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INTERNATIONAL DYNAMIC CAPABILITIES AND THEIR INFLUENCE ON THE PERFORMANCE OF INTERNATIONAL COMPANIES IN DEVELOPING COUNTRIES

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DOCTORAL THESIS

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I dedicate this thesis to my mother Nancy Arcos who is not on this earth, but it was a dream of both of us to complete my doctorate. Also, to my baby Miguel Angel who is my strength and my life.

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Abstract

With the rise of globalization, internationalization has become a crucial aspect for companies in developing countries. Consequently, it is interesting to understand how these companies successfully internationalize despite their resource constraints (Peng & Chang, 2023). Some scholars have pointed out that these companies have developed international dynamic capabilities to increase their competitiveness in global markets (Ferreira et al., 2023). The main objective of this research is to empirically demonstrate how international dynamic capabilities can improve the performance of international firms in developing countries.

In the initial phase of this research, a comprehensive literature review was conducted using bibliometric analysis to examine the dynamic capabilities developed by international firms, their antecedents, and their effects on performance. This review revealed two key capabilities: international ambidexterity and international open innovation. Further analysis identified internal and external factors influencing these capabilities, with international entrepreneurial culture emerging as a pivotal antecedent. The study also uncovered moderating factors in this relationship, including absorptive capacity, environmental dynamism, and the political and commercial ties of the top management team (TMT).

One relevant aspect of this research lies in investigating these international dynamic capabilities in the context of clusters, which represent an essential unit of analysis, given that, according to the theory of dynamic capabilities, companies organized in clusters experience faster growth, innovation, and internationalization. With the increasing presence of clusters in developed countries, most research has focused on these contexts, leaving a gap in studies on Latin American countries. This limitation in focus restricts theoretical breadth and constitutes a significant gap in the literature (Derlukiewicz et al., 2020).

Building on the insights derived from the literature review, an empirical study was conducted using a sample of 400 international firms operating in Colombia. Structural equation modeling (SEM) was employed to analyze the influence of international entrepreneurial culture on both international ambidexterity and open innovation, as presented in Chapter Three. The study further investigated the mediating effect of absorptive capacity and the moderating role of environmental dynamism in these relationships. Chapter Four empirically validated the impact of international dynamic capabilities on three performance dimensions: international, innovative, and brand performance. Additionally, it revealed how this relationship is enhanced by the political and commercial networks of the top management team (TMT).

The findings indicated that international entrepreneurial culture benefits international ambidexterity rather than open innovation. Neither the mediating role of absorptive capacity nor the moderating role of environmental dynamism in this relationship could be confirmed. However, it was found that international dynamic capabilities positively impact international and innovative performance. However, international open innovation management capability leads to a more comprehensive performance because it also affects brand performance. It was found that the political ties of the top management team (TMT) play an important role in strengthening the relationship between dynamic capabilities and performance. However, it was demonstrated that belonging to a cluster does not improve the results of dynamic capabilities in the performance of international companies in developing countries but that the political ties of the TMT are critical in clusters to position the brand with the help of international partners. A significant limitation of this study was the use of the international entrepreneurial culture scale, which was not found to be the most suitable in this context.

CHAPTER 1

1 INTRODUCTION

1.1 Problem Statement

With the rise of globalization, internationalization has become a crucial aspect for companies, especially in developing countries. Despite limited resources, these companies expand internationally by relying on developing dynamic capabilities. The theory of dynamic capabilities has attracted the interest of researchers in international business, given that global environments are increasingly complex, uncertain, and turbulent (Teece, 2023). In this context, it is relevant to understand how companies develop these capabilities locally and internationally since the skills acquired in their country of origin may differ from those they need to compete in global markets (Pinho & Prange, 2016).

