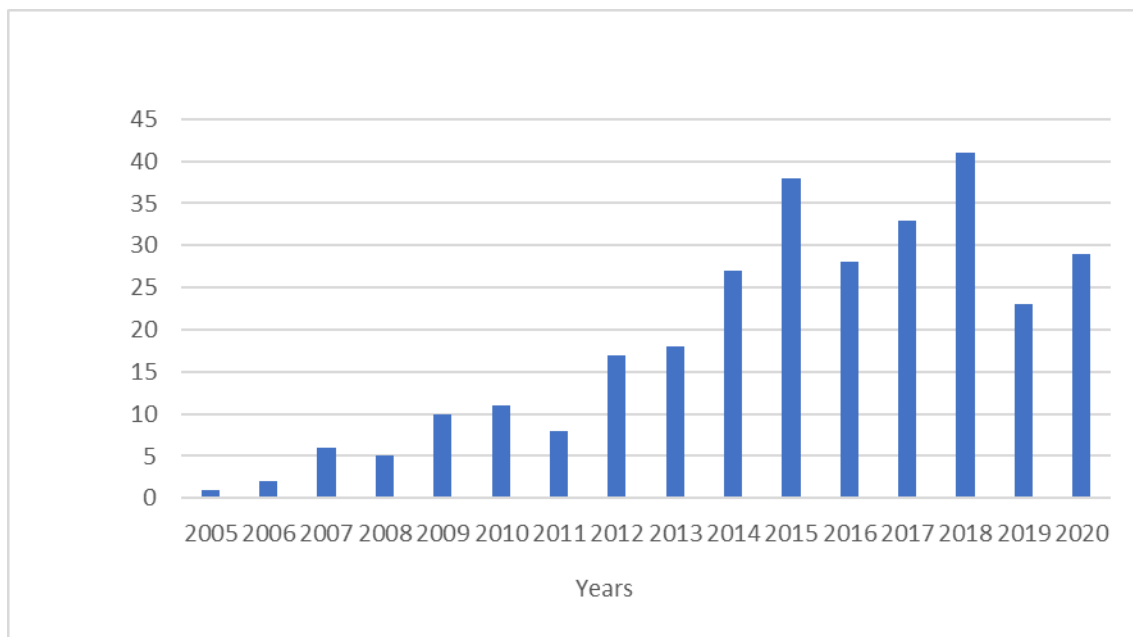


Figure 2. Year wise distribution of reviewed papers

Since then, the number of papers on organisational ambidexterity in the SME context has been steadily growing. Moreover, the growth is especially expressive since 2012, since two-thirds of the papers were published between 2014 and 2018. This evolution reflects the significance of the growing interest in this research field. The literature analysis, ranging between 2005 and 2020, also shows that the studies were conducted by authors from 34 different countries; the most representative countries are the USA (29%), followed by China (25%), and The Netherlands (13%).

3.3. The Research Approach of the Reviewed Articles

The approach followed in this review is based on the identification of explorative and exploitative activities (Salvador et al., 2014; Zacher & Rosing, 2015). The different approaches adopted to understand OA reflect different holistic definitions and

perspectives, rather than unifying the concept around a solid conceptual perspective (Birkinshaw & Gupta, 2013; Burgers & Covin, 2016). From a methodological standpoint, the approach adopted in this study seeks to simplify the concept instead of enlarging it.

However, according to Turner et al. (2013), the concept of OA also does not reflect a managerial activity but a capability; as a capability, OA means adapting, integrating, and reconfiguring skills, knowledge, and resources (Teece & Pisano, 1994). Thus, this notion of OA as a capability explains, in our perspective, the difficulty enhanced in the literature in clarifying the concept, because being a capability, it will be the object of scrutiny and broad research in a wide set of theoretical fields. We believe that the difficulty in conceptualizing OA can be overcome if we only consider how exploration and exploitation activities articulate with each other, either simultaneously or alternately, regardless of the related mechanisms (Turner et al., 2013). This was the perspective adopted in this study since SMEs are firms with very specific characteristics, such as their small size or their difficulty in making resources available.

Regarding data collection, 92% report empirical studies (both quantitative - 70%, and qualitative - 22%), while theoretical contributions (literature reviews or meta-analyses) represent only 8% of the total papers. A significant percentage of studies (91%) follows an approach based on the higher levels of management and decision. Top management's position, autonomy, and decision, as well as detailed knowledge regarding processes and performance results of firms (financial, innovation, or others), sustained the technical decision on this approach. This descriptive analysis highlights that 70% of the studies were based on the CEO and top management. Thirty percent of the studies collected data from other leaders, such as production managers, marketing managers, strategy, or product development department heads, among others. Only 4% of the studies used an approach based on non-leaders and other functions.

3.4. About the Nature of SME Surveyed

The literature review highlighted that in around 84% of the papers selected, SMEs are involved in activities related to the manufacturing industry; cork and wood, metallurgical, machinery and automotive industries are the most representative sectors. In the remaining 16%, SMEs belong to the financial, design, medicine, and fashion sectors. Moreover, the analysis also shows that around 60% of the articles focus

their study on European SMEs, while 20% refer to North America and 20% to Asian countries. Almost 93% of studies focus on SMEs from OECD countries (OECD, 2005).

4. Thematic Analysis

The multilevel analysis allowed us to gather a set of significant contingency factors related to OA in SME. In accordance with the aim of this research, we followed a contingency-based view. Contingency factors have been described in the literature as internal and external processes, activities, personal characteristics of leaders, contextual environment, or market conditions (De Clercq et al., 2014). In the essence of contingency theory, the performance of firms is dependent on the way firms adjust characteristics to contingencies that reflect their situation (Woodward, 1965; Donaldson, 2001). The ability of firms to be competitive depends largely on how the adjustment is made, which implies a continuing adaptation over time (Donaldson, 2001).

According to the literature, such adjustment is a process of optimized adaptation of characteristics with contingency factors in which the effect of one variable on another variable depends on a third variable (Donaldson, 2001). Thus, the review of the literature was subjected to a careful analysis of contingency factors, following Ghofar and Islam's (2015) framework: control processes and management tasks, business environments and strategies, financial structure, company size, internal structure, internal procedures, management team or leadership. Following this line of research, the contingency factors collected were subjected to rigorous scrutiny to understand their level of relationship with OA. The review was undertaken by looking at the variables used in the quantitative studies, with the acceptance criterion being its moderation relationship with the OA construct. Each of these variables, after passing the criteria, was grouped in one of the three levels of analysis, organisational, environmental, and individual.

From the perspective of the contingency theory, these three levels find coherence in the internal and external perspectives, in line with what theory advocates (Donaldson, 2001; Ghofar & Islam, 2015), as well as in the research line of Turner et al. (2013) and Simon and Tellier (2011). Also, this systematic review highlighted four main key theoretical fields in OA research; around 23% of studies focus on organisational learning, 15% on dynamic capabilities, 32% on innovation in its different dimensions, and 30% on SME performance, also in its different forms of control, monitoring and

measurement of performance. After each study the review was analysed for its research field, and it was manually allocated to each one of the key theoretical fields.

This multilevel analysis provided a research framework into three levels of analysis: i) contingency factors focusing on the internal environment of organisations, systems, processes, management mechanisms - organisational level; ii) contingency factors that focus on organisations' external and surrounding environment, namely markets in which firms operate - environmental level; and iii) contingency factors that focus on managers and management teams' personal and individual characteristics - individual level. Figure 3 summarises graphically the framework concerning OA research in the context of SME. The research mapping shows the different studies focussing on each of the four main theoretical fields (organisational learning, dynamic capabilities, innovation, and SME performance), across the three levels of analysis.

Hereafter, the results of the thematic analysis are presented. The remaining of this section is subdivided into three sub-sections, each one focussing on a specific level of analysis (organisational, environmental, and individual level). It also showed how research approached each one of these levels, analysing the main contingency factors and key theoretical fields (organisational learning, dynamic capabilities, innovation, and SME performance). At the end of each sub-section a summary table is provided, listing the different papers analysed, and indicating for each, the sector of activity, the type of study, the focus, as well as the main contributions.

Contingency factors at
Organisational Level

- Firm age (Voss & Voss, 2013; Choi & Phan, 2014)
- Absorptive capacity (Fernhaber & Patel, 2012, Sarsah et al., 2020; Lee et al., 2020)
- Resources availability (Wei et al., 2014)
- Organisational size (Cao et al., 2009; Burgers & Covin, 2016)
- Exploration, exploitation & learning processes (Enkel & Heil, 2014; Ahmadi et al., 2020)
- Innovation orientation (Colclough et al., 2019; Heavey et al., 2015)
- Strategic management practices (and HR) (Liao & Rice, 2010; Ng et al., 2015; Patel et al., 2013; Bérard & Fréchet, 2020)
- Knowledge management (Bocquet & Mothe, 2013; Benitez et al., 2018)

Key theoretical fields

Innovation	Organisational Learning	Dynamic Capabilities	SME Performance
Sarsah et al. (2020); Priyono et al. (2020); Colclough et al. (2019); Helms (2016); Dasi et al. (2014); Karlsson et al. (2015); Kilic et al. (2015); Cagno et al. (2014); Lee et al. (2014); Villar et al. (2014); Chang et al. (2012); Nowacki and Staniewski (2012); Azadegan and Wagner (2011); Patel et al. (2013); Archibugi et al. (2013); Ferradas et al. (2017); Rafailidis et al., (2017).	Tian et al., (2020); Ahmadi et al. (2020); Brix (2019); Güttel et al. (2015); Ng et al. (2015); Tzokas et al. (2015); Enkel and Heil (2014); Villar et al., (2014); Lee et al. (2014); Mattes (2014); Lee and Huang (2012); Manzanares and Gómez (2010); Manzanares and Gómez (2008); Cegarra-Navarro ad Dewhurst (2007); Kitapçı and Çelik (2014); Kitapçı and Çelik (2013); Kilpi et al. (2018); Rafailidis et al., (2017); Benitez et al. (2018).	Dolz et al. (2014); Wang et al. (2015); Li et al. (2014); Salvador et al. (2014); Weismeier-Sammer (2011); Liao and Rice (2010); Villar et al., (2014); Qaiyum and Wang (2018); Senaratne and Wang (2018); Colclough et al. (2019).	Dolz et al. (2019); Bouncken et. (2016); Burgers and Covin (2014); Jacobs et al. (2016); Choi and Phan (2014); Tamayo-Torres et al. (2014); Leidner et al. (2011); Salvador et al. (2014); Villar et al. (2014); Patel et al. (2013); Voss and Voss (2013); Zhan and Chen (2013); Chang et al. (2012); Chang and Hughes (2012); Lee and Huang (2012); Hotho and Champion (2010); Archibugi et al. (2013); Malagueño et al. (2018).

Contingency factors at Environmental Level

- Environmental adversity (Choi & Phan, 2014)
- External resources (Kilpi et al., 2018)
- Network support (Soetanto & Jack, 2014)
- Inter-organizational cooperation & networks (Michelfelder & Kratzer, 2013)
- Demand uncertainty (Forkmann et al., 2016)
- Network resources (Mihn & Hjortso, 2015; Yang et al., 2014)
- Business environments (Alcalde-Heras et al., 2019)
- Competitive intensity (Kammerlander et al., 2015)
- Environmental dynamism (Halevi et al., 2015; Wiratmadja et al., 2020)

Key theoretical fields

Innovation	Organisational Learning	Dynamic Capabilities	SME Performance
Colclough et al. (2019); Mashahadi et al. (2016); Soetanto and Jack (2014); Yang et al. (2014); Michelfelder and Kratzer, (2013); Monferrer et al. (2013); Gredel et al. (2012); Chang et al. (2011); Lin et al. (2007).	Minh and Hjortsø, (2015); Paliokaitė and Pačėsa, (2014); Lowik et al. (2012); Soto-Acosta et al. (2018); Battaglia et al. (2018).	Wiratmadja et al., (2020); Scuotto et al. (2020); Alcalde-Heras et al. (2019); Monferrer et al. (2013); Lin et al. (2007).	Forkmann et al. (2016); Bocquet and Mothe (2013); Abebe and Angriawan, (2014); Zabala-Iturriagoitia (2014); Hsu et al. (2013); Gedajlovic et al. (2012); Cui et al. (2014).

Contingency factors at Individual Level

- Managers/leaders' characteristics (Dolz et al., 2019; Dolz et al., 2015; Ou et al., 2018; Wiratmadja et al., 2020; Keller & Weibler, 2014)
- Entrepreneurs' social capital (Stam et al., 2014)
- Manager's entrepreneurial spirit & behavioural integration (Engelen et al., 2015; Sarsah et al., 2020)
- Entrepreneurial leadership (Chew, 2012)
- Manager's style of management (Håkonsson et al., 2012)
- Transformational leadership behaviour (Engelen et al., 2015; Chang & Hughes, 2012; Zacher et al., 2014; Zacher et al., 2015)
- CEO interaction (Cao et al., 2010)
- Manager's leadership behaviour (Zacher & Rosing, 2015; Chen et al., 2019; Mom et al., 2009)

Key theoretical fields

Innovation	Organisational Learning	Dynamic Capabilities	SME Performance
Ahmad et al. (2020); Sarsah et al. (2020); Tang (2016); Heavey et al. (2015); Dierk and Dover (2014); Zacher and Rosing (2015); Håkonsson et al. (2012); Lubatkin et al. (2006); Agostini et al. (2017); Venugopal and Kumar (2018).	Chen et al. (2019); Halevi et al. (2015); Olaisen and Revang (2014); Cao et al. (2010); Ou et al. (2018).	Kammerlander et al. (2015); Reisinger and Lehner (2015); Jiang and Kortmann (2014); Chang and Hughes (2012); Chew (2012); Heavey and Simsek (2017).	Mu et al., (2020); Wiratmadja et al., (2020); Zimmermann et al. (2020); Dolz et al. (2019); Volery et al. (2015); De Clercq et al. (2014); Jiang and Kortmann (2014); Dolz et al. (2013); Lee et al. (2013); Chang and Hughes (2012); Napier et al. (2011); Lubatkin et al. (2006).

Figure 3. A framework for organisational ambidexterity research in the context of SME

4.1. Organisational Level

Literature has conceptualised SMEs as having reduced, compact and flexible structures, with few hierarchical levels and proximity between people and sectors (Bouncken et al., 2016; Burgers & Covin, 2016). The level of formality is also low, technical and financial resources are scarce (Dasí et al., 2014) and there is a high degree of versatility and flexibility (Mattes, 2014).

The review highlighted OA's effects on SME performance (Malagueño et al., 2018), as well as the different measurement and assessment approaches, both at financial and product/market levels. That tendency, noticeable from the point of view of the approach adopted in this study, also showed that the concept of OA often emerges related to other research approaches present in the literature. Thus, the review highlighted concepts and theories, such as the theory of dynamic capabilities (Tece & Pisano, 1994) or quality management systems, and their effect on innovation (Ferradas et al., 2017; Rafailidis et al., 2017), on SME competitiveness (Villar et al., 2014) and knowledge management (Bocquet & Mothe, 2013).

This review also identified a specific line of thought that relates structural and contextual elements to the organisational perspective, as advocated by contingency theory (Donaldson, 2001). Literature shows that there are specific SME characteristics (Franco & Haase, 2010), as size and structure with effect on OA (Dasí et al., 2014). The interaction of organisational structure and context in SMEs to combine exploitation and exploration is managed through learning and flexibility (Güttel et al., 2015). The learning dimension refers to balancing incremental and radical innovations (Hotho & Champion, 2010), while the flexibility dimension refers to balancing alignment and adaptability (Napier et al., 2011).

In OA, the organisational level covers different perspectives of SME performance. Innovation is closely linked to SME's characteristics, especially in the way that it is enhanced (Franco & Haase, 2010). However, in SME innovation also emerges linked to several aspects such as strategic orientation, processes of management, and facilitating the innovation experience through people management practices, organisational processes, and planning (Hotho & Champion, 2010; Voss & Voss, 2013; Chang et al., 2012; Kilic et al., 2015; Cagno et al., 2014; Karlsson et al., 2015; Nowacki & Staniewski, 2012). Those studies highlight the nature of the tensions arising from the relationship between exploration and exploitation, due to the scarcity of resources available (Franco & Haase, 2010).

In fact, according to March (1991), there is an antagonistic nature between exploitation and exploration. In environments with resource scarcity, the trade-off between both produces alternate strategic orientations. This causes tensions through setting momentary priorities, concerning access to resources, and the expected results (Voss & Voss, 2013). Cost control and quality management investments represent a clear example, where firms need to strategically decide, between both approaches (Rafailidis et al., 2017). However, exploitation and exploration also reflect complementarity, when different strategies are combined to achieve desired outcomes (Raisch & Birkinshaw, 2008). Russo and Vurro (2010) suggest that these effects can be minimised when firms are able to specialise in specific exploration and exploitation processes.

The way exploration and exploitation are balanced affects organisational learning, knowledge transfer, and absorptive capability, also with an effect on SME performance (Voss & Voss, 2013). For example, SMEs' technological level emerges related to internal contingency factors as a function of size, internal complexity, learning capacity and connection between internal structures and internationalization strategies, and by external contingency factors such as highly competitive technological environments (Jacobs et al., 2016; Voss & Voss, 2013; Lee & Huang, 2012; Lee et al., 2014). From this perspective, there is an understandable effect of organisational practices (related to both knowledge exploitation and knowledge exploration) and knowledge management strategies on SME performance (Manzanares & Gómez, 2008). Research also underlines how the interaction between SME's absorptive capacity, and its technological capacity and customer relationship capacity contributes to its overall performance (Tzokas et al., 2015).

From the SME's point of view, the relationship between dynamic capacities and OA also represents a core issue in some of the studies identified in this review. Dynamic capacities are critical for SMEs to balance exploitation and exploration. This is being particularly relevant for SMEs since in many cases there are no formal strategic knowledge management processes (Villar et al., 2014). The relationship between performance, dynamic capacities, and competences were also studied. For Wang et al. (2015), dynamic capabilities have been conceptualized as two broad categories of capability hierarchies: the first, operational, refers to how SMEs set in motion activities to develop dynamic capabilities; the second refers to how SMEs modify operational routines and apply them substantively in changing products, defining markets or customers, or creating new capacities. According to Qaiyum and Wang (2018), dynamic capabilities are dependent on the way organizations are structured internally, considering their relation to the external environment.

Literature has also identified a set of contextual elements related to OA, such as ISO standards, through practices such as customer focus, continuous improvement or practices of human resource management (Tamayo-Torres et al., 2014; Ng et al., 2015). Such practices can be combined into a single system allowing SME to achieve both exploration and exploitation (Patel et al., 2013). Findings also indicate that efforts to develop product configuration ambidexterity have an indirect effect through responsiveness on sales and operating cost but not on operating margin, with this effect diminishing with product complexity (Salvador et al., 2014).

This research also highlighted several organisational factors affecting exploration and exploitation activities in SMEs (Abebe & Angriawan, 2014; Burgers & Covin, 2016; Mashahadi et al., 2016; Weismeier-Sammer, 2011). Those authors analysed the role of entrepreneurial orientation, market orientation, and perceived competitive intensity, and results show strong support for a positive association between those and exploration/exploitation activities; explorative activities involve short-term changes while exploitative activities involve improvements in efficiency. Market orientation also has a positive effect on international SMEs in technological and non-technological innovation contexts (Tzokas et al., 2015). SME entrepreneurs should consider market orientation when developing OA in innovation contexts. If managed efficiently, these dynamic capabilities may be a differentiating issue for SMEs' competitiveness in response to the changing landscape of dynamic and competitive international business environment (Weismeier-Sammer, 2011).

Research on OA in SMEs revealed the existence of contingency factors such as size, financial and technical resources, management and innovation processes, organisational structure or technological level playing a significant and a contingent role in how SMEs find the balance between exploration and exploitation (Lubatkin et al., 2006; De Clercq et al., 2014). This allows a better understanding of how the concept of ambidexterity can function in SMEs' true organisational situation, also revealing complete contingency, as a result of SMEs' specific situation, according to contingency theory (Donaldson, 2001). Furthermore, the different studies identified at the organisational level explains OA in SMEs in fields of study such as innovation, organisational learning, dynamic capacities, and performance. Table 3 summarises the different perspectives of the various papers selected for this review regarding the organisational perspective of ambidexterity.

Table 3. Research mapping of OA in SME context through an organisational perspective

Author	SME activity	Type of Study	Contribution
Priyono et al. (2020);	Industry	Qualitative	This study contributes to the limited empirical evidence on how actors in SMEs perceive and manage the various tensions emerging from organisational agility and efficiency.
Iborra et al. (2020)	Industry	Quantitative	This suggests that companies must be able to respond to the changing environments through ambidexterity and strategic consistency.
Colclough et al. (2019)	Industry	Quantitative	Resource scarcity is not correlated with the innovation orientation of SMEs.
Senaratne and Wang (2018)	High-tech industries	Qualitative	The study contributes to understanding OA in high-tech SME, exploring the mechanisms used, despite resources limitations.
Benitez et al. (2018)	Industry and services	Quantitative	The study suggests that SME' technological infrastructures allow exploring and exploiting knowledge in what innovation concerns.
Qaiyum and Wang (2018)	Indian high-tech industries	Quantitative	The study distinguishes different types of dynamic capabilities and its effects on SME.
Ferradas, et al. (2017)	Spanish Industry	Qualitative	This case study enriches the literature of both innovation contests and topics relevant to SMEs.
Rafailidis et al. (2017)	Greek high-tech industry	Quantitative	The study highlights the importance of quality systems' competitive capacity on OA.
Bouncken et al. (2016)	Medical equipment industry	Quantitative	The different configurations of SME and planning practices influence performance.
Helms (2016)	Industry and services	Qualitative	Business models associated with public services present a set of difficulties in developing innovative service public.
Jacobs et al. (2016)	Fashion industry	Qualitative	Ambidexterity leads to positive performance in SME

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Table 3. Research mapping of OA in SME context through an organisational perspective (continuation)

Author	SME activity	Type of Study	Contribution
Burgers and Covin (2016)	Industry	Quantitative	A set of contingencies affect differentiation and structural integration in SME in dynamic environments
Dasí et al. (2014)	Wood, cork and machine industry	Quantitative	Exploitation orientation influences managers' intention to internationalise, with existing resources moderating this relationship.
Dolz et al. (2014)	Cork, wood and metal industries	Quantitative	Family nature and management team diversity – in age and experience – improve ambidexterity.
Güttel et al. (2015)	Industry (not specified)	Qualitative	Management of exploitation and experimentation activities can lead to ambidexterity and should be managed at different levels, above all in terms of the learning dimension and the flexibility dimension
Karlsson et al. (2015)	Industry and services	Qualitative	The study reveals the degree of integration in SMEs and the effects of the planning process and methodology in SME' daily routines and their effect on innovation.
Kilic et al. (2015)	Industries (chemical sector, textile, metallurgical)	Quantitative	SME with high levels of innovation have multiple concentrations of priority operations
Ng et al. (2015)	Industry and services	Quantitative	Authors propose a re-conceptualization of process management through the development of a measurement instrument for process management and conclude that process exploitation and exploration are likely to be interdependent.
Tzokas et al. (2015)	Semiconductor industry	Quantitative	Being reflected in SME' absorptive capability, technological capability contributes to ambidexterity.
Wang et al. (2015)	Technology industry	Quantitative	The development of dynamic activities in SME has a greater relationship with internal factors than with external factors.
Cagno et al. (2014)	Smelting	Quantitative	The study shows that smelters complementing internal R&D with entry practices have a higher level of energy efficiency, a higher level of technology adoption
Enkel and Heil (2014)	Industry and services	Qualitative	Absorptive capability can stimulate innovation in SME, acting as a mean to raise exploitative and experimental innovation and improve ambidexterity.
Tamayo-Torres et al. (2014)	Industry and services	Quantitative	The study explores if there are differences between certified and non-certified organizations regarding the relationship between manufacturing flexibility and exploitation and exploration strategies; most of the relationships analysed are only significant in ISO certified organizations.
Lee et al. (2014)	Industry and services	Quantitative	The study proposes a balanced approach between exploration and exploitation and its effect on innovative knowledge and performance

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Table 3. Research mapping of OA in SME context through an organisational perspective (continuation)

Author	SME activity	Type of Study	Contribution
Leidner et al. (2011)	Financial services	Quantitative	Ambidextrous SMEs have better performance in association with existing information strategies
Li et al. (2014)	Biotechnology, electronics and telecommunications	Quantitative	SMEs oriented to both exploitation and experimentation have a better relationship with internal social capital
Mattes (2014)	Industry and services	Qualitative	The study explores the various ways in which formalization and flexibility complement each other.
Salvador et al. (2014)	Machine industry	Quantitative	Ambidexterity applied to production has a positive effect because it associates product development with a set of aspects related to decision-making.
Villar et al. (2014)	Ceramic industries	Quantitative	Application of a framework of ambidexterity in exporting SME.
Patel et al. (2013)	Technology industry	Quantitative	The use of high-performance work systems is positively related to ambidexterity, which mediates the relationship between the use of these systems and company growth.
Voss and Voss (2013)	Theatre	Quantitative	Oldest SME have resources, capabilities, and experience to benefit from a strategy of product ambidexterity.
Zhan and Chen (2013)	Textile industry, electronics	Quantitative	The results suggest that joint ventures in international environments are more successful when explorative and exploitative activities interact.
Chang et al. (2012)	Industry (not specified)	Quantitative	The capability for organisational integration allows integration and alignment through ambidexterity and performance of radical innovation.
Chang and Hughes (2012)	Industry and services	Quantitative	Leadership and characteristics of organisational structure have an effect on OA, unlike context characteristics.
Lee and Huang (2012)	Technology industry	Quantitative	SME performance depends on knowledge stock and the capability to balance exploitative and explorative learning. Large companies have better results than SME.
Nowacki and Staniewski (2012)	Services	Qualitative	Managers' and collaborators' qualifications are not elements which in themselves contribute to SME' innovation.
Napier et al. (2011)	Technology industry	Qualitative	The study shows how the development of contexts for organisational ambidexterity can help to solve SMEs' strategic challenges.

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Table 3. Research mapping of OA in SME context through an organisational perspective (continuation)

Author	SME activity	Type of Study	Contribution
Weismeier-Sammer (2011)	Food industry	Quantitative	Strategic planning in SME seems to involve a certain "entrepreneurial spirit", which directly influences the extension of entrepreneurial behaviour.
Azadegan and Wagner (2011)	Industry and services	Quantitative	The study reveals an SME tendency through industrial modernization with direct and indirect effects on innovation, through exploration and exploitation.
Hotho and Champion (2010)	Computer games industry	Qualitative	The study suggests that innovation is not just a market result but the result of a strategic orientation.
Liao and Rice (2010)	Industry (not specified)	Quantitative	Configurations of exploitation and experimentation are important for developing dynamic capacities related to innovation.
Manzanares and Gómez (2010)	Industry (not specified)	Quantitative	Results reveal the existence of significant differences in relation to how knowledge management strategies are conceived and applied.
Manzanares and Gómez (2008)	Technology industry	Quantitative	Explorative and exploitative practices should be considered together, highlighting the need to develop strategies integrating those practices.
Cegarra-Navarro and Dewhurst (2007)	Technology industry	Quantitative	This study suggests contextual ambidexterity as a mediating factor between the effects of exploitation and exploration in creating knowledge about customer capital.

4.2. Environmental Level

The literature review also showed OA frequently related to the SME environment, emphasising relationships with customers and suppliers, and its effect on internationalisation processes (Colclough et al., 2019). OA is also associated with SME in alliances and cooperation networks (Gedajlovic et al., 2012). Other research approaches focus on the relationship between OA and its core concepts (exploration and exploitation) productivity, innovation processes as well as dynamic markets between firms (Kilpi et al., 2018).

At the environmental level, studies show SMEs as being sensitive to changes in the environment, which is one of the aspects per the contingency theory (Donaldson, 2001). In fact, it should be noted that an important research stream relates OA to the market's dynamics, and how SMEs position themselves to become competitive (Yu et al., 2014; Colclough et al., 2019). The degree of influence of the external environment shows how structural and contextual configurations in SMEs are developed. Literature evidences such influence on exploration and exploitation (Zabala-Iturriagoitia, 2014;

Hsu et al., 2013), at the technological level (Soto-Acosta et al., 2018), or the internationalization level (Cui et al., 2014).

The environment affects exploration and exploitation strategies in SMEs. Researchers such as Archibugi et al. (2013) investigated firms' characteristics that make SMEs more likely to innovate in the crisis context, and Bouncken et al. (2016) address different configurations of planning practices and performance considering main firm characteristics in dynamic and uncertain industrial environments. Those authors conclude that either formal or emergent planning practices can drive success, depending on certain configurations of firm characteristics such as firm age and firm size. As highlighted by the authors, larger and older firms' greater resource base, greater slack, and greater differentiation allow higher levels of OA and demand more OA to overcome inertia and greater bureaucracy associated with mature firms.

The market and its dynamics also play a decisive influence on how SMEs form their strategic orientations to become competitive. And this external influence implies a distinction between exploitation and exploration related to the development of products, markets, or competencies (Gedajlovic et al., 2012). This dynamism gives managers the possibility of identifying, evaluating, and selecting information that leads to various strategic options reflected in SMEs' performance and results. Diversity in decision-making as a function of market opportunities allows SMEs to adopt exploitative or explorative paths according to the type of opportunity identified (Paliokaitė & Pačėsa, 2015).

The literature also highlights that, environmental factors, are influential to the development of a balance dimension of OA (Donaldson, 2001; Ghofar & Islam, 2015). This perspective is important because it reinforces the influence of environmental contingency factors (Salvador et al., 2014; Zacher & Rosing, 2015; Chang et al., 2011; Cui et al., 2014). Contingency factors are found in studies about exploitation and exploration activities which vary according to SMEs' age and their environmental adversity (Choi & Phan, 2014), in relationships with suppliers (Forkmann et al., 2016), through adjustment between SMEs' global market performance and strategy in order to increase flexibility and reduce costs (Cui et al., 2014). Moreover, dynamic environments encourage SMEs to pursue an explorative orientation, providing new products, and strengthening their technological capabilities, following new market opportunities to secure finance as first movers, and then blocking competitors' entry. Following an exploitative orientation, SMEs can better cater to actual customers and

build customer loyalty, while incurring lower costs (Chang et al., 2011). The literature on OA also mentions that SMEs adopt internationalization strategies benefiting from the characteristics of the SME environment (Cui et al., 2014).

The contingency nature affecting OA is shown in alliances between SMEs for innovation (Michelfelder & Kratzer, 2013), in mechanisms affecting new knowledge acquisition as a key factor for innovation performance (Lowik et al., 2012), in technological performance (Soetanto & Jack, 2014), and in resource constraints (Gredel et al., 2012). Cooperation and networks in SME are also approached regarding the effects of how they are developed, based on different strategies for innovation (Minh & Hjortso, 2015), alliances with large firms (Yang et al., 2014), access to resources (Lin et al., 2007) or market's orientation (Monferrer et al., 2013). Table 4 provides a summary of the main contributions of studies approaching OA at the environmental level.

Table 4. Research mapping of ambidexterity in SME context through an environmental perspective

Author	SME activity	Type of study	Contribution
Scuotto et al. (2020)	High-tech industries	Quantitative	This study offers relevant implications for SMEs managers in better employing the OA for the repositioning strategy in the global value chain
Alcalde-Heras et al. (2019).	Spanish SMEs	Quantitative	Results show that SME managers wanting to develop ambidextrous strategies in recession periods must forecast scenarios in terms of innovation
Soto-Acosta et al. (2018)	Industry	Quantitative	The study supports the idea that innovation can be developed in an ambidextrous manner within a single SME
Battaglia et al. (2018).	High-tech industries	Quantitative	The study explores how innovation activities can influence international SME' performance, according to firms' age
Forkmann et al. (2016)	Industry and services	Quantitative	The effects of relationships with suppliers are attributed to the characteristics of the business environment combined with strategic choices.
Mashahadi et al. (2016)	Cosmetics	Quantitative	The study suggests that market orientation has a positive effect on developing ambidexterity and technological and non-technological innovation in the context of international SME.
Minh and Hjortso (2015)	Animal fodder industry	Qualitative	The normative elements present in relations between organizations lead managers to develop their contact networks to promote activities of exploitation/experimentation.
Paliokaitė and Pačėsa (2015)	Industry (not specified)	Quantitative	SME' capability to predict can be related to organisational ambidexterity.
Yu et al. (2014)	High-tech industries	Quantitative	The authors provide strong evidence for the essential role of ties with government in enabling ICT firms' exploratory and exploitative innovation strategies

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Table 4. Research mapping of ambidexterity in SME context through an environmental perspective (continuation)

Author	SME activity	Type of study	Contribution
Soetanto and Jack (2014)	High-tech industries	Quantitative	Market strategies influence technology-based activities of exploitation and experimentation.
Abebe and Angriawan (2014)	Machinery	Quantitative	Organisational predictors play an important role in exploitation/experimentation activities.
Cui et al. (2014)	Industry (not specified)	Quantitative	Internationalization strategies are moderated by strategies of exploitation and experimentation.
Kitapçı and Çelik (2014)	Metallurgical industry	Quantitative	Ambidexterity affects the capability for organisational learning and quality performance.
Yang et al. (2014)	Pharmaceutical	Quantitative	Strategic alliances between SME and large firms enhance exploitative strategies rather than explorative strategies.
Zabala-Iturriagoitia (2014)	Machine tool companies and technology centers	Qualitative	The use of technology-based processes influences exploitation routines and experimentation processes.
Choi and Phan (2014)	Technology-based industry	Quantitative	Exploitation activities in mature SMEs are usually fewer than in the youngest SME, but when belonging to dynamic environments, exploitation activities are greater.
Archibugi et al. (2013)	Industry (not specified)	Quantitative	The companies in pursuit of more explorative strategies towards new product and market developments are those to cope better with crisis periods.
Bocquet and Mothe (2013)	Industry (not specified)	Qualitative	The paper explores the role of governance structure in ambidexterity development.
Hsu et al., (2013)	High-Technology industry	Quantitative	Concerning firms in small emerging economies, international ambidexterity is extremely vulnerable to environmental complexity and sensitive to previous international experience.
Michelfelder and Kratzer (2013)	Universities, industries	Qualitative	The study demonstrates why and how an ambidextrous inter-organisational R&D collaboration outperforms other collaboration structures in the creation of innovation.
Monferrer et al. (2013)	Industry (not specified)	Quantitative	The study revealed that market orientation in a network contributes significantly to developing dynamic capacities and developing absorption and innovation capabilities.
Lee et al. (2013)	Industry and services	Quantitative	The study shows that environmental dynamism favours ambidexterity learning with an effect on performance
Gredel et al. (2012)	Industry (not specified)	Qualitative	The study analyses how patent-based investment funds (operating as innovation intermediaries) help in overcoming SME' resource and competency constraints.

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Table 4. Research mapping of ambidexterity in SME context through an environmental perspective (continuation)

Author	SME activity	Type of study	Contribution
Lowik et al. (2012)	Metallurgical industry	Qualitative	The study suggests that SMEs should invest more in the exploration of strong ties instead of increasing their weak tie network. Doing so helps them to improve alliance ambidexterity.
Chang et al. (2011)	Industry (not specified)	Quantitative	The analysis reveals that internal organisational structures in dynamic environments stimulate the emergence of ambidexterity and innovation.
Lin et al. (2007)	Technology industry	Quantitative	The study reveals that the development of ambidextrous alliances benefits large firms, while alliances focused on exploitative or explorative activities benefits small firms.

4.3. Individual Level

The literature review also showed that the concept of OA has also been closely related to how leaders influence SME strategy, as well as their influence on performance. According to Raisch et al. (2009), OA occurs also, at an individual level, influenced by the organisational level. In this relationship, a set of issues are approached by researchers, acting as contingent factors in the OA phenomenon, personality, patterns of leadership (Agostini et al., 2017) or strategic entrepreneurship (Ajayi et al., 2017; Jones et al., 2011).

At the individual level of OA, studies identified portray centralisation of the management style, based on a simple hierarchical structure, directed to people and processes. This context of owner or senior manager proximity serves to facilitate information exchanges and decisions, reducing the need for intermediate levels (Lubatkin et al., 2006; Håkonsson et al., 2012). The relationship between leaders' characteristics and how they act in promoting exploration and exploitation is described in various studies. Firms' dynamic environments allow SME to develop dynamic capabilities and allocate available resources better (Heavey & Simsek, 2017). In dynamic and highly competitive markets where SME needs to master qualitative changes effectively and efficiently to survive, the ability to act quickly, based on the division of labour and of responsibilities represents a dynamic capability that may lead to competitive advantages. In this context, leaders are key elements that affect the SME strategy through decisions and influence (Håkonsson et al., 2012). This argument is echoed on contingency theory, where leaders' action is framed in the business strategy and in the way these firms position themselves in the market (Ghofar & Islam, 2015).

An example of such influence is shown in the way top management teams play a pivotal role in how firms might attain ambidexterity through the extent of the CEO's network. Here, the strategy appears as a balance that can be both internal and external, aiming for stability or efficiency through the tensions between exploration and exploitation (Cao et al., 2010). This duality, due to tensions between exploitation and exploration, reflects certain attributes of leaders' personality, since leaders with a higher propensity towards exploration will be more focused on creativity, whereas leaders more focused on management will be more directed towards exploitation activities. In this sense, a well-balanced mix of entrepreneurial capabilities and managerial skills appears to be especially critical for SMEs (Reisinger & Lehner, 2015). Previously, Lubatkin et al. (2006) had already argued that top management teams are linked to internal mechanisms that facilitate the exchange of organisational information and how these internal mechanisms are created and maintained. However, SME generally does not have sufficient resources for managing knowledge processes, and this affects OA (O'Reilly & Tushman, 2013). Large firms can manage these processes through the creation of structurally separate business units, some focused entirely on exploration and others on exploitation (Raisch & Birkinshaw, 2008). Frequently lacking such mechanisms, SME must rely more on the capability of its top management team to achieve OA (Lee et al., 2013). In particular, SMEs have fewer hierarchical levels, their senior managers are more likely to perform both strategic and operational functions. So, they experience directly the discordance in inherently pursuing activities directed towards OA (Halevi et al., 2015; Chen et al., 2019) as well as the processing of resources essential to SMEs (Lubatkin et al., 2006).

Various contingency factors are indicated in the literature such as the entrepreneurial spirit (Olaisen & Revang, 2014), employees' empowerment, involvement (Ajayi et al., 2017), or employees' participation (Volery et al., 2015). Additionally, other contingency factors are also reported in the literature at the individual level related to people management, such as the interaction between employees, development of creative culture, goal orientation, or communication, and knowledge sharing (Parmentier & Picq, 2016).

One of the aspects referred to widely in the literature on SMEs has been the effect of managers' personality traits and the effect of those traits on performance, and more specifically, on OA. This is an aspect that has not been given sufficient attention by academics (Stokes et al., 2015). Strategies undertaken by SMEs are often connected to the type of personality of senior managers (Kammerlander et al., 2015), and literature

highlights that managers with a proactive personality are better at implementing innovation (Tang, 2016). The executive style of managers influences strategy in SMEs (Håkonsson et al., 2012) and, the entrepreneurial orientation of managers effect on customer process integration in firms (Jiang & Kortmann, 2014). Nevertheless, some areas have emerged in the literature proposing new possibilities for study at the individual level. One of them is supported by the idea that OA is a dynamic capacity and the nature of this capability is found in its micro-foundations as a driving force towards OA at an individual level (Dolz et al., 2014; De Clercq et al., 2014). Table 5 shows a summary regarding the main contributions of studies approaching OA at an individual level.

Table 5. Research mapping of ambidexterity in SME context through an individual perspective

Author	SME activity	Type of study	Contribution
Zimmermann et al. (2020)	Industry	Quantitative	This study allows the development of important theoretical insights for ambidexterity research from a micro-foundation perspective.
Ali et al., (2020)	Service sector	Quantitative	This study provides a novel explanation of the relationship between manager ambidextrous behaviour and business performance through the mediation of job crafting among top managers working in SME, with an overarching view of gender.
Dolz et al. (2019)	Industry	Quantitative	This study contributes to our understanding of the antecedents of SME ambidexterity by providing a theoretical model that combines the arguments of upper-echelons theory with those found in family-firm.
Ou et al. (2018)	Computer industry	Quantitative	This study relates CEOs characteristics to the performance of organisational ambidexterity.
Venugopal and Kumar (2018)	High tech industries	Quantitative	The study suggests that the behavioural integration process of the management team increases OA.
Ajayi et al. (2017)	Manufacturing and services	Quantitative	Organisational context that decentralises decision making promotes the delegation of authority, reduces emphasis on formal rules and procedures and lateral interactions among employees.
Heavey and Simsek (2017)	Technology-based firms	Quantitative	The study highlights that top management with well-developed transactional memory systems is able to nurture an ambidextrous orientation, and that the impact of transactional memory is also shaped by the organisational experience of top management.
Agostini et al. (2017)	Medium-high tech industries	Quantitative	This study focuses on the dimensions of Intellectual Capital and its impact on the performance of radical and incremental innovation.
Tang (2016)	Hotels	Quantitative	The knowledge that managers have about their SME' environment and social capital acts as a mediator in the relationship between managers' personality and innovation capability

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Table 5. Research mapping of ambidexterity in SME context through an individual perspective (continuation)

Author	SME activity	Type of study	Contribution
Parmentier and Picq (2016)	Videogame firms	Qualitative	Positive practices related with creative climate are good for creativity and support performance management.
Halevi et al. (2015)	Industry and services	Quantitative	The management team's influence on behavioural integration processes influences ambidexterity, especially through the environmental dynamism effect
Heavey et al. (2015)	Technology industry	Quantitative	The study shows that through the effect of networks and pro-active behaviours, top management influences innovation.
Kammerlander et al. (2015)	Industry, construction and services	Quantitative	The link between regulating focus and ambidexterity is reinforced in highly competitive environments.
Reisinger and Lehner (2015)	Metallurgical industry	Qualitative	The ability to act quickly in dynamic environments can represent a dynamic capability
Volery et al. (2015)	Industry and services	Qualitative	Identification of a set of managers' behaviours and competences that facilitate organisational ambidexterity.
Zacher and Rosing (2015)	Services	Quantitative	Ambidextrous behaviour in leaders' favours innovation
De Clercq et al. (2014)	Industry	Quantitative	The study mentions the need for SME to understand their internal and external environments to improve their performance
Dover and Dierk (2010)	Industry	Qualitative	Risk is associated with the entrepreneurial spirit and the innovation process through experimental activities
Jiang and Kortmann (2014)	Industry and services	Quantitative	The study shows that entrepreneurial orientation has a negative effect on the integration of customer processes, which is an exploitative approach.
Olaisen and Revang (2014)	Industry and services	Qualitative	The entrepreneurial spirit can be spread in SME through empowerment and participation, favouring the development of ambidexterity and knowledge dynamics.
Dolz et al. (2014)	Animal fodder industry	Quantitative	Ambidexterity is a dynamic capability that allows companies to achieve high performance in situations where they must align with their environment.
Gedajlovic et al. (2012)	Technology industry	Quantitative	Managers' decision-making processes influence activities of exploitation and experimentation.

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Table 5. Research mapping of ambidexterity in SME context through an individual perspective (continuation)

Author	SME activity	Type of study	Contribution
Chang and Hughes (2012)	Industry	Quantitative	The balance between exploration and experimentation activities has a mediating effect between organisational context/structure and leadership
Håkonsson et al. (2012)	Industry	Quantitative	The alignment of executive style and strategy is crucial for SME pursuing innovation
Chew (2012)	Industry and services	Qualitative	The study reveals CEO' patterns of action that are the basis for strategic options, ambidexterity and dynamic capacities in SMEs
Cao et al. (2010)	Technology industry	Quantitative	OA is found to be related to information-sharing processes at the management team level.
Lubatkin et al. (2006)	Industry and services	Quantitative	The study shows that the top management team's role regarding behavioural integration facilitates the development of ambidexterity in SMEs.

As a complement, during the review process, the analysis of the applied methodological procedures allowed us to identify several unexplored or under-explored problems. The results of this analysis are presented in table 6, organized according to four theoretical fields identified in this study: innovation, organisational learning, dynamic capabilities, and performance, allowing for insights into possible future lines of research.

Table 6. Unexplored or underexplored issues and avenues for future research

Theoretical fields	Further research suggested
Innovation	<ul style="list-style-type: none"> • Future research should focus on firms' behavioural components, internal environments, together with typical structural and contextual antecedents to examine the formation of innovation and organisational ambidexterity. • Future research should look for other primary resources (or factors) mediated through various strategic behaviours for SME transformation and related to investment in innovation in SME. • Future research can investigate combined effects of absorptive capability's antecedents and barriers to knowledge transfer, to improve SME' innovation capability. • More studies are needed about the relationship between exploitation-based innovation and exploration-based innovation exploring different business sectors:

Continued >>>

Table 6. Unexplored or underexplored issues and avenues for future research (continuation)

Theoretical fields	Further research suggested
Organisational learning	<ul style="list-style-type: none"> • New research should explore workers' perception in organisational contexts about ambidexterity. • Future research should explore the relationship between absorptive capability and performance, using longitudinal studies in different types of industry. • Future research should incorporate measures of absorptive capability to better explain the variation in organisational ambidexterity. • Studies should be performed aiming to understand the alternative strategies for transferring innovative knowledge in SMEs and how these can be operationalized. • New research should explore the effects of performance process management regarding the moderating factors that influence organisational learning capacities, relating them to organisational ambidexterity;
Dynamic capabilities	<ul style="list-style-type: none"> • Future research should focus on how social capital influences entrepreneurs and motivations, objectives, emotions, and decisions. • Different organisational contexts can help to assess the relationships between dynamic capabilities and SME' internationalization strategy in different industries, as well as the impact of these capabilities on firms' performance. • New studies can explore the influence of entrepreneurial leadership on organisational ambidexterity, seeking patterns for subsequent comparison. • Future longitudinal studies are needed to examine the relationships between organisational ambidexterity and social capital. • New studies should focus on exploration/exploitation activities as dynamic capacities at the basis of organisational ambidexterity, considering their operationalization. • Future studies can examine the relationship between dynamic capabilities and market orientation, using longitudinal data and qualitative research, concerning the different hierarchical levels in SME. • Future research should seek to better understand the relationships between the individual characteristics and behaviours of top management and the emergence of ambidexterity in innovation, with a view to improving SME performance. Furthermore, future research can examine the effects of individual characteristics besides the consequences of top management's actions;
SME performance	<ul style="list-style-type: none"> • The role of government institutions in SME' internationalization process as a measure of organisational performance mediated by organisational ambidexterity. • New performance measures can serve as valid indicators of firms' performance; future research should seek to include objective measures of company performance involving information systems. • New approaches are proposed to understand how management processes ground alternating dynamics of various organisational principles, namely concerning formalization, flexibility and the related tensions between exploration and exploitation. • New research can focus on entrepreneurial behaviour in family SME, with a multi-respondent approach to overcome problems with individual interviewees' answers. • New research should focus on understanding to what extent the need to innovate technologically determines the intensity and variety of knowledge management practices in SMEs and how those practices influence the development of the innovative process in relation to organisational ambidexterity. • New studies should focus on the relationship between quality management systems and their contributions to foster OA' contexts. • New research should focus on market orientation, business orientation, exploitation and exploration in the context of organisational ambidexterity;

5. Conclusions and Contributions

This research aims to perform a multilevel analysis to identify contingency factors related to organisational ambidexterity (OA) in small and medium-sized enterprises (SME). Through a literature review, it was possible to identify a set of significant contingency factors, at three different levels of analysis, organisational level, environmental level, and individual level. For that reason, this study fills two major gaps: first, regarding which contingency factors are related to OA in SME; and second, regarding OA-based research in the context of SMEs through multilevel analysis.

This study contributes positively to a more complete theory of OA in two ways. First, because it follows Simsek's (2009) recommendation to identify contingency factors, proposing a relationship between contingency factors and OA in the context of SMEs, and introduces a new theoretical perspective on OA through Contingency Theory (Donaldson, 2001). According to the Contingency Theory, the performance of firms is contingent, depending on external influences and internal influences through a moderating effect (Ghofar & Islam, 2015). Literature also highlights that SMEs are more sensitive to market variations because they have specific characteristics with influence on OA. Within the scope of this study, based on literature about OA in SMEs, and following Ghofar's and Islam (2015) framework (control processes and management tasks, business environments and strategies, financial structure, company size, internal structure, internal procedures, management team or leadership), it was possible to contextualize these contingency factors at three different levels of analysis and respond to Simsek's (2009) call for a multilevel analysis in OA, in the SME's: organisational, environmental and individual. The review also highlighted four main theoretical fields in OA research: i) organisational learning, ii) dynamic capabilities, iii) innovation, and iv) SME performance.

At an organisational level, the research body approaches several issues such as SME structure, context, knowledge management, market orientation, dynamic capacities, innovation capability, learning capability, and absorptive capability. Moreover, according to Contingency Theory (Donaldson, 2001), several contingency factors are referred in the literature selected, such as SMEs' age, size, resource availability, internal processes (e.g., management control, quality, and innovation), organisational processes or strategic management practices (involving human resources). Regarding this organisational level, findings revealed a substantial understanding about OA's effect on performance, organisational learning, and innovation in SME' context, grounding on

theories, such as the theory of dynamic capabilities (Teece & Pisano, 1994), and approaching issues such as structure and context, together with their degree of development and the effect of exploration and exploitation activities on SME innovation, competitiveness, and effectiveness.

At an environmental level, the literature focuses especially on networks and alliances and competitive intensity issues. Several contingencies are highlighted throughout the different studies, including the environment's adversity, network support, demand uncertainty, business environments, competitive intensity or environmental dynamism. This level is echoed in the theory of dynamic capabilities (Teece & Pisano, 1994) since the theory suggests that external information enables new strategic market orientations.

At an individual level, the studies concentrate on leadership characteristics, as well as entrepreneurial leadership. The contingency theory (Donaldson, 2001) identifies a broad set of contingency factors related to managers' leadership behaviour, personality, entrepreneurial spirit, manager's planning style, CEO interaction or manager's leadership behaviour, showing their influence on developing environments propitious to the development of OA.

Furthermore, findings also reveal that the research on OA in SME's context has been reported through several scientific journals, with high visibility and impact in the research community and very different in nature, including fields such as business strategy, operations management, human resource management, innovation, SME and entrepreneurship, among others. The oldest paper identified in this review was published in 2005, and since then, the number of studies has been steadily growing, especially since 2012. Mostly supported by the Contingency Theory (Donaldson, 2001), the research body has favoured empirical-based studies, focussing essentially on manufacturing SME, with a special relevance of the cork and wood, metallurgical, machinery, and automotive industries. Moreover, regarding data collection, an expressive number of studies follow an approach centred on the higher levels of management and decision centre, and use primary sources, mostly through surveys addressed to SME' top management.

This study also contributes to the literature through synthesizing a set of key contingency factors for OA in SME context, organized according to organisational, environmental, and individual levels, and highlights four main theoretical fields in OA

research: organisational learning, dynamic capabilities, innovation, and performance. With this significant contribution, this study brings to literature a new perspective on OA, as it introduces the concept of contingency factors as conditions to OA's development in SME.

For management, this study means a new perspective to achieve OA by introducing contingency factors in the practical approach that managers must consider. This statement represents a series of challenges for management which should be underlined, as managers must pay attention to the presence of these factors. Thus, managers should consider that contingency factors moderate the performance of firms in terms of a set of internal characteristics and in terms of the characteristics of the markets in which they operate. Furthermore, knowing the relevance of the presence of these contingency factors is, in our understanding, an important contribution to management and becomes essential in order to achieve OA in SMEs (Voss & Voss, 2013).

Besides an overall mapping of the literature on OA concerning the SME context, the review process also allowed the identification of several unexplored or underexplored issues, contributing to additional avenues for future research. The gaps identified and further studies suggested are summarised and organized according to the main theoretical fields, and according to the organisational, environmental, and individual levels, thus providing an agenda for future research, dealing with the relationship between OA in the SME universe, and organisational learning, dynamic capabilities, innovation, and SME performance.

This study also represents a small step towards opening other possibilities for future investigations about OA in SMEs. Nevertheless, this study also has its limitations. Thus, this study focused only on the classification of contingency factors and not their effect (positive or negative) on performance. On the other hand, this study also did not consider the different contingency factors located in its theoretical fields. As a suggestion for future research, researchers may focus on the identification of contingent factors by theoretical fields SMEs to understand how these contingent factors increase or reduce the performance of OA in SMEs.

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CHAPTER 3

Facilitating and Inhibiting Effects of Organisational Ambidexterity in SME: An Analysis Centred on SME Characteristics.

Abstract

The analysis of organisational ambidexterity in the small- and medium-sized enterprise context should consider their unique characteristics, including size, internal structure, the low level of use of management practices and great capacity to introduce innovative products. Aiming to understand how the characteristics of SMEs influence, or do not influence, organisational ambidexterity, this article presents an explanatory theoretical model of that relationship. This paper contributes to an innovative systematisation of these firms from a multi-level perspective. This unique approach also advances theory by contributing to clarifying the debate on organisational ambidexterity and identifies important opportunities and directions for future research.

Keywords: Organisational ambidexterity, antecedents, characteristics, small and medium-sized enterprises, SME.

1. Introduction

Studies made in organisational ambidexterity (OA) in recent years have followed different explanatory perspectives of how this phenomenon emerges in firms. In the context of small- and medium-sized enterprises (SMEs), careful analysis of the literature identifies various perspectives all explaining that process, above all relating the concept to a number of areas of research, such as innovation (Karlsson, Schaeffer, & Winbo, 2015), organisational learning (Cegarra-Navarro & Dewhurst, 2007), dynamic capabilities (Li, Lin & Huang, 2014) or organisational performance (Bouncken, Fredrich & Pesch, 2016).

The multiple approaches to OA show both the fragmented nature of those studies and the need to construct a new explanatory model. From macro approaches to micro approaches, what has essentially been missing is an integrative approach to how OA can effectively be developed (O'Reilly & Tushman, 2013; Gibson & Birkinshaw, 2004; Chang, Hughes, & Hotho, 2011). Some studies also tried to follow this path. The contribution of Raisch and Birkinshaw (2008) attempted to show the elements found at the basis of exploitation and exploration activities with an effect on the formation of OA environments, and Simsek, Heavey, Veiga and Souder (2009) summarised the different knowledge by constructing a typology joining the main theories, antecedents and results. Other authors evidenced the dichotomic nature of OA based on exploration and exploitation and on the strategic perspective both hold for firms (Chang & Hughes, 2012), while other research tried to discern the swings between exploration and exploitation according to management of existing resources (Dasí, Iborra & Safón, 2014). However, the different proposals to explain the phenomenon point to a heterogeneous nature of OA, where the combined influence of internal and external elements affects its manifestation in SMEs.

However, SMEs are a type of company with very specific and unique characteristics. These characteristics hinder the potential impact that these companies may have on the economy. Despite its importance in the countries' economies, a growing body of literature has focused on the conditions under which SMEs' performance can be improved, particularly at the level of OA (Voss & Voss, 2013; Wang, & Rafiq, 2014; Venugopal et al., 2019; Stettner & Lavie, 2014). OA, as a capability (O'Reilly & Tushman, 2013), has attracted the attention of an important body of researchers in recent years. The contributions have focused mainly on the study of OA at the level of large companies, despite starting to appear in the relevant literature on SMEs (Yang &

Li, 2011). However, regarding research in the context of SMEs, the literature has not presented approaches focusing on the characteristics of SMEs and their relationship with OA. In this sense, and seeking to make an important contribution to literature, this study presents a theoretical approach that aims to launch a new research path with regard to OA in the specific context of SMEs and its unique characteristics, such as its small size, structure and internal context or low level of management practices.

The unique characteristics of SMEs make this type of firms special regarding management and leadership practices that can be adopted. The difficulty often lies in these characteristics' specificity and in the way in which these characteristics can relate to and influence objectives of competitiveness and performance. The relevance of this research topic is, therefore, important for management.

Therefore, the objective of this study is to define a theoretical approach based on a multi-level perspective, explaining how SMEs' characteristics can influence OA in these firms. The aim is to contribute to clarifying the potential influence of those characteristics on OA.

From this perspective, and considering the specific nature of SMEs, a theoretical framework is drawn up aiming to understand how the characteristics of SMEs can influence OA. It is therefore important to propose a systematisation that explains how those characteristics influence the development of OA in the SME context. This study contributes to research on OA in four ways: i) it gives a centralised vision of the possible combinations of SME characteristics for OA; ii) it helps to align research on OA in SMEs; and iii) it proposes a theoretical approach analysing how SME characteristics may act as antecedents of OA, from a multi-level approach; iv) it contributes to spreading the concept in the common language of management and among SME managers.

The article has the following structure: the first part analyses the bases of OA, contextualised in the literature in the form of antecedents. The second part seeks to present a wide-ranging, systematised perspective and maps the characteristics of SMEs with the antecedents for OA. The article ends with a synthesis of the main contributions to theory and practice, limitations, as well as guidelines for future research.

2. Methodology

Over the years, the literature has presented different antecedents for OA. Some approaches show OA influenced by the top management team (Mihalache et al., 2014), through the strategic options towards exploitation and exploration (Jansen et al., 2006) or through styles of leadership (Lubatkin et al., 2006). Other studies observe the influence on OA through the action of the individuals (Bonesso et al., 2014) or through the influence of external elements such as firms' alliances and networks (Lavie & Rosenkopf, 2006). In this sense, two paths were established to serve as a guideline for this study. First, it was decided to group the antecedents of OA into internal and external antecedents. Then, antecedents were analysed at the level of processes, structure and context (Asif, 2017).

According to the literature, internal antecedents are the practices and the procedures in the execution of tasks that define the way things are done (Asif, 2017). These internal antecedents occur through processes, in the structure, and in the organisational context. According to Asif (2017) processes means actions or behaviours that potentially enhance OA. In this scope, individual or group behaviours are included, as well as technologies, organisational capabilities, and individual competencies. The structures delimit processes, and the context refers to a set of potential internal and environmental contingent factors that can influence processes with the ability to change the desired result (Asif, 2017). Organisational structures are production units, eventually physically separated from other organisational units, but with different values and precise objectives, and directed, for example, towards autonomous research or product development activities. Organisational context is constituted by a set of values, culture, and the existing technical, human, and financial resources. External antecedents are a set of factors with influence at the level of processes, structures, and context, such as environmental dynamism. (Kim & Rhee, 2009). According to Asif (2017), structures, processes, and context support both exploitation and exploration activities.

2.1 Methodological Approach

In order to analyse how the characteristics of SMEs may affect OA, this study was developed in two steps. In the first step, a literature analysis was carried out and the main antecedents for OA were identified. Then, these antecedents were grouped into internal and external antecedents. In the second step, an attempt was made to identify

SMEs' characteristics centred on processes, structures and context, through relevant literature analysis. The approach centred on these two phases allowed, later, the analysis of the antecedents, internal and external, and its potential relationship with SMEs' characteristics, under the lens of exploitation and exploration concepts. Theoretical propositions were developed on the potential effect of these characteristics on OA. The main characteristics of SMEs are shown in Table 1.

3. The Antecedents of Organisational Ambidexterity

OA antecedents is still an important field of research (Chandrasekaran et al., 2012), and various approaches, some more practical and oriented to the mechanisms of OA (Andrade et al., 2016), and others developed under different levels of OA, have emerged to help understanding this paradigm (Gibson & Birkinshaw, 2004). However, this study proposes a new way of looking to OA in the SME context, once it looks for the characteristics of SME through the filter of their antecedents. This proposed new approach, seek to understand how characteristics of SMEs may influence OA, through exploration and exploitation.

So the line of thought followed here sets out from the premise that OA is developed through the configurations constructed around continuous adjustment to the situation, through exploitative and exploratory processes, as a response to a momentary, real or effective need and can be repeated over time, but taking into account that these configurations are conditioned by SME intrinsic and typical characteristics (Cao et al., 2010; Lubatkin et al., 2006; Mom et al., 2015; Voss & Voss, 2013). In SMEs' context, OA is the result of a set of internal processes related to exploration and exploitation, to ground and build a strategic, competitive and evolutionary vision of the firm (Voss & Voss, 2013). In this line, exploration and exploitation are the theoretical bases for understanding OA. *Exploitation* is related to the activities of refining, efficiency, selection and implementation, whereas *exploration* refers to searching, variation and discovery (March, 1991). Exploration and exploitation require organisational processes, structures and contexts that are fundamentally different from each other. Both exploitation and exploration allow the refining of existing competencies, the suitability of the available resources and experimenting with new alternatives. Therefore, in this sense, OA is essentially a learning process and an organisational capability (March, 1991).

Considering the above, the main orientations presented in literature (Chandrasekaran et al., 2012; Chang et al, 2011; Dolz et al, 2014; Raisch & Birkinshaw, 2008) were summarised in two groups of antecedents, internal and external antecedents. These two groups of OA antecedents serve as a guide for this study.

3.1. Internal Antecedents

The structural view of OA, based on one or more business units directed to exploitation or exploration processes, was initially proposed by Tushman and O'Reilly (1996). The concept of structure emerges as related to the conditions at the organisational level that prepare individuals, within a given framework, for collective interactions, behaviour, information processing and heuristics, meaning a capability to implement specific actions (Russo & Vurro, 2010). That vision considers that firms attain OA through differentiated structural units, such as production installations or product development, or through mechanisms of formal structural differentiation, for example, specific departments incorporated in the firm's structure or sections (Raisch, 2008; Raisch, Birkinshaw, Probst & Tushman, 2009). According to Raisch (2008), each unit is configured according to a specific set of tasks, being more formal and mechanical in the case of exploration activities (associated with rules, procedures, internal protocols) and more adaptive in the case of units destined to the development of activities connected to exploitation. From the above, that structural differentiation in organisations is considered to be of a contingency nature and also includes a set of competences, work systems, incentives, and specific cultures aligned internally, resorting to coordination mechanisms to link and integrate different processes (O'Reilly & Tushman, 2008, 2013).

The existence of different production units captures some complementarities between exploration and exploitation associated with degrees of formalization (Tushman et al., 2010). In that context, formalisation captures the extent to which a structure standardises detailed processes and routines to reinforce efficiency and improve existing activities, establishing standards of organisational behaviour.

According to Fu et al., (2015), internal antecedents of OA are a consequence of the development of organisational support for exploitation and exploration activities. Examples of internal antecedents *are management processes, social and organisational context, or human resource management practices.*

Hodgkinson et al., (2014), explicitly investigate the impact of *human resource management practices* on organisational culture and values through exploration and exploitation processes. This study shows that through these practices, individuals can act in a more exploitative or exploratory way according to the previous definition of the work processes. Evidence suggests that human resource management practices makes an important contribution for the construction of ambidextrous behaviours, namely through the influence of managers on individual performance (Mom et al., 2015), supervisor-subordinate relationships (Xing et al., 2016), high involvement, organisational social climate, productivity, motivation and performance (Swart et al., 2019).

These internal antecedents can also be considered as a set of management processes based on alignment and adaptability (Raisch & Birkinshaw, 2008). While alignment reflects the firm's capability to carry out its current activities efficiently rather than invest in new activities that can require the deconstruction of established procedures and rules, adaptability refers to the capability to reconfigure activities in the business unit quickly as a response to market demands (Gibson & Birkinshaw, 2004). Chandrasekaran et al. (2012) refer that it is through mechanisms of alignment and adaptability that top management develops organisational ambidexterity. Their definition of alignment and adaptability is based on a dichotomy close to the concepts of exploitation and exploration, but with differences: alignment occurs in the firm's operations when it adapts to the environmental conditions affecting it. It shows itself in the capacity to develop a clear sense of how activities create value in a coordinated way, also allowing the combination, within the organisational context, of discipline and motivational tension in individuals. On the other hand, adaptability refers to a firm's capability to adjust rapidly to new market opportunities, through people-managing practices and leadership that reinforce support and trust.

Others important antecedents referred to in the literature are *organisational social context and organisational culture*. For Gibson and Birkinshaw (2004) and Güttel et al. (2015) OA can be attained through mechanisms that promote behaviours favourable to OA. These mechanisms focus on teamwork and socialisation processes that incorporate activities and learning processes that enhance OA through individuals. *Organisational culture* is also an important antecedent of OA because it is here that value systems and common habits join together, in the form of norms accepted by all (Chang, 2016; Bonesso, Gerli & Scapolan, 2014). One general feature of organisational culture in SMEs, is the influence of the owner-manager on the management practices.

Smaller firms tend to be more influenced by such than larger firms, given the proximity between people and hierarchical functional links (Okřęglicka et al., 2015). In this context, SMEs that have an organisational culture that facilitates internal processes based on exploitation and exploration can develop OA (Poon et al., 2020; Taylor & Helfat, 2009).

Structure and context sustain firms' options and evolve through initiatives that aim strategically for results through administrative and cultural mechanisms regulating the allocation of resources to different areas of strategic initiative, thereby formalizing learning processes incorporated through definition of objectives and domains of an organisational nature (Burgelman, 1991). Under this perspective leadership also emerges at the basis of strategic initiatives, concerning the management of available resources as well as in the definition of management strategies that support exploitation and exploration (Raisch & Birkinshaw, 2008). The relationship between OA and strategy arises through top management inducing initiatives intentionally (Burgelman, 1991; Lubatkin et al., 2006), which has repercussions on the options of exploration and exploitation. An example of these strategic initiatives emerges when organisations promote change processes, for example, by reconfiguring organisational assets, aiming to use them strategically as a competitive advantage in the market (O'Reilly, Harreld & Tushman, 2009) or when OA is developed by top management processes through behavioural integration. This is a process embarked on by top management which influences, orients, and integrates the quality of available information, management decisions, and the unity of work teams' efforts (O'Reilly et al., 2009).

In this line of thought, Mom, Fourné and Jansen (2015) and Mom et al. (2007, 2009) suggest three related characteristics of top managers for the formation of environments of organisational ambidexterity: 1) handling contradictions and conflicts; 2) multitasking, and 3) always refining and renewing their knowledge, competences and skills. Besides these three characteristics, these authors propose two mechanisms of coordination inherent to top managers: formal structural mechanisms and personal coordination mechanisms. The former is related to managers' decision-making and authority and their strategic impact on the organisation; the latter are related to how managers handle the sharing of values, objectives and interests within the organisation.

3.2. External Antecedents

Although some authors consider environmental factors as moderating OA (Jansen et al., 2006), others suggest that OA is an internal process resulting from the direct influence of developing internal exploitation and exploration activities (Rothaermel & Alexandre, 2009; Bagnoli & Giachetti, 2014; Russo & Vurro, 2010).

Indeed, the literature contains concepts such as environmental dynamics (Gonzalez-Benito et al., 2014) or market uncertainty (Eklinder-Frick, Eriksson & Hallén, 2012) which basically express the degree of instability in firms' competing environment, its unpredictability, its variations, the result of consumers' preferences or external pressure to develop new products, new technology or services (Jansen et al., 2006). Dynamism or uncertainty is reflected in firms in how they act according to exploitation or exploration. In this connection, the study by Jaworski and Kohli (1993) stands out, considering that firms operating in competitive markets feel forced to develop actions to respond to those external pressures, which affects their strategic orientations. Therefore, the external environment is a factor that, in OA, moves firms towards certain tendencies of exploitation or exploration (Lavie & Rosenkopf, 2006).

So, exploitation and exploration emerge as balanced between external pressure from customers and markets, business opportunities, tendencies or guidelines in networks, alliances or partnerships. Stettner and Lavie (2014) suggested that the relationship of exploitation and exploration activities in networks, partnerships or alliances is explained by the benefits associated with each, combined with each other and grounded internally. The same happens in relation to the processes whereby OA can be achieved, for example, when firms balance and reconcile the interaction between internal and external learning processes when faced with the need to innovate (Russo & Vurro, 2010).

4. Elements Facilitating and Inhibiting Organisational Ambidexterity in the SME Context

4.1. Characterisation of Small- and Medium-sized Enterprises

SMEs are greatly affected by global transformations in markets. In the Portuguese case, their influence on the economy is decisive, due to the number of jobs they can create, their capability to introduce innovative products or to provide greater social integration and stability through the workforce (Schmiemann, 2009; ENSR, 2003). These attributes allow the creation of reciprocal opportunities between innovation, local and social development, and economic growth (Leigh & Blakely, 2016). For that reason, SMEs have attracted growing interest in the academic community.

From the organisational point of view, these firms are characterised by their form of ownership, based on the figure of the owner/founder, centralised management and their style of management and leadership (Neto & Junior, 2006). In addition, the shortage of resources, particularly technical or financial resources, access to them and their distribution are among their most determinant characteristics. Financial restrictions are among the characteristics with greatest impact on their development (Winborg & Landström, 2001). The relationship between their resources and their performance has also been greatly studied (Vaz & Nicolas, 2000). The difficulty in accessing technology, limited access to external resources, the nonexistence of support structures for innovation and development, or the weak tendency to cooperate with other firms end up being important limitations for their development and competitiveness (Vaz & Nicolas, 2000; Kalafsky & Duggan, 2016). In addition, their small size, the difficulty in accessing legal and administrative mechanisms for financing, the reduced influence on the market and low product diversification are identified in the literature as limiting SMEs (Calof, 1994; Franco & Haase, 2010).

Considering the human component, the literature on SMEs also refers to a number of important characteristics, such as functional flexibility or the absence of a culture of strategic human resource management (Ricci, 2011; Nakos & Brothers, 2002; Reale & Dufour, 2006). The qualifications and experience of SMEs' founders or managers, their personality and entrepreneurial traits are other characteristics affecting SMEs (Hendrawan, 2012; Ahmad & Muhammad, 2016). Some studies refer to this relationship between qualifications and firm performance, for example, the studies by Van Praag (2003) and Bates (2005). In general, these characteristics emerge in different studies related to innovation, entrepreneurial capability, and their relationship with markets or leadership styles (Neto & Junior, 2006; Franco & Matos, 2015; Franco, 2003; Saunila & Ukko, 2014).

One of the important characteristics of SMEs is that they can be less bureaucratic and more flexible than large companies. Furthermore, because SMEs have shorter product development cycles and are closer to the market, these firms can make changes to their technological knowledge better than large companies (Franco, 2003). These aspects, when combined with entrepreneurial capability, allow SMEs to take greater advantage than large firms (Ricci, 2011, Dankbaar, 1998).

Regarding their performance, this is frequently associated with how a number of external contacts, cooperation networks or strategic partnerships are formed, or how these firms position themselves in the market and react to opportunities and obstacles (Franco, 2003; Lu & Beamish, 2001; Ricci, 2011). They are also strongly influenced by their environment and by the dynamics of those markets (Abebe & Angriawan, 2014). Therefore, due to their high capability for adaptation and flexibility, these firms manage to be very reactive concerning cost control when faced with difficult economic situations (Acs & Oreston, 1997). These important characteristics for success in SMEs are mentioned by some authors, such as Lee, Lee and Pennings (2001) or Franco and Haase (2010).

The effect of OA in SMEs is vitally important for their competitiveness (Raisch et al., 2009; Koschatzky & Zenker, 1999), but it is also important to understand how their characteristics can hinder OA. Therefore, for better systematisation of this topic, the different characteristics were grouped in three levels: organisational, environmental, and individual. Table 1 summarises those characteristics, and the following sections seek to systematise the relationship between SME characteristics and the antecedents of ambidexterity, framed in a multi-level perspective.

Table 1. Characteristics of SMEs

Level	Main characteristics	Key idea(s)	Theoretical and empirical support
Organisational	Adaptability and flexibility	Great capacity to adapt to internal and external structural changes	Pinho (2007); Parida et al. (2016)
	Centralized management and form of ownership	Form of family ownership is usually centred on personal management	Pinho (2007); Torres (1998); Bayad and Garand (1998); Neto and Junior (2006)
	Small size and simple internal structure	Few hierarchical levels (vertical level), departments and posts (horizontal level).	Parida, Lahti and Wincent (2016); Torres (1998); Ricci (2011)

Continued >>>

Table 1. Characteristics of SMEs (continuation)

Level	Main characteristics	Key idea(s)	Theoretical and empirical support
	Informality	The informality of relationships is based on a simple structure, direct authority based on the owner and simple work processes	Holatova and Monica (2013); Jones and Macpherson (2006)
	Low capacity for investment in research and development processes and cooperation networks with other firms	SMEs' difficulty to invest in technological processes is reflected in alternative options and low capacity for research and development, and in forming cooperation networks, alliances and partnerships	Neto and Junior (2006); Ricci (2011); Franco and Haase (2010)
	Limited financial capacity	Financial restrictions limit innovative capacity and access to resources that are important for SME development.	Hendrawan (2012); Brouthers and Nakos (2004); Ripollés, Blesa and Monferrer (2012); Laufs and Schwens (2014); Lu and Beamish (2001); Neto and Junior (2006)
	Great ability to reduce costs when faced with difficult situations	Few hierarchical levels and greater flexibility when faced with variations in the business context make SMEs more responsive to difficult situations.	AcS and Preston (1997); Laufs and Schwens (2014)
	Low product diversification	Tending to provide a limited range of products and services	Neto and Junior (2006); Sammut (2001);
	Non-existence of a culture of strategic management of human resources	Corporate culture that systematically promotes the quantitative rather than qualitative approach and structures that frequently place HR in a situation depending on other functions	Réale and Dufour (2006)
	Low capacity to access and use external resources	Little tendency to form alliances with other firms and access external sources of finance and knowledge networks, except in SME with a strong export component, lack of knowledge	Fernández-Ortiz and Lombardo (2009); Zacharakis et al. (1999); Brouthers and Nakos (2004); Schwens and Kabst (2011); Volery et al. (2015)
	Little influence in the market	Their influence and impact on the market is limited, and distribution channels are insufficient, being controlled by large firms.	Calof (1994); Lu and Beamish (2001); Ricci (2011); Franco and Haase (2010)
	Contact network	Contact network based on the leader's personal experience and the management team's personal knowledge	Okamuro (2007); Francioni et al. (2015)

Continued >>>

Table 1. Characteristics of SMEs (continuation)

Level	Main characteristics	Key idea(s)	Theoretical and empirical support
	Non-existence of professional management	Limited number or absence of specialized management professionals	Neto & Junior, 2006; Sammut (2001); Ricci (2011)
	Low level of professional specialization in human resources	Poorly qualified human resources, leading to a low level of innovation	Nakos & Brouthers (2002); Hannan & Freeman (1997); Parida et al. (2016); Ricci (2011); Vaz & Nicolas (2000)
	Great capacity to introduce innovative products	Achieved by the speed with which internal processes, once set in motion, produce effects	Umidjon et al. (2014); Ripolles Meliá, Blesa Pérez & Roig Dobón (2010)
	High degree of functional flexibility among human resources	Human resources perform diverse functions and tasks in different activities, evidencing great functional flexibility and polyvalence.	Réale and Dufour (2006); Hannan and Freeman (1977)
Environmental	Highly sensitive to external environmental influence	The variables and volatility of the external environment have a great effect on their capacities and attributes, characteristics to which SMEs are particularly sensitive.	Mom et al., (2009); Rothaermel and Alexandre (2009); Laufs and Schwens (2014); Schwens and Kabst (2011)
	Market dynamics	Market dynamism reflects the degree of competition in the market and forces SMEs to direct their resources to exploitation activities, which does not favour the balance of ambidexterity	Dimitratos et al. (2016); Abebe and Angriawan (2014); Yitzhack Halevi et al. (2015)
Individual	Strategic vision and leadership	The leader's vision based on their experience and intuition and their ability to construct future scenarios	Bayad and Garand (1998); Abebe and Angriawan (2014); Volery et al. (2015); Neto and Junior (2006); Ricci (2011); Franco and Matos (2015)
	Founders' personality traits and entrepreneurship influences SME behaviour	Personality traits, beliefs and values, personal characteristics such as age, qualification, experience, and area of business influence SME behaviour	Hendrawan (2012); Ahmad & Muhammad Arif (2016); Fernández-Ortiz & Lombardo (2009); Bayad & Garand (1998); Réale & Dufour (2006); Francioni et al. (2015)

4.2. Analysis Centred on Internal Antecedents

Developing OA is a difficult process for SMEs because they are dependent on the complexity of strategic architectures (Voss & Voss, 2013), learning models (Benner & Tushman, 2003) or the allocation of resources that lead to tensions or important organisational changes between exploration and exploitation (March, 1991). One solution to the management of these tensions and exchanges is proposed by Tushman

and O'Reilly (1996) and Raisch et al. (2009). For these authors, the existence of autonomous or structurally distinct structural units in firms allows the simultaneous configuration of a set of tasks associated with exploration and exploitation. This configuration allows a unit to develop processes related to research, experimentation, creation of new processes or products characterised by new and totally different learning processes from existing ones, while another unit can develop other processes and products based on existing knowledge. However, this perspective is not arguable when contextualizing OA at the SME level.

From a structural point of view, firms' size appears frequently as a feature with an adverse impact on SMEs' action, especially concerning both external and internal processes. At the external level, this characteristic affects both their capacity to export and enter international markets, and in their tendency to export or their export intensity (Calof, 1994; Franco, 2003). SMEs do not have the ability to influence markets, either through commercial capacity or production capacity (Schwens & Kabst 2011; Volery, Mueller & Von Siemens, 2015). In this perspective, the challenges are also critical for SMEs when exposed to internationalisation processes, and networking or alliances with other firms. SMEs face difficulties when they want to evolve and develop their internationalisation activities due to the specific conditions they face in markets (Franco & Haase, 2010), since these conditions have an impact on their export capacity (Cos, Colom & Cabasés, 2019), as well as in the definition of expansion strategies in international markets (Ruzo, Losada, Navarro, & Díez, 2011). These strategies are reflected in how exploration and exploitation are constructed, as they vary depending on the degree of SME capacity to respond to market demands. Due to a smaller size, their influence in markets is low because the access to distribution channels is dominated by bigger firms (Calof, 1994), which leads to different combinations of strategies in the processes of exploration and exploitation of these firms (Stettner & Lavie, 2014). Voss and Voss (2013) argue that, to achieve OA, SMEs must combine exploration and exploitation to be competitive in markets. These authors suggest that larger, more mature firms are better prepared to deal with exploration and exploitation tensions when compared to younger SMEs. Competitiveness in markets also has an impact on the allocation of resources available for these strategies, especially when considering their relative degree of dispersion and penetration in key markets (Larimo, Zucchella, Kontkanen, & Hagen, 2018). However, despite the resource constraints, this obstacle can be overcome through collaborative behaviours between SMEs concerning resources needed for exploration and exploitation activities (Senaratne & Wang, 2018).