Research in international business has delved deeper into dynamic capabilities, providing essential insights into their influence on the factors, processes, and outcomes of international activities (Matysiak et al., 2018). In particular, the dynamic capabilities approach has been widely used to analyze internationalization processes (Prange & Verdier, 2011), especially in the case of Born Global companies. However, a greater understanding of international dynamic capabilities improves business performance and provides a competitive advantage in the global scope (Peng & Chang, 2023). Therefore, this research seeks to empirically demonstrate how international dynamic capabilities can improve the performance of international firms in developing countries.

Several international dynamic capabilities are mentioned in the literature, such as international marketing agility, cultural ambidexterity, and open innovation. However, international ambidexterity is highlighted as a key for companies from developing countries to effectively face global challenges and seize opportunities (Pinho & Prange, 2016). Teece (2023) suggests that these companies should adopt an entrepreneurial approach, promoting open innovation and collaborating with external partners. International ambidexterity involves balancing exploration and exploitation in different markets, facilitating technological adaptation and innovation (Luo & Rui, 2009). However, to achieve global success, it is also crucial to integrate external knowledge through international open innovation (Zahoor et al., 2021).

Although several studies have demonstrated the impact of international dynamic capabilities on firm performance (Pinho & Prange, 2016; Prange & Verdier, 2011; Peng & Lin, 2021; Peng & Chan, 2023), few have investigated their underlying factors. Among the internal factors that influence this, the International Entrepreneurial Culture (IEC) stands out, as defined by Dimitratos and Jones (2005), as an organizational strategy to create value in international markets. The theory of intrapreneurship highlights that this culture is crucial to drive innovation and take advantage of opportunities in foreign markets (Bilichenko et al.,

2022) and allows companies to adapt and reorganize in changing environments (Teece et al., 1997). Although IEC has been mainly analyzed in Born Global companies, extending this approach to established international companies is necessary.

This research also highlights a gap in the international business literature, which has prioritized studying the internationalization of companies in emerging countries and their different entry modes. However, it needs to pay more attention to analyzing the probability of success in global markets. According to Teece (2023), it is essential to incorporate the principles of dynamic capabilities to better understand this process. These capabilities allow companies to design innovative strategies that improve their performance and give them a competitive advantage.

However, there is an academic debate on whether dynamic capabilities improve performance. Empirical evidence shows inconclusive results (Peng & Lin, 2021; Hsu et al., 2013; Peng & Chang, 2023). Furthermore, studies have no evidence addressing international dynamic capabilities across multiple performance dimensions (Peng & Lin, 2021). This study seeks to empirically demonstrate how international dynamic capabilities can improve the performance of international firms in developing countries. This study focuses not only on international performance and innovation-related aspects, but also on brand performance (Peng and Chang, 2023).

The literature indicates that the concept of international dynamic capabilities has helped explain the success of firms in global and changing environments (Teece et al., 2007). Although this approach has sparked research interest (Teece, 2023), its application to international firms within clusters still needs to be improved. Studies indicate that firms in clusters tend to grow, innovate, and internationalize rapidly, and their rise and research have been concentrated in developed countries, leaving Latin American countries in the background, representing an essential gap in the literature (Derlukiewicz et al., 2020). Currently, among the best-ranked Latin American economies in the use of clusters are Mexico (38), Brazil (41), Costa Rica (45), Panama (46), Guatemala (75), and Colombia (79) (Confecámaras, 2021). In particular, Colombia, with more than 25 years of implementing cluster strategies, has positioned itself as a benchmark in Latin America.

Successful cases of competitive clusters in several regions have motivated countries to develop cluster strategies to overcome structural barriers, boost the internationalization of companies, and increase innovation and competitiveness. In Colombia, international companies within clusters require dynamic capabilities such as open innovation and international ambidexterity to compete globally (Ferreira et al., 2023). Gjelsvik and Haus-Reve (2016) point out that clusters are ideal for analyzing these capabilities,

thanks to creating networks and exchanging external knowledge. This study attempts to fill the gap in this little-explored field.

1.2 Main contributions of the research

The main contribution of this research is the identification of international dynamic capabilities such as