At the internal level, organisational processes find support in the capacity of these firms to be more adaptable and flexible when faced with rapid change processes. The way SME are structured, with few hierarchical levels, is also reflected in their ability to reduce costs and make effective strategic adjustments to existing resources. However, the small size of SMEs also has an impact on their growth and sales and determines the number of human resources hired (Larimo et al., 2018). It also affects their innovation and entrepreneurial capability (Franco & Haase, 2010), access to sources of knowledge, technology, and strategic behaviour (Link & Bozeman, 1991; Koschatzky & Zenker, 1999; Fernandes, 2009; Vaz & Nicolas, 2000). Due to their small size and the simplicity of their internal structure, SMEs can exploit innovation processes in market niches underexplored, but associated costs make simultaneous adoption of exploration and exploration activities unfeasible (Lavie & Rosenkopf, 2006). To Ghofar and Islam, (2015) the small size of SME is an important factor that affect internal conditions and may influence SMEs performance (Taylor & Taylor, 2014), and the study by Fourné et al (2019) showed that the performance of firms in OA is differentiated by factors such as their size. The same suggestion is proposed by Raisch and Birkinshaw (2008) for whom the size of a firm is a critical factor on OA. Given the above reasoning, the following theoretical proposition is suggested:

Proposition 1. The small size and simplicity of their structure may inhibit OA in SMEs.

In the scope of SMEs' internal context, literature has pointed out the existence of a set of elements that characterise the way in which these firms operate (Andrade, Ferreira & Ratten, 2016; Franco & Haase, 2010). Practices of human resource management, organisational culture, functional flexibility are examples of processes with an important effect on SMEs' performance, and they can act as inhibitors or facilitators of OA (Chang & Hughes, 2012; Lubatkin, Simsek, Ling & Veiga, 2006). The literature has presented an important set of studies related to this subject.

One of the most important arguments is related to the influence of SME' organisational culture on human resources practices. Organisational culture that emphasises human resource management practices also allow a greater alignment between competences, capabilities, and opportunities, including the activities of exploitation and exploration (Jansen et al., 2012; Wang & Rafiq, 2014). This contingency perspective of SMEs' internal environment, their organisational culture and their values allow to argue that such aspects can contribute to the definition of an organisational culture model

influencing individuals' behaviours. Wang and Rafiq (2014) suggest that OA can be deeply rooted in the company culture, by linking the type of business with its ability to innovate. The contingency nature is also mentioned by Acs and Preston (1997), when relating the technological and human resources SMEs needed to strengthen their competitiveness. In SMEs, for example, learning processes are based on the workplace, individualised, and not systematised, and involve existing knowledge to improve operations (Keskin, 2006). This also emerges in the relationship between strategic culture and human capital when related to SMEs' increased capacity to respond to markets (Umidjon et al., 2014; Onkelinx, Manolova & Edelman, 2015).

In fact, the absence of a strategic culture addressing the asset of human capital in SMEs does not encourage the involvement of human resources in exploration and exploitation activities (Wang & Rafiq, 2014). The literature has shown that human resource management practices can facilitate OA. An example of this are high performance work systems or total quality environments, where in specific organisational contexts, these systems play a fundamental role in the processes of exploitation and exploration (Bakotić & Rogošić, 2017; Chang, 2016; Asif, 2017b). Voss and Voss (2013) share this idea when evidencing the lesser collaborative spirit of human resources through incentive programs and recognition of positive practices in SME. Furthermore, low investment in human resource management practices, low levels of involvement and commitment of human resources, the lack of recognition from top management concerning the impact of positive exploitation and exploration practices does not promote OA in SMEs (Onkelinx, Manolova, Edelman, 2015; Venugopal et al., 2019). These factors affect internal processes in SMEs associated with exploration and exploitation (Neto & Junior, 2006; Lubatkin et al, 2006; Bayad & Garand, 1998; Bloom et al., 2011). Following this line of thought, Venugopal et al. (2019) suggest the lack of human resource management structures based on the improvement of individual and group skills, does not enhance the ability to work on exploitation and exploration activities.

An important characteristic of SMEs corresponds to the high degree of functional flexibility of human resources. In fact, a high degree of functional flexibility in human resources means that people are not specialised enough in some specific type of activity (Patel et al., 2012; Cantarello et al., 2012; Bonesso et al., 2014; Laureiro-Martínez et al., 2010; Boxall & Macky, 2014). In this sense, the lack of specialisation can make it difficult to exploitation or exploration (Chang et al., 2011; Kodama & Shibata, 2014). From the point of view of human resource management, this turns out to be

detrimental to the development of OA because there is no functional specialisation (Mattes, 2014). Instead, according to literature, functional specialisation becomes a factor that, inserted in human resource management practices, can help OA, because it helps individuals in their exploitation or exploration roles (Mattes, 2014; Kang & Snell, 2009).

Literature highlights also that SMEs are less likely to use formal management practices, such as individual performance management, communication and involvement practices, or work process organisation system. These aspects, based on the contextual element of SMEs, end up affecting exploration and exploration since SMEs have great difficulty in identifying and adopting innovative technologies and working methods due to their weaker internal resources, and greater difficulty in implementing process management practices (Roper and Hart, 2013).

A considerable number of studies have shown that SMEs have other distinctive characteristics such as fewer formal management practices (Bloom et al., 2011; Forth et al., 2006), the high degree of functional flexibility of human resources or low financial capacity or low ability to access external resources. In small firms, the low qualification and specialisation of management staff seems to be related to the low levels of qualifications and knowledge of its main managers (Bloom et al., 2011). This difficulty in adopting more effective management methods, innovative technologies, working methods based on human resource management practices (Roper & Hart, 2013) ends up having an impact on OA, when it is observed through the perspective of exploitation and exploration. Exploitation and exploration are facilitated by management practices, innovative technologies, control systems for monitoring products and services, as well as human resource management practices (Brouthers & Nakos, 2004).

Evidence suggests SMEs have less capacity to diversify products and services, and to access specialized services, as well little market influence, a heavy dependence on clients and suppliers, focus on current operations and less capacity to innovate (Koschatzky & Zenker, 1999; Franco & Haase, 2010; Kalafsky & Duggan, 2016). Factors such as size, financial capacity, or limited ability to access external resources of SMEs is reflected in their low influence on the market, they are aspects that contribute in an important way to inhibit OA in SMEs. SMEs' limited financial capacity limits their options for strategic orientation related to exploration and exploitation. The allocation of resources, especially financial resources, has a significant hindering effect on SMEs at the OA level. Comparatively, in SMEs without financial restrictions, the

compensations between exploration and exploitation do not suffer from connected restrictions (Cao et al., 2009).

The resource-based theory suggests that current SMEs' resources contribute to firms' competitive advantage when combining resources and capabilities in unique ways to deliver superior performance (Barney, 2001). This combination of resources and capabilities will tend to be more effective when based on the perception of value and rarity, associated with those resources. Baia et al. (2019) support this idea when they highlight that the current resources in SMEs have a positive effect on organisational performance, when these resources are based on their rarity and value.

Nevertheless, SMEs have limited resources at the technical or financial level. SMEs reveal difficulties in accessing different external resources, such as knowledge networks or financing sources, which may be due to difficulties in combining technical competences and capabilities in association with the low tendency to form networks and strategic partnerships.

Considering the above reasoning, the proposed relationships between SMEs' characteristics and their effects on the development of OA in SMEs support the following theoretical propositions:

Proposition 2. The lesser use of management practices and the absence of a strategic culture of human resources, inhibit OA in SMEs.

Proposition 3. The high degree of functional flexibility of human resources inhibit OA in SMEs.

Proposition 4. Low financial capacity and the low capacity to access external resources inhibits OA in SMEs.

Proposition 5. The low influence on the market inhibits OA in SMEs.

In the SME context, management acts according to internal mechanisms, available resources and contextual, structural and environmental situations encountered (Burgelman, 1991; Bagnoli & Giachetti, 2014). SMEs faces more management challenges due to the opportunities and threats that arise in the external environment. The complexity of these challenges leads SMEs to be more reluctant than large firms to

adopt new management practices since their internal processes are less structured, less formal, less sequential, and the majority do not have long-term planning (Keskin, 2006).

SMEs' strategic behaviour is mainly based on how leadership manifests itself, considering a set of specific characteristics of this type of company (Franco & Matos, 2015). In SMEs, leaders play a key role in defining and supporting procedures, influencing work processes and human resource behaviours (Franco & Matos, 2015). In this type of enterprise, due to their reduced dimension, leaders act as a facilitator of individual and collective efforts (Mihalache, Jansen, Van den Bosch & Volberda, 2014). The style of leadership and management varies according to the characteristics of firms' competitive environment (Franco & Matos, 2015). It has repercussions on innovation, the organisation of work and human resource processes, entrepreneurship, and capability development, as well as on OA, in a positive way (Mom et al., 2015). In SMEs, leadership is often in the hands of the firm owner, its founder or a group of people with family links and their degree of influence. Jones and Macpherson (2006) and Keskin (2006) refer to that influence of the owner/founder figure, regarding their strategic orientations, being above all dependent on the management and leadership style adopted, as well as on the external relations they establish and centralise.

Leadership is also related to the nature of SMEs' owners (family business or not) and affects the performance of SMEs by how management processes are established. Fernández and Nieto (2006) suggest that the combination of different family property structures in SMEs with external factors such as market pressure, networks or alliances, and with internal factors such as technology, internal communication or resources, can affect decisions related to investments in innovation and development, product diversification or internationalisation. Investment decisions in areas such as technology or innovation and development in SMEs can be conditioned by this ownership structure relative to leadership among family members (Chen & Hsu, 2009). SME are less likely to invest in technological innovation than larger firms. Although the market is very competitive, SMEs show great difficulty in transforming resource investments into desired outputs. This difficulty turns out to be affecting exploitation and exploration. The study of Sarkees et al. (2014) highlights this aspect by suggesting that firms' exploitation and exploration capabilities are viewed as the ability to transform inputs into outputs. However, the limitation of existing resources greatly conditions both exploitation and exploration, affecting OA (Voss & Voss, 2013).

The study of OA has revealed different aspects through which leadership manifests itself. For example, human capital, which can be used effectively to create innovation, can be a facilitator of ambidexterity. Hodgkinson et al. (2014), for example, illustrate how human capital can be mobilised, through top management, to incorporate activities oriented to alignment and adaptability. Lubatkin et al. (2006) highlight the role of top management in OA through behavioural integration in SMEs. Another example is the study by Yang and Li (2011), which suggests the influence of environmental dynamics on individual competences through exploitative and exploratory activities.

The influence of founders' personality and entrepreneurial traits has been identified as another characteristic of SMEs. These traits are shown through the personal philosophy of action of the owner/founder, their personal beliefs and values, including their qualifications and own experience (Hendrawan, 2012). Those beliefs and personal values can influence OA because the decisions taken reflect the personal perceptions of these leaders. Another evidence of this aspect concerns to the fact that SME leaders tend to opt for exploitation, as they tend to be more suited to the limitations and scarcity of resources in SMEs (Francioni, Musso, & Cioppi, 2015; Dimitratos et al., 2016; Gredel, Kramer & Bend, 2012; Rhee, Park, & Lee, 2010; Kammerlander, Burger, Fust & Fueglistaller, 2015). The entrepreneurship capability of SMEs' leaders enables SMEs to respond to the challenges of markets, trends and technologies (Brouthers et al., 2015). This capability also allows the identification of business niches and new fields to be explored (Parida et al., 2016). To that extent, the entrepreneurial orientation reflects the strategic vision associated with activities with a high degree of uncertainty in results, but it may also reflect an ability to optimise internal processes in order to gain a competitive advantage over rivals and competitors through a more systematic action (Brouthers et al., 2015). In accordance, SMEs also have a great capacity to introduce innovative products. Through the entrepreneurial capacity of their leaders, SMEs may be more agile in providing innovative solutions to processes, services or products (Kammerlander et al., 2015). SMEs' internal processes are characterised by their simplicity and the speed of response to market requests and the response to specific niches, facilitating OA (Van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009; Okamuro, 2007). SMEs are more agile in adjusting to market variations and this translates into adapting processes according to these variations. Their small size and internal structures end up having the impact of these firms being able to be more responsive to the market (Gupta et al., 2006; Heavey et al., 2015; Tan

and Liu, 2014). Thus, SMEs reduce the variability of internal processes due to market's dynamism through OA approaches (Parida et al., 2016).

Also, the link between SMEs' strategic objectives and the owner/founder's personal objectives and vision can be a factor influencing SMEs (Franco & Haase, 2010). This connection affects an extensive set of processes linked to adaptability and flexibility, decisions about investment in innovation and development, entrepreneurial orientation and processes related to the business, markets or costs reduction (Claver-Cortés, Pertusa-Ortega & Molina-Azorín, 2012; Ahmad & Muhammad Arif, 2016; Franco & Haase, 2010; Okamuro, 2007; Bonesso et al., 2014; Gedajlovic et al., 2012; De Massis, Kotlar, Campopiano & Cassia, 2015; Arthur-aidoo et al., 2016). Their influence spreads through the distribution of resources, that role being fundamental in solving tension and conflicts between exploitation and exploration. That action may have repercussions on certain levels of performance, such as low product diversification (Mihalache, Jansen, Van den Bosch, & Volberda, 2014; Okamuro, 2007; Neto & Junior, 2006) and on the contact network based on the external network formed by the owner/founder and top management team (Li, Lin & Huang, 2014). Through managing the tensions between exploration and exploration, through adapting existing resources and through combining in a single way those resources with existing capacities, the centralisation of decisions, in the figure of the owner/founder, is linked to these processes. In this perspective, these leaders can favour the development of dynamics associated with OA environments (Cui, Michael & Zou, 2014; Halevi, Carmeli, & Brueller, 2015; Bonesso et al., 2014; Gedajlovic et al., 2012).

Besides leadership and the entrepreneurial traits of SME founders, other characteristics emerge as facilitators of OA. The centralised management of SMEs and the type of ownership, normally familiar, are characteristics of SMEs that have an impact on the performance of these firms. At the level of centralised management, these firms end up having an owner-manager who centralises all strategic, financial, and commercial decisions (Azadegan & Wagner, 2011). Centralised management in SMEs, often based on ownership, also influences the allocation of resources, whether technical, human, or financial (Sarkees et al., 2014). Its influence also on the way these firms carry out their internationalisation processes and how they compete with other companies (Pertusa-Ortega and Molina-Azorín, 2018). In this sense, according to the work of Bloom et al. (2011), this type of directive structure, based on ownership and centralized management ends up having a significant impact on the low use of formal management practices. However, somewhat surprisingly, the literature on OA states

that top management plays an important role in the formation of OA through behavioural integration (Garavan et al., 2016), whose example ends up being spread throughout the simple structure of these firms.

The capacity to introduce innovative processes or products are also characteristics that allow the reconfiguration of internal procedures and an effective response to market demands (Song & Chen, 2014; Okamuro, 2007). This has a significant impact on how exploratory and exploitative activities are developed. Based on flexibility, organisational processes in SMEs are characterised by their ability to respond to ever-changing processes, where learning is built on the basis of open environments (Adler, Goldoftas, & Levine, 1999). This capability is based on qualified human resource management processes with great capacity to adjust new behaviours to current SMEs' technology with great autonomy (Ebben & Johnson, 2005). In the absence of those elements, flexibility will not have a positive effect on OA (Nadkarni & Herrmann, 2010). Adaptability corresponds to firms' ability to adopt change processes through behaviours based on knowledge sharing, facilitation of learning, communication strategies, and being responsive to markets and customers' needs (Hodgkinson, Ravishankar, & Aitken-Fischer, 2014). Its effect on OA is mainly related to management's guidance in relation to the allocation of current resources, current technological processes, the introduction of new processes or products or the response to external requests from markets, customers, or suppliers. These factors are contingent and have a positive effect on the OA, when considered from the point of view of leadership decisions and the balances provided by these decisions in exploration and exploitation, namely at cost control level (March, 1991). SMEs' agility in occupying business niches reflects these two characteristics. Gibson and Birkinshaw (2004) support this thesis, saying that organisations become ambidextrous when they adopt certain configurations in relation to the environment.

In OA, the question of existing resources, whether technical or human, is one of the explanatory conditions. SMEs' ability to reduce costs also emerges as a corrective reaction in specific market circumstances, and from this perspective, may affect OA. SMEs have a great capacity to reduce costs when facing difficulties. In operational terms, this aspect is closely related to exploration and exploitation activities, through the diminished risk associated with the phases of products' life-cycle or operational costs (Brouthers & Nakos, 2004). Cost reduction serves as a catalyst for developing organisational alternatives that influence SMEs' competitiveness, with positive effects on OA (Ahmad & Muhammad Arif, 2016). This effect is reflected when SMEs are faced

with challenges that impel them to seek alternative solutions based on the combination of resources with current capacities or on the change of internal processes related, for example, to their inefficiency and poor quality (Albliwi, Antony, Abdul, Lim, & Wiele, 2014), production costs (Ahmad & Muhammad, 2016), or fixed costs related to current technologies (Teece, Pisano, & Shuen, 1997). For this reason, the simple structure and reduced bureaucracy benefits the ability to control and lower costs in SMEs, with an effect on their capacity for OA (Goel & Jones, 2016). However, in this domain, other limiting factors have also been suggested in the literature, such as the low investment in technological innovation or the low capacity to develop internal research and development processes (Vaz & Nicolas, 2000; Brouthers, Nakos & Dimitratos, 2015). Issues such as SMEs' focus on cost reduction and the lack of a strategic orientation for balancing exploitation and exploration activities affect their capacity for investment in new technology does not allow the development of new, innovative, and differentiated processes, preventing the development of exploratory and exploitative activities fundamental for OA (Ahmad & Muhammad Arif, 2016).

Given the above reasoning, the proposed relationships between SMEs' characteristics and their effects on the development of OA in SMEs are based on the following theoretical propositions:

Proposition 6. Low investment in technological innovation or low product diversification inhibits OA in SMEs.

Proposition 7. Adaptability and flexibility in SMEs may act as a facilitator of OA.

Proposition 8. The high capacity to introduce innovative products and high capacity to reduce costs may facilitate OA.

Proposition 9. Centralised management and form of ownership may facilitate OA.

Proposition 10. The entrepreneurial and personality traits of the owner-manager, his strategic vision, and leadership may facilitate OA.

4.3. Analysis Centred on External Antecedents

In globally competitive environments, technology and capabilities transform business practices and systems (Raisch & Birkinshaw, 2008; Gibson & Birkinshaw, 2004).

Concepts such as market dynamism or environmental turbulence emerge in the literature as related to the degree of environmental instability, unpredictability, competitiveness, and constant change in technology (Halevi et al., 2015). These concepts are also related with variations in consumers' preference and with pressure to develop and innovate in products and services (Kim & Rhee, 2009; Jansen et al., 2006). That influence ends up having an impact on the choice of routines, processes and practices essential for firms' survival in increasingly competitive markets (March, 1991).

SMEs are no exception to this rule. They do not have a constant number of products, nor a large structure or size. The diversity of capacities and internal resources, specialists and qualified human resources is limited, and they do not have specific commercialization channels and scale economies (Rao-Nicholson et al., 2020). These factors end up conditioning how SMEs position themselves in markets, how they allocate resources, how strategically they determine investments in new technologies or new production processes (Li et al., 2014). SMEs are sensitive to market dynamism and cannot escape from a set of influential factors regarding different internal dimensions, such as individual competences (Yang & Li, 2011), alliances and cooperation between firms (Monferrer, Blesa & Ripollés, 2013; Li, Wei, Zhao, Zhang & Liu, 2013; Franco & Haase, 2010), learning processes (Li et al., 2013), internationalisation (Lu & Beamish (2001) or leadership (Lubatkin et al., 2006). Access to resources such as specialised technical knowledge, new technology or new markets is also strongly affected by environmental dynamism (Bianchi, Glavas & Mathews, 2016).

Madrid-Guijarro et al. (2016) also refer to SMEs' financing difficulties and their impact on investment in innovation and development processes, technology, and product diversification, as factors preventing SMEs from competing in hostile environments. However, even with less resources comparing to large firms, particularly financial resources and skilled human resources, SMEs play an important role in economies, because they have a great capacity to exploit business opportunities locally, through the bonds they establish with other firms (Oinas & Malecki, 2002; Koschatzky & Zenker, 1999).

In this context, the development of networks, strategic alliances, has been pointed out as one of SMEs' strategies being able to help in accessing important resources. Brouthers, Nakos, and Dimitratos (2015) emphasise the influence of networks and strategic alliances in the processes of internationalisation and their performance

concerning OA, and Franco (2003) refers to collaboration strategies among SMEs as a mechanism to overcome the costs associated with innovation.

However, the environmental effect on SMEs is a critical factor in the relationship between exploitation and exploration. Because market pressure' effect is generally very significant in SMEs' context, they tend to focus on exploitation activities rather than exploration activities, mainly due to costs (Ebben & Johnson, 2005), the effect of uncertainty and the potential and critical consequences of risk for firms (Brouthers & Nakos, 2004), and because they are projected from existing knowledge (Abebe & Angriawan, 2014). This is a known and controlled process. As noted by Jansen et al., (2006), that preponderance of the different facets of the environment in SMEs ends up forming exploitation and exploration processes internally. Exploration tends to be reflected negatively in the relationship between innovation and performance, and exploitation is reflected positively in the relationship between innovation and financial performance (Kim & Rhee, 2009; Abebe & Angriawan, 2014), which hinders OA.

The literature highlights other aspects of the influence of the environment on SMEs. Regulated excess and administrative and commercial regulations are important obstacles (Tahar et al., 2011; Senaratne & Wang, 2018). SMEs are characterised by their difficulty in integrating those mechanisms, due to little awareness and absence of information and resources, which also hinders OA (Li et al., 2014). Considering the above reasoning, the proposed relationships between SMEs' characteristics and their effects on the development of OA in SMEs are based on the following theoretical propositions:

Proposition 11. High sensitivity to external influence in SMEs inhibits the development of OA.

5. Conclusions, Main Suggestions for Future Research and Limitations

This study followed a perspective of how OA emerges in firms. The different studies (Chandrasekaran, Linderman, & Schroeder, 2012; Chang, Hughes & Hotho, 2011; Dolz, Safón, Iborra, & Dasí, 2014; Gibson & Birkinshaw, 2004) essentially follow approaches centred on exploration and exploitation. However, in the line proposed in the

introduction to this study, it was observed that other paths could be followed, also important regarding the development of OA in SMEs.

It is consensual that SMEs have characteristics distinguishing them from large firms, especially regarding their culture, size and type of leadership or management. Moreover, they are fundamental for job creation and countries' economic growth.

Despite these considerations, various processes and practices found in SMEs let us consider a wider spectrum in understanding OA. Examples are management practices, investments in technology and innovation, human resource management practices, organisational culture, learning process or individual characteristics and personality traits associated with leadership. However, these processes alone do not trigger OA in SMEs. In the SME context, these processes and practices give rise to the idea that other perspectives and explanatory relationships are possible, and indeed required in OA.

From the theoretical point of view, there may be a question concerning the weight of SMEs' characteristics in development of OA. The evidence found in the literature and considered in the previous sections suggests, firstly, that those characteristics are the basis of how SMEs develop OA, affecting and influencing how OA is developed; and secondly, addressing OA in SMEs implies, from the empirical point of view, a quite different interpretation and approach from what is adopted in relation to large firms. However, in this respect, an important question arises: given the shortage of resources, how to incorporate processes that lead to OA, without considering them?

These reflections are at the basis of the theoretical framework developed in this study, where the intention was to include all aspects controlling the development of OA in SMEs, trying to be systematic and wide-ranging at the same time, following the main guidelines provided by the literature in recent years. It is also of note how SME characteristics were grouped, from the perspective of each group of antecedents and in the form of their potential effects on OA, which allowed a concentrated view of the phenomenon and the extraction of some conclusions.

Nevertheless, some characteristics stand out in the SME situation, and these warrants closer attention. For example, the lack of financial and technical resources, managers' lack of preparation and that of human resources generally, or this firm sector's chronic difficulty in forming strategic partnerships, are characteristics that create difficulties in SMEs (Franco & Haase, 2010). That difficulty usually emerges as the result of a

combination of internal and external determinants. External factors act on the firm from outside and can hardly be avoided. On the contrary, internal factors can be controlled by the firm or its own members (Zacharakis et al., 1999). To develop OA in SMEs, the challenge for managers is enormous.

However, some of these characteristics raise doubts. Firstly, there is ambiguity concerning the role of these firms' size in performance. On one hand, limited size is considered to have a negative effect when thinking about the idea of different structural units, but on the other, it will serve as a facilitator of exploratory or exploitative activities according to SMEs' strategic balance. The same occurs in relation to their capacity to form alliances and partnerships or their capacity to generate innovation. Will the limited diversity of capacities, limited commercialization channels and resource shortage really be characteristics that inhibit OA? The idea of ambiguity arises in the discussion in the literature. (Franco & Haase, 2010; Tushman & O'Reilly, 1996; Chang & Hughes, 2012; Jansen et al., 2006; Choi & Phan, 2014; Bouncken et al., 2016). From the management viewpoint, the major question is knowing how to combine those characteristics to make SMEs even more innovative and rise above their competitors.

This study went a little further, by proposing to relate SME characteristics to factors traditionally associated with OA. It showed that OA should be interpreted considering its whole internal, organisational, and individual, as well as its external setting. Therefore, the study takes a new, more wide-ranging approach to OA in the SME context to be tested empirically.

From the theoretical point of view, the major theoretical contribution of the study consisted of proposing the idea that OA is the result of interactions, through the combination of characteristics that function together, placed at different levels. The basis of this notion and the model proposed is that all levels contribute to OA and are complementary. In practice, OA is based on complex capacities of learning, differentiation, oriented integration, and leadership.

As for the contribution to practice, this study serves as a guideline for firms interested in developing OA as a capability (O'Reilly & Tushman, 2013), and to be aware of the characteristics they can exploit to maximum benefit, as well as those characteristics that contribute most to inhibiting the OA process. Based on the above, the study also contributes to spreading the concept in the common management lexicon.

Empirically, and to guide future research, factors such as the sector of activity and region, and phases of the life cycle could be explored, considering the different types of relationship between SME characteristics for different sectors of activity.

Our study provides researchers working in the field of OA with a comprehensive view and allows you to glimpse the areas that require further analysis. In addition, we have provided a brief review of some important articles on OA. Also, this approach can help to recognize the importance of antecedents for OA and points to the contingency character of the main characteristics of SMEs as potential influencing factors in the construction of OA as a capability.

As the main limitation of this study was the fact that it was not possible to deepen the scope of the study to an activity sector in SMEs, due to the scarcity of studies on this research topic, which would have been more fruitful from the point of view of conclusions and contributions to future research.

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CHAPTER 4

The Effect of Owner-Managers' Personality Traits on Organisational Ambidexterity In SME' Context

Abstract

This study aims to analyse the influence of the personality traits of owner-managers in small and medium-sized enterprises (SME) on organisational ambidexterity. Based on the existing literature, five hypotheses were formulated about the relationships between the Big Five personality traits and organisational ambidexterity. A second order structural equation model was used with a sample of 224 Portuguese SMEs in the sector of information technology (IT), telecommunications, audio-visual and IT consultancy. The results obtained suggest that the personality traits of Extraversion, Neuroticism (emotional stability) and Conscientiousness do have a significant influence on organisational ambidexterity. These results are consistent with research and demonstrate that owner-managers' personality traits influence organisational ambidexterity in SMEs. Theoretical and practical implications are explored.

Keywords: Big Five model, organisational ambidexterity, owner-manager, personality traits, SME.

1. Introduction

The idea that firms able to explore and exploit simultaneously are more competitive is the basis of research on organisational ambidexterity (Birkinshaw, Julian & Gupta, 2013). In this context, literature highlights, two major lines of research: the first, at the organisational level, refers to the difficulty of conciliating exploitation and exploration due to the intrinsic nature of each of the activities (Jansen, Volberda & Van Den Bosch, 2005). These constraints are based on the way in which exploration and exploitation activities are carried out and literature notes that both concepts contain contradictory aspects. While exploitation is based on existing knowledge and experience to consolidate its knowledge base (Holmqvist 2004; Keller & Weibler, 2014), exploration, improves the variability of knowledge through the introduction of new technologies, products, and markets (Lubatkin, Simsek, Ling, & Veiga, 2006). However, this balance is more difficult to achieve in small and medium enterprises (SMEs) because they face greater challenges and difficulties compared to larger firms. For example, SMEs face greater constraints concerning access to resources for both exploitation and exploration activities (Stettner & Lavie, 2014).

The second major line of research concerns the contribution of individual level's values, attitudes and behaviours, as well as personality traits, contributes to organisational ambidexterity. For example, Lin and McDonough (2014) point out the individual cognitive structures used to deal with the contradictions between exploitation and exploration and Bonesso et al. (2014) adopt a micro level of analysis by focusing on the relevance of individual perception of exploitation and exploration. Taking a different approach, Mom et al. (2009) focus on the behavioural orientation of top managers and their influence on exploration and exploitation activities.

The volume of research produced related to the influence of top management in SMEs remains scarce and underexplored, despite the theoretical support provided by various theories, such as Upper Echelons Theory (Hambrick & Mason 1984), Behaviour Theory of the Firm (Cyert and March 1963), or Theory of Dynamic Capabilities (Teece, Pisano, & Shuen, 1997).

Indeed, in the SME context, given the position they hold in SMEs, leading and directing owner-managers' actions have a significant impact on SMEs success and competitiveness (Kammerlander, Burger, Fust & Fueglistaller, 2015). They have been characterised as responsible for strategic decisions made according to market demands,

clients, suppliers, innovation processes as well as assigning different types of resources available (De Visser, Faems & Van Den Top 2011; Kammerlander, Burger, Fust & Fueglistaller, 2015; Malmendier & Tate 2005; Rodenbach & Brettel 2012). Characterised by a smaller structure and fewer resources, SMEs are greatly influenced by global transformations affecting the markets (Franco & Haase, 2010). For Hambrick and Mason (1984), owner-managers' personal characteristics are reflected in strategic decision-making processes. Other theoretical contributions have emerged in the literature to structure the debate on the owner-manager's influence on developing the capacity of organisational ambidexterity (Bonesso et al., 2014; Håkonsson, et al., 2012; Kammerlander et al., 2015; Raisch et al., 2009). However, none of these approaches sought to advance towards a more intrinsic perspective, such as personality traits of the owner-manager, and if these personality traits, influence or not, organisational ambidexterity in SME' context.

In the field of studies about personality, the Big Five model of personality (McCrae & Costa, 1996) has gained consensus in the literature, particularly in the field of personality studies in psychology, and more specifically, in the field of management studies. The relationship between personality traits and company performance present interesting perspectives as a research area (Gow et al., 2016; Kaplan et al., 2012; O'Reilly et al., 2014). The Big Five model (McCrae & Costa 1996) has been used to explain entrepreneurs' personal performance, creativity or innovation. It should be noted that the literature has suggested that the behaviours of owner-managers in SMEs can predict behaviours in employees as well as the ability of SMEs to be competitive (Leutner et al., 2014). This perspective gains particular interest at the level of SMEs since these firms have a small size, simple internal structures and where the behaviour effect of the owner-managers is more visible. Therefore, this study aims to go further by relating the Big Five model to organisational ambidexterity. While not seeking a psychological analysis of owner-managers, this research adopts the perspective of Hambrick and Mason (1984) concerning their basic theoretical arguments that intrinsic psychological nature associated with owner-managers is applicable to developing organisational ambidexterity in SMEs.

Considering the above reasoning, this research aims to find out if there is a significant influence of owner-managers' personality traits on organisational ambidexterity in the SME context. Following the question asked by O'Reilly and Tushman, (2013) "how is ambidexterity achieved?", this research adds a new perspective by considering the

relationship between managers' psychological traits and organisational ambidexterity in SMEs.

In the Portuguese context, studies in organisational ambidexterity involving SMEs are scarce. Portuguese SMEs have a great impact on the economy, due to the number of jobs they can create their capacity to introduce innovative products or, to provide greater social integration and stability through the workforce (Franco & Haase, 2010). Portuguese SMEs represent a high percentage (Franco & Haase, 2010; INE 2021) in the universe of firms in Portugal, and they are decisively important for the country's economy.

Portuguese SMEs have, in their dimension, the biggest challenge for their competitiveness, since they operate in a narrow, and not very versatile market. This aspect has consequences for their growth and sustainability, which is a decisive aspect when compared to SMEs in other countries (Schmiemann, 2009). SMEs in Portugal are usually family businesses, often based on a traditional style of leadership and management. However, one of the main characteristics of Portuguese SMEs is the fact that their owner-managers have a high degree of entrepreneurial capacity. These attributes justified the choice of these types of firms for this study, especially when considering SMEs' specificities such as the small size or the scarcity of resources (Franco & Haase, 2010).

To respond to the challenges raised above and to the question defined for this study, the article is structured as follows. Section 2 provides a general view of the relevant literature, discusses the main studies and develops the hypotheses. Section 3 explains the research methodology. Section 4 describes the results and section 5 provides a discussion of these results. Finally, in section 6, conclusions are outlined, underlying the main contributions and suggestions for future research.

2. Literature Review and Research Hypotheses

2.1 Organisational Ambidexterity: The Balance Between Exploration and Exploitation

Organisational ambidexterity is a concept linked to company performance and refers to the capacity to manage simultaneously processes of exploration and exploitation

(Birkinshaw et al., 1998; Chang & Hughes, 2012; Jansen et al. 2012; Raisch et al., 2009). According to March (1991), through exploitation, firms orient their activities towards efficiency in their production, refinement, improvement, selection and execution, whereas exploration is related to innovation, flexibility, discovery, risk-taking, variation and research (March 1991). Exploitation involves individual and collective competences and knowledge, which, by being combined and internalized, allow incremental refinements in technology, product, or service, adapting existing technology, and to a better response to current clients' needs. Exploration generally, emerges as a response to latent environmental trends through creating innovative technology, revolutionary new products, and new markets (Andrade et al., 2016). When exploitation and exploration are managed together in firms, they provide an important dynamic capacity for organisational ambidexterity (Raisch et al. 2009).

The concept of organisational ambidexterity implies considering rather than an opposing relationship between exploration and exploitation, an orthogonal relationship inasmuch as both learning activities direct the specific processes associated with each other. Therefore, and according to March (1991), exploration and exploitation represent a series of fundamental differences in the company's behaviour and strategy with significant consequences for its performance. The first refers the creation of new technology, products, and markets (He & Wong, 2004; Lubatkin et al., 2006), while the second focuses on new learning possibilities and challenges based on the use of knowledge, competence and efficiency, creation of routines, control, and bureaucracy.

One of the concerns mentioned in literature on OA is related to whether exploitation or exploration occurs in a continuous or orthogonal way. Exploitation and exploration are activities that compete for scarce organisational resources and assigning more resources to one type of activity means an imbalance between both. However, we can go a little further and suggest, similarly, to what Gupta et al. (2006) and Katila and Ahuja (2002) suggested that there may be an interaction between exploitation and exploration activities whenever there is a need to resort, not to scarce resources, but to resources that are not limited, such as knowledge or learning. In this sense, exploitation, and exploration can be orthogonal. However, for Gupta and Shalley (2006), the question of continuity or orthogonality of exploitation or exploration must be observed from the level of analysis' perspective. Thus, it is easier for the group or organization than for the individual to manage exploitation or exploration. This is due to the fact that for an organisation or group it is easier to adjust exploitation or exploration activities based on the need for resources, learning or routines being more

difficult for the individual to switch between these two types of activities (Gupta & Shalley 2006).

The interaction between exploration and exploitation activities, as mutually orthogonal, assumes that both activities can reach high levels in companies, thereby emphasizing firms' capacity to be ambidextrous (Dolz et al., 2014). Therefore, ambidexterity is understandable within a framework where firms can be ambidextrous as long as their levels of exploration and exploitation are high. Cao et al. (2009) follow this perspective, by conceiving ambidexterity as a dynamic capability and by suggesting a way of measuring ambidexterity through two notions, namely, balancing ambidexterity and combining ambidexterity. The former refers to operationalizing the difference between exploration and exploitation or the symmetry between them (Dolz et al. 2014), while the latter refers to the product of exploration and exploitation, or to volume (Dolz et al. 2014) achieved by the firm.

Organisational ambidexterity is also contextualized in literature at the individual level and some studies use this explicit level of analysis. Mom et al. (2009) suggest the existence of a behavioural orientation associated with owner-managers, which combines exploitation and exploration, and Bonesso, Gerli and Scapolan (2014) suggest that patterns of individual perceptions are at the basis of owner-managers' strategic options. Good and Michel (2014) highlight owner-managers' cognitive capacities regarding options between exploration and exploitation strategies in firms. Generally speaking, these authors provide basic theoretical grounding that also allows considering the individual dimension in SMEs, through its effect on constructing organisational ambidexterity as a dynamic capability. Both exploration and exploitation are contextualized within the firm's relationship with its environment, with its organisational characteristics and, since they have different characteristics, end up competing for resources (Benner & Tushman, 2003; Gibson & Birkinshaw, 2004; Levinthal & March, 1993; Laureiro-Martínez, Brusoni & Zollo, 2010).

2.2. Owner-managers' Personality Traits and Exploration–Exploitation at the Individual Level

Literature suggests the personality traits of top managers as a potential antecedent of organisational ambidexterity. According to Felin et al., (2012), top managers manifest

themselves as a collective phenomenon but situated at the individual level. At the heart of this perspective is the idea that individual characteristics interact with organisational conditions (Huang, Battisti & Pickernell, 2021) through actions, routines, and capabilities developed by top managers (Felin, et al., 2012). However, Huang et al. (2021) state that top managers' personality traits are often studied separately and suggest that these characteristics could be studied together. In this sense, their study on the regulatory focus seeks to understand how these personality traits are influenced by top managers' perceptions in relation to the situational and contextual conditions of the markets. Other studies refer to this theory as being a factor that shapes the actions of CEOs. Thus, Tuncdogan et al., (2017) suggest that CEOs' behavioural traits actuate as antecedents of exploration through coordination mechanisms such as centralization and connectedness. Nadkarni and Herrmann (2010) had previously suggested the importance of CEOs' personality in terms of the strategic flexibility construct, but also indicating how each facet of the CEOs' personality increases or inhibits this construct. According to Mammassis and Kostopoulos (2019), top managers are involved in learning actions directed at organisational ambidexterity with greater or lesser intensity, depending on the degree of environmental dynamism where SMEs are inserted. However, in the case of SMEs, one of the main elements linked to organisational ambidexterity refers to the entrepreneurial trait of owner-managers. In the Portuguese case, this has been a characteristic referred to in literature, given the limitations of the Portuguese market. This entrepreneurial trait (Shane & Venkataraman, 2007; Staniewski, Janowski & Awruk, 2016) is characterized by the ability to switch between exploitation and exploration opportunities (Goel & Jones, 2016).

The relationship between owner-managers' personality and SME' performance is reflected in literature, especially regarding its influence on different organisational configurations. At the heart of this perspective is the influence of the owner-manager's personality on the way the firm aligns and organizes itself internally (Francioni, Musso & Cioppi, 2015) and how it reacts externally (Slaughter & Greguras, 2009; Schreurs et al., 2009).

Among the different contributions in the literature about definitions of personality, we may highlight the notions of Schneider et al., (1998), for whom personality is a set of individual attributes that gives form, structure, and consistency to people's behaviour over time and when faced with different situations, and that of Funder (2001) who

refers to the concept as a set of structures and tendencies that reflects or explains characteristic patterns of an individual's thought, emotions, and behaviours.

Despite the complexity of the concept, studies have shown this influence of the owner-manager's personality on SMEs' styles of leadership and management (De Visser et al. 2011; Franco & Matos, 2015), innovation capacity (Figueiredo & Piana, 2018), orientation towards internationalization (Marcati, Guido & Peluso, 2008) and entrepreneurial orientation (Brouthers, Nakos & Dimitratos, 2015).

Literature also refers to how the owner-manager's personality goes beyond the individual level to reach the collective or organisational level. This issue can be summarised essentially through two perspectives. Firstly, according to Hofmann and Jones (2005), we may find evidence about the relationship between owner-managers personality traits and the results of firms' performance through the analysis of the behavioural regularities occurring at the collective level. These authors explain that those regularities, at the basis of structures, processes and dynamics established in firms are identified in observable and relatively consistent behaviours over time. The second perspective deals with a conjugation between organisational context and leadership mechanisms. Here, the literature identifies different types. Organisational context mechanisms are operationalized in companies through processes that act on human resource management, such as organisational culture (Levinthal & March, 1993), or leadership (Dvir & Shamir, 2003). These mechanisms guide and reinforce the firm's strategic options, as well as function as a determinant of firm performance (O'Reilly, Caldwell, Chatman & Doerr, 2014).

In recent years the Big Five model of personality (McCrae & Costa, 1996) has gained consensus in the literature as a basic structure to understand personality. This is a widely-studied model, covering areas such as economics or decision-making (Gow et al. 2016). The theoretical perspective on the Big Five model of personality supports that the individual is a system characterized by internal dynamics that cause variation between adjustable and stable components in relation to individuals' real situations (Obschonka & Stuetzer, 2017). Different studies have related the Big Five model to entrepreneurial behaviour, risk-taking, locus of control, attitudes, or self-efficacy (Leutner et al., 2014; McCrae & John, 1992; Obschonka & Stuetzer, 2017; Rammstedt & John, 2007) or innovation (Becheikh, Landry & Amara, 2006).

The Big Five model is based on the taxonomy of neuroticism, extraversion, agreeableness, openness to experience and conscientiousness (John & Srivastava, 1999). This taxonomy, being the most used and validated conceptualization (O'Reilly et al. 2014), systematizes an integrated personality trait that individuals use to describe themselves and others. This model is not based on a specific theory of personality, but is a model that summarises, incorporating, according to McCrae and John (1992), a theory of personality traits, including different streams of research. A personality trait is defined as a consistent pattern that regulates an individual's action, thought or feeling, as a response to a stimulus (Leutner et al., 2014). The model incorporates individual variables that are distinguishable and organized dynamically, acting in interaction with individuals' context, considering their experience and assumes four assumptions of human nature summarizing the perspective of personality traits: knowledge, rationality, variability and pro-activeness (McCrae & Costa, 1996). Knowledge is the assumption that personality is a valid subject of scientific study; rationality is the assumption that individuals can understand themselves and others; variability means that individuals are different from each other, considering the psychological dimension; and pro-activeness refers to individuals as the centre of their action, having control of their lives and where personality is an active element in defining their life paths. Each of these five factors is bipolar and includes various more specific traits: extraversion vs. introversion, agreeableness vs. antagonism, conscientiousness vs. lack of orientation, neuroticism vs. emotional stability and openness to experience vs. closure to experience.

Neuroticism (versus Emotional Stability) is a personality trait characterized by the individual's tendency to feel negative emotions, nervousness, depression, impulsiveness, anxiety, or tension. Individuals are pessimists, with low self-esteem, and the surrounding environment is threatening and difficult. Individuals with low levels of neuroticism are calm, stable and optimistic. Low levels of neuroticism are associated with the majority of owner-managers of successful companies (Gow et al. 2016). In this perspective, as a dimension involving interaction with others, this is also considered a good predictor of teamwork (Mount et al., 1998). According to the literature, other facets associated with neuroticism are self-awareness or even irritability (John & Srivastava, 1999). From the point of view of organisational ambidexterity (being the effect of exploration and exploitation activities carried out simultaneously), neuroticism does not reflect the essence of either exploration activities or exploitation activities since, in organisational ambidexterity, both activities reflect differentiated forms of organisational learning (Levinthal & March, 1993). The former follows an

atypical path in developing new knowledge, aiming for a given objective; the latter is achieved through past knowledge which is consolidated and secure (Bonesso et al., 2014; Fojcik 2013; Kammerlander et al., 2015; Rosing & Zacher, 2017). Following this reasoning, the idea of experimentation and variability associated with exploration, as well as extending and refining existing competences associated with exploitation, which emerge in the literature on ambidexterity, is not reflected in the neuroticism dimension. This can be a factor of influence that distorts organisational ambidexterity as described by the literature about the Big Five model. Excessive variability, a typical element of exploration activities, doesn't reflect the focus on the result to be achieved, and can be a factor of tension in the individual, an aspect that also affects ambidextrous behaviour on owner-managers. Therefore, the following hypothesis is presented:

H1: Organisational Ambidexterity is negatively and significantly related to owner-managers' level of Neuroticism.

Openness to Experience (vs. closure to experience) is a trait characterized by the individual's tendency to become involved in different organisational activities. The individual feels a need to engage in a variety of vocational activities characterized by novelty and change. Individuals with high levels of openness to experience are curious, original, imaginative and seek new sensations (McCrae & John, 1992). In companies, this trait has a positive relationship with leadership (Judge et al., 2002), as well as with strategy or performance (Herrmann & Nadkarni, 2014).

The literature also mentions that this trait is related to owner-managers who actively seek constant change and new experiences, accepting the risk inherent to the process of researching, experimenting and the variability of environments (Herrmann & Datta, 2006). This process associated with owner-managers is reflected in their capacity to adapt to countless challenging environments characterized above all by divergent thought and receptivity to a wide set of stimuli. Owner-managers with great openness to experience consider different possibilities of action as a function of their capacity to interpret, quickly and effectively, a diversity of information that does not fit in with the existing mentality, considering different strategies (Nadkarni & Herrmann, 2010). Following this reasoning, the idea of owner-managers capacity of accepting different possibilities of action and strategy according to their interest and attraction to discovery, experimenting, and risk, is not sustainable, from a theoretical point of view, as a trait that influences in ambidexterity, as described by the literature on the Big Five model. From the point of view of organisational ambidexterity, the variability of

business environments allows the Openness to Experience a personality trait to favour exploration activities in SMEs, and not exploitation activities, conditioning organisational ambidexterity. So, the following hypothesis is presented:

H2: Organisational Ambidexterity is not related to Owner-managers' level of Openness to Experience.

Extraversion (versus introversion) is a personality trait where the individual's social character and gregarious nature are valued. Individuals are satisfied with themselves and with life, valuing social networks and relations with others (McCrae & John, 1992). Other facets referred to in the literature as associated with extraversion are cordiality, sociability, assertiveness, activity and seeking excitement or positive emotions (John & Srivastava, 1999). Individuals with high levels of extraversion tend to be confident, sociable, assertive, emotionally positive, whereas individuals with low levels of extraversion (or introversion) are shy and of few words (McCrae & John, 1992).

This personality trait in the owner-managers of SME may influence the way SMEs positions themselves in the business context, since extraversion is a trait associated with owner-managers' ability to motivate others. Extraversion traits spreads throughout the company, since the literature refers to the formation of contact networks as an element of information dissemination, identifying business opportunities and strategic orientation in SMEs, developing appropriate solutions for those opportunities (Nadkarni & Herrmann, 2010). Owner-managers' capacity to adapt to the volatility and rapid changes in business environments is also related to their influence within the firm. This influence is noticed in the development of new ideas and new internal processes linked to innovation. It also impacts on new strategies and the initiative to persuade and influence others.

Although the relationship between extraversion and firm performance needs greater clarification, the link with innovation seems to exist (Gow et al. 2016). So, from the point of view of organisational ambidexterity the following hypothesis is proposed:

H3: Organisational Ambidexterity is positively and significantly related to Owner-managers' level of Extraversion.

Agreeableness (versus antagonism) is a personality trait characterized by the individual's readiness to be affectionate, nice and trustworthy. Individuals who tend to

possess this trait tend also to be described as friendly, kind, altruistic, generous, fair, and anxious to help others (Blickle et al. 2008). Other facets associated with this trait are modesty, sensitivity, cooperation, or acquiescence (John & Srivastava, 1999). This trait is closely related to the capacity of team working and interpersonal relationships. The individual reveals a tendency to avoid conflict and reveals beliefs related to the importance of work, avoiding leadership and preferring to be led (Gow et al. 2016). In the business context, the literature states that agreeableness is associated with certain behaviour leading to a culture of risk and creativity (characteristic elements of exploitation activities), but, when excessive, leads to a loss of objectivity and focus on goals to be achieved (element related to exploration activities) (Judge et al. 2002; Nadkarni & Herrmann, 2010). These extremes tend to inhibit the capacity to adapt and align (Cegarra-Navarro & Dewhurst, 2007) in respect to different market demands, affecting strategic options. However, it is important to highlight that organisational ambidexterity is related to the functional relations necessary for specific processes within organizations, such as people management and teamwork practices (Ghoshal 1997). Lubatkin et al., (2006), and Gibson and Birkinshaw (2004) conclude that environments promoting processes of socialization and recognition, culture, and interpersonal relations help to encourage ambidexterity, supporting the trait of agreeableness in owner-managers. For Chang and Hughes (2012), contextual conditions can increase the quality of internal communication to create and improve current products and services. Andriopoulos and Lewis (2009) found that in small companies, the context favouring the emergence of ambidexterity could serve to support internal communication processes, facilitating the elimination of impractical processes. Nevertheless, the literature does not support the idea that this trait can originate the development of ambidexterity, but only contribute to that performance. Therefore, considering these arguments, the following hypothesis is proposed:

H4: Organisational Ambidexterity is not related to Owner-manager's level of Agreeableness.

Finally, Conscientiousness (versus lack of orientation) is a personality trait characterized by leadership capacity, planning, self-discipline and respect for norms and efficiency. This trait is reflected in behaviours such as responsibility and controlling impulses and orientation. Individuals with a high level of conscientiousness have a strong sense of direction, self-discipline and orientation towards results. They are also characterised as being organised, hard-working and determined. This is also a trait associated with behaviour directed towards objectives, order, a sense of obedience

and the need to comply with rules (John and Srivastava 1999). The literature considers this trait fundamental for motivation in the organisational context (Borman & Motowidlo, 1997), and it also emerges frequently in the literature associated with structured strategic decisions and with owner-manager's formal and personal structural mechanisms (Mom et al. 2009).

In the context of ambidexterity, the essence of exploitation activities lies in experimental activities based on the owner-manager's existing knowledge. This also means activities such as searching for new routines, structures and systems, where owner-managers react to the challenges arising from market needs and respond to technological opportunities (O'Reilly & Tushman, 2013). Owner-managers base themselves on the context, as a result of the market's competitive dynamics and they establish the strategic actions necessary for the organization (Andrade et al., 2016), facilitating ambidexterity (Lubatkin et al., 2006; Gibson & Birkinshaw, 2004). Following these arguments, the following hypothesis is proposed:

H5: Organisational Ambidexterity is positively and significantly related to Owner-manager's level of Conscientiousness.

3. Research Methodology

3.1 Sampling

A significant number of studies on organisational ambidexterity seek to build their research hypotheses in relation to a set of indicators of company performance. Adhering to this premise, we frame the study's hypotheses around the effect of owner-managers' personality traits on organisational ambidexterity in SMEs. Using the Informa D&B database and resorting to the support from business associations to the sectors chosen, questionnaires were sent by e-mail to a randomly selected sample of 1,202 Portuguese SMEs between November 2017 and June 2018. The select SMEs were from the sector of information and computing technology, programming, telecommunications, audio-visual, and IT consultancy, and according to INE (2010) they all met the criteria of SME in Portugal of having up to 250 employees and turnover up to 50 million euros.

The market of the sampled SMEs is characterised by a high degree of uncertainty. In such a context, to be competitive, SMEs depend greatly on their capacity to adjust and

adapt to new developments, circumstances and demands. This adaptation and adjustment are typical mechanisms of exploration and exploitation, where organisational activities incorporate the social and technical infrastructure of SMEs, contributing to organisational ambidexterity (Ruzzier, Hisrich & Antoncic, 2006; Lubatkin et al. 2006; O'Reilly & Tushman, 2011). In this context, this study argues that SMEs' performance in organisational ambidexterity is influenced by the owner-manager's personality. We can therefore expect the owner-manager role to be related to activities of planning and improving existing internal processes, and exploration and exploitation activities, affecting ambidexterity (Raisch et al. 2009).

3.2. Participants

The questionnaire was constructed aiming to obtain some demographical data about the participants (gender, age, academic qualifications), as well as information about their relationship with the company, and about the company itself (years in the company, company size). The results show that the majority (79%) of respondents are males, 28% are between 20 and 40 years old, 63% between 41 and 60, and 9% are over 60 years old. This classification was chosen arbitrarily to segment and simplify data analysis. Regarding qualifications, 45% of respondents have completed post-secondary but not higher education, 38% have a degree, master or Ph.D., and 17% stated they had completed secondary education (in its various forms), or less than this.

Concerning respondents' position in the firm, 83% of participants said they belonged to firms with up to 50 workers and 17% to firms with between 51 and 100 collaborators. Regarding time spent in the company, 20% answered they had been there up to 20 years, 43% between 21 and 30 years and 38% for over 30 years. This breakdown is usual in official documents in Portugal, related to the labour area, namely the firms' Social Balance.

3.3. Instrument

Data was collected through a questionnaire based on a set of scales already used and tested in a wide range of different contexts in previous studies and self-administered by owner-managers. Before the administration process, the research questionnaire was subject to a validation process in three stages, which included professionals working in IT, telecommunications, top management functions, consultants in the area of SME management and organisation (in the first two stages), and four SME owner-managers

in the telecommunications and management consultancy sectors (in the third stage). Each stage contributed to questionnaire's adjustments to improve interpretation and the order of questions. Some items were modified to fit better with the specific context under study. Because the scales were developed in English, we used the conventional translation method, i.e., translation of the English to a first version in Portuguese. The process used allowed for time and cost-efficiency.

However, this translation method depends on the translator's experience and knowledge and can sometimes result in low levels of validity and reliability of the study instruments (Weeks, Swerissen & Belfrage, 2007). To limit this possibility, a native English-speaker translator was asked to validate the translation from English to Portuguese. Thereafter, the questionnaire was reviewed by several consultants and higher education lecturers, for a validation of the process of translation to Portuguese, based on the dimensions of the original questionnaires. The process allowed for the refining of some questions in the Portuguese version to avoid any ambiguity or misunderstanding. Other improvements were reached after the pre-test to ensure that questions were clear, relevant, and interpreted as expected.

Considering the well-known difficulty in managing paper questionnaires and the respective response, we decided to administer the questionnaire online, which was constructed and developed on an appropriate internet platform, and following the recommendations of (Dillman et al., 2009). This type of approach ensured that all the items were answered, preventing any from being left blank.

The questionnaires were sent out gradually, by groups; before this process, an attempt was made to contact the firms in each group to provide explanations about the questionnaire and the underlying research project. After this step, a questionnaire was sent by e-mail to each company addressed to the owner-manager. In some cases, extra effort was made to encourage the completion of the questionnaire through a direct telephone call. Here, it was explained to the participants that they would have access to a summary of the main evidence from the study. Of the 1,202 questionnaires sent out, 224 were received and duly completed, representing a response rate of around 19%.

3.4. Measurements

The study variables were operationalized through items on a Likert style scale, to obtain more reliable and valid results (Preston & Coleman, 2000). This study aimed to employ

instruments already used and validated in other studies and with a good level of internal consistency.

Ambidexterity

The ambidexterity scale used in this study was developed by Lubatkin et al. (2006), based on scales developed previously by He and Wong (2004), and Benner and Tushman (2003). The scale proposed by Lubatkin et al. (2006) includes twelve items, six of them reflecting the exploitation dimension and the other six the exploration dimension. The six items formulated according to the exploration orientation consist of statements such as "looking for creative ways to satisfy customers." Similarly, the six items formulated according to the exploitation guidance consist of statements such as "searching for commits to improve quality and lower cost". Both dimensions are assessed on a seven points Likert-type scale, ranging from "Strongly Disagree" (1) to "Strongly Agree" (7), in order to ensure statistically significant variability of the answers obtained. Participants were asked to indicate their level of agreement with the statements concerning activities carried out according to their influence on them as firm owner-manager.

Personality

To assess the owner-managers' personality, we used the BFI-K proposed by Kovaleva et al. (2013), a version of Rammstedt and John's (2005) Big Five Personality Inventory instrument. This instrument presents good reliability and validity. The BFI-K (Kovaleva et al. 2013) was chosen for this study for two reasons. The first deals with the scale's potential to be applied to larger samples considering its qualities. The second, because the BFI-K (Kovaleva et al. 2013) is an economical instrument for use in studies based on online questionnaires. Personality questionnaires are usually extremely long, and it is a challenge for the researcher to choose a personality measuring instrument that, while bearing in mind the ideal research questions, focuses on practical aspects such as the ease of answering and the time required to complete the questionnaire. The BFI-K scale developed by Kovaleva et al. (2013), corresponds to these requirements. This is a short scale that includes twenty-one items, which facilitates the respondent's participation, and is developed around five dimensions: extraversion (e.g. "I see myself as someone who tends to be quiet"), agreeableness (e.g. "I see myself as someone who is generally trusting"), conscientiousness (e.g. "I see myself as someone who does things efficiently"), neuroticism (e.g. "I see myself as someone who worries a lot") and openness (e.g. "I see myself as someone who is curious about many different things"). All the dimensions of the BFI-K are evaluated on a seven-point Likert-type scale from

“Strongly Disagree” (1) to “Strongly Agree” (7). All the dimensions were comprised of four items, except for Openness which was assessed through five items. Participants were asked to show their level of agreement with each statement related to personality characteristics.

3.5. Statistical Procedures

A structural equational approach was adopted to assess the influence of owner managers’ personality traits on organisational ambidexterity. This approach allowed for a better representation of the variables studied, and also for the association of measurement errors with endogenous and exogenous variables, allowing multiple indicators of latent constructs (Bollen & Long, 1992). Here, we decided to represent organisational ambidexterity as a second-order construct inasmuch as both exploration and exploitation are constructs intrinsic to organisational ambidexterity. The methodology of Cao et al. (2009) was applied to understand the level of ambidexterity achieved by SMEs in the sample. According to Cao et al. (2009), the simultaneity inherent to the ambidexterity concept does not mean that both exploration and exploitation reach the same level of intensity. Companies can be ambidextrous without having the same level of intensity, and this can occur at different moments according to the specific contingencies of context and business environment that the firm is a part of. This is an important process since as it allows us to consider the research model of this study as being supported theoretically. The approach adopted in this study was based on the methodology proposed by Cao et al. (2009) and Dolz et al. (2014) which sustains this principle. The approach followed considers a dynamic configuration of organisational ambidexterity, through the perspective of balancing ambidexterity and the combined perspective of ambidexterity. The former considers the exploration mean and the exploitation mean; the latter considers the product between them. Table 1 presents the level of ambidexterity achieved by SMEs in this study.

Table 1. Level of balanced ambidexterity and combined ambidexterity achieved

	Balanced ambidexterity		Combined ambidexterity	
	A) Average of Exploitation	B) Average of Exploration	A*B	$\sqrt{A*B}$
Level of Ambidexterity	4,63	5,90	27,32	5,22

SMEs in our samples reveal a high balance of ambidexterity, since the levels of exploration and exploitation are high (considering that the maximum is 7) and a level

of ambidexterity (combined view of ambidexterity) of 27.32, when the maximum possible is 49. The other indicators present values supporting this conclusion. Thus, the level of organisational ambidexterity reflects the ratio of the scale used (Likert-type from 1 to 7), through the square root of each of the means of each completed questionnaire, with the value of 5.22 being considerably high.

3.6. Concerns About Common Method Bias

After the initial validation to check the levels of balanced and combined ambidexterity, according to the methodology proposed by Cao et al. (2009) and Dolz et al. (2014), the next step was to validate the measurements of the structural equation model studied. Since all the information gathered in this research came from a single questionnaire, the recommendations of Podsakoff, MacKenzie, Lee, and Podsakoff (2003) were followed regarding the variance attributed to the data collecting method (common method bias).

Common method bias (CMB) occurs when variations in answers are caused by methods used rather than interviewees' attitudes. In this sense, the collection method biases the variations to be analysed. To test this effect, the Harman single factor test was used, in which all the items (measuring latent variables) are loaded on a common factor. A total variance for a single factor under 50% suggests there is no CMB biasing data. Therefore, to detect the presence of CMB, a factor analysis was applied with all the variables used in the model. One factor, without rotation, was extracted, and the result obtained captured only 16% of the variance, and so CMB was not considered a threat in this study.

3.7. Analysing Statistical Assumptions

Data obtained were analysed, based on the biases for suspect response patterns, outliers, and answers inconsistency. Concerning the first one, no missing data were detected. Regarding the second one, the existence of outliers was assessed through the squared Mahalanobis distance (D^2) and the answers were analysed searching for patterns or repetition of the same type of answer to different questions.

The assumption of variables normality was assessed through the univariate and multivariate coefficients of asymmetry (Sk) and kurtosis (Ku). No variable presented sk or ku values indicating severe violations of normal distribution. Asymmetry values (Sk)

ranged between 0.027 and 0.943 and kurtosis (Ku) remained between 0.020 and 1.651, suggesting no violation of these assumptions since both remained below the values indicated in literature: $|Sk| < 3$ and $|Ku| < 10$ (Hair, Anderson, Tatham & Black, 2010). The KMO criterion was also used with the classification criteria defined in Hair et al. (2010); the KMO value obtained was equal to 0.807. Regarding multicollinearity, we used the *VIF* and Tolerance values; *VIF* values were below 4.261 and Tolerance values were over 0.235, indicating a low level of multicollinearity (Hair et al., 2010).

4. Results

4.1. Validation of the Measurement Model

The literature recommends that the process of validating the research model should be performed in two phases: firstly, a factor validation of the measurement model, and secondly, a validation of the structural model (Hair et al., 2010). To validate the measurement model, a confirmatory factor analysis (CFA) was performed using the AMOS software (v.24), in order to adjust the model (Preston & Coleman, 2000; Hair et al., 2010). The maximum likelihood estimation method was used, because, as reported in literature, this is the most common approach in structural equation modelling for its robustness (Hair et al., 2010). Factor weights ($\lambda \geq 0.5$) were determined and items with reduced individual reliability ($R^2 \leq 0.50$) were withdrawn. The adoption of a more conservative perspective aimed for correlation between factors which, theoretically, should be orthogonal (Hair et al., 2010). Items saturating in more than one factor were also withdrawn and the model redone.

The reliability analysis of the measurement scales was performed through the Cronbach alpha, normally used in studies with constructs based on various Likert-type scales. The results observed (see Table 2) indicate suitable levels of internal consistency for all the scale variables used, varying between 0.798 and 0.911 (Cronbach, 1951). After removing the items and correlating the errors based on the modification indices proposed by AMOS, a good adjustment quality was obtained, except for GFI (although very close to 0.9, indicating a good model) ($\chi^2/df=1.469$; $CFI=0.957$; $GFI=0.895$; $RMSEA=0.045$; $PCFI=0.810$; $PGFI=0.691$) (Hair, Anderson, Tatham, and Black 2010). Table 2 presents the values of individual reliability and the alphas for the construct and Table 3 presents the assessment of the measurement model with the values of AVE, CR, MSV and ASV.

Table 2. Factor analysis with the alpha of Cronbach coefficient values

Constructs	Items	Individual Reliability	Standardized regression weights Reliability	T-values	Alpha Cronbach
Extraversion	I see myself as someone who is outgoing, sociable.	0.74	0.87	4.49	0.83
	I see myself as someone who generates a lot of enthusiasm.	0.61	0.78	7.22	
	I see myself as someone who is reserved.	0.51	0.71	8.42	
Agreeableness	I see myself as someone who is generally trusting.	0.73	0.86	5.04	0.80
	I see myself as someone who can be cold and aloof	0.60	0.77	7.68	
	I see myself as someone who tends to find fault with others.	0.57	0.76	7.89	
Conscientiousness	I see myself as someone who makes plans and follows through with them.	0.76	0.88	4.19	0.83
	I see myself as someone who does a thorough job.	0.59	0.76	7.65	
	I see myself as someone who tends to be lazy.	0.53	0.73	8.21	
Neuroticism	I see myself as someone who is depressed, blue.	0.74	0.86	5.90	0.85
	I see myself as someone who is relaxed, handles stress well.	0.60	0.77	8.17	
	I see myself as someone who worries a lot.	0.53	0.71	8.81	
	I see myself as someone who gets nervous easily.	0.52	0.70	8.83	
Openness	I see myself as someone who is curious about many different things.	0.69	0.83	7.25	0.87
	I see myself as someone who has an active imagination.	0.66	0.81	7.70	
	I see myself as someone who has values artistic, aesthetic experiences.	0.61	0.80	7.90	
	I see myself as someone who is ingenious, a deep thinker.	0.55	0.75	8.60	

Continued >>>

Table 2. Factor analysis with the alpha of Cronbach coefficient values (continuation)

Constructs	Items	Individual Reliability	Standardized regression weights Reliability	T-values	Alpha Cronbach
Exploitation	Your action has sought to focus on fine-tunes what it offers to keep its current customers satisfied.	0.82	0.90	5.91	0.91
	Your action has sought to continuously improve the reliability of your firm products and services.	0.73	0.75	7.92	
	Your action has sought to increase the levels of automation in your firm operations.	0.70	0.83	7.53	
	Your action has sought to focus on commits to improve quality and lower costs.	0.56	0.80	9.16	
	Your action has sought to focus on constantly surveys the customers' satisfaction	0.55	0.75	9.56	
Exploration	Your action has sought to focus on looking for creative ways to satisfy its customers' needs.	0.72	0.85	6.79	0.89
	Your action has sought to actively target new customer groups.	0.65	0.81	7.79	
	Your action has sought to create products or services that are innovative to the firm.	0.61	0.80	7.96	
	Your action has sought to bases the success of our firm on its ability to explore new technologies.	0.59	0.77	8.42	

Table 3. Assessment of the measurement model

Constructs	AVE	CR	MSV	ASV
Extraversion	0.62	0.83	0.07	0.04
Agreeableness	0.62	0.83	0.06	0.03
Conscientiousness	0.60	0.86	0.31	0.10
Neuroticism	0.61	0.82	0.31	0.10
Openness	0.63	0.87	0.10	0.06
Exploitation	0.67	0.91	0.06	0.03
Exploration	0.66	0.91	0.10	0.05

4.2. Validation of the Structural Model

To study the structural model (Figure 1), the maximum likelihood estimation method was used to determine the model's adjustment indices. With the model adjusted through the modification indices (above 11; $p < 0.001$), produced by AMOS, and based on theoretical elements, the following indicators were obtained, confirming the model's adjustment and consequent internal and external consistency: $\chi^2/df=1.571$; CFI=0.946; GFI=0.889; RMSEA=0.051; PCFI=0.815; PGFI=0.694 (Hair, Anderson, Tatham, and Black 2010). This study analysed the relationships between personality

traits according to the Big Five model - neuroticism, openness to experience, extraversion, agreeableness and conscientiousness, and organisational ambidexterity. The measurement model of the latent factors explains 61% of the variability of the Big Five model regarding organisational ambidexterity. The paths analysis between the factors revealed that Extraversion->OA presents the greatest weight ($\beta_{\text{Extra.OA}}=0.193$; $SE=0.060$; $\beta_{\text{Extra.OA}}=0.610$; $p=0.001$), followed by Neuroticism->OA ($\beta_{\text{NEURO.OA}}=0.122$; $SE=0.072$; $\beta_{\text{neuro.OA}}=-0.366$; $p=0.090$) and Conscientiousness->OA ($\beta_{\text{consc.OA}}=0.105$; $SE=0.056$; $\beta_{\text{consc.OA}}=0.360$; $p=0.059$). The paths Openness to Experience->OA and Agreeableness->OA are non-significant ($\beta_{\text{OPEN.OA}}=0.034$; $SE=0.057$; $\beta_{\text{OPEN.OA}}=-0.116$; $p=0.547$; and $\beta_{\text{AGREE.OA}}=0.011$; $SE=0.060$; $\beta_{\text{AGREE.OA}}=-0.039$; $p=0.856$). According to the model summarised in Figure 1, data obtained gave support to the five guiding hypotheses for this research.

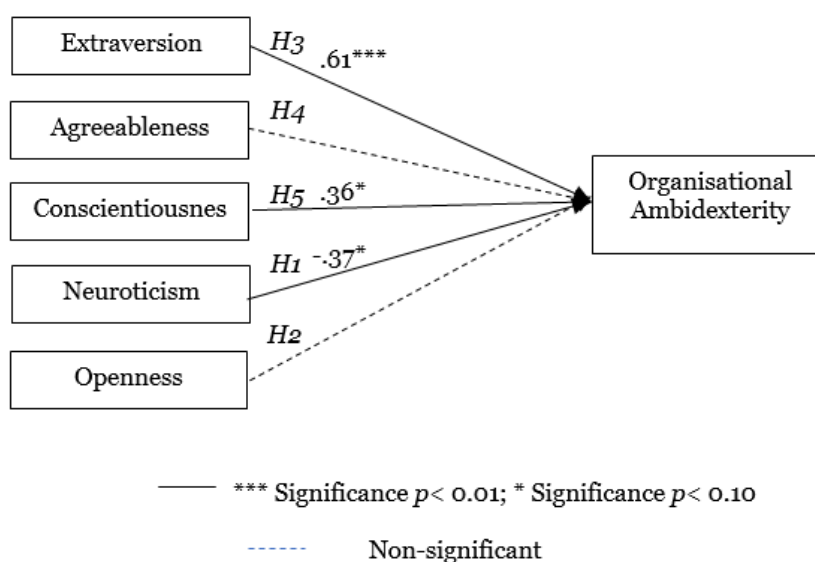


Figure 1. Structural Model

5. Discussion

5.1. Summary of the Results

This study aimed to show the influence of personality traits on organisational ambidexterity in SMEs in Portugal from the sector of information and computing technology, programming, telecommunications, audio-visual, and IT consultancy. Before this study, as far as we know, no studies had focused on this type of influence on OA using a second-order structural equation modelling for the ambidexterity variable and corroborates some literature on the influence of owner-managers' personal

characteristics on the performance of SMEs and organisational ambidexterity (Leutner et al., 2014; Hambrick & Mason, 1984; Cyert & March, 1963; Teece, 2007; Nadkarni & Herrmann, 2010). Results obtained suggest that organisational ambidexterity is positively and significantly related to personality traits Extraversion, Neuroticism (emotional stability), and Conscientiousness but not with Agreeableness and Openness. These results are consistent with the literature (Gow et al. 2016; Judge et al., 2008; Nadkarni & Herrmann, 2010), since these studies also report the influence of personality traits on firms' performance variables, though not all of those traits influence those variables in the same way. The explanation could be that these personality traits may not relate to just exploration or exploitation but rather to both. Furthermore, it is also interesting to note that, being exploration and exploitation, the academic concepts highlighted by literature are closer to the organisational level, and that this study suggests the existence of a relationship between some personality traits and these concepts, thus focusing on this research at an individual level. This idea suggested in literature (Kammerlander et al. 2015; Hambrick & Mason, 1984), leads us to assume that organisational ambidexterity has a multilevel nature.

5.2. Theoretical Contributions

The research path defined for this study helps to understand and updates knowledge about the influence of owner-managers personality traits on achieving organisational ambidexterity. This perspective based on the development of OA by the owner-managers of Portuguese SMEs is built on their behavioural orientations towards exploration and exploitation.

By adopting the perspective of Bonesso et al. (2014) regarding the perceptions of owner-managers for ambidextrous performance, this study contributes to advancing this area of research, as studies establishing relationships are still at an early stage. With this in mind, it has brought two new perspectives to the literature. The first sheds light on the specific reality of Portuguese SMEs, mainly characterized by a small size and management style, entrepreneurial capacity, and closer proximity between individuals. The study suggests that extraversion personality traits, conscientiousness, and a low level of neuroticism characterize the Portuguese management style relating to Portuguese SMEs. The second perspective highlights the importance of the Big Five personality model as an explanatory model for organisational ambidexterity.

In fact, via the Big Five model, it was possible, through the study, to demonstrate its effect on organisational ambidexterity in SMEs. The reason for this effect is found in the way by which the Big Five model can help explain OA through each personality trait relating to exploitation and exploration. The literature recognizes that exploitation and exploration can coexist across a continuum or through an orthogonal mode. The interaction between both occurs through the role of resource availability or individual behavioural guidelines, intrinsically defined in the owner-manager personality. Individuals have behavioural patterns based on individual cognitive perceptions that make them act based on their options for exploitation or exploration.

Thus, with regards to the first personality trait, Extraversion, the literature does not support a specific relationship with exploration or exploitation. However, extrovert owner-managers are essentially able to influence others positively. Extraversion is supported in the literature by different studies on ambition, orientation towards objectives, work, leadership, and effectiveness. The elements supported in the literature on ambidexterity relate to the exploration and exploitation activities which, from a theoretical point of view, are sustainable with the study (Goel & Jones, 2016; Herrmann & Nadkarni, 2014). Concerning Neuroticism (or emotional stability), the literature also fails to present a relationship between this factor and exploration or exploitation activities. The literature states that a significant part of owner-managers are emotionally stable and this stability reflects how they manage their companies (Gow et al. 2016). From this perspective, owner-managers with low levels of neuroticism are optimistic, entrepreneurial and with a degree of self-efficacy, feel less threatened by uncertainties in the business environment, and have an adaptive view according to the need to change. These elements also appear in the literature on ambidexterity, which corroborates with the conclusions of this study when related to exploration and exploitation activities. However, the levels of neuroticism found in this study were negatively associated with ambidexterity. The mean obtained from all the completed questionnaires is 3.59, which to a certain extent explains the results reached inasmuch as there is no clear definition of low neuroticism or high emotional stability. Here, the results obtained corroborate those of other studies (Gow et al. 2016) suggest that the neuroticism factor is negatively associated with ambidexterity.

For the Conscientiousness trait of personality, the results obtained in this study suggest a positive relationship with organisational ambidexterity as exploration and exploitation are activities that require a focus on results to be achieved, on seeking positive performance, efficiency, and variability. This trait has emerged, on a par with

others by also reporting a positive relationship with performance results in various types of work, and a positive relationship with regards to innovation. Owner-managers with a high level of conscientiousness tend to be characterized as individuals with a strong sense of responsibility, discipline, and the will to abide by rules and procedures. Despite these results, we must also consider that there is no evidence to show whether the relationship established between exploitation and exploration is orthogonal or not. Further studies are needed to explore this concern.

In this study, the hypotheses concerning the absence of influences of the Openness to Experience and Agreeableness personality traits were also confirmed, with non-significant results, albeit with some ambiguity, as indicated in some of the literature. McCrae and John (1992) conclude that Openness to Experience is a personality trait reflecting the individuals' tendency to seek change in scenarios, and Nadkarni and Herrmann (2010) suggest that this factor can influence a companies' performance. Indeed, despite some studies suggesting a positive relationship between Openness to Experience and, for example, innovation, there was no positive effect concerning organisational ambidexterity in the SME context shown. This factor is intimately related to the need for change, experimentation, and discovery, and in the literature on organisational ambidexterity, these elements are associated with exploration but not exploitation activities. Openness to Experience is a personality trait that encompasses various behaviours related to the constant search for new experiences. However, this is a dimension that finds, at an exploration level, theoretical support, because it refers to the individual's tendency to get involved and experience new sensations, being these dreamers and creators. However, literature has also suggested a proneness for top management to be more cautious and focused on exploitation activities rather than exploration activities. In this sense, the combination of exploitation and exploration will reduce. Thus, the results achieved in this study for this personality trait in top management are in line with the latter. These aspects, suggested by Benner and Tushman (2003), for whom SMEs tend to engage in exploitation activities, ensure the efficiency and reduce the variability usually associated with exploration. De Visser et al. (2011) also support this idea, referring to the concept of cognitive style to justify the decisions of top management in terms of options more strategically linked to exploration or exploitation.

Finally, concerning Agreeableness, this is a personality trait that values social and interpersonal relationships. Agreeableness is related to a self-regulating temperament and, individuals with a high level of this factor have a predisposition to be friendly and

tolerant. Individuals with this strong personality trait show low risk-taking behaviour and tend to be less competitive and therefore do not relate to an entrepreneurial capacity, whose characteristics are strongly associated with exploration. Agreeableness is also not associated with leadership (Nadkarni & Herrmann, 2010) or with factors such as performance or result-oriented (Kaplan et al. 2012). The characteristics of this personality trait also suggest a reduced tendency to be related to innovation processes, investment risk, or aggressive business strategies. In this sense, these characteristics do not have the behavioural basis for exploitation and exploration, and therefore, do not influence organisational ambidexterity.

5.3. Limitations and Suggestions for Future Research

The study presents several limitations. The first is related to the sector of activity targeted and its business context. The Portuguese market is in the process of digital transformation. SMEs are to be competitive through the improvement of their management processes and products and services. Therefore, this study has the crucial limitation of not considering other SMEs from other sectors of activity, where these internal processes could be comparable by relating them to the personality traits of their owner-managers. The second limitation is related to SME owner-managers' characteristics, such as qualifications, experience, or tenure. This study does not approach those characteristics of Portuguese owner-managers and does not explore their relationship with organisational ambidexterity.

Therefore, future work can study the relationship of other intrinsic factors and their moderating role, such as time leading the company, qualifications, and experience with owner-manager personality traits in organisational ambidexterity in SMEs. Other studies could be carried out applying this model to other sectors of activity. Qualitative studies could also be made over time to complement traditional data-collecting methods such as questionnaires and the measures of perception associated with these. For a better understanding of how the owner-manager's personality is connected to company performance, a multi-disciplinary approach is necessary involving both the individual perspective and structural and organisational perspective simultaneously. This idea suggested by Hambrick and Mason (1984), for whom, the complexity of the phenomenon required different scientific approaches, justified by the relevance of the subject and its context. Besides this, it would be interesting considering the dynamics that would take place in the context of SMEs, to proceed with studies that would focus

on the question of the role played by owner-managers personality traits on the orthogonality or in the continuum between exploitation and exploration, given the absence of studies on this theme.

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CHAPTER 5

Technological Capacity and Organisational Ambidexterity: The Moderating Role of Environmental Dynamism on Portuguese Technological SMEs.

Abstract

This research aimed to study the influence of environmental dynamism and technological capacity on organisational ambidexterity (OA) and the moderating role of environmental dynamism in small and medium-sized enterprises (SME). To this end, a structural equation model was applied to a sample of 224 SMEs in the sector of information technology, telecommunications, and IT consultancy. The results obtained show that technological capacity has a significant, positive effect on OA as well as a statistically significant influence only in exploration but not in exploitation. And the moderating effect of environmental dynamism also has a positive effect in the relationship between technological capacity and OA, and stronger effect in the relationship between technological capacity and exploration. These results are consistent with the existing literature and shows that environmental dynamism and technological capacity influence OA in SMEs, but in a different way. Various implications for theory and practice are also presented.

Keywords: Environmental Dynamism; Technological Capacity; Organisational Ambidexterity; SME

1. Introduction

One of the most influential aspects of SME to adapt and to remain competitive in highly dynamic markets is their technological capacity. In SME this capacity is conditioned by a set of factors such as resources limitations, sector of activity or opportunities and threats in markets (Estrada, Cano, & Aguirre, 2019). The ability of SME to mobilize new technical and scientific knowledge, innovative technological processes and update existing technological processes and knowledge means that SMEs is capable to respond to the demands of competitive environments. This ability brings together diverse knowledge and technologies in technological activities. Technological capacity involve a set of activities based on knowledge, expertise, competencies, products (Li, Wei, Zhao, Zhang, & Liu, 2013), equipment and systems (Kim & Rhee, 2009) and it is an important dynamic capacity for SMEs to be able to improve their performance (Ahmad, Othman, & Lazim, 2014). Through technological capacity SMEs reach to new resources (Liao, Liu, Fu, & Ye, 2019), new work processes, production and technologies (Gedajlovic, Cao & Zhang, 2012), configure new knowledge and enhance technical specialization (Wang, Senaratne, & Rafiq, 2015). However, in order to be able to adjust to fluctuations of the markets and to be competitive, SMEs must adopt dual strategies, which implies the ability to be exploitative and exploratory (Wang, Senaratne, & Rafiq, 2015). Exploration encompass activities related with experimentation and selection process, while exploitation is built on the refinement of existing skills, technologies and processes (March, 1991).

As activities related to the learning process and knowledge development in firms (March, 1991), exploitation and exploration are fundamental activities to organisational ambidexterity (OA) (Soto-Acosta, Popa, & Martinez-Conesa, 2018). OA is a concept related with the ability of firms deal simultaneously with exploitation of existing competencies and exploration of new opportunities (Wamba, Dubey, Gunasekaran, & Akter, 2020), in order to meet the challenges of markets and become competitive (He & Wong, 2004). SMEs must manage both based on short-term reactive and adaptive responses, as well as guarantee future survival based on effective long-term management.

As a dynamic capability (Soto-Acosta, Popa, & Martinez-Conesa, 2018), OA is a challenge to SMEs because they are heavily conditioned by the global changes that affect markets. Characteristics as size, resources limitations or lack of managerial

expertise are barriers to OA in SMEs. SMEs invest in exploitation and exploration in order to be flexible and efficient when facing the dynamism of the markets and in view of its level of technological capacity (Kocoglu, Imamoglu, Ince & Keskin, 2012). The development of new tools and processes to adapt to technological changes in markets and to identify technical resources means that SME embrace a process of adjustment technological capacity through exploitation and exploration, where environmental dynamism plays a determinant role (Revilla, Prieto & Prado, 2010; Soto-Acosta, Popa, & Martinez-Conesa, 2018). Hence, a question arises in this relationship between technological capacity and OA as to whether this relationship is subject to variations as function of the environment in which SME operate.

Although most studies on OA have been carried out in large companies, studies on this area of research in SMEs remain scarce. The context of SMEs is different from large companies, where there are more resources, technological, human and financial, providing researchers with ample research possibilities. We argue that considering the importance of SMEs and their influence on economy, due to the number of jobs they can create, their ability to introduce innovative products, and the high level of flexibility in changing production processes and to innovate quickly, (Franco & Haase, 2010), a greater production of literature on OA in SMEs is justified. Thus, one of the most interesting aspects related with OA is, as firms evolve and accumulate more experience, they become more efficient in using existing knowledge, tending to generate variations in exploratory and exploitative activities, in response to the external environment and its dynamism. (Benner & Tushman, 2003). This assumption leads us to questioning about the effect of technological capacity on OA, as well whether technological capacity has the same effect on exploration and exploitation in SME? And what is the moderation role played by environmental dynamism on this relationship? Furthermore, little attention has been paid to the empirical examination of the moderating role of environmental dynamism in the relationship between technological capacity and OA, and only a few and similar studies have dedicated some attention to technological capacity, but as an antecedent of innovation in SMEs (Martínez-Román & Romero, 2017; Strobl, Matzler, Nketia, & Veider, 2018). In this sense, different weights can be attributed to exploration and exploitation activities when considered in SME contexts and when related to their technological capacity (Zhou & Wu, 2010).

This study fills this major gap. Therefore, the main objective of this study is to explore the relationship between technological capacity and OA in the context of technological SMEs and the role played by environmental dynamism. This study uses a quantitative

research method on SMEs in the Portuguese technological sector to better understand this phenomenon. This study intends to go a little further on OA paradigm in SMEs. Based on this premise, this study also makes a solid contribution to literature showing that technological capacity has a positive effect on OA as well as a statistically significant influence only in exploration but not in exploitation. And the moderating effect of environmental dynamism also has a positive effect in the relationship between technological capacity and OA, and stronger effect in the relationship between technological capacity and exploration.

To address these issues, this study develops and tests a research model based on literature and aims to empirically observe the technological capacity effect in OA and to observe if there is a distinct effect in exploitation and exploration, as well as to understand the contingent role of environmental dynamism in this relationship through the assess of it moderating effect.

Upon this idea, this study draws on contingency theory and on dynamic capabilities theory. Both theories demonstrate the role of capabilities and the importance of the external environment on exploitation and exploration. In the view of contingency theory, firms' performance is dependent on the contingencies that reflect their situation (Donaldson, 2001). This theoretical assertion is built on the premise that the external environment influences the performance (Reisinger & Lehner, 2015), and the ability of SMEs of being competitive depends largely on how the adjustment between markets and firms' technological level is made (Donaldson, 2001). On the view of dynamic capabilities theory (Teece, & Pisano, 1994), there is a timely exchange of information between environment and SMEs, which reflect the way they integrate and adapt this information into internal routines and process to increase efficiency. In this sense, technological capacity implies a considerable effort by SMEs and a long-term commitment (Ahmad, Othman, & Lazim, 2014) through competencies, knowledge and capabilities. Both theories allow us to frame environmental dynamism and technological capacity in different levels of analysis: the first concept describes the complexity and changes on firm's environment and runs at external level; and the second concept, focuses on internal level where technological knowledge, systems and technological infrastructure, fundamental to the survival and competitiveness of SMEs, are built.

To the questions raised, this study is structured as follows. It begins with a general review of the relevant literature and discussion of the main topics addressed. After this

theoretical part, the research methodology is explained and the hypotheses formulated, followed by discussion of the results obtained. The study concludes with the contributions and suggestions for future research.

2. Literature Review and Study Hypotheses

2.1. Impact of Technological Capacity on Organisational Ambidexterity Exploration and Exploitation in SMEs

Technological capacity is a firm's capacity to perform a technical function with impact on its performance (Teece, Pisano & Shuen, 1997). Firms can develop new processes and products using a set of techniques, knowledge and tools at its disposal (Salisu & Abu Bakar, 2019), physical equipment (Ahmad, Othman, & Lazim, 2014) in production (Tsai, 2004) and industrialization processes (Kim, 2001). It also the ability to generate new engineering processes, technology development, equipment mobilized through technical and scientific resources (Ahmad, Othman, & Lazim, 2014). Technological capacity is also a determinant of firms' performance (Tsai, 2004), entrepreneurial capacity (Dai, Maksimov, Gilbert, & Fernhaber, 2014), industrial capacity (Wang & Zhang, 2018), innovation capacity (Figueiredo & Piana, 2018) as well a learning capacity, upgrading their technological level (Mathews, Maruyama, Sakurai, Perks, & Sok, 2019). Firms with high levels of technological capacity are more competitive, innovative and they develop products, systems and processes in a more effectively way than others (Ho, Fang & Lin, 2011).

Through technological capacity other technologies can be incorporated (Figueiredo & Piana, 2018), as well new knowledge and techniques (Kahle, Marcon, Ghezzi & Frank, 2020). The relationship between technological capacity and knowledge is very relevant because not only allows knowledge to be updated, but also enables it to be mobilized for the development of new technologies and innovative processes (Martinez-Conesa, Soto-Acosta & Carayannis, 2017). Therefore, the way in which technological capacity integrates different exploitative and exploratory processes makes firms' performance dependent, for example, on the level of its capacity to innovate (Atuahene-Gima, 2005). In this sense, exploration and exploitation perform an important role, enabling firms to react to the demands of the markets (Salisu & Abu Bakar, 2019) and to assimilate and adapt existing knowledge into internal operations (Shah Abdullah & Ahmad, 2009) and external knowledge into an opportunity for new products, procedures and work routines (Salisu & Abu Bakar, 2019).

In essence, exploration and exploitation are two learning activities through which firms develop and adapt processes and creates new ones, increasing the existing knowledge and advancing into new business fields (March, 1991). This learning process improves existing skills and launches new skills (Schmitt, 2018). Exploration is fundamental for searching new alternatives, experimentation and selection, while exploitation is based on the refinement of existing skills, technologies and processes (March, 1991). Exploration is linked to improvisation, autonomy and chaos, emerging markets and technology. In turn, exploitation is associated with systems, routines, control and bureaucracy, as well as stable markets and technology (Halevi, Carmeli, & Brueller, 2015).

The importance of exploitation and exploration for SMEs lies on the premise that these firms enhance their operational skills and superior technological performance in the markets (Wei, Zhao & Zhang, 2014). Through technological capacity, exploration and exploitation activities build a considerable body of knowledge (Swart & Kinnie, 2007) providing SMEs more arguments to innovate (Bourke & Roper, 2017), to identify new opportunities and technological trends (Tzokas et al., 2015) and to be competitive (Swart & Kinnie, 2007). In this process, exploration and exploration are complementary (Wang & Rafiq, 2014) and their settings are adjusted according to the availability of resources, without running the risk of firms balancing excessively for one of them (Kim & Rhee, 2009). Under such conditions, SMEs' ability to be competitive can be affected by this imbalance (Cao, Gedajlovic & Zhang, 2009).

However, there are fundamental differences between these two types of activities. The role that these activities play in SMEs allows them to engage in efficiency gains and focus in short-term results, when oriented towards exploitative activities, and engage in activities oriented towards long-term results when oriented towards exploratory activities (Kammerlander, Burger, Fust, & Fueglistaller, 2014). Both activities configure two fundamental differences in SMEs strategy, with significant consequences in the way in which knowledge emerges: the first, focuses on the existing processes related to context trends (Lubatkin, Simsek, Ling & Veiga, 2006); and the second, focuses on learning that generates new knowledge. Although some literature advocates a balance between exploitation and exploration (Cao, Gedajlovic & Zhang, 2009), some research suggests when firms falls into excessive orientation towards one of these activities can lead them to an inability to be competitive and fail to realize their full potential (Halevi, Carmeli, & Brueller, 2015), even in presence of SMEs with high technological capacity

(Senaratne & Wang, 2018). The underlying reasons for SMEs to dedicate themselves more to exploration or exploitation are not quite well understood in the literature (Uotila, 2017). Excessive exploration leads to stagnation of ideas and evolutionary incapacity, while excessive exploitation leads to inertia in competence development (Kim & Rhee, 2009). In fact, research has suggested a set of mechanisms as explanatory factors for these differences, mainly aimed at leadership (Kammerlander, Burger, Fust and Fueglistaller, 2014), at contextual and structural factors (Cao, Gedajlovic & Zhang, 2009) or at external factors, such as environmental dynamism (Mammassis & Kostopoulos, 2019). Since environmental dynamism is a contingency factor (Donaldson, 2001) through its effect on SMEs exploration becomes a more reactive process about adaptation to external factors and their dynamism, and exploitation is a process that seeks for control and adaptation (Kocoglu, Imamoglu, Ince, & Keskin, 2012). But when we consider the case of technological knowledge, both exploitation and exploration complement each other since experimentation of new processes, brought by exploration must be based on the reduction of risk and variability that exploitation makes possible (Pertusa-Ortega & Molina-Azorín, 2018).

As technological capacity involves different types of resources, technological or human, these are assumed to be an important factor for possible differences in the balance between exploitation and exploration in SMEs as well. Exploration and exploitation compel a trade-off between the two, since they are also dependent to the way resources are managed (Lubatkin, Simsek, Ling & Veiga, 2006). Both exploitation and exploration are resource-consuming activities. The allocation of these resources causes tensions between them as firms starts to follow a certain orientation, more exploitative or more exploratory (Soto-Acosta et al., 2018). Exploration and exploitation settings are adjusted according to the availability of resources, without running the risk of firms balancing excessively for one of them. Under such conditions, firms' ability to react can be affected by this imbalance (Soto-Acosta et al., 2018).

The way to solve these tensions between exploitation and exploration is through organisational ambidexterity (OA). OA is a concept that means the ability of firms to manage simultaneously, both exploitation and exploration (Uotila, 2017). Research on OA has also presented several suggestions for solving the tensions between exploitation and exploration, namely in terms of the structural distinction of exclusively dedicated units for exploitation or exploration. Firms with the capacity to develop exploration and exploitation activities simultaneously are better prepared to market demands in a more

efficient way (Kim & Rhee, 2009), involving different combinations of available resources (Soto-Acosta et al., 2018).

OA is a competency based on exploration and exploitation and can only be competency when it is subject to development and implemented (Chandrasekaran, Linderman, & Schroeder, 2012). This means that OA results from a continuous learning process, through exploration and exploitation. In this sense, we follow the view of Chandrasekaran et al. (2012) who argues that exploration and exploitation cannot be dissociated from each other in order to achieve OA. Exploration and exploitation enable the construction of new learning and to renew the capacity of OA over time, boost knowledge and not fall into inertia (Levinthal & March, 1993). From this point of view, technological capacity is linked to exploration and exploitation activities to promote innovative processes and achieve OA in SMEs (Chandrasekaran et al., 2012; Crick & Spence, 2005; Senaratne & Wang, 2018; Sarkees & Hulland, 2009).

From the point of view of OA, given the scarcity of resources, the ability of SMEs to mitigate adverse effects arising from market pressures will be less when compared to large companies (Cao, Gedajlovic & Zhang, 2009). In this scenario, we argue that this may influence the way in which SMEs adopt more exploitative or more exploratory strategies. Constraints related with scarcity of resources tend to be minimized since in SMEs, structures and hierarchies are substantially smaller, and leadership is closer to the fundamental processes in firms (Franco & Haase, 2010). Thus, at the strategic level, top management directs and ratifies the strategy guidelines, enhancing and promoting exploratory and exploitative activities (Lubatkin et al., 2006). The way that management deals with both is strongly related with the company's strategic vision, whether it is more exploitative or more exploratory depending on needs and responsiveness.

Following this line of thought, technological capacity use different types of resources (Zhou & Wu, 2010), to incorporate and transform knowledge and competences to attain higher levels of technical efficiency (Bianchi, Glavas, & Mathews, 2016). Such resources may be considered as qualifications of human resources, technical and financial resources, investments in innovation, experimentation and production systems, whereas the main external resources include collaborative processes and alliances with universities, research institutions and others firms (Jansen, Volberda & Van Den Bosch, 2005; Kocoglu, Imamoglu, Ince, & Keskin, 2012; Sobanke, Adegbite, Ilori, & Egbetokun, 2014).

We argue that technological capacity has two ways of influencing SMEs. The first related to how technological capacity develop accumulated knowledge and influences both the firm's capacity to innovate and its capacity to assess and implement new technological processes that can trigger new technology. And the second is that when related to organisational ambidexterity, technological capacity influences exploration and exploitation activities differently. For example, Benner and Tushman (2003) suggest that the knowledge and experience acquired over years of activity can develop exploration activities more than exploitation activities, when companies look more for improvement and efficiency of internal processes. Also Zhou and Wu (2010), following a similar line of thought, argue that technological capacity has a central effect on exploration activities, due to its degree of accumulated technical knowledge which facilitates interactions with the outside and development of existing knowledge and its efficiency. In the same connection, Yalcinkaya, Calantone and Griffith (2007) argue that technological capacity influences exploitation activities, and Löfsten (2017), studying Swedish SMEs, concludes that very dynamic environments develop competences, stimulating exploitation activities more. In view of the above, our argument is that the technological capacity influences OA but influences differently exploration and exploitation. The following research hypotheses are presented:

H1: Technological Capacity is significantly related to OA

H2: Technological Capacity shows a statistically different relationship with exploration and exploitation.

2.2. The Moderating Role of Environmental Dynamism

Environmental dynamism is the degree of instability and unpredictability in markets, and it is characterised by variations in technology, customers or product requirements (Dess & Beard, 1984; Volberda & Van Bruggen, 1997). Environmental dynamism influences technological capacity and firms' business (Volberda & Van Bruggen, 1997), and it is a cause of uncertainty in firms (Hambrick & Mason, 1984). This uncertainty influence SMEs when they seek to identify, evaluate and select information that supports both exploration and exploitation (Zabala-Iturriagoitia, 2014; Hsu, Lien and Chen, 2013), and also when firms reacts to clients demands, technological upgrades and competitors' pressures (Revilla, Prieto & Prado, 2010). It is also concerns to the introduction of collaborative technologies (Martinez-Conesa, Soto-Acosta, &

Carayannis, 2017), competitive environments (Wamba, Dubey, Gunasekaran, & Akter, 2020), innovation, (Yang & Li, 2011), variations in customer preferences and fluctuations in product demand or supply of materials (Peng & Lin, 2019). To stay competitive and to avoid obsolescence, firms introduce new products to meet up to market demands (Jansen et al. 2006).

SMEs are extremely sensitive to the influence of environmental dynamism and this manifest itself in different ways (Koberg, 1987). One of the most interesting aspects in SMEs is the effect of environmental dynamism on the activities related with OA. Both in highly dynamic markets and in markets with low level of environmental dynamism, exploration and exploitation activities are inherently distinct from each other (Suzuki, 2019). In highly competitive markets firms develop two kinds of strategies, first related with research strategies for new market opportunities (exploration) and second, related with strategies for using existing resources and capacities (exploitation) (Wamba et al., 2020). In this context, exploration and exploitation simultaneously has a high cost to SMEs concerning the scarcity of resources (Franco & Haase, 2010), since they must balance the tensions created between exploration and exploitation (Peng & Lin, 2019). The influence of environmental dynamism in exploration and exploitation has different effects due to the intrinsic nature of both. Thereby, exploration is related to the development of new products and services (Gedajlovic, Cao & Zhang, 2012), strengthening technological capabilities (Giniuniene & Jurksiene, 2015), following new market opportunities (Atuahene-Gima, 2005). Exploitation is related with the development of existing knowledge and the improvement of internal processes (Zabala-Iturriagoitia, 2014). In dynamic environments, exploratory processes are necessary to firms to compete (Mathews, Maruyama, Sakurai, Perks & Sok, 2019), but with the uncertainty of the results to be achieved (Pertusa-Ortega & Molina-Azorín, 2018). In turn, exploitative activities are also necessary for SMEs in order to maintain competitive balance, through efficiency and control (March, 1991). This distinction allows us to argue that SMEs combine exploitation and exploration according to the synergistic benefits that SMEs obtain from them (Cao, Gedajlovic, & Zhang, 2009; Pertusa-Ortega & Molina-Azorín, 2018). In fact, the ability of SMEs to be competitive can lead to different combinations of existing resources in view of the needs of exploration and exploitation (Peng & Lin, 2019). On the other hand, in stable and predictable market environments firms engages in exploitative adaptation (Uotila, 2017), as a mechanism for development of skills and capacities and to improve a greater level of specialization. In low dynamism environments, innovative processes arise through an incremental adjustment and where the advance of exploration takes

place due to continuous exploitative adaptations (Uotila, 2017). Technological capacity is important to SMEs to consolidate competences, knowledge and skills, and simultaneously, to engage SMEs to respond to new business opportunities (Wang & Rafiq, 2014). In these circumstances, technological capacity articulate both exploration and exploitation considered essential for firms' ambidextrous performance (Salisu & Abu Bakar, 2019).

Therefore, conditions in which markets operate determine how SMEs reacts, adjusting exploration and exploitation according to their ability to adapt to them (Khan & Mir, 2019). SMEs responsiveness to markets conditions means that SMEs have exploratory and exploitative forward-looking capabilities to move towards combining existing knowledge with emerging needs (Foglia et al. 2019). In this perspective, factors such as environmental dynamism can lead SMEs to become ambidextrous. However, this effect is not always positive for OA performance, because market influences exploration and exploitation differently, conditioning ambidextrous performance (Atuahene-Gima, 2005). Thus, exploitation is influenced by stable external environments, whereas exploration is influenced by highly unstable external environments (Halevi et al., 2015).

Literature has presented an argument justifying this difference. Thus, for Kim and Rhee (2009), environmental dynamism has a pattern of frequency and magnitude. The frequency pattern explains the cycles of turbulence and magnitude explains the extent of that turbulence. Both assume mutual interaction which in turn explains the distinct effects on exploration and exploitation activities in companies. However, here we can expect SMEs' market strategy orientations to focus on certain exploratory or exploitative processes, thereby reducing their ambidextrous capacity. This observation is also expressed in organisational theory (Koufteros, Vonderembse, & Jayaram, 2005) and in the theory of dynamic capacities (Teece & Pisano, 1994), since both theories suggest that external information allows firms new strategic market orientations.

Environmental dynamism can also lead also to uncertainties in SMEs' technological capacity and in a context of change where the competitive advantage is frequently short-lived (Bierly & Daly, 2007). Thus, SMEs adopt strategies according to their performance forecasts and goals with consequences for customer satisfaction and for their competitiveness (Gonzalez-Benito et al. 2014). Revilla et al. (2010) suggests the relationship the direct effects of environmental dynamism on firms' technological capacity, suggesting that efforts to develop products strengthen both exploration and exploitation. A similar study was presented by Soto-Acosta et al., (2018), where the

results obtained, in Spanish industrial companies, show that environmental dynamism is positively associated with OA and that this strengthens SMEs technological performance. In less dynamic environments, firms position themselves strategically according to cost control and efficiency, and investment in technology is lower. In dynamic environments, firms tend to direct their efforts to exploratory activities (Benner & Tushman, 2003). In both cases, firms ground their strategy on exploitative processes rather than exploratory processes and point to a trend towards stability. In these contexts, firms' internal learning processes are slower, also influencing ambidexterity and the focus is on product improvement rather than product creation (Bierly & Daly, 2007).

The degree of environmental complexity, its unpredictability, competitiveness and constant changes in technology, variations in consumers' preferences and the pressure to develop and innovate products and services (Kim & Rhee, 2009; Jansen et al., 2006) are aspects influencing firms' selection of routines, processes and practices essential for survival in increasingly competitive markets and related with exploration and exploitation (Gonzalez-Benito et al., 2014). This is an important aspect to consider regarding the influence of environmental dynamism on OA, since it is a critical factor in the relationship between exploration and exploitation. Therefore, as noted by Jansen et al., (2006), that preponderance of the different facets of the environment in SMEs ends up establishing and directing exploitation and exploration processes internally. For example, exploitation tends to influence negatively the relation between innovation and performance, and exploration influence positively to innovation and financial performance (Kim & Rhee, 2009; Abebe & Angriawan, 2014). From the above, the following research hypothesis is presented:

H3: Environmental Dynamism moderates the relation between technological capacity and OA in SMEs.

H4: Environmental Dynamism moderates differently the relation between technological capacity and exploitation and exploration in SMEs.

3. Research Methodology

3.1. Sampling Procedures and Strategy

A significant number of studies on organisational ambidexterity aim to construct their research hypotheses in relation to a set of company performance indicators. According to this premise, we set the research hypotheses around the effect of technological capacity and environmental dynamism, to find out if those factors influence ambidexterity in SMEs.

Using the Informa D&B database and resorting to the support of business associations related to the sectors chosen, 1202 companies were randomly selected, in the sectors of information technology and computing, programming, telecommunications and IT consultancy according to the following criteria: employing up to 250 workers, with a turnover up to 50 million euros and being based in mainland Portugal. The sampling method was conducted by technical personnel from the Informa D&B corporate database. The process of selecting SMEs for the sample was random, stratified and proportional for each subgroup of SMEs, with the final sample consisting of simple random sampling of companies belonging to each of the subgroups, information technology and computing, programming, telecommunications and IT consultancy. The sample size was considered acceptable for this research, corresponding to a 2.72% sampling error (with a 95% confidence level).

In order to examine non-response bias, we set the characteristics of the initial population against the final sample. Thus, the attributes of the 224 responses did not diverge in any systematic way from non-participants. This holds true in particular for demographic characteristics such as firm age or number of employees, so that a non-response bias did not occur in our study. Additionally, we performed a t-test (Armstrong & Overton, 1977) to compare the first and last waves of responses for each of the research variables, and this analysis also revealed no significant differences ($p < 0.05$).

The questionnaires were sent by e-mail to the companies selected randomly based on the criteria described above. The sample companies are characterised by a high degree of uncertainty in their operating markets. They are firms which, to be competitive, depend greatly on their capacity to adjust and adapt to new developments, new conditions and demands, typical elements of exploration and exploitation activities in ambidexterity. They also depend on their capacity to incorporate those developments in the firm's technical structure (Ruzzier, Hisrich, & Antoncic, 2006; Lubatkin et al., 2006). Therefore, this study argues that performance in OA in SMEs is influenced by both internal and external factors, in this case technological capacity and

environmental dynamism. For that reason, in such contexts, we can expect the owner-manager role to be related to activities of planning and improving existing internal processes, in the strategic decisions of exploration and exploitation, affecting ambidexterity (Raisch, Birkinshaw, Probst, & Tushman, 2009). Data were collected through a questionnaire constructed using a set of scales already used in previous studies and self-administered by the owner-managers.

To support this study, the research questionnaire was subject to a three-stage validation process, which included professionals working in IT, top management in telecommunications, consultants in the area of SME management and organisation (in the first two phases) and four SME partner-managers, in the telecommunications and management consultancy sector (in the third phase). In each phase, the questionnaire was subject to improvements in interpretation and adjustments to the order of questions. Some items were also modified in order to make the questionnaire more appropriate to the specific context of the study. The questionnaire was originally developed in English and the different dimensions used in this study belong to instruments already used by other researchers. As the scales were developed in English, we used the traditional translation method, i.e., translation of the English to a first version in Portuguese. The process used is time and cost efficient. However, this translation method depends on the translator's knowledge and experience, sometimes resulting in low levels of validity and reliability of the study instruments (Weeks, Swerissen, & Belfrage, 2007). To limit that possibility, a translator, a native English speaker, was asked to confirm the translation from English to Portuguese, and after this process, the questionnaire was subject to analysis by a number of consultants and higher education lecturers to validate the process of translating to Portuguese, based on the dimensions of the original questionnaires. This process refined some questions in the Portuguese version to avoid any type of ambiguity and lack of understanding. Other improvements were made after the pre-test to ensure the questions were clear, relevant and interpreted as expected.

3.2. Data Collection

Considering the recognised difficulty in using paper-based questionnaires and the consequent response, it was decided to send the questionnaires online. This was built and developed on an internet platform appropriate for the purpose and following the recommendations of Dillman (2007). This type of approach ensured that all the items were answered, preventing any of them from being left blank. The questionnaires were

sent by e-mail to 1202 randomly selected companies based on the criteria described above. Sample firms are SMEs in the field of information technology and computing, programming, telecommunications and IT consultancy. These firms are characterised by a high level of uncertainty in their markets of operation. For that reason, in such contexts, we can expect CEOs to have to vary their decisions according to firms' involvement in, and focus on, exploration and exploitation activities, allowing greater variability of orientation between those two dimensions and affecting ambidexterity.

Traditionally, SMEs in the field of information technology and computing, programming, telecommunications, and IT consultancy are devoted to developing new products and new technology and can adapt appropriately to technological uncertainties. According to Strand, Wiig, Torheim, Solli-Sæther and Nettet (2017), this type of company can develop OA strategies.

The questionnaires were sent out gradually, and before sending out a set of them an attempt was made to contact firms to explain the questionnaire and the research project it was part of. After doing so, a questionnaire was sent by e-mail to each company, addressed to the executive director (CEO), partner-manager, administrator, or owner. In some cases, we made an extra effort to encourage completion of the questionnaire through direct contact by telephone. Here, it was explained that participants would have access to a summary of the main results of the study. Of the 1202 questionnaires sent out, 224 completed ones were received, corresponding to a response rate of 19%.

3.3. Operationalization of the Constructs

The study variables were operationalized through items on a Likert-type scale, to obtain more reliable and valid results (Preston & Coleman, 2000), for this purpose using instruments already used and validated in other studies and with a good level of internal consistency.

Ambidexterity

According to the perspective adopted in this study concerning ambidexterity, the ambidexterity scale used was developed by Lubatkin et al. (2006), based on the scales developed earlier by He and Wong (2004) and Benner and Tushman (2003). This scale is formed of twelve items, with six of them related to the exploitation dimension and the other six related to the exploration dimension. Both dimensions are assessed on a

seven-point Likert-type scale (originally of five points), varying from “Strongly Disagree” (1) to “Strongly Agree” (7), to ensure statistically significant variability between the answers obtained.

Environmental Dynamism

The scale of environmental dynamism used was developed by Jansen et al., (2006), based on scales developed previously by Volberda and Van Bruggen, (1997). The Likert-type scale is composed of four items, keeping the version of Jansen et al., (2006), with seven points varying from “Strongly Disagree” (1) to “Strongly Agree” (7).

Technological Capacity

The technological capacity scale used in this study was developed by Tzokas et al., (2015), based on the scales developed previously by Zhou and Wu (2010) and Tsai, (2004). This scale assesses a company’s capacity to use diverse technology. The Likert-type scale is composed of four items, with seven points, varying from “Strongly Disagree” (1) to “Strongly Agree” (7).

3.4. Statistical Procedure

To determine the influence of environmental dynamism and technological capacity on organisational ambidexterity, a structural equation approach was adopted. This allows better representation of the variables studied and the association of measurement errors with the endogenous and exogenous variables, allowing multiple indicators of latent constructs (Bollen & Long, 1992). In this study it was decided to represent organisational ambidexterity as a second-order construct inasmuch as both exploration and exploitation are intrinsic constructs of organisational ambidexterity.

4. Results

4.1. Profile of Respondents and Descriptive Statistics

The questionnaire was constructed also aiming to obtain some demographical data about respondents (gender, age, academic qualifications) and information about their position in the company (years in the company, company size). The results show that most respondents are male (79%), with 28% being between 20 and 40 years old, 53% between 41 and 56 and 20% older than 56. Regarding qualifications, 45% of respondents attended post-secondary education, 38% have a degree, master or Ph.D.

and 17% said they had completed secondary education in its different forms or at a lower level.

Concerning respondents' relationship with the company, 83% said they belonged to companies with up to 50 collaborators and 17% to companies with between 51 and 100 collaborators. As for their time with the firm, 20% answered they had been there up to 20 years, 43% between 21 and 30 years and 38% more than 30 years.

4.2. Concerns About Common Method Bias

Since all the information gathered in this research came from a questionnaire, the recommendations of Podsakoff, MacKenzie, Lee and Podsakoff (2003) were followed. Factor analysis was performed with all the variables forecast in the model. One factor, without rotation, was extracted, and the result obtained (with extraction of only one factor) captured only 30% of the variance.

The next phase was validation of the measurements of the structural equation model. As all the information gathered came from a single questionnaire, the recommendations of Podsakoff, MacKenzie, Lee and Podsakoff (2003) were also followed here regarding the variance attributed to the data collection method rather than the measures considered (common method bias).

Common method bias (CMB) occurs when the variations in the answers are caused by the instrument used rather than the real attitudes of the respondents that the instrument aims to discover (Podsakoff et al., 2003). Sources of CMB can be the evaluators themselves (for example, reasons of consistency and social convenience), the characteristics of the item (for example, complex, ambiguous items) the context (for example, humour induced by the context) and the measurement context (for example, time and place of measurement, common means to obtain the measurement) (Podsakoff et al., 2003). Therefore, the collection method biases the variations to be analysed. Identifying the sources of CMB allows better control of their influence on the data collected.

To test that effect, Harman's single factor test was used, where all the items (measuring latent variables) are loaded on a common factor. If the total variance for a single factor is under 50%, this suggests there is no CMB biasing the data. Therefore, to detect the presence of CMB, factor analysis was performed with all the variables forecast in the model. One factor, without rotation, was extracted, and the result obtained (extracting

only one factor) captured only 23% of the variance, showing that CMB is not a concern in this study.

4.3. Statistical Assumptions: Outliers, Response Bias and Sample Normality

This study followed some recommendations present in the literature, namely by Hair, Anderson, Tatham and William (2010). Therefore, seeking to establish relationships between variables, research based on questionnaire surveys has been seen to have attractive aspects for researchers, such as efficiency in obtaining information and the capacity to generalize. Considering the research characteristics, the type of questioning may also be subject to some bias effect.

The data obtained were analysed based on the bias caused by identical response patterns, outliers and inconsistency in answers. No missing data were detected, and the existence of outliers was assessed by the Mahalanobis (D^2) squared distance, giving six observations, and so factor analysis was carried out without these observations, following a conservative strategy. The answers were also analysed seeking patterns or repetition of the same type of answer to different questions.

The assumption of variable normality was assessed by the univariate and multivariate coefficients of skewness (Sk) and kurtosis (Ku). No variable presented sk and ku values indicating severe violation of normal distribution. Skewness (Sk) values were between 0.031 and 1.202 and kurtosis (Ku) values between 0.083 and 1.591, suggesting no violation of these assumptions, since both remained below what is indicated in the literature, $|Sk| < 3$ and $|Ku| < 10$ (see(Hair, Anderson, Tatham, & Black, 2010)). The KMO test was used with the classification criteria defined in Hair, Anderson, Tatham and Black, (2010), observing $KMO=0.873$ (Kaiser & Rice, 1974). Regarding multicollinearity, the VIF and Tolerance were checked, revealing $VIF \leq 6.709$ and Tolerance ≥ 0.149 , indicating a low level of multicollinearity (Hair, Anderson, Tatham, & William, 2010).

4.4. Validation of the Measurement Model

The literature recommends that the study model validation process should be in two stages. The first consists of factor validation of the measurement model and the second

consists of validating the structural model. To validate the measurement model, confirmatory factor analysis (CFA) was performed using AMOS software (v.24, SPSS, IBM Company, Chicago, IL), aiming for model adjustment (Preston & Coleman, 2000). The maximum likelihood estimation method was used, this being the most common approach in structural equations due to its robustness (Hair, Anderson, Tatham, & Black, 2010). The factor weights ($\lambda \geq 0.5$) were determined and the items with low individual reliabilities ($R^2 \leq 0.50$) were withdrawn. Adopting a more conservative perspective allowed correlation between factors which, in theory, should be orthogonal. Items saturating in more than one factor were also withdrawn and the model adjusted.

The reliability of the measuring scales was analysed through the Cronbach alpha, generally used in studies with constructs based on various Likert-type scales. The results observed (see Table 1) indicate appropriate levels of internal consistency for all the scale variables used in the study, varying from 0.793 to 0.911 (Cronbach, 1951).

The items of Intensity03, Explor01 and item Exploit06 presented a considerably lower factor weight. Therefore, and adopting a more conservative approach, it was decided to remove those items not to cause the correlation between factors which, theoretically, should be orthogonal (Hair, Anderson, Tatham, & Black, 2010). (Fig.1). After analysing the modification indices, the Explor04 item was found to saturate in more than one factor, and so it was also decided to remove it. Content analysis of that item “Have tried to concentrate on activities seeking essentially to find out and develop clients’ level of satisfaction with the company?” and “concentrated on activities focused on improving the products and services provided by the company in order to keep clients satisfied?” also supports this theoretical decision on the relevance of this item according to its interpretation by respondents. After removing the item and continuing to modify the model, it was possible to obtain a good quality of adjustment ($\chi^2/df=1.453$; CFI=0.978; GFI=0.919; RMSEA=0.045; PCFI=0.787; PGFI=0.665) (Hair, Anderson, Tatham, & Black, 2010).

Table 1. Assessment of the measurement model

Contracts	Items	Individual reliability	AVE	CR	MSV	ASV	Cronbach alpha
			0.564	0.838	0.325	0.091	0.793
Environmental Dynamism	Intensity01	0.510					
	Intensity02	0.514					
	Frequency01	0.660					
	Frequency02	0.575					
			0.581	0.847	0,063	0,019	0.847
Technological Capacity	TechnoCap01	0.537					
	TechnoCap02	0.642					
	TechnoCap03	0.642					
	TechnoCap04	0.577					
			0.673	0.913	0.01	0.005	0,911
Exploitation	Exploit01	0.574					
	Exploit02	0.794					
	Exploit03	0.647					
	Exploit04	0.602					
	Exploit05	0.688					
			0.680	0.910	0.073	0.042	0.897
Exploration	Explor03	0.514					
	Explor04	0.887					
	Explor05	0.719					
	Explor06	0.651					

4.5. Validation of the Structural Model

To study the structural model (Figure 1), the maximum likelihood estimation method was used to determine the model's adjustment indices. With the model adjusted from the modification indices (above 11; $p < 0.001$), produced by AMOS and based on theoretical elements, the following indicators revealed good model adjustment and consequently internal and external consistency ($X^2/df=1.522$; $CFI=0.969$; $GFI=0.918$; $RMSEA=0.049$; $PCFI=0.798$; $PGFI=0.672$) (Hair, Anderson, Tatham, & Black, 2010).

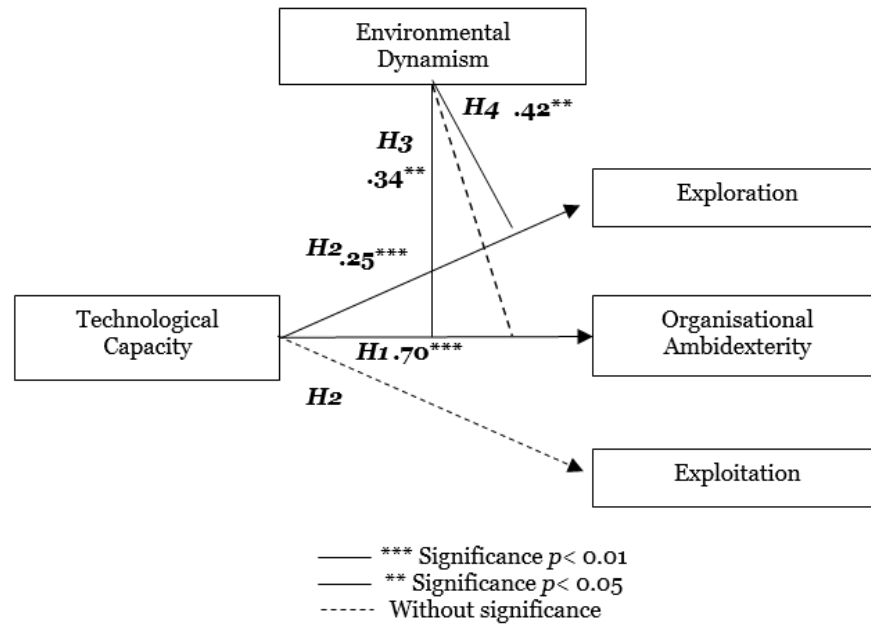


Figure 1. Structural Model

This study analysed the relationship between technological capacity and organisational ambidexterity, and technological capacity and exploration and exploitation, and the moderation role played by environmental dynamism on those relationships. The model explaining latent factors explains 93% of the model's variability. Analysis of the trajectories between factors revealed that, for the hypothesis H1, the Technological Capacity->OA trajectory presents the greatest weight and a positive and significant relationship ($B_{\text{TECHNOLOGICAL_CAPACITY.OA}}=0.325$; $SE=0.092$; $\beta_{\text{TECHNOLOGICAL_CAPACITY.OA}}=0.700$; $p=0.001$) and was found a moderation effect of environmental dynamism between the two variables ($\beta=0.34$; $p=0.05$) (Figure 2), and this effect varies according to the increase of environmental dynamism in OA. Thus, in the presence of low environmental dynamism, there is no effect of technological capacity on OA. But when we add to the model high environmental dynamism, it turns out that it starts to have a positive slope, which leads us to conclude that technological capacity starts to have a greater effect on OA. This result supports hypothesis H3.

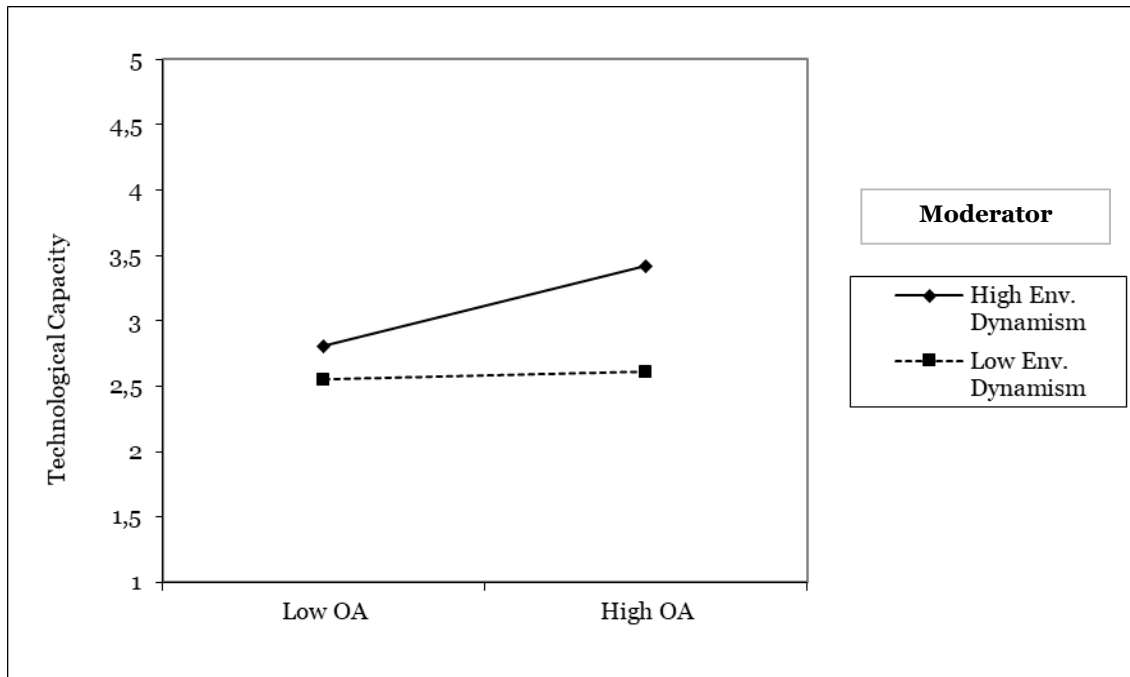


Figure 2. Moderating role of environmental dynamism on the relationship between Technological Capacity and Organisational Ambidexterity

Analysis of the trajectories between factors revealed that the Technological Capacity->Exploration trajectory is positive and significant ($\beta_{\text{TECHNOLOGICAL_CAPACITY.EXPLORATION}}=0.307$; $SE=0.094$; $\beta_{\text{TECHNOLOGICAL_CAPACITY.EXPLORATION}}=0.252$; $p=0.001$), whereas the Technological Capacity->Exploitation trajectory was positive but not significant. According to the model presented in Figure 1, data support hypothesis H2. Data analysis also revealed a significant moderating effect between Technological Capacity and Exploration ($\beta = 0.42$, $p = 0.05$). Thus, in the presence of low environmental dynamism, there is no effect of technological capacity on exploration. But when we add to the model high environmental dynamism, it turns out that it starts to have a strong positive slope, which leads us to conclude that technological capacity starts to have a greater effect on exploration. This result supports hypothesis H4.

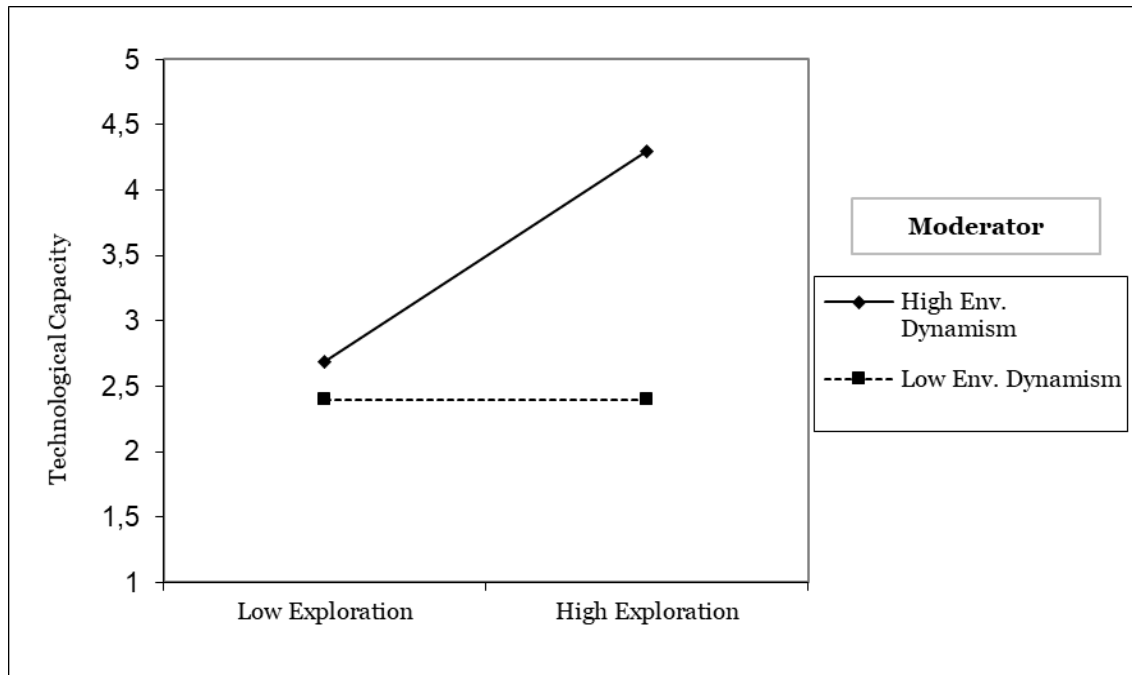


Figure 3. Moderating role of environmental dynamism on the relationship between Technological Capacity and Exploration

5. Discussion and Conclusion

This study aimed to find out the effect of technological capacity on OA as well as looking for whether there is a moderating effect of environmental dynamism in this relationship. However, study sought to go a little further of knowing whether there is also a moderating effect of environmental dynamism also in the relationship of technological capacity and exploitation and exploration. In this study, the relationships were tested through a second-order structural equation model and all the hypotheses were validated.

For this study, four hypotheses were built. The testing for the different hypotheses built for this study went through two distinct phases. The first phase, for hypotheses H1 and H2 and a second phase, for hypotheses H3 and H4. The hypothesis H1, our model revealed that technological capacity has a statistically significant positive effect on OA, which in this study was validated. In fact, the literature supports theoretical assumptions that technological capacity has on OA, as well on exploration and exploitation activities (Benner & Tushman, 2003). Hypothesis H2 of this study advocates that both exploration and exploitation activities are subject to a positive effect of technological capacity. In fact, the literature has reported that technological capacity has a positive effect on exploitation and exploration (Zhou & Wu, 2010), but this was not achieved in this study. The result obtained for exploitation, although positive, was

not statistically significant but we find that technological capacity has a positive and statistically significant effect on exploration, which came to validate hypothesis H2 in this study.

However, our model advocates the moderating role of environmental dynamism in the relationship between technological capacity and OA, as well as in the relationship between technological capacity and exploitation and exploration. In fact, for the second testing phase, for hypothesis H3, we find that in the presence of low environmental dynamism, there is no effect of technological capacity on OA, but when in the presence of high environmental dynamism, technological capacity starts to have a greater effect on OA. This result supports hypothesis H3. Indeed, the relationship between technological capacity and OA is consistent with the theoretical assumptions which refer to the moderating effect of environmental dynamism in different contexts, namely when comparing firms in the presence of low environmental dynamism with firm in the presence of high environmental dynamism. In these diverse contexts, firms tend to adopt more prospective or more exploratory strategies (Wamba et al., 2020). Regarding hypothesis H4, we find that the effect of environmental dynamism in exploitation was not statistically significant. However, concerning to the moderating effect of environmental dynamism in exploration, we also find that in the presence of low environmental dynamism, there is no effect of technological capacity on exploration. But when in presence of high environmental dynamism, technological capacity has a greater effect on exploration. This result supports hypothesis H4.

These findings lead us to consider some important aspects with implications for theory and practice. Thus, regarding the contingency nature of SMEs. In fact, the contingency theory (Donaldson, 2001) refers that the performance of firms is influenced by the characteristics of the market where they operate and depending on external influences through a moderating effect (Ghofar & Islam, 2015). This is an element inherent to the nature of SMEs, more sensitive to changes in the markets, due to their size or scarcity of resources (Franco & Haase, 2010). In fact, literature shows this perspective (Tzokas et al., 2015; Kim & Rhee, 2009; Mesa, Iborra, & Safón, 2013; Halevi et al., 2015); but other factors are suggested to explain this diversity of results, namely influencing factors related to areas of business, firms' characteristics (Gonzalez-Benito et al., 2014) or possibly the existence of others moderators.

In the context of OA, this study clearly indicates the positive direction of that relationship between technological capacity and OA, strengthening the idea that

dynamic, highly competitive business environments have a positive impact on OA (Kim & Rhee, 2009). However, the type of sample used in this study would allow considering the assumption that we have a type of firm whose business area is traditionally associated with the development of new products and new technology, theoretically promoting OA (Strand, Wiig, Torheim, Solli-Sæther & Nettet, 2017). The dynamic nature of this type of business environment, a positive influence of environmental dynamism on technological capacity and OA would be expected. Certainly, the specific nature of SMEs also allows considering the explanation of Kim and Rhee (2009), for whom in dynamic environments SMEs tend to turn to exploration more than exploitation activities. Therefore, the result obtained finds support in the principle of inequality proposed by Levinthal and March (1993), which results from resource allocation, affecting the nature of simultaneity required for OA (Lavie, Stettner, & Tushman, 2010).

From this perspective, it is justified that OA is subject to various types of effects, suggested by the literature. The literature presents two different perspectives concerning how tensions between exploration and exploitation are managed in companies. The first perspective emerges with authors such as Benner and Tushman (2003), Birkinshaw and Gupta (2013) or He and Wong (2004), for whom the right combination of exploitation and exploration is necessary to achieve OA. The second perspective suggests inequality, recommending that more resources are devoted to exploitation (Wei, Zhao, & Zhang, 2014; Levinthal & March, 1993) or exploration, when there is a need for responses to certain configurations of environmental dynamism. Considering the specific nature of SMEs and their shortage of technical or financial resources, their lack of willingness to cooperate with other companies or the limited influence on the market (Calof, 1994; Tamayo-Torres, Gutierrez-Gutierrez, & Ruiz-Moreno, 2014; Franco & Haase, 2010), the way exploration and exploitation are balanced could explain different performances in SMEs in relation to OA (Thorpe, Holt, Macpherson & Pittaway, 2005). This leads us to consider that exploration and exploitation in SMEs cannot be developed simultaneously, as proposed by Jansen, Tempelaar, Van den Bosch and Volberda (2009), but those activities can be mobilized, coordinated and developed considering a continuum of alternation between both, allocating existing resources according to needs and their development in specific business contexts. This is an important theoretical contribution resulting from this study, by proposing that the construction of OA in SMEs is dependent on the environmental dynamism they are part of.

For technological capacity, the results obtained showed this to have a positive effect on OA. Technological capacity makes companies more competitive and thereby likely to achieve positive performance at various levels, namely regarding OA. Greater technological capacity allows SMEs to respond to the needs of demanding and dynamic markets, by developing new products and new technology, greater gains in efficiency (Teece et al., 1997), and using different types of technological resources (Zhou & Wu, 2010).

However, this study did not reveal the same type of effects on processes associated with exploitation, suggesting that SMEs prioritize internal processes that consolidate knowledge strategies directed towards development and efficiency. So, in relation to technological capacity, the results of exploration are significant whereas those of exploitation are not. Activities in SMEs related to knowledge creation, maintaining routines, control and bureaucracy are activities related to exploitation, and therefore the result of their development based on experience accumulated over the years (Zhou & Wu, 2010). However, exploration emerges as a response to trends in the context that guide and establish the creation of new technology, products and markets (Lubatkin et al., 2006), and is characterised by research, discovery, experimentation, assuming risks and innovation (He & Wong, 2004). The explanation for exploration and exploitation having different degrees of influence on OA when related to technological capacity results, from the point of view of the OA paradigm, from a relationship between learning and development of knowledge. This theoretical affirmation is supported in Zhou and Wu (2010), where high levels of exploration activities in firms allow technological development to be carried out resorting to existing levels of knowledge. These authors suggest that the focus of technological capacity on exploitation is reduced when the level of existing knowledge becomes a sufficient degree of specialization for technological capacity. Therefore, to achieve OA in SMEs, and from the point of view of practical management, different effects of technological capacity on exploration and exploitation should be taken into consideration.

6. Contributions

The research path followed in this study contributed to finding out the moderating role of environmental dynamism on the relationship between technological capacity and

OA. This study was carried out in SMEs in the sector of information technology and computing, programming, telecommunications and IT consultancy. This contribution can be summarised at two levels: theoretical and practical.

Regarding theory, this study advanced knowledge about how, in the SME context, technological capacity has a positive influence on OA and exploration activities, as well the moderating role played by environmental dynamism. This advance is in accordance with the forecasts of the contingency theory (Donaldson, 2001) and on dynamic capabilities theory (Teece, & Pisano, 1994). Both theories demonstrate the role of capabilities and the importance of the external environment on OA. In the view of contingency theory, firms' performance is dependent on the contingencies that reflect their situation. On the view of dynamic capabilities theory (Teece, & Pisano, 1994), there is an exchange of information between environment and SMEs. Both theories allow us to frame environmental dynamism and technological capacity in different levels of analysis: the first concept describes the complexity and changes on firm's environment and runs at external level; and the second concept, focuses on internal level where technological knowledge, systems, and technological infrastructure, fundamental to the survival and competitiveness of SMEs, are built. With OA being the result of a knowledge process between exploration and exploitation, it is understandable that SMEs, when supporting the knowledge acquired over the years based on experience, can reinforce activities of a more exploratory nature, as proposed by those theories. This is an important contribution of this study, by showing the link between these two theories.

This study sought to relate technological capacity and organisational ambidexterity and the moderation role played by environmental dynamism, using structural equations for the ambidexterity variable, as a second-order model. This approach allows a more integrated view of the OA construct, based on exploration and exploitation, and supports the idea that contingency elements such as environmental dynamism and technological capacity have different effects on OA.

Following up the question asked by O'Reilly and Tushman, (2013) "how is ambidexterity achieved?", this study added a new perspective: will OA be the result of conjugating factors that function simultaneously, in a given context? This study supports this idea and contributes to clearly showing that, in the SME context, exploration and exploitation have different levels of influence on OA, due to contingency elements such as environmental dynamism and technological capacity.

Despite their resource limitations, SMEs can also be competitive by centring their efforts on developing existing knowledge, prioritizing exploration activities in order to be competitive in dynamic environments.

In practical terms, this study contributes with two important implications for managers. Firstly, it suggests that SMEs and their managers, facing different effects and environmental dynamics, in their strategic options should understand the most appropriate strategies related to exploration or exploitation to respond to environmental pressure. This aspect influences SMEs' competitiveness since managers should consider how they pay attention to exploration and exploitation. Ambidextrous companies with an appropriate exploration strategy depend greatly on external conditions to match their exploitation activities. Secondly, the study contributes to the literature on entrepreneurship and innovation since the results obtained allow proposing distinct approaches to preparing new SME managers. These approaches, in relation to the knowledge strategy, cannot be considered in isolation from factors characterizing the environmental context.

7. Limitations and Suggestions for Future Research

Although the study makes significant contributions, it suggests some aspects that can be addressed in future studies. Firstly, it is based on a questionnaire methodology, this being directed to one key-informant per company. Future research should use respondents at different levels in companies. Secondly, organisational ambidexterity is a dynamic concept and longitudinal research could enrich the conclusions of this study. Thirdly, future studies should consider other environmental characteristics, such as complexity or predictability, as suggested by the literature (Volberda & Van Bruggen, 1997). Given the clear need to avoid making the questionnaire used here too long, such additional characteristics were not considered in this study.

Other suggestions for future research can also be considered. For example, the relationship between CEOs' experience and technological capacity and its influence on exploration or exploitation, or the existence of moderating effects of environmental characteristics on OA, in other sectors of SME activity.

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CHAPTER 6

The Influence of Iso 9001-Based Quality Management Systems in SME Organisational Ambidexterity: An Exploratory Multiple-Case Approach

Abstract

The aim of this study is to understand how Quality Management Systems based on ISO 9001 (QMS) can facilitate or inhibit organisational ambidexterity (OA) in small and medium-sized enterprises (SME). Literature indicates that QMS bring an important set of changes in SME, and the approach adopted in this study identified a set of changes caused by QMS in SME with possible effects on OA. Based on case studies conducted in Portuguese SME, in the sector of information technology (IT), telecommunications, audio-visual and IT consultancy, this study showed that QMS contribute to ambidextrous behaviours in SME, even if not all changes caused by QMS in SME acted as OA facilitators. The results obtained contribute to the literature in two ways: first, by showing that the changes caused by QMS in SME triggered ambidextrous behaviour, and second, showing the existence of alternating cycles and the orthogonality of exploitation and exploration. This pioneering study is a significant opportunity for SME reflect about their own practices related to QMS in order to improve their performance at the OA level.

Keywords: Quality Management Systems, ISO 9001, organisational ambidexterity, small and medium-sized firms, SME.

1. Introduction

Quality management systems (QMS) based on ISO 9001 are management tools that bring standardization and control, streamlining firms' organisational processes (Shenawy et al., 2006), including the development of products and services (Gutierrez - Gutierrez et al., 2018), human resource management or innovation (Zeng et al., 2015). QMS has been recognized in the literature as an important factor for firms' competitiveness (Phan et al., 2011), and a growing number of companies has implemented quality systems with great benefits in terms of cost control and greater customer satisfaction (Moreno-Luzon & Gil-Marques, 2015). Research has reinforced the idea that QMS are adjustable to different types of organizations and have also positive results at the financial level (Moreno-Luzon and Gil-Marques, 2015; O'Neill et al., 2016; Calvo-Mora et al., 2015). QMS are based on a process approach, through achieving compliance with a set of principles and requirements, seeking to ensure customer satisfaction and continuous improvement (Fonseca, 2015).

Concerning OA, literature has produced an important set of studies highlighting distinct streams of research, such as innovation (Karlsson et al., 2015; Agostini et al., 2016) or organisational performance (Bouncken et al., 2016). The OA concept emerges as an ability to use and refine existing knowledge and to create new knowledge (Turner, Swart, & Maylor, 2013). OA is a management research paradigm that has been framed by various theoretical perspectives, including the theory of dynamic capabilities (Tece & Pisano, 1994), the theory of organisational learning (Levinthal & March, 1993), or the resource-based theory (Barney, 1991). Other studies approach OA as an organisational capability (O'Reilly & Tushman, 2008), as a process linked to leadership and top management (Carmeli & Halevi, 2009), or as a human resource management mechanism (Patel et al., 2013).

However, concerning the influence of QMS on OA, the literature has been somewhat ambiguous, including studies suggesting that QMS can only benefit exploitation, and studies showing that it can benefit both exploitation and exploration (Benner & Tushman, 2003; Asif & de Vries, 2015). This ambiguity leads us to raise the following question: are QMS capable of fostering ambidextrous behaviours in SME? In fact, this question leads us to consider that there is an important gap in literature that remains to be filled, since studies that focus on the influence of QMS on OA are very scarce (Asif & de Vries, 2015; Felício, Caldeirinha, & Dutra, 2019; Hsieh et al., 2018; Koryak, Lockett, Hayton, Nicolaou, & Mole, 2018). Thus, following what was highlighted by Tushman

and O'Reilly (2011), we also consider that a better understanding of the mechanisms that can act as inhibitors or facilitators of OA is necessary. In accordance, the objective of this research is to identify which changes brought through QMS' development/implementation in SME can act as facilitators or inhibitors of OA.

The study was conducted through a qualitative research approach, based on a set of case studies focused on SME, in the sector of information technology (IT), telecommunications, audio-visual and IT consultancy. These SME create technology (Loon & Chik, 2019) and drive both exploration and exploitation (Chandrasekaran et al., 2012). This study involved top management, as well as middle managers (project managers, commercial directors) and non-leaders, moving away from the traditional approach centred only at the senior management or decision-making level, to focus on a multi-level approach. As far as it is possible to identify, there is no study with this type of methodology carried out in SME, concerning the influence of QMS on OA.

This study adopts an organisational perspective of OA and is structured in four sections: a first section dedicated to the construction of the OA process, addressing the dilemma between exploitation and exploration; a second section dedicated to the possible changes in SME caused by QMS based on ISO 9001 and the effects on OA; a third section related to the study methodology; a fourth section dedicated to the discussion of the results and conclusion, ending with suggestions for future research lines.

2. Theoretical Framework

2.1 Organisational Ambidexterity and the Exploitation-Exploration Dilemma

Organisational ambidexterity is firms' ability to manage exploitation and exploration tensions, where both compete for the availability of resources (Felício et al., 2019). While exploration involves learning new skills and knowledge, exploitation involves the institutionalization of a learning process improving companies' skills (He & Wong, 2004). According to Álvarez et al. (2018), exploration means new alternatives and future paths, while exploitation seeks refinement and execution. The exploration and exploitation attributes are distinct from each other. Thus, while exploration is based on creative and revolutionary knowledge processes (Hsu et al., 2007) involving technologies, processes, products, and systems, exploitation involves evolutionary

knowledge processes, of controlled, systematised, and efficient development (Lubatkin, Simsek, Ling & Veiga, 2006).

Exploitation and exploration are concepts that can interact with each other continuously or orthogonally, competing with or complementing each other. According to March (1991) exploitation and exploration can represent two extremes of a continuum, where the reciprocal interaction between them is based on a logic of competition for scarce resources, alternating with each other. However, Gupta et al. (2006) state that this logic can be arguable when internal resources are available, or when access to them is made in such a way that there is no competition between exploitation and exploration. In this sense, exploitation and exploration can be orthogonal, when these two concepts operate in different domains. This is the case of knowledge or information resources that, while not scarce, allow to support both exploitation and exploration.

The key element for the balance between exploration and exploitation lies in preventing the company from focusing on one of these extremes (Balboni, Bortoluzzi, Pugliese, & Tracogna, 2019). According to March (1991), exploitation and exploration are fundamental activities for companies: excessive focus on exploitation inhibits innovation; excessive focus on exploration leads to inefficiencies and waste. This process is, however, often contradictory between exploitation and exploration, due to critical factors such as the availability of existing resources (Andrade et al., 2016), cost control, search for greater efficiency, and where dichotomous processes predominate: new-old, existing-emerging. Exploitation and exploration refer to complex actions that intensify the challenges of management in companies (Andriopoulos & Lewis, 2009) but that also imply the combination of knowledge: exploitation, based on existing knowledge, and exploration, based on new, dispersed, and varied knowledge.

2.2 Organisational Ambidexterity' Antecedents in SME Context

Turner et al. (2013) considers that there are antecedents that help firms to achieve OA and reflect the diversity of organisational complexity. According to Teece et al., (1997), OA antecedents are related to resources that companies use to learn, develop and obtain new capabilities. How these backgrounds help OA is based on how knowledge emerges in firms and how this knowledge is used. This aspect is highlighted by Syrigos et al. (2013) who suggest that these antecedents use knowledge and learning to manage the tensions between exploitation and exploration.

Literature also corroborates the study conducted by Turner et al. (2013) through documenting a set of contributions to the identification of antecedents that enable OA, namely human resource management practices. Faisal Ahammad et al. (2015) highlight practices based on incentive systems, among the human resource management practices that favour OA, and Gutierrez-Gutierrez et al. (2018) highlight human resource management practices based on training, teamwork, and autonomy. In this line of thought, Syrigos et al. (2013) suggest that the organisational contexts of SME that promote effective human resource management practices can act as OA facilitators because they shape the relationship between different levels of management and human resource structures (Benitez et al., 2018). Practices related to quality management also act as a facilitator of OA in SME, including the adoption of practices focused on customer focus (Asif, 2017b), of control and monitoring practices (Alič, 2018), the introduction of work methodologies (Alcaide-Muñoz & Gutierrez-Gutierrez, 2017) or customer service and information sharing activities (Asif & Gouthier, 2014). The study conducted by Ajayi et al. (2017) is another example, proposing a model that relates organisational culture with employee involvement and suggesting that appropriate organisational contexts are favourable for OA. A similar idea is suggested by Patel et al. (2013) who argue that OA can be developed through a company culture that favours trust and discipline among human resources. Other practices related to employee involvement highlight the importance of social interactions in firms (Turner et al., 2013). The involvement of human resources is an important factor for firms to be able to adopt change and decision-making processes in participatory management processes (Mendes, 2012; Dover & Dierk, 2010; Carmeli & Halevi, 2009). Likewise, socialization processes emerge as mechanisms for creating and sharing knowledge (Benitez et al., 2018) and promoting teamwork (Parmentier & Picq, 2016), facilitating communication and the generation of ideas, as well as continuous improvement processes (Gutierrez-Gutierrez et al., 2018).

Other OA antecedents are based on SME' need to look for solutions that allow them access to knowledge (Puranam & Srikanth, 2007) or access to technology (Soto-Acosta et al., 2018). The technological level is an important antecedent of OA as it is found in the construction of knowledge, influencing exploitation and exploration, as well as varying this influence according to environmental dynamism, market action, and customer relationships (Chandrasekaran et al., 2012; De Visser et al., 2011; Minh & Hjortsø, 2015). Firms' partnerships and alliances also emerge as processes for responding to requests and opportunities from markets and customers (Lavie et al.,

2010; Stettner & Lavie, 2014) and development of business models (Balboni et al., 2019). Table 1 shows a summary of the main antecedents of OA in SME.

Table 1. Synthesis of OA' antecedents in SME context

OA Antecedents	Authors	Key ideas
Human resources management	Malik et al. (2017); Revilla and Rodríguez-Prado (2018)	Human resource management practices such as learning and talent management, training and development of skills or creativity may enhance OA
	Syrigos et al. (2013)	Human resource management practices based on participation and commitment can help in developing OA
	Asif and De Vries (2015)	Human resource management practices that encourage training can empower OA because these practices act on the internal processes that involve human resources, guiding and developing skills
	Felício et al. (2019)	Different internal communication strategies in companies help to develop OA through exploration and exploitation activities, depending on whether they are more informal or disruptive, or more routinized and formal.
	Ajayi et al. (2017)	Organisational contexts based on employee involvement enhance the development of OA through more decentralized processes, delegated authority, less formalism in procedures
Organisational culture, organisational context and structure, and technological level	Poon et al. (2020)	Organisational contexts that promote entrepreneurial orientation in SME enhance the development of OA as they encourage the development of risk-taking or proactive behaviours by employees.
	Chang et al. (2011)	OA can be developed in firms as long as they streamline internal structures based on the connection between human resources, the degree of decentralization of decisions and delegation of authority at different levels in SME, and as long as they internally support exploitation and exploration actions.
	Soto-Acosta et al. (2018); Martínez-Conesa et al. (2017); Chandrasekaran et al. (2012); Chebbi et al. (2015);	SME' technological capacity allows them to be more capable of responding to the dynamism of the market and influences internal knowledge management processes, through exploitation and exploration, positively enabling OA.
	Fundin et al. (2018)	Customer satisfaction management systems influence the development of exploitation and exploration operations in SMEs
	Jasmand et al. (2012)	Organisational contexts that promote customer orientation and are based on customer support systems in SMEs can help develop OA
	Good and Michel (2014); Rosing and Zacher (2017)	Being more flexible and having simpler internal structures, SME react more easily through developing the appropriate procedures for solving problems and setting goals.
	Moreno-Luzon and Gil-Marques, (2015)	Quality management systems implemented in SMEs enable OA when based on a culture of change.

Continued >>>

Table 1. Synthesis of OA' antecedents in SME context (continuation)

OA Antecedents	Authors	Key ideas
Partnerships, alliances, interorganisational cooperation	Prasad and Prabhudesai (2018); Dolz et al. (2014)	The creation of alliances between companies provides opportunities for OA in SME, through identifying the necessary resources for both exploitation and exploration
	Rothaermel and Alexandre (2009)	Alliances between SMEs act as facilitators of access to technologies and knowledge, enabling OA.
	Nielsen and Gudergan (2012)	Factors such as experience, trust, cultural distance or skills influence the choice of partners to form partnerships between SME, influencing exploitation and exploration strategies, which may enable the OA.
Involvement and Commitment	Ajayi et al. (2017)	Involvement and commitment among human resources, based on leadership and on an organisational culture of sharing and encouraging teamwork, can enhance the development of OA.
Cooperation and teamwork	Gibson and Birkinshaw (2004)	Social contexts in firms that promote discipline, cooperation, support, flexibility and trust among human resources help to develop simultaneous exploitation or exploration behavioural responses in human resources that can enable the OA
Customer focus	Fundin et al. (2018); Jasmand et al. (2012); Moreno-Luzon and Gil-Marques, (2015)	Customer satisfaction management systems influence the development of exploitation and exploration operations

2.3 The Influence of ISO 9001-based QMS on SME' Organisational Ambidexterity

Organisational Changes in SMEs Through ISO 9001-based QMS

SME provide a very specific context for the implementation of QMS, since they are firms with very specific characteristics, such as their small size or the simplicity of their internal structures (Franco & Haase, 2010). From the point of view of the resource-based view theory, SME are also dependent on the availability of resources and on their heterogeneity (Wenerfelt, 1984), namely in terms of their technological capacity or their ability to innovate (Radas & Božić, 2009). However, these characteristics end up facilitating organisational change processes in SME, due to the speed and adaptability with which they adapt and incorporate practices when compared to large companies (Bianchi et al., 2016).

Literature has highlighted some negative impacts of QMS on SME. Among these, the rigidity of procedures, excessive formalism (Melão & Guia, 2015), and the associated costs (Brown & Loughton, 1998). However, Poksinska et al. (2006) consider that these

negative impacts of QMS on SME are not related to QMS but to the implementation methodology and to how they are operationalized in SME, since the methods used may not be the most consistent with reality and with the specific context of these companies (Poksinska et al., 2006).

Regarding the positive impact of QMS, the literature suggests that organisational changes in SME reflect a better internal organization (Melão, & Guia, 2015; Santos et al., 2011; Poksinska et al., 2006), a greater document control (Poksinska et al., 2006), a greater internal discipline and order (Brown & Loughton, 1998), and improvements in internal communication (Sun & Cheng, 2002; Briscoe et al., 2005; Melão & Guia, 2015). Through QMS' development/implementation, SME also generally pay greater attention to customer requirements and to their satisfaction (Heras-Saizarbitoria & Boiral, 2015), to continuous improvement, to risk and knowledge management, and to innovation (Matthews & Marzec, 2017; Cachadinha, 2009; Sousa-Poza et al., 2009; Cuerva et al., 2014).

Thus, through QMS, SME start to integrate and monitor a set of actions, processes, and systems that were previously neglected or unknown, reflecting on their better internal organization and a more strategic management approach (Melão & Guia, 2015). In fact, SME start to systematise actions and act both from a preventive and corrective perspective (Anttila & Jussila, 2017). These new approaches start to provide inputs for the management of SME, based on documented processes, management by processes, and the definition of indicators (Fonseca, 2015). Concerning the documental perspective of the QMS, SME begin to identify key actions and contribute to continuous improvement, as the records collected in these actions are subjected to analysis and evaluation, thus contributing significantly to improving the final quality of products or services (Brown & Loughton, 1998). In this way, SME also start to improve the internal discipline and to structure their activities, the processes used, and their workflow (Barata & Cunha, 2017). A better internal organization in SME allows for greater formalism in communication between sectors, and for a delimitation of actions and contributions of each functional area, its principles, and objectives (Barata & Cunha, 2017; Cachadinha, 2009; Sousa-Poza et al., 2009).

Other methodologies aimed at continuous improvement are introduced in SMEs, such as statistical analysis and data monitoring tools, which are now used, such as audit and non-compliance reports, failure and defect analysis, Pareto diagrams, or techniques of inspection and quality control (Asif & de Vries, 2015). Often, the implementation of

QMS leads to the introduction in SMEs of other methodologies such as Kaizen or Kanban, contributing to the development of a culture of quality and improvements in decision-making by top management (Steiber & Alänge, 2015; Asif, 2017b). Also, the degree of formalism and discipline introduced by QMS in SMEs brings greater rigor and discipline, with important inputs for continuous improvement, in general, through evidence of systematic records and controls (Asif, 2017b; Moreno-Luzon & Gil-Marques, 2015; Prajogo & Sohal, 2003; Pueo et al., 2020; Cachadinha, 2009).

Towards these QMS practices, all hierarchical levels of SME must have adequate knowledge and contribute to quality management (Honeycutt & Pearson, 2000). Previously, management in SME already presupposed a more or less defined strategic intention, depending on their established objectives (Sun & Cheng, 2002). However, with the implementation of QMS, SME began to incorporate their quality policy and objectives in their strategic formulation (Wongrassamee et al., 2003) and to share it throughout the company (Costa et al., 2018).

In this context, internal communication represents an important mechanism, suitable for this purpose (Rodríguez-Escobar et al., 2006). Due to their small size and simple internal structures, SME already had internal communication, especially direct (Sun & Cheng, 2002), due to the proximity of departments and a leadership close to daily processes (Mendes, 2012). However, with a formal QMS, internal communication becomes a systematized activity in SME, with a range of actions adjusted to the QMS requirements, through communication supports such as newsletters (Govindarajulu, 2004), creating information-sharing mechanisms more effective and more efficient (Mendes, 2012). Thus, SME start to internally disclose the actions, results, and objectives associated with the implementation and support of the QMS (Marde, 2015; Sun & Cheng, 2002), managing to reduce resistance to change (Rodríguez-Escobar et al., 2006), and promote more generalized attention, oriented towards customer requirements and their satisfaction (Aggelogiannopoulos et al., 2007).

Another important element of QMS is the focus on customers and their satisfaction. With the implementation of QMS based on ISO 9001, SME begin to focus their attention on customers' requirements, as well as on their needs and expectations, thus seeking to ensure their satisfaction (Belas et al., 2018). What was once a simple relationship based on proximity to customers (Sun & Cheng, 2002) evolves into an approach guided by the construction of metrics to assess customer satisfaction (Briscoe et al., 2005; Jayaram et al., 2010; Moreno-Luzon & Gil-Marques, 2015). Thus, SME use

now assessment tools such as customer satisfaction indexes, through the analysis of complaints and satisfaction questionnaires, thus enabling them to improve their effectiveness (Aggelogiannopoulos et al., 2007). This form of action allows SME to systematize information through these methodologies and incorporate it into their strategies and decision-making by top management (Sun & Cheng, 2002).

The 2015 revision of ISO 9001 also brought new features with the introduction of a focus on risk management (Fonseca, 2015; Wilson & Campbell, 2020; Lee et al., 2017), which allows greater credibility to QMS through more robust processes (Fonseca, 2015), and the assessment of different business opportunities, with the objective of systematizing the assessment processes regarding the effect of uncertainty and the potential risk consequences (Marcelino-Sádaba et al., 2014). Thus, SME now have a preventive tool to support decision-making (Ferreira et al., 2018), based on planning the identification of risk, in its different sources, internal and external, and on preventive actions arising from this identification (Chiarini, 2017). The focus on risk management thus brings greater internal discipline to SME, associated with the risk of business processes (Hudakova et al., 2019), because SME start to incorporate activities that analyse risk, and how risk is prioritized and monitored.

Innovation has also been identified as an important element in the context of implementing and sustaining QMS in SME (Manders, De Vries, & Blind, 2016). ISO 9001:2015 introduces innovation as an element for continuous improvement (Oliveira et al., 2019), leading SME to research and develop new services and products, in a structured way (Pueo et al., 2020). However, the literature has presented some contradictory studies regarding the influence of QMS on the capacity to innovate in SME. For example, Benner and Tushman (2002) suggest that QMS make innovation difficult because activities generated by process management, due to their systemic approach, accentuate the resistance to change and inhibit the variability associated with innovation. On the other hand, other studies underline that QMS have brought to SME the possibility of being able to focus on continuous improvement, through the contribution of innovation (Briscoe et al., 2005; Mcadam & Mckeown, 1999; Ndubisi, 2012). Thus, with the introduction of QMS, responses to customer requirements, assessment of opportunities and risks, or knowledge generated from the development of products and services that meet the needs and expectations of customers may be seen as inputs for innovation in SME (El Manzani, Sidmou, & Cegarra, 2019).

In fact, QMS can stimulate innovation capacity in SME (Cuerva et al., 2014), through their technological capacity (Cuerva et al., 2014), with the implementation of production control practices or with the introduction of new organisational processes (López-Mielgo, Montes-Peón, & Vázquez-Ordás, 2009). These practices arise as a response of SME to the needs and demands of customers and markets that encourage the innovation process (Yeung et al., 2004; Manders et al., 2016). Other factors can also enhance the development of innovation in SME, through the introduction of approaches and tools such as Kaizen, lean management, quality circles, suggestion boxes, quality meetings, among many others, and thus also contributing to continuous improvement (Wandersman et al., 2012; Laursen & Foss, 2003; Van de Vrande et al., 2009; Manders et al., 2016). However, in SME context, some factors are pointed out in the literature as conditioning the capacity to innovate, such as the small size of the firms or the scarcity of resources (López-Mielgo et al., 2009).

Another significant aspect of the QMS is related to its human dimension (Sun & Cheng, 2002), encompassing interactions in the social context between individuals (Asif, 2017b; Fonseca, 2015). Unlike what happens in large companies, whose QMS contribution to their performance is based both on the human dimension and on the organisational dimension (Sun & Cheng, 2002), the human dimension assumes, in SME context, another preponderance considering the specific characteristics of this type of company, especially its small size and its greater flexibility and adaptability (Franco & Haase, 2010).

Some of the changes brought by QMS in SME focus on a greater involvement and commitment of human resources, as well as on the emphasis placed on empowerment and teamwork (Mendes, 2012; Moreno Luzon & Valls Pasola, 2011). In fact, SME gradually start to incorporate practices of involvement and commitment of human resources, through defining their contribution and participation in order to achieve their QMS goals and targets (Asif, 2017b; Moreno-Luzon & Gil-Marques, 2015; Prajogo & Sohal, 2003; Pueo et al., 2020). The absence of these practices generally represents a negative impact of QMS on SME (Brown & Loughton, 1998).

Moreover, QMS also lead SME to implement a set of practices based on the analysis of work processes (Siltori et al., 2020), such as the design of functions, allowing SME to pay attention to elements such as the functional autonomy of human resources, incorporating diversity and enrichment of tasks (Asif, 2017b), to achieve greater involvement and commitment of employees in relation to QMS (Moreno Luzon & Valls

Pasola, 2011). In addition to these, other practices may be adopted, acting as alternative feedback systems (Cachadinha, 2009), such as performance evaluation and reward systems (Briscoe et al., 2005).

In addition, through implementing QMS, SME often start to see involvement (Asif & De Vries, 2015) and teamwork as practices that can strengthen the participation of human resources in QMS processes (Mendes, 2012; Asif & De Vries, 2015; Talib et al., 2013), which is equally reflected in the definition of functional responsibilities of human resources (Honeycutt & Pearson, 2000; Melão & Guia, 2015), and in decision-making (Moreno Luzon & Valls Pasola, 2011). Employees start to work together to solve problems, using specific strategies such as quality circles (Pfeffer & Jeffrey, 1998). Other practices derive from these strategies in SME, such as meetings recordings, and the elaboration of action plans resulting from work teams' meetings (Moreno Luzon & Valls Pasola, 2011).

Training is another QMS issue highly significant for SME. Training is the mechanism that ensures that human resources possess the knowledge and skills necessary to support QMS in SME (Rodríguez-Escobar et al., 2006). As highlighted by Juran (1974), the importance of training for QMS is reflected in the way employees meet customer needs and are able to act more quickly to change. In this case, employees can perform different tasks being more versatile, and the literature reinforces this idea. Macduffie (1995) states that work systems require a set of skills to solve problems through the use of a variety of multipurpose practices such as job rotation, and Felstead and Ashton (2000) suggest that the multiplicity of skills and employees' skills allow them to be able to perform a wide range of tasks, while ensuring better performance. The development of skills thus appears as a key factor (Poksinska et al., 2006), because it contributes to greater training of employees towards continuous improvement (Hameed & Waheed, 2011), and to efficient performance of QMS in SME (Mueller et al. 2018).

Table 2 presents a summary of the main changes generally related to QMS in SME, organized from the mechanistic perspective of QMS (Prajogo & Sohal, 2003) and from the humanistic perspective of QMS (Sun & Cheng, 2002), in order to better analyse the different perspectives observed in literature. The first perspective integrates the notion of stability and control of the QMS, while the second perspective integrates the notion that QMS promote the human dimension of QMS through teamwork, involvement, or cooperation.

Table 2. Main changes brought by QMS in SME context

	Main Changes	Rational	Authors
Mechanistic perspective	Greater focus on internal communication	The dissemination of the quality policy and objectives, among others, promote more effective internal communication between employees and departments.	Sun and Cheng (2002); Melão and Guia (2015);
	Increased monitoring and continuous evaluation of products, services, and processes	The introduction of process management and the focus on continuous improvement enable greater control and monitoring of the products and services provided.	Cachadinha (2009); Mcadam and Fulton (2002); Sun and Cheng (2002); Brown and Loughton (1998);
	Better internal organization and document control	The approaches developed by the QMS allow the integration and monitoring of a set of actions, processes, and systems, enabling significant improvements at the level of the internal organization, providing inputs for the management of the SME, based on properly documented processes.	Cachadinha (2009); Melão and Guia (2015); Brown and Loughton (1998); Heras-Saizarbitoria and Boiral (2015); Gurd and Helliard (2017); Santos et al., (2011); Barata and Cunha (2017)
	Greater focus on the Customer and his satisfaction	Requirements at the level of customer satisfaction assessment help SMEs to focus their efforts on developing goods and services capable of meeting customer requirements.	Sun e Cheng (2002); Melão and Guia (2015); Sousa-Poza et al. (2009); Heras-Saizarbitoria and Boiral (2015)
	Greater discipline and greater formalism	QMS discipline activities, processes and their workflow, allowing for greater rigor, with important inputs for continuous improvement through evidence of records and systematic controls	Aggelogiannopoulos et al. (2007); Brown and Loughton (1998); Sun and Cheng (2002); Mcadam and Fulton (2002)
	More formal strategic management	QMS allows to formalize a management strategy that ensures the alignment of the quality policy with its objectives. in order to gain a competitive advantage	Muñuzuri et al. (2013); Oliveira et al., (2019); Sfakianaki and Kakouris (2018)
	Greater focus on knowledge management, risk management, process management, continuous improvement, and innovation	ISO 9001:2015 encourages the development of processes oriented towards better use of the knowledge generated, better identification of the different types of risks, as well as better planning of innovation, and provides inputs for continuous improvement	Calvo-Mora et al. (2015); Gutierrez-Gutierrez et al. (2018); Ferreira et al., (2018); Cuerva et al. (2014); López-Mielgo et al., (2009); Lee et al., (2017).

Continued >>>

Table 2. Main changes brought by QMS in SME context (continuation)

	Main Changes	Rational	Authors
Humanistic perspective	Greater involvement and commitment of human resources.	QMS allow to implement a set of practices based on the analysis of work processes (e.g., job design), considering elements such as the functional autonomy of human resources, diversity and enrichment of tasks, fostering greater involvement and commitment of human resources	Briscoe et al., (2005); Moreno Luzon and Valls Pasola, (2011); Mendes (2012); Melão and Guia (2015)
	Greater focus on teamwork and empowerment	Empowerment and teamwork allow reinforcing the participation of employees in the implementation and support of an effective and efficient QMS.	Asif and De Vries (2015); Mendes (2012); Steiber and Alänge (2013)
	Greater focus on employees' functional responsibilities	The implementation of the QMS requires the identification of critical processes for quality assurance and employees' functional responsibility.	Cachadinha (2009); Aggelogiannopoulos et al. (2007); Bahri et al. (2017); Melão and Guia (2015); Briscoe et al., (2005);
	Greater focus on training processes	The efficient and effective performance of QMS in SME involves ensuring that their employees possess the knowledge and individual skills necessary for performance, a key factor in the SME, as it influences their satisfaction, as well as the improvement of their performance.	Zeng et al. (2015); Steiber e Alänge, (2013); Santos et al. (2011); Felstead e Ashton (2000); Macduffie (1995); Van Der Heijde and Van Der Heijden (2006)

How ISO 9001-based QMS May Boost OA

To understand how QMS can facilitate OA, it is necessary to observe the role played by QMS in companies. First of all, QMS provide a holistic approach because they address all key business functions (Kaynak & Hartley, 2005). As a management system, the QMS emphasise a set of practices (Pertusa-Ortega et al., 2021) that decisively contribute to its performance, such as human resources management, leadership, management by processes, continuous improvement, or risk management. These practices represent the QMS in their essence (Asif & de Vries, 2015), but also allow two types of guidance, at the level of exploitation and exploration (Zhang et al., 2012). If on the one hand, according to March (1991), exploitation practices are related to efficiency, refinement, or execution, on the other hand, exploration practices presuppose practices

related to discovery, research, variation, and innovation. In this way, through the exploitation and exploration lens, it is possible to draw a perspective on how QMS can contribute to OA in SME (Zhang et al., 2012).

The QMS emphasise the importance of human resources in contributing to quality (Wongrassamee et al., 2003), being a determinant of its success (Malik et al., 2019), and playing eventually a key role for OA in SME. This contribution can be achieved through activities aimed at exploitation as well as through activities aimed at exploration, for example, through a set of management activities such as broadening tasks or analysing and describing functions. These are activities in which the focus is on defining the action of human resources, in which it is possible to horizontally add a set of tasks and functions, making human resources more versatile. These activities are essentially focused on seeking efficiency, controlling internal operations, monitoring and maintaining the QMS, typical of exploitation (Asif & De Vries, 2015; Gomes et al., 2020). On the other hand, activities that seek a greater degree of autonomy and responsibility for the actions and decision-making capacity of human resources enable the development of exploration opportunities (Asif & De Vries, 2015). The influence of a more effective human resource management on the OA can be equally reinforced through actions that focus on both exploitation and exploration, through discipline and incentive schemes, such as reward management or career management (Bowen & Lawler III, 1992), flexible working practices, development of self-managed teams or job rotation (Bayo-Moriones et al., 2011).

Among QMS issues, aiming at mapping the activities and internal systems in SME as well as their efficiency, the adoption of the processes approach also has a potential impact on OA (Oliveira et al., 2019; Oakland, 2011; Asif & De Vries, 2015).

In the context of SME, if, on the one hand, the adoption of the processes approach, when developing, implementing and improving a QMS, brings organisational capacity and discipline, focusing mainly on document control which, within the scope of the OA, translates into essentially exploitation activities, on the other hand, this approach can also enhance innovation, and the development of products and services (Matthews & Marzec, 2017). In fact, the literature highlights the effect of a significant set of activities both in exploitation and exploration. Exploitation activities include activities aimed at monitoring, controlling, and seeking efficiencies, such as statistical methods for production analysis, the definition of performance indicators, approaches to solving cause-effect problems, or the Pareto analysis (Choo, Linderman, & Schroeder, 2007;

Moreno-Luzon & Gil-Marques, 2015). Regarding exploration activities, there are activities that seek the development and creation, change processes, training, and development of skills or activities to develop innovative ideas (Gomes et al., 2020).

The focus on customers and on meeting their needs and expectations is another feature of the QMS with potential influence on the OA. This has been one of the key elements most strongly emphasised in the QMS literature (Ebrahimi & Sadeghi, 2013). QMS highlight activities that can promote product and service compliance (Oakland, 2011). These activities can be equally viewed through the perspective of exploitation and exploration. Exploitation activities include the identification of customer requirements, the management and analysis of complaints or after-sales services. These activities essentially aim at monitoring the performance of SME regarding their customers, seeking to understand customers' expectations and their degree of satisfaction with the products/services. The exploration activities are reflected in activities related to the definition of innovative products, the development and search for new solutions in compliance with customers' requirements. In this perspective, these activities can leverage innovation processes in SME, insofar customer requirements can enhance the emergence of innovative solutions (Matthews & Marzec, 2017). Nevertheless, customer focus can benefit both exploitation and exploration (Asif & De Vries, 2015).

The literature also suggests the existence of other QMS issues with a potential effect on OA, such as continuous improvement or risk management. Continuous improvement is one of the QMS pillars and can enhance both exploitation and exploration (Asif & De Vries, 2015) as it allows SME to be able to reduce variability, through the control that QMS impose, in order to increase efficiency and transforming best practices into new routines (Benner & Tushman, 2002). This role of continuous improvement in reducing variability enhances exploitation. However, this convergence with exploitation (Álvarez Santos et al., 2018) is questioned by Malik et al. (2019) who argue that continuous improvement can enhance exploration through learning activities strategically oriented towards innovation. Thus, the development of an organisational culture oriented at continuous improvement and centred on consolidated internal communication and leadership processes can help SME to materialize their efforts in quality and innovation processes (Faisal, Rahman, & Azam, 2011) contributing to the OA (Felício et al., 2019).

Risk management was introduced in ISO 9001:2015 in order to systematise the assessment of the effect of uncertainty and the potential and critical consequences of risk for the company (Chiarini, 2017). According to Hudakova et al., (2019) risk

management makes internal processes more robust and capable and seeks to systematize the assessment, turning processes in SME more robust (Fonseca, 2015). The adoption of formal risk management methodologies requires planning and control activities more suitable to the SME reality. This is essentially an exploitation principle, but with a broad value towards exploration, because it allows to sustain risk decisions related to exploration processes and radical innovation (Jones & Rowley, 2011; Marcelino-Sádaba et al. 2014), and to technological capacity (Lee et al., 2017).

Likewise, the introduction of the focus on knowledge management leads SME to focus their attention on knowledge considered critical to their business process (Fonseca, 2015), and to develop a set of internal methodologies related to relationship management with customers (Sila, 2020; Lee et al., 2017). SME became aware of how knowledge management can be a consistent resource to ensure good products and services (Wilson & Campbell, 2020; Lee et al., 2017).

QMS also implies a human dimension, and at this level, the literature emphasises the involvement and commitment of human resources as attitudes and behaviours related to QMS, with a great potential for OA. In literature, involvement often appears among the key factors generally related to the success of QMS implemented in SME (Ugboro, et al., 2000). QMS frequently brings greater responsibility and autonomy concerning employees' decision-making (Asif & De Vries, 2015), and greater control over their tasks, with a positive effect on the involvement and commitment towards QMS' implementation (Mendes, 2012). Human resources involved and committed to the practices introduced by QMS and aligned with the business strategy have also a positive effect on SME performance (Tari & Sabater, 2006). This effect can be achieved through practices that support teamwork, responsibility, and autonomy (Asif, 2017b), encouraging behaviour towards knowledge sharing and generation of new ideas conducive to exploitation and exploration approaches.

In fact, the impact of QMS on the OA may also be reflected in a set of practices that can be developed in SME such as teamwork, engagement practices, and active participation of human resources (Kabak et al., 2014). This type of practice in SME promotes the human resources' satisfaction and motivation, but also contributes to a solid basis for the social construction of relationships (Psoinos & Smithson, 2002; Tari & Sabater, 2006). In this perspective, the activities developed from there, based on task enrichment and problem analysis, are exploitation activities, while activities centred on experimentation and risk-taking are exploration activities (Gomes, Silva, & Sarkis,

2020). Teamwork enhances the development of skills and promotes cooperation, providing support for the development of QMS (Zeng et al., 2015), but also helps in creating the conditions for the development of OA (Felício et al., 2019). Teamwork promotes exploration (Alcaide-Muñoz & Gutierrez-Gutierrez, 2017), due to the commitment and commitment that is promoted among team members (Moreno Luzon & Valls Pasola, 2011).

Another QMS issue with a potential impact on OA is training (Bayo-Moriones et al., 2011). The employees' training can develop exploitation through training actions that focus on process management and compliance with the QMS, and exploration, through actions focused on creativity or the generation of ideas (Asif & De Vries, 2015). Other exploration-related activities include training actions related to problem-solving, brainstorming techniques, quality circles, or autonomous work teams (Asif & De Vries, 2015; Psomas et al., 2013).

Some studies report that training can enhance exploitation activities to the detriment of exploration activities (Herzallah et al., 2017). Training can facilitate exploitation if the focus is on skills development and increasing individual efficiency and may develop exploration if the focus is on learning-based development (Alcaide-Muñoz & Gutierrez-Gutierrez, 2017). Concerning training aimed at exploitation activities, the increase in knowledge has repercussions at the level of capacity development, better autonomy, promoting knowledge sharing behaviours (Pertusa-Ortega et al., 2021). Training more focused on the multiplicity of skills and abilities and on problem-solving facilitates the ability of human resources to address a diverse set of problems, situations, and distinct tasks (Herzallah et al., 2017). Bonesso et al. (2014) reinforces this line of thought, suggesting that training should focus on behavioural modification of human resources, through work experiences that develop ambidextrous behaviours.

How ISO 9001-based QMS May Condition OA

A more comprehensive analysis of QMS dynamics in OA implies considering how QMS can influence OA development in SME. There are several authors who, at the organisational level, report potential QMS inhibitors in OA. The scarcity of resources (Oliveira et al., 2019) and QMS' bureaucratic rigidity (Muñuzuri et al., 2013; Benner & Tushman, 2003) are examples of these inhibiting factors.

The scarcity of resources has been one of the main factors that most hinder the success of QMS in SME (Mendes & Lourenço, 2014; Mendes, 2010; Briscoe et al., 2005). In fact, it is up to the management in SME to ensure the allocation of human and material resources necessary for the QMS (Balboni et al., 2019; Marde, 2015). The scarcity of different types of resources in SME, combined with their low heterogeneity (Asif & De Vries, 2015) causes low levels of technical skills and inadequate use of quality tools and technologies (Oliveira et al., 2019). These elements are potential inhibitors concerning OA, because they have different repercussions in exploitation and exploration activities in SME (Koryak et al., 2018; Asif & De Vries, 2015; Prajogo & Sohal, 2004). This idea is also highlighted by Álvarez Santos et al. (2018), for whom QMS are a set of practices based on control and rationalization. For these authors, these practices have a synergistic effect between exploitation and exploration activities, resulting from the distribution of available resources, which tend to be reflected in the intensity of their effect on both.

Another factor in QMS potentially inhibiting OA in SME is their strong bureaucratic dimension (Heras-Saizarbitoria & Boiral, 2015; Melão & Guia, 2015; Muñuzuri et al., 2013). The existence of strict procedures in QMS may influence especially exploitation activities at the expense of exploration activities, through approaches such as processes management or focus on continuous improvement (McLean et al., 2017). Practices that value document control and its monitoring strengthen exploitation (Asif, 2017b), compared to practices based on creativity and problem-solving processes which can promote more exploration activities (Asif, 2017b). The first type of practices adopts mechanistic QMS approaches, based on internal hierarchies and degrees of decision (Zhang et al., 2012), comparing to approaches more organic, which tend to be more flexible and based on new forms of development and evolution (Zhang et al., 2012).

3. Methodology

3.1. Type of Study and Context

This study adopted an inductive case study methodology (Eisenhardt & Graebner, 2007; Yin, 2009). Case studies allow to capture in greater detail the dynamics, nature and complexity of the phenomena under analysis (Yin, 2009), as well as to support a thorough explanation of the case under investigation (Eisenhardt & Graebner, 2007; Yin, 2009). This type of approach also makes it possible to strengthen the external

validity of facts (Gibbert & Ruigrok, 2010), and to demonstrate key points of management studies. To investigate what QMS changes in SME can facilitate or inhibit OA in these companies, a multiple case study was conducted in four SME in the sector of information technology (IT), telecommunications, audio-visual and IT consultancy, having an ISO 9001-based QMS, out of twenty-eight companies that expressed willingness to participate. According to Eisenhardt and Graebner (2007), theoretical studies are valued when data are extracted from at least four cases.

The sector of information technology (IT), telecommunications, audio-visual and IT consultancy is characterized by its competitiveness, fundamentally linked to innovative processes (Chandrasekaran et al., 2012; Crick & Spence, 2005; Senaratne & Wang, 2018; Sarkees & Hulland, 2009). The products and services cover areas as distinct as the development and customization of software products, programming, specific applications, and solutions for information systems for companies and training (Mcadam & Fulton, 2002). In this type of companies, teams are often organized to work on specific client projects. These teams include highly qualified technicians in specific areas such as communication, design or computer programming.

3.2. Case Studies Selection

The selection of firms for this study was based on the principle of intentional sampling rather than random sampling (Patton, 2005). Firms in this sector are known to have technical knowledge and show great flexibility in responding to changes in the business context (Crick & Spence, 2005). For companies to participate in this study, two criteria were considered: First, SME must have a certified ISO 9001-based QMS, and second, SME must be considered as ambidextrous. In order to guarantee that the selected SME were, in fact, ambidextrous, the methodology proposed by Cao et al. (2009) was applied to measure companies' level of OA, using for this purpose the questionnaire developed by Lubatkin et al. (2006).

Then, owner-managers of the selected SME were contacted, and after an initial meeting where the objectives of the study and the methodology to be used were explained, a middle manager and two or more employees considered as non-leaders were chosen per company. As a criterion, all participants must perform functions within the scope of the QMS. SME selected for this study were labelled "Alpha", "Beta", "Gamma" and "Delta", in order to keep firms' anonymity. The selected SME were aged between

nineteen and twenty-three years old and the certification of the ISO 9001-based QMS ranged from 6 to 13 years old. Table 3 presents the four SME selected for this study.

Table 3. SME' Characterization

Activity area	Label	Number of employees	Year of initial QMS certification	Year of foundation	Products and services
Software	Alfa	49	2012	2000	Business Services and Mobile Applications
Security software	Beta	37	2010	2001	Security software for WEB platforms, servers
Multimedia content and communication	Gama	18	2013	1998	Image and video editing, multimedia products
IT consulting and services	Delta	41	2006	1996	Consulting in information technology, digital transformation, and content services

3.3 Data Collection

For a better planning of the research process, this study favoured several sources, namely the analysis of SME' documentation, direct observation, as well as interviews' content. These semi-structured interviews involved participants with different roles and from different organisational levels (See Table 4). In addition to the owner-manager who, due to his functions, has a solid knowledge of the company's operations, the other participants in the interviews also included the middle managers linked to project teams, depending on their level of knowledge and involvement in the company's general operations and in the QMS. In order to increase the effectiveness of the interviews, the interview protocol was tested in two previous interviews (Yin, 2009). Then, eight participants (two for each company) linked to management function (top-manager and middle manager) were interviewed, and each interview lasted between one and two hours. Concerning non-leaders, a focus group was organized in each company, including two or three participants who were working on the development of projects for ongoing clients. These interviews lasted an average of two hours each. This approach encourages individual participation, through the synergy that facilitates the sharing of opinions, meanings, individual experiences, seeking to reach consensus (Parker & Tritter, 2006). In order to avoid the potential bias of a single interviewer,

each interview was conducted following the same common thread in the sequence of questions (Gall, Borg, & Gall, 1996).

The opinions of the owner-managers, middle managers and non-leaders were collected in a total of twelve interviews. The interpretation of the different opinions was carried out based on the analysis of the data collected and based on the principles of grounded theory (Charmaz, 1996; Leonard & McAdam, 2001), allowing thus a systematic classification, comparison, interpretation and structuring of the interview transcripts (Boiral, 2003).

Table 4. Participants' profile

Case label	Participant	Years of connection to the QMS	Functional area	Hierarchical level
Alfa	A	7	Management	Owner-manager
	B	7	Commercial	Project manager
	C	7	Programming	Non-leader
	D	7	Programming	Non-leader
	E	7	Multimedia design	Non-leader
Beta	A	9	Management	Owner-manager
	B	7	Commercial	Project manager
	C	6	Programming	Non-leader
	D	9	Programming	Non-leader
Gama	A	6	Management	Owner-manager
	B	6	Management	Project manager
	C	6	Programming	Non-leader
	D	2	Multimedia design	Non-leader
Delta	A	13	Management	Owner-manager
	B	13	Commercial	Commercial director
	C	13	Programming	Non-leader
	D	9	Programming	Non-leader
	E	11	Programming	Non-leader

Data collection was intensive and lasted about two months (August to October 2018), considering the volume of information collected in interviews, internal documents analysed and direct observation. The methodology proposed by Carson and Coviello (1996) and Karafyllia and Zucchella (2017) was applied, following a data collection process, step by step, combining different data sources over time. The 1st step (analysis of each company's context) focused on internal documentation analysis and direct observation. In the 2nd step the interviews were conducted, and in the 3rd step data collected were analysed.

The stage of conducting the interviews consisted of collecting the respondents' opinion regarding the degree of change that each element introduced by the QMS caused in the company. The interview guide was based on the requirements of the ISO 9001:2015 standard and favoured an organisational approach, based on the principles of customer focus, people commitment, process approach, continuous improvement, evidence-based decision making and relationship management. From here, a set of questions were developed that aimed to obtain information about the changes that the QMS caused in the company with their implementation. The questions were formulated in order to know what organisational changes were introduced by the QMS in firms that can enhance ambidextrous behaviour. Open-ended questions such as "*With regard to the roles, responsibilities, and autonomy of your human resources, what changes did you feel with the implementation of the QMS in your company?*", or "*What has changed in your company with the application of the standard's requirements and with the search for compliance? Are there any strategic guidelines for your company?*". With this approach, we sought to deepen the respondents' narratives, focusing on the changes provided by the QMS and the impact of these changes, identifying the changes and requesting evidence. These interview protocol questions were previously validated by two consultants with experience in QMS audits (Appendix A).

3.4. Analysis and Information Organization

The narratives obtained from each of the interviews were transcribed and compared to each other, allowing the construction of a mapping about patterns concerning similarities and differences identified in the different contents; such methodological procedures have already been used in previous studies focused on SME' management context, such as Loon and Chik (2019). The collected data were analysed and condensed into summaries (Charmaz, 1996). This process allowed to identify patterns in what changes caused by QMS in SME concerns. Then, in order to analyse whether the changes caused by the QMS may facilitate or inhibit the OA, a textual analysis of the narratives was carried out based on the content analysis methodology adopted in the study by Bonesso et al. (2014). These authors propose a customized vocabulary that was used for the content analysis and replicated in this study (Appendix B). This analysis focused on understanding whether the effect of each change is a facilitator or inhibitor of OA, associating vocabulary that are related to exploitation or exploration (Krippendorff, 2004).

According to Charmaz (1996), such approach allows a systematization of the analysis and a better understanding of results. Results of this study were able to be organised into two large dimensions: a mechanistic perspective of QMS (Prajogo & Sohal, 2003), and a humanistic perspective of QMS (Sun & Cheng, 2002).

4. Results

In general, data collected from SME covered in this study suggest that most of the changes introduced through developing and implementing ISO 9001-based QMS (approached during the interviews carried out with the owner-managers, middle managers, and non-leaders) acted as OA facilitators or inhibitors. These firms develop technological solutions for clients, based on innovative, typical exploration processes, and improved and internally developed solutions, essentially typical exploitation activities. Results obtained also revealed the ambidextrous capacity of these firms as suggested by the literature (Chandrasekaran et al., 2012).

4.1. Internal Organization, Document Control, Discipline and Formalism

From a mechanistic perspective of the QMS, which integrates notions of QMS' stability and control, the firms participating in the study adopted practices focused on document control and internal organisation, but these changes did not reflect into ambidextrous behaviours. These practices deal essentially with control of records, monitoring of process indicators, decisions based on the definition of human resources' responsibilities, because these are practices of control and monitoring, seeking efficiency (March, 1991). Such requirement towards document control and internal organisation led to a level of formalism and internal discipline that did not exist before, as well as to a greater concern with the continuous monitoring of products and services provided by firms. The project manager of the company Gama summarises these aspects when he says that *"(...) we started to have more work and other concerns with the evidence of the records (...). In fact, there are members of our work teams who have included in their tasks (...) the need to highlight each decision making, each technical option (...), and thus helping us to have greater control, but it led to more work and bureaucracy"*. These issues are also reported by the owner-manager of the Alfa company, who emphasizes the greater control and formalism associated with products, services and processes provided by his company: *"(...) despite helping us to*

improve our internal controls, it also brought us some bureaucracy and documental concerns that we didn't have before (...)."

4.2. Internal Communication

One of the changes brought about by QMS in SME focused on the way in which internal communication began to consolidate existing practices and to encourage new ways to explore other solutions, new approaches and processes. Evidencing a clear commitment towards quality and continuous improvement, firms in this study have promoted institutional communication zones, publicity boards and internal newsletters. These communication mechanisms proved to be ambidextrous behaviour enhancers, as they promoted the formalism of quality procedures, policy and objectives, typical exploitation activities, but also streamlined a support and sharing system among employees, promoting their ideas and suggestions, creative solutions and disruptive thinking, typical exploration activities. The owner-manager of the Delta company highlights these aspects when he says that *"(...) we were concerned with developing internal communication, (...) which facilitates teamwork and people's participation (...), as they are more adapted to actual needs and to ensure more control. But also, in our communication, we started to encourage the sharing of new ideas (...), the dissemination of technical solutions among our programmers and technicians, which allowed positive feedback (...)."*

4.3. Strategic Management, Continuous Improvement, Monitoring and Process Management

In SME' context, the QMS also reinforced their strategic management orientation as top management of these firms started to consider a set of new performance indicators, previously neglected and introduced by the QMS. These indicators have their origin in the various processes, methodologies and practices introduced by the QMS in SME. These new practices contributed to enhance SME' ambidextrous behaviour, both at the level of assessment and monitoring of activities and indicators defined for the processes (typical exploitation activities), and at the level of actions and activities defined at the level of continuous improvement, seeking to be challenging, dynamic and diversified, aiming to boost SME (typical exploration actions and activities). The owner-manager of the company Gama observes that *"(...) we started having to analyse other information*

and it was always a challenge to establish new goals and targets that would make us evolve and grow (...)". In this sense, through continuous improvement and management by processes orientation, SME generated a set of internal disciplinary activities, based on control and monitoring. This formalism inherent to process management led to an excessive emphasis on exploitation. However, in the case of continuous improvement orientation, interviews' results point to ambidextrous behaviours. On the one hand, this effect was noted in the greater focus placed on the way procedures are evaluated and, on their efficiency, (typical exploitation activities), but it also promoted the introduction of mechanisms that helped to foster creativity and a greater concern with the search for novelty and innovation (typical exploration activities). For the project manager of the Beta company, "*continuous improvement brought logic and order to our actions and activities and helped us to improve processes. It helps us in being efficient and focusing on procedures.*" On the other hand, the owner-manager of the Alfa company supports the idea that the continuous improvement introduced by the QMS enhances exploration, as well as innovation: "*(...) the idea of working groups resulted very well. Our project teams have now to incorporate a set of continuous improvement tools that drive creativity and innovation, such as reasoning maps or design thinking processes (...) With a process management orientation, we feel some pressure with the focus on compliance (...)*".

4.4. Risk Management

Another significant change in SME brought about by the introduction of QMS based on ISO 9001:2015 international standards has to do with the incorporation of methodologies related to risk management. SME formalised control and monitoring activities through risk assessment plans related to business opportunities and business environments. With this change, SME developed ambidextrous behaviours, when developing exploitation activities linked to the control and monitoring of the risk assessment plan and, simultaneously, developing activities related to exploration, by enabling the development of innovation processes through the definition of the needed resources, their planning and access, while enhancing their technological capacity. This evidence is expressed by the project manager of the Beta company: "*with ISO guidelines, we created a risk management model, ensuring risk prevention, mitigation, but also the management of opportunities through better actions that provide the acquisition of new technologies and the development of new products*". Alfa's project manager also underlines this last idea: "*our risk management procedure*

(...) also gives us enough openness to be able to evolve and discover new paths, (...) to be innovative, but always in a controlled way”.

4.5. Knowledge Management

Although all SME in this study already have knowledge management systems, with the implementation of the QMS, what was previously just a data and information recording activity has become a process oriented towards seeking to identify future needs and trends. SME showed ambidextrous behaviour when organizing and sharing knowledge and information, according to thematic areas, such as design or programming, internal sharing of specifications provided to customers, documenting and analysing errors and failures, and making the projects available on an intranet developed. These activities are typical exploitation activities. Moreover, these SME also started to provide inputs for training, to encourage the sharing of individual experiences, to gather and organize knowledge and information from customers, to define the requirements for the development of new products based on continuous improvement and looking for customer satisfaction, which are typical exploration activities. These aspects were expressed in different interviews. A non-leader of the company Gama states that *“(...) the way knowledge is developed is reflected in the customization of the products and services offered. In short, this is the process: new knowledge is adjusted internally and is reflected in how we can be innovative. Existing knowledge is shared internally with degrees of access to all members of the development teams. This process is reflected in performance (...) in responding to customers, delivery times, budgeting and other services. This also leads to collaborative processes within companies.”* On the other hand, the owner-manager of the Delta company refers that: *“(...) our responsible for Quality (...) presented several ideas, such as the creation of a database where all projects developed for clients would be available to everyone, with references to the interventions carried out and the technicians involved. This allows any technician from the same area of knowledge to intervene without the need for the initial technician.”*

4.6. Focus on Customer Satisfaction

With the introduction of the *customer focus* principle, which used to be guaranteeing customer loyalty, it became a process centred on the continuous assessment of

customer satisfaction. ISO 9001-based QMS brought to SME the need to have metrics for continuous assessment of customer satisfaction and its systematization. These changes also led to ambidextrous behaviour as SME began to focus on activities related to exploitation, such as the analysis of customers' requirements, but they also supported the development of new products in response to customer requirements, seeking to respond to their needs and satisfaction, developing exploration. In this type of firms, linked to the technology area, the focus on the customer and the assessment of their satisfaction also had its impact on continuous improvement, risk management and knowledge management. The interviews also revealed the alternation between exploitation and exploration, in a continuum (March, 1991), but also cycles where both processes appear as orthogonal (Gupta, Smith, & Shalley, 2006). This aspect was mentioned several times during the interviews. Concerning the BETA company, the project manager refers to the orthogonal nature of exploitation and exploration in terms of opportunities to develop new products based on existing knowledge: *"It happens that we develop software based on ideas, suggestions, new processes that customers ask us to develop. All that programming work is saved. Later, we resumed this work and introduced some improvements. And often this is, for us, an opportunity to introduce new products to new customers"*. The owner-manager of the Delta company reinforces this idea when he says that *"(...) it is common in a given project for one part of the team to have to adjust an existing programming solution and the other part of the team (...) to try to find a solution absolutely different and innovative to fit what the client wants and what the rest of the team is developing (...)"*.

4.7. Innovation

Although the impact of QMS on SME did not have a direct effect concerning innovation issues, since these firms were already innovative, the fact is that innovation benefits from a set of internal activities related to risk management, knowledge management, customer focus, and customer satisfaction or continuous improvement, processes that were introduced/boosted by QMS. All these activities, together, allowed the creation of the field for ambidextrous behaviour, through exploitation, evidenced on the definition of the means and resources necessary for innovative projects, performance indicators, and monitoring of the different processes and their compliance with the QMS, but also through exploration, evidenced through the development of new products, new technological solutions looking for an alternative, unique and differentiated solutions in relation to what is available in the market. The project manager of the Alfa company

stated that *“we were already innovators before ISO 9001 arrived, but with the QMS we started to better structure our internal procedures (...) our focus was to define the conditions under which we could be more innovative (...) and define the objectives by which we could be different from the competition (...)”*.

4.8. Commitment, Participation, Involvement of HR and Teamwork

From the point of view of the humanistic dimension (Sun & Cheng, 2002), one of the issues most frequently highlighted is the greater commitment and participation of human resources in QMS activities. With this change, the context of social relationships began to be valued in SME, helping to create a climate of employees training on quality issues, and a greater discipline and support for the QMS. These changes evidenced ambidextrous behaviour, both through exploitation and exploration. The climate oriented towards supporting quality efforts nurtured over time has turned teamwork more disciplined, around objectives, and information sharing relating to the QMS, pointing to exploitation concerns. In addition, with the promotion of teamwork, the search for new solutions through the participation and involvement of human resources in the QMS' implementation and development, points to exploration concerns. The owner-manager of the Beta company illustrates these elements by referring that: *“Our [quality] system has made it easier to work in a team, especially in small teams, turning employees more aware and more committed to the projects where they work. And this capacity makes us more responsible, more innovative and more confident about the importance of what we produce, about the execution of new projects, in a disciplined way towards the objectives to be achieved (...)”*. However, the different interviews did not allow us to materialize the impact of the change regarding empowerment.

4.9. HR Responsibility and Functional Autonomy

One of the issues highlighted during the interviews is related to how the QMS introduced levels of responsibility and autonomy among human resources. However, SME report that the introduction of these conditions, despite seeking to clarify the role of human resources, their obligations and authority are not very dynamic and are limited to the function performed. In this sense, the focus on the definition of responsibility and autonomy levels is more appropriate to exploitation activities,

focused on control, than to exploration activities, more focused on creativity and freedom of action. Such autonomy limitation is expressed by the product manager of the Gama company: *“the attributions of functions written and defined in the QMS reflect a process that sometimes does not capture the breadth of the function. In reality, we often have to follow other paths that are not written down (...). We have to be versatile, not rigid, and if we were guided only by what is defined functionally for each of us, the company would not evolve quickly”*. This last issue highlights the importance of the bureaucratic dimension of the QMS, which can potentially inhibit OA, through emphasizing control in the definition of employees’ functions, reducing thus the degree of freedom and autonomy, necessary for exploration concerns.

4.10. Education and Training

With the modifications introduced by ISO 9001-based QMS, namely through the definition of indicators and evaluation methodologies, training processes brought to firms the development of ambidextrous behaviours, in two ways: the first one, observable both through the documental component of the training evaluation process, of control and monitoring processes, performance indicators typical of exploitation; and the second one, observable through indicators allowing to define new performance goals, new technological, innovation and creativity challenges, and the need for new skills for employees, evidencing typical exploration concerns. The owner-manager of the Alfa company highlights the potential effect on OA, highlighting that *“(...) our training plan now incorporates a methodology that allows us to assess how training has an impact on our projects (...) it is a methodology based on the principle of knowledge consolidation and on the principle of evidence of learning in the development of new technological solutions for our customers”*. The project manager of the Gama company points to the exploitation and exploration dichotomy, stating that *“continuous training is important for us, as it provides technicians with more tools, renewing their skills and possibilities for researching new solutions based on creativity and technical resources and available knowledge”*.

Table 5 presents a summary of the main changes reported during the interviews, as well as how they affect OA in SME.

Table 5. Summary of the effect of QMS changes on SMEs and their effect on OA

Main changes on SME	Effect on OA	What has changed
Internal organization and document control	Inhibitor	SME developed new practices related to exploitation, such as the introduction of new records and procedures that brought greater control and more documental emphasis
Discipline and formalism	Inhibitor	The documental and bureaucratic dimension enhances activities related to exploitation, such as reports, procedures, or controls to support the decision-making processes and responsibilities
Internal communication	Facilitator	The introduction/improvement of internal communication mechanisms helped to promote exploitation activities (formal disclosure of existing procedures, and their relevance to the QMS) and exploration (through the promotion of sharing and incentive mechanisms, suggestions and ideas, and Innovative solutions)
Strategic management	Facilitator	Top management started to consider data/ information that supported strategic decisions, that were previously not considered. Ambidextrous behaviours were identified because at the level of strategic management, performance indicators were analysed and controlled, consolidating and monitoring the efficiency of processes (exploitation); inputs were also provided for continuous improvement, such as the definition of new process indicators that they sought to be challenging, stimulating and creative (exploration).
Continuous improvement	Facilitator	There is now an emphasis on control and monitoring (characteristic in exploitation activities), but it also helped in the development of common thinking, linked to novelty, innovation, the need to follow alternatives (typical in exploration activities).
Process management	Inhibitor	Changes introduced a greater focus on formalism inherent in management by processes, emphasizing excessive exploitation – this is a result contrary to the literature
Continuous monitoring of products, services and processes	Inhibitor	Greater focus on exploitation through monitoring practices, definition of procedures and records
Risk based thinking (risk management)	Facilitator	Development of exploitation activities, for the control and monitoring of risk assessment actions, but also promotion of actions related to exploration through differentiated and innovative processes
Knowledge management	Facilitator	SME exhibit ambidextrous behaviours through sharing information related to the development of new products (exploration) and by organizing information sharing and documenting developed projects (exploitation).
Focus on the customer satisfaction	Facilitator	SME developed exploitation through the analysis of customer requirements, but also exploration because they developed new products and services, seeking to respond to their needs and seeking their satisfaction.
Innovation	Facilitator	The introduction of new QMS-related activities, such as continuous improvement, risk management or knowledge management, led SME to develop ambidextrous behaviours, through internal processes that control and monitor, but also through the development of new processes, products and services.

Continued >>>

Table 5. Summary of the effect of QMS changes on SMEs and their effect on OA (continuation)

	Main changes on SME	Effect on OA	What has changed
HUMANISTIC PERSPECTIVE	Commitment, participation and involvement of HR	Facilitator	SME started to value the social context, fostering the development of a climate of support and discipline, typical of exploitation; but a greater dynamism in human resources was also developed through greater participation and contribution of human resources in the QMS' development, exploration issue.
	Teamwork	Facilitator	Greater focus on teamwork evidenced ambidextrous behaviours, through the control of compliance with the client requirements and the QMS (exploitation), but also boosting the search for new solutions and information sharing through human resources involvement (exploration).
	HR responsibility and functional autonomy	Inhibitor	The definition of responsibilities and functional autonomy of human resources emphasizes exploitation, due to the degree of control and formalism associated with the functions performed by human resources.
	Empowerment	Not determined	There were no significant changes reported during the interviews concerning empowerment.
	Education and training	Facilitator	Ambidextrous behaviours were perceived through the introduction of indicators for training, which led SME to focus on evaluating the effects of training, leading to exploitation behaviours, but also through allowing these indicators to become objectives grounded in new skills and technological challenges, evidencing exploration behaviours.

5. Discussion

5.1. Summary of Main Results

This study seeks to understand how QMS can facilitate or inhibit the development of OA in SME through the main changes introduced in these firms. For this purpose, four SME with an ISO 9001-based certified QMS were selected, from the sector of information technology (IT), telecommunications, audio-visual and IT consultancy, to identify which changes the QMS brought to these firms and which may influence OA behaviours. Semi-structured interviews were conducted with owner-managers, middle managers and non-supervisors in SME exhibiting proven OA behaviours, confirmed previously through a questionnaire administered in advance, based on the methodology of Cao et al. (2009). For a better analysis, the results of this study were organized into two large dimensions: from the mechanistic perspective of the QMS (Prajogo & Sohal, 2003) and from the humanistic perspective of the QMS (Sun & Cheng, 2002).

This study showed that changes introduced through the QMS in the SME have a potential effect on ambidextrous behaviour, in line with the research of Asif and De Vries (2015) and Asif (2017). However, other changes introduced through the QMS

were only reflected in exploitation. Some examples show this excessive focus on exploitation. Such examples are referred to in the interviews highlighting document activities, formalism, and internal discipline, corroborating Cachadinha (2009) and Briscoe et al. (2005).

In these firms, the levels of autonomy and responsibility of human resources are based on a set of elements introduced by the QMS that define the way through which human resources work. Employees who have more autonomy in decision-making tend to be those with skills related to management and technical knowledge. Autonomy and responsibility of human resources are defined for each hierarchical level and in accordance with the QMS principles. Autonomy, in QMS' context, means the degree of decision associated with certain functions or hierarchical levels, and it is related with a range of action (Sá et al., 2015). Responsibility, in turn, is related to the effect of autonomy (Sá et al., 2015). This study evidenced the rigid nature imposed by QMS regarding functional autonomy and responsibility, which potentially inhibit exploration and corroborates the results of Costa et al. (2018) and Melão and Guia (2015) who warn for a possible high degree of formalism and control, turning OA more difficult to achieve.

Continuous improvement and process management are perceived as QMS mechanisms that affect the entire organization. With continuous improvement and process management, changes generated were predominantly disciplinary, bureaucratic, and rigid, focusing mainly on procedures and control. In the case of process management, there was no evidence of ambidextrous behaviour in SME in this study, which is contrary to some literature that refers to its positive effect on OA (Matthews & Marzec, 2017). However, firms in the study showed ambidextrous behaviours through continuous improvement, with the emphasis placed on control and monitoring activities, typical of exploitation, but also through exploration activities related to innovation and the search for new technical solutions.

Other significant changes introduced by the QMS and which acted as OA facilitators were found at the level of risk management, knowledge management, customer focus, and internal communication. A greater focus on innovation and strategic management also represents changes introduced by QMS in SME, benefiting from the influence of other activities developed, such as knowledge management, customer focus, or continuous improvement.

Different narratives in the interviews highlight different perceptions about risk management. These perceptions are mentioned by the owner-managers because they are the ones who make decisions involving, for example, the investment in new technologies, as suggested by Hudakova et al., (2019). The change brought about through this new approach in firms opens the possibility for them to use a mechanism that works as a pivot in the early identification of relevant situations and allowing SME to leverage their technological capacity, with a potentially positive effect on OA, in line with Gurd and Helliari (2017). In this sense, the impact of risk-based thinking in exploitation and exploration implies the control of risks associated with the business and projects with clients but also validates the possibility of following the opportunities that arise in an equally controlled manner, which can enhance ambidextrous behaviours in firms.

This study also showed that organisational processes linked to knowledge management and internal communication allow the link between continuous improvement and strategic management, acting as a facilitator of OA. Knowledge management and internal communication processes are a transversal element to all company processes, as suggested by Asif, De Vries and Ahmad (2013), to whom information and knowledge sharing act as an important basis for exploitation and exploration, functioning as an OA facilitator.

Customer focus is certainly one of the changes referred to as most significant concerning the introduction of QMS in SME. This is a QMS issue that streamlines exploitation and exploration for continuous improvement and for the development of processes based on existing knowledge, or new knowledge. There were several reports of exploitation and exploration cycles during the interviewing process, that vary according to how the company responds to customer needs, whether through new projects or through the improvement of existing projects. The narratives highlighted the potential role played by QMS in the ambidextrous behaviour of SME, especially through the development of products and services, as suggested by Asif and De Vries (2015).

It is also important to highlight significant changes introduced by QMS and fostering ambidextrous behaviours, in terms of training and the commitment and participation of human resources, which are critical for QMS whose main activities involve essentially training and involvement of people, as well as the development of a culture of quality and teamwork, as suggested by Phan et al. (2011). In this sense, exploration

and exploitation activities in SME were highlighted, facilitating OA, in line with suggestions by Moreno Luzon and Valls Pasola (2011). Results observed follow the line of previous studies, with regard to the participation of human resources and work teams (Ajayi, Odusanya & Morton, 2017) or training (Zacher & Rosing, 2015). Regarding the commitment and participation of employees, the results obtained with this study are related with teamwork, in line with the findings of Moreno-Luzon and Gil-Marques (2015).

5.2 Contribution to Theory and to Practice

This study contributes to the theory by highlighting a number of issues related to the implementation of QMS and that can act as OA facilitators. Organizational contexts that promote the human dimension in SME enhance the development of OA, as suggested by Poon et al. (2020). In particular, human resource management is mentioned in literature as an important antecedent of OA in SME, but it is also a facilitator of OA, through incorporating a set of facilitating practices, namely at the level of employees' training, participation, involvement and commitment (Ajayi et al., 2017; Malik et al., 2019). These practices make the social context more dynamic as they aim to build a culture of quality in the company, that promotes the appearance of ambidextrous behaviour, as predicted in literature (Phan et al., 2011). The internal dynamics that QMS enhance are built-in contexts where these human resource management practices exist, and with the exception of the responsibility and functional autonomy of human resources, they aim at specific contributions from human resources to the QMS. In this scenario, the literature also reinforces the idea that organisational contexts that promote the decentralisation of decisions or empowerment can also facilitate OA. However, some of the main changes in QMS in SME referred to in this study concern a greater focus on teamwork as a practice that facilitates ambidextrous behaviour (Gibson & Birkinshaw, 2004), but not as much in empowerment. In fact, all the SME in the study did not refer to empowerment as a practice established. This is somehow strange, as empowerment is an issue often associated with QMS. Nevertheless, the literature indicates that empowerment cannot always be developed in firms. An explanation for this fact may be related to some contingencies embedded in SME, with their small size, the lack of formal structures, or a specific organisational culture, as suggested by Andrade et al. (2017) or Honeycutt and Pearson (2000).

Concerning the mechanistic perspective of QMS, we identified two distinct dimensions of changes. The first group is based on how knowledge is streamlined. Knowledge is built around exploitation and exploration (March, 1991), through continuous improvement practices, risk management, knowledge management, customer focus, or internal communication (Asif, 2017b; Felicio et al. 2019). In addition, in the logic of the QMS, these practices have also repercussions for the construction of ambidextrous behaviours in SME, through strategic management or through their technological and innovation capacity. These practices promote ambidextrous behaviours, in which there are variations between exploitation and exploration, as highlighted by Asif (2017b). These variations were verified as a function of the relationship between SME and their customers. Its effects were felt at the level of innovation of these companies, but also at the level of technological capacity, continuous improvement, risk management, or knowledge management. Changes promoted through QMS brought to SME a greater capacity to adopt ambidextrous behaviour, as SMEs, when planning their risk and opportunity activities, could also be more innovative and diversify their technological capacity.

It is also important to emphasize that, through the way SME in this study relate to their clients, we may observe alternations between exploitation and exploration. In fact, one of the most interesting aspects revealed in this study was the evidence of the continuum between exploitation and exploration (March, 1991), but also periods where both appear as orthogonal, as recommended in the literature (Gupta et al., 2006). In fact, a significant change related to the introduction of QMS in SME in this study, refers to the focus on customers and their satisfaction. It was found in several interviews that the alternation between exploitation and exploration varies according to how the company responds to clients' needs, seeking their satisfaction, which are key issues in QMS. It led SME to differentiate exploitation or exploration solutions, depending on the need to develop new products or improve existing products, as suggested by Burgelman (2002). This alternation appears distinct, whether through new projects or through the improvement of existing projects.

The second group of changes related to the mechanistic perspective of QMS is focused on knowledge orientation, reflecting discipline and formalism, control, the search for efficiency, and continuity. Formalism is associated with internal organisation and document rigidity, inhibiting ambidextrous behaviour, due to its excessive focus on exploitation, in line with what the literature suggests (Koryak, 2018; Pertusa-Ortega et al., 2017). In fact, SME in this study point to the excessive weight of documents, and to

the excessive focus on formalism brought by QMS, with findings suggesting that these issues inhibit ambidextrous behaviour.

Regarding contributions to practice, this study revealed that QMS can effectively be a solid basis for the development of ambidextrous behaviours. In fact, results of this study can help top management, in SME interested in implementing ISO 9001-based QMS, to pay a special attention to QMS key elements that facilitate ambidextrous behaviours, such as continuous improvement, and to worry with the excessive focus on activities that emphasize exploitation, such as the excessive bureaucratic burden of QMS, in line with Asif (2017). Following such an approach helps SME' top management in developing ambidextrous behaviours, and thus in promoting the development of key issues for the competitiveness of these SME, such as their capacity to innovate or their technological capacity.

6. Conclusion

This study shows that QMS it is an important source to the development of OA, through exploitation and exploration activities, contributing with empirical evidence corroborating some of the previous ideas highlighted in Asif and De Vries' (2015) theoretical reasoning concerning the creation of ambidexterity through quality management. Another important issue of this study is related to the alternation between exploitation and exploration and its orthogonality, and this evidence is the result of the relationship established with clients. The conception of OA in this study follows the perspective of Syrigos et al. (2013) who interpret the concept as a learning capability based on exploitation and exploration. Both activities are a function of the type of structure that promotes knowledge and learning. In this sense, one of the most interesting aspects revealed in this study was the evidence of SME alternating exploitative and exploratory cycles, but also of periods where both appear simultaneously, as suggested in some previous studies (Gupta et al., 2006; March, 1991). The analysis of the different narratives showed that this alternation is grounded in the relationship between SME and their customers. This is a key finding in this study.

This study also shows that QMS may contribute with a potential framework for the construction of internal processes that influence OA, by encouraging variation, suggested by March (1991) for exploration, through a set of practices such as internal communication, training, continuous improvement, or teamwork, but controlling this

variation through activities such as management by processes or by the functional autonomy of human resources, as they are activities closer to exploitation. SME' context influences the way the QMS is defined and implemented, considering internal factors such as its internal communication, its structure and organization or the participation of human resources, and external factors such as the relationship with customers and the market.

This study also shows that the different changes introduced by QMS in SME have different impacts on both exploitation and exploration, which can condition their effect on OA, as already suggested in previous few studies (Asif & De Vries, 2015; Curado, Oliveira, & Antunes, 2019; Felício et al., 2019; Moreno-Luzon & Gil-Marques, 2015; Moreno Luzon & Valls Pasola, 2011; Pertusa-Ortega et al., 2021). This issue explains the diversity of studies on the influence of QMS on OA (Álvarez Santos et al., 2018; Asif, 2017a; Herzallah et al., 2017; Zeng et al., 2015).

Indeed, this study validates partially the conclusions of the study conducted by Moreno-Luzon and Gil-Marques (2015), regarding the trend towards exploitative activities, but advances further, since this study shows that a set of QMS issues, such as internal communication, customer focus or continuous improvement, meet conditions for the development of the OA in SME through exploitation and exploration.

Findings of this study may contribute with helpful insights for SME wishing to improve practices related to QMS in order to favour their performance at the level of the OA. This study allows SME' top management to be more aware about QMS being a potential catalyst for ambidextrous behaviour but underlines the idea that QMS process management structure can potentially unbalance the activities developed for exploitation or exploration, inhibiting the OA in SME.

Finally, like most empirical studies, this research project has also a few limitations that should be highlighted here. The first limitation is related to the fact that this is a qualitative study, based on four case studies, discussing the QMS essential practices only from an organizational perspective. The second limitation is related to the fact that this study was restricted to the sector of information technology (IT), telecommunications, audio-visual and IT consultancy, which may limit the main conclusions. Other paths for future research should be followed namely concerning the analysis of QMS implications in other sectors of activity involving a larger sample size.

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Appendix A. Interview Protocol

Objective: which organisational changes were introduced by the QMS that may have facilitated ambidextrous behaviours in the companies.

Questions for the semi-structured interview (Script):

PEOPLE (P3-Engagement of people) Requirements: 5.1.1, 5.3, 7.2, 7.3, 7.4.
(Ask for examples) (depth and detail issues, focusing on change/impact)

What are the changes introduced by the Quality Management System in your company?

- *With regard to the functions, responsibilities and autonomy of your human resources, what changes did you feel with the implementation of the QMS in your company?*
- *How has the QMS changed your procedures with regard to people skills? Were there any changes? What changed and in what way? What did they gain from it? What came into being? How did you benefit from this change?*
- *With the introduction of your QMS, did you feel a greater involvement of human resources? How and in what form? What did they do?*

PROCESSES (P4- Process Approach/5- Improvement/P6-Evidence-based Decision Making) Requirements: 4.4, 5.1.1, 5.3, 6.1, 5.2, 6.1, 9.1, 10, 4.1, 4.2, 7.1.5, 7.1.6,
(Ask for examples) (depth and detail issues, focusing on change/impact)

What are the changes introduced by the Quality Management System in your company?

- *Did the QMS introduce the notion of processes, or this principle had already been implemented?*
- *What has changed with process management in your company? Were there any new controls and monitoring? What was introduced? What changes did it bring?*
- *With these changes, how is the information gathered to be handled? What effects did it have on your company?*
- *With the introduction of process management: did it streamline the company's operations? Are processes evaluated? Is it too bureaucratic?*
- *With the introduction of the System, how did you start treating your company's resources? What features? Have these features been optimized?*
- *What has changed in your company with the application of the standard's requirements and with the search for conformity? Are there any strategic guidelines for your company?*
- *Did the introduction of the System lead your company to define performance indicators? How and in what form?*
- *With the introduction of the System, did the company start to develop continuous improvement? What has changed? What happened to be done?*
- *Did your company already have a knowledge management system in place? How did the implementation of the System change/modify what they were doing?*
- *Was the management of risks and opportunities something that changed in your company? In what way? What has changed? What happened to be done?*

STAKEHOLDERS (P7-Relationship Management/P1-Customer focus. Requirements: 4.2, 5.1.1, 6.2, 8.2, 8.3, 8.5.3, 9.1.2) – Topics to be studied further: planning, bureaucracy, innovation, creativity (search for new technical solutions, improvement, risk assessment). – Focus: before and after...

What are the changes introduced by the Quality Management System in your company?

- *Monitoring of customer perception/expectation? And planning?*
- *Which methods have been introduced regarding MEASURING CUSTOMER SATISFACTION?*
- *What is the impact of measuring customer satisfaction in your company? What has changed?*
- *How do you assess the compliance of your products and services with customers? Was this process introduced by the Quality System in your company? Is this process documented? Is there a written procedure? Has there been a concern to assess the conformity of products and services with the introduction of the System in your company? Or did this process already exist before?*
- *How do the changes introduced by the QMS in your company improve the assessment of customer requirements? After that evaluation, what does your QMS establish? What effects do these changes/changes introduced by the QMS have on your company? How did you get organized?*
- *What changes have been introduced by the System in your company with regard to product/service development?*
- *Has the implementation of the QMS allowed you to improve communication with the Customer? In what way? How do you do it?*
- *Do you assess the Customer's requirements? Has this been introduced by the System and planned? Are customer requirements important to you? How?*
- *Did the System allow the introduction of new commercial strategies in your company? How?*
- *Has the QMS changed anything in your company that you didn't have before, with regard to new products/services and Customer requirements? Have these changes helped your company to INNOVATE? Or have you made your company more bureaucratic?*
- *Has the QMS made your company more competitive? In what sense?*
- *Has the QMS introduced new internal procedures regarding complaints?*

FINAL QUESTION

- *What are the positive and negative aspects you can highlight with the introduction and implementation of the QMS in YOUR company?*

Appendix B. Customized vocabulary used for the content analysis

Exploration	Exploitation
Adventure	Adaption
Anticipate	Adjustment
Astounding	Applied research
Autonomy	Automate
Being_the_first	Aversion_to_risk
Break up	Bureaucracy
Breaking_away	Caution
Boost	Certainty
Challenge	Certification
Change	Codification
Create	Clarity
Creativity	Continuity
Decentralization	Control
Development	Correction
Discontinuity	Defend
Discovery	Differentiate
Distant_search	Efficiency
Diversify	Existing_clients
Differentiate	Existing_markets
Diversity	Existing_partners
Dynamic	Existing_products
Evolution	Formalization
Evolve	Implementation
Expand	Improvement
Expansion	Incremental_innovation
Experimentation	Operational_strategies
Explore	Perfecting
Fantasy	Planning
Far_beyond	Precision
Flexibility	Predictability
Forefront	Procedure
Freedom	Program
Idea	Prudence
Innovation	Rationalization
Invent	Reduce
Inventive	Redo
Low_codification	Reactive
Low_formalization	Reduction_of_costs
Low_standardization	Refinement
New	Reliability
New_clients	Routine
New_markets	Rules
New_partners	Serial production
New_products	Stability
Novelty	Standardization
Open_mentality	Update
Patent	Variant
Planning	Verification
Proactive	
Release	
R&D	
Release	
Revolution	
Risk	
Start	
Search	
Something_extra	
Transform	
Uncertainty	
Vary	

CHAPTER 7

Conclusions and Implications

This last chapter summarises an important set of theoretical and practical contributions to the literature and to management, and points out the research's main limitations, as well as key research paths for future research. The approach followed in this study focused on the multilevel nature of organisational ambidexterity (OA) in small and medium-sized enterprises (SME). As far as it is possible to know, no study had focused on the phenomenon of OA in the context of Portuguese SME in the sector of information technology (IT), telecommunications, audio-visual and IT consultancy.

7.1. Summary of Main Conclusions

The main objective of this study is to achieve a better understanding of how OA can be developed in SME' context. In accordance, through a multilevel perspective covering the organisational level, the environmental level, and the individual level, this research aimed at identifying the factors that could influence OA in the SME' context through exploration and exploitation.

Thus, bearing in mind the background of OA, SME' specific characteristics, as well as the factors that can condition or influence AO in this type of firm, this study addressed, starting from an individual-level perspective, the influence of owner-managers' personality traits in the development of OA in the context of SMEs. Findings highlight the positive influence of extraversion and conscientiousness personality traits in OA and the negative influence of neuroticism in OA. At the environmental level, this study aimed at understanding the influence of environmental dynamism and technological capacity in OA, as well the moderating role of environmental dynamism in these relationships.

Results suggest a significant positive effect of technological capability in OA, as well as a moderating effect on the relationship between technological capability and OA. Finally, through an organisational-level perspective, this research was planned in order to understand how Quality Management Systems (QMS) based on ISO 9001 can inhibit or facilitate OA in SME' context. Findings point to the importance of the main changes

caused by the implementation of ISO 9001-based QMS for the development of ambidextrous behaviours in SME, highlighting nevertheless that some of the changes inherent to QMS in SME didn't act as OA facilitators.

7.2. Theoretical Contributions

This research is supported by a set of different theories that supports our understanding and interpretation of OA as a paradigm, in the management literature. Given OA' multilevel nature, it is not possible to fully understand the phenomenon with the sole support of a single theory. In fact, this study shows that OA in SME' context is influenced by a specific set of organisational, environmental e individual factors, and thus involving several different but also complementary theories.

One of the main theoretical contributions of this study concerns the idea that processes that occur internally in companies can be influenced by contingent factors (both internally and externally), which can cause different effects in exploration and exploitation, and thus enabling or inhibiting OA in SME. For example, from an organisational perspective, this study demonstrated that ISO 9001-based QMS are management systems with particular characteristics that can enhance or inhibit OA. An explanation may lie in the contingent effect that the different changes caused by the QMS may have on exploration and exploitation. In this sense, this theoretical argument reinforces the relevance of Contingency Theory for OA. According to the Contingency Theory (Donaldson, 2001), the action of companies is framed and influenced by the business strategy and the processes that are inherent to it, such as information systems, human resource management practices, innovation, or strategic management. These processes and practices are present in QMS, whose changes in SMEs have different effects on exploration and exploitation. However, in SME' context, such processes and practices need resources that helps companies' to be more competitive and to achieve superior performance. The role of resources in firms is, therefore, an important theoretical argument that is echoed in the Resource-Based View (Barney, 1991; Wernerfelt, 1984) since firm's internal resources are fundamental in developing new capabilities and new assets, to explore and to exploit opportunities and market demands. According to this theory, the ability of companies to be competitive also allows them to build new capabilities in existing resources, such as knowledge. This perspective, proposed by the Resource-Based View, supports theoretically the exploration and exploitation concepts, as both concepts are also processes linked to the learning capacity of companies (March, 1991). Moreover, it is important to understand

how knowledge is managed, how learning processes (linked to exploration and exploitation) are triggered, and how the technological capability influences exploration and exploitation because both enable knowledge to be updated and to the development of new technologies and innovative processes.

Furthermore, it should be emphasized that balancing exploration and exploitation is an important issue in management research, especially at the OA level. In fact, the literature points to a line of research regarding the difficulty of reconciling exploration and exploitation, mainly due to the nature of each of the activities. However, this study reinforces the idea that exploration and exploitation could articulate with each other, in a continuum, either through complementary or orthogonal processes (Gupta et al., 2006). This observation suggests that companies can combine, develop or reconfigure internal resources in order to respond quickly to opportunities that arise in the external environment. In this sense, we can consider that companies can learn to develop capabilities that allow them to be more competitive and respond better to external requests, as suggested by the Dynamic Capabilities Theory (Teece & Pisano, 1994). In fact, this theory supports this finding by considering that the exchange between exploration and exploitation is, in itself, a process of learning and adaptation to the external environment and to its dynamism.

From an environmental perspective, this research was developed to study the influence of technological capacity on organisational ambidexterity, and to analyse the moderation role played by environmental dynamism on this relationship, as well as the relationship between technological capacity and exploration and exploitation.

In accordance, these findings can be supported by the main principles inherent to the Contingency Theory (Donaldson, 2001) and the Dynamic Capabilities Theory (Teece, & Pisano, 1994). Both theories demonstrate the role of capabilities and the importance of the external environment on OA. From the contingency theory perspective, firms' performance is dependent on the contingencies that reflect their situation. According to the dynamic capabilities theory (Teece, & Pisano, 1994), there is an exchange of information between environment and SMEs. Both theories allow us to frame environmental dynamism and technological capacity in different levels of analysis: the first concept describes the complexity and changes on firm's environment and runs at external level; the second concept focuses on the internal level where technological knowledge, systems, and technological infrastructure, fundamental to the survival and competitiveness of SME, are managed. Because OA is the result of a knowledge process between exploration and exploitation, it is understandable that, when supporting the

knowledge acquired over the years based on experience, SME can reinforce activities essentially exploratory in nature, as suggested by those theories. This is an important contribution of this study, by showing the link between these two significant theories.

Finally, from an individual perspective, it is important to highlight the influence of individual characteristics in exploration and exploitation. In fact, through the use of the Big Five model (McCrae & John, 1992), this research highlights the influence of owners'/managers' personality traits on OA in SME' context. The theoretical argument is based on the principle that personality traits are patterns that regulates the individual's behaviour towards a particular stimulus. The interaction between personality traits and exploration/exploitation occurs through management decisions intrinsically linked to the owner-manager personality, interaction with the context and based on their cognitive perceptions. Thus, it is expected that the personality traits of top managers can influence OA performance through management decisions that can be related to exploration or exploitation. Moreover, the influence of personality traits in exploration and exploitation, framed by the Big Five model, can also find theoretical support in the Upper Echelons Theory (Hambrick & Mason, 1984). According to this theory, the influence of top managers' personal characteristics on SME' performance may be the result of managers' personal experiences or values that affect companies' strategic decisions, which may also explain the results obtained in this study concerning the effect of some personality traits in OA, namely extraversion, Neuroticism (emotional stability) and Conscientiousness. In addition, it should also be highlighted that the decision-making process in SME may be the result of an interaction between top managers' perception of the market and its dynamism, as recommended by the Behavioural Theory of the Firm (Cyert & March, 1963). This theory argues that top managers' individual characteristics are important antecedents to the development of certain organizational capabilities, such as OA.

7.3. Contributions to Practice

We believe that this study makes an important contribution to including the concept of organisational ambidexterity in the lexicon of management and firms in general, and SME in particular. In this sense, this study offers relevant implications for SMEs managers towards the organisational ambidexterity.

For management, this study explores and provides new perspectives for achieving OA, introducing contingency factors into the practical approach that SME managers should consider. This statement represents a series of challenges for management that should be highlighted, as managers must be aware of the presence of these factors. Thus, managers must consider that contingency factors moderate the performance of firms in terms of both internal attributes and characteristics of the markets in which they operate. Furthermore, knowing the presence of such relevant contingency factors is, in our understanding, an important benefit for top management, concerning the development of OA strategies.

In practical terms, this study contributes with two important implications for managers. First, the research suggests that, when faced to different environmental effects and dynamics in their strategic options, SME and their managers should understand the most appropriate exploration or exploitation strategies to respond to environmental pressures. This issue influences SME' competitiveness, because these firms depend heavily on external conditions to adapt their activities. Second, because findings of the research highlight the importance of exploration and exploitation concepts, especially concerning how to manage these two concepts in companies, considering their internal dynamics, their internal processes and how these two concepts can contribute in making their companies more competitive.

This study provides strategic insights and practical thinking about how OA can be achieved in SMEs. In this sense, this study revealed that QMS can effectively be a solid basis for the development of ambidextrous behaviours in SMEs. In fact, the way the QMS is implemented in SMEs can facilitate or inhibit exploration or exploitation-based activities. This aspect can help SME' management to focus on QMS elements that facilitate ambidextrous behaviours, such as activities oriented towards continuous improvement, and to control excessive efforts focused on activities that underline exploitation, such as the excessive bureaucratic burden of the QMS, which tend to inhibit OA. Through this type of approach by top management, SMEs may enhance the development of ambidextrous behaviours and thus become more competitive through fundamental capabilities such as the capacity for innovation or technological capacity. This study also suggests that OA can be influenced by some personality traits. In this sense, extraversion, conscientiousness, and a low level of neuroticism characterise managers of Portuguese SME in the sector of information technology (IT), telecommunications, audio-visual and IT consultancy, and sheds light on the specific reality of Portuguese SMEs, mainly characterized by a small size, a proper management style, and a high entrepreneurial capacity.

7.4. Limitations and Suggestions for Future Research

Although this study makes significant contributions, some limitations should be reported and further research issues need to be addressed in future studies, and thus need to be highlighted here in this study.

This study proposed a set of potential contingency factors related to OA and organised them into three levels of analysis (organisational, environmental and individual) but did not explore their positive or negative effect on OA. This aspect could be interesting to investigate, as a suggestion for future research, considering that SMEs are companies with very specific characteristics, such as their small size or the scarcity of resources.

Another limitation of this study is related to the targeted activity sector and its business context. The Portuguese market is undergoing a digital transformation process, and in such a context, SME must be competitive by improving their management processes, products, and services. Therefore, an additional limitation of this study lays on not considering SME from other sectors of activity, losing the opportunity to compare findings from different contexts in terms of internal processes, markets' characteristics, or owner-managers' personality. Future research may address these limitations, for example through longitudinal studies or other moderation effects, such as the effect of company age on OA.

Moreover, other owner-managers' characteristics, such as their qualifications or their experience, are not considered in this study; this may be another limitation in this study, which does not address these characteristics and future research may analyse the potential influence of owner-managers' qualifications and experience on OA. For such a purpose, qualitative studies can be conducted over time to complement results from cross-section data collection methods such as questionnaires.

Concerning the environmental level, future research can also consider the study of other moderating effects of environmental characteristics on OA, such as the demand uncertainty. Finally, at an organisational level, future research can consider the study of which aspects of the QMS may influence exploration and exploitation to understand whether, in these scenarios, exploration and exploitation are complementary and orthogonal or alternate with each other in different cycles.

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Appendix

Projeto de Doutoramento - Questionário de Investigação

Orientações para preenchimento o questionário de investigação.

Este questionário é parte integrante do Projeto de Doutoramento de José Ricardo Andrade e conta com a orientação do Prof. Doutor Luis Mendes e do Prof. Doutor Mário Franco (Universidade da Beira Interior).

Enquanto for completando o questionário, deve ter em consideração o seguinte:

- As questões foram preparadas para serem respondidas através de uma escala que mede a intensidade da resposta, e que caracteriza a perceção/opinião relativa a um determinado assunto.
- A pessoa que responde deverá ser o proprietário da empresa, o seu representante legal ou gerente.
- É muito importante responder a todas as questões de modo que cada questionário possa ser validado para posterior tratamento estatístico.
- Preencha o questionário, clicando no item que considere mais adequado. Não existem respostas corretas ou incorretas, pelo que se solicita sinceridade na escolha. O objetivo é conhecer a sua opinião.
- Todas as respostas são confidenciais e anónimas.

Caso deseje obter qualquer tipo de informação adicional sobre este trabalho poderá contactar o autor, através do email: ricardo.andrade@ubi.pt

Obrigado pela sua colaboração.

Instruções gerais

Enquanto for completando o questionário, deve ter em consideração o seguinte:

- As questões foram preparadas para serem respondidas através de uma escala que mede a intensidade da resposta, e que caracteriza a perceção relativa a um determinado assunto.
- A pessoa que responde deverá ser o proprietário da empresa, o seu representante legal ou gestor de topo.
- Preencha o questionário, clicando no item que considere mais adequado. Não existem respostas corretas ou incorretas, pelo que se solicita sinceridade na escolha. O objetivo é conhecer a sua opinião.
- Todas as respostas são confidenciais e anónimas.

Obrigado pela sua colaboração.

Secção 1. (Personalidade)

As 21 afirmações seguintes referem-se a características de personalidade. Indique, com base na sua perceção, o nível de concordância que atribui a cada um dos itens indicados.

(1=discordo totalmente e 7=concordo totalmente, considerando 4=nem concordo nem discordo).

Normalmente, vejo-me como alguém que:

- ... é extrovertido(a), sociável.
- ... gera muito entusiasmo.
- ... tende a ficar quieto(a).
- ... é reservado(a).
- ... é de confiança.
- ... tende a encontrar falhas cometidas por outros.
- ... por vezes é frio(a) e contundente.
- ... por vezes é rude para com os outros.
- ... faz as coisas de modo eficiente.
- ... faz um trabalho minucioso.
- ... faz os planos e cumpre-os.
- ... tende a ser preguiçoso(a).
- ... fica nervoso(a) facilmente.
- ... se preocupa muito.
- ... está deprimido(a).
- ... está relaxado(a), lida com o stress bem.
- ... valoriza experiências artísticas e estéticas.
- ... é curioso(a) sobre muitas coisas diferentes.
- ... tem uma imaginação ativa.
- ... é engenhoso(a), um(a) pensador(a) profundo(a).
- ... tem poucos interesses artísticos.

Secção 2. Atividades

As questões seguintes referem-se a diferentes tipo de atividades relacionadas com o seu trabalho, enquanto responsável da empresa. Indique em que medida concorda com cada uma das afirmações seguintes, considerando que 1 significa "discordo totalmente" e 7 significa "concordo totalmente" (4 significa "nem concordo nem discordo").

Enquanto responsável pela empresa, a sua ação tem procurado incidir em:

...atividades em que procurei desenvolver novas ideias, novas tecnologias ou novos processos, procurando pensar, sobretudo, "fora da caixa"?

...atividades em que procurei o sucesso da empresa através da capacidade desta em explorar novas tecnologias?

...atividades em que concentrei os esforços na criação de produtos inovadores para a empresa?

... atividades em que procurei formas criativas de satisfazer as necessidades dos meus clientes?

... atividades que procurei direcionar a empresa para novos negócios e novos segmentos de mercado?

... atividades em que defini objetivamente, como alvo para a empresa, encontrar novos clientes?

... atividades em que se comprometi a melhorar a qualidade dos produtos e o controlo dos custos?

... atividades em que procurei a melhoria da confiança dos clientes nos produtos da empresa?

... atividades em que se focou essencialmente na melhoria do desempenho dos processos de produção e operações internas da empresa?

... atividades em que procurei essencialmente conhecer e desenvolver o nível de satisfação dos clientes para com a empresa?

... atividades focadas na melhoria dos produtos e serviços fornecidos pela empresa por forma a manter os clientes satisfeitos?

... atividades em que procurei desenvolver uma melhor compreensão, por parte da empresa, das necessidades dos clientes?

Secção 3. Contexto de Mercado

As afirmações seguintes referem-se a características do mercado onde a sua empresa se insere. Indique com base na sua perceção o seu nível de concordância para cada um dos itens.

(1=discordo totalmente e 7=concordo totalmente, considerando 4=nem concordo nem discordo).

As mudanças no nosso mercado são muito intensas.

Os nossos clientes perguntam frequentemente pelos nossos produtos/serviços.

No nosso mercado as mudanças ocorrem continuamente.

Num ano nada mudou no nosso mercado.

No nosso mercado, a quantidade de produtos a serem entregues, muda com rapidez e com frequência.

Secção 4. Capacidade tecnológica

Seguem-se quatro questões respeitantes à capacidade tecnológica da sua empresa. Indique com base na sua perceção, o nível de concordância que atribui a cada um dos itens.

(1=está muito pior e 7=está muito melhor, considerando 4=nem pior nem melhor).

Quando comparada com os principais concorrentes, como avalia a capacidade tecnológica da sua empresa: na aquisição de tecnologias importantes?

na identificação de novas oportunidades tecnológicas?

na resposta às mudanças de tecnologia?

no domínio das mais modernas tecnologias?

Secção 5. Conhecimento

As seguintes afirmações referem-se a considerações relativas à forma como a sua empresa procura, assimila e adapta novos conhecimentos. Indique com base na sua perceção, o nível de concordância que atribui a cada um dos itens indicados. (1=pouquíssimo e 7=muitíssimo, considerando 4=nem pouco nem muito).

Por favor, especifique em que medida a sua empresa usa recursos externos para obter informações, por exemplo, de redes pessoais, consultores, seminários, internet, banco de dados, revistas, pesquisas de mercado, regulamentos ou leis:

A busca de informações relevantes sobre o nosso tipo de indústria é algo que fazemos todos os dias na nossa empresa.

A nossa empresa incentiva os colaboradores a usar fontes de informação relativas ao nosso setor de atividade.

A nossa empresa espera que os colaboradores lidem com informações que ultrapassam o nosso setor de atividade.

Por favor, avalie em que medida as seguintes declarações se encaixam na estrutura de comunicação da sua empresa:

- Na nossa empresa, ideias e conceitos são comunicados entre departamentos.
- A nossa empresa enfatiza a relação entre departamentos para resolver problemas.
- Na nossa empresa, há um fluxo de informações rápido. Por exemplo, se uma unidade de negócios obtiver informações importantes, ela comunica esta informação prontamente para todas as outras unidades de negócios ou departamentos.
- A nossa empresa exige que se façam reuniões periódicas entre departamentos para intercâmbio de novos desenvolvimentos e ideias, problemas e conquistas.

Por favor, especifique até que ponto as seguintes declarações se encaixam no processamento do conhecimento em sua empresa:

- Os nossos colaboradores têm a capacidade de estruturar e usar o conhecimento disponível.
- Os nossos funcionários são usados para absorver novos conhecimentos, bem como para prepará-lo para outros fins e disponibilizá-lo para todos.
- Os nossos funcionários ligam, com sucesso, o conhecimento existente com novas ideias.
- Os nossos funcionários são capazes de aplicar novos conhecimentos no seu trabalho diário.

Por favor, especifique até que ponto as seguintes declarações se encaixam na exploração comercial de novos conhecimentos da sua empresa (Considere todas os departamentos da empresa, tais como inovação e desenvolvimento, produção, marketing ou contabilidade):

- A nossa empresa promove o desenvolvimento de protótipos.
- A nossa empresa adapta as tecnologias existentes de acordo com os novos conhecimentos obtidos.
- A nossa empresa tem a capacidade de trabalhar mais efetivamente, através da adoção de novas tecnologias.

Secção 7. Dados para contextualização do estudo

As questões seguintes referem-se a considerações relativas a si, enquanto respondente deste questionário, assim como da sua empresa.

Idade

Género

Qualificações

Experiência à frente da empresa (em número de anos)

A sua experiência profissional, antes de liderar a sua empresa, encontra-se relacionada com:

- Engenharia, Produção, operações, finanças, processos de inovação e desenvolvimento (I&D)
- Contabilidade, qualidade, melhoria contínua, processamento de dados e sistemas de informação
- Vendas / marketing, desenvolvimento de produtos ou mercados e empreendedorismo

Área de atividade da empresa

Dimensão da empresa (coloque o número médio de colaboradores)

A sua empresa dispõe de um sistema de gestão da Qualidade pela norma ISO 9001?

A sua empresa estabelece relações de cooperação com outras empresas?

A sua empresa estabelece relações de cooperação com outras instituições, como universidades e/ou centros de investigação?

Quantos sócios tem a sua empresa?

Quantos destes sócios pertencem à mesma família?

Qual a percentagem do capital que estes sócios detêm?

Quantos colaboradores da família trabalham na empresa?

Caso deseje participar num estudo de caso, relacionado com este estudo, por favor escreva o seu email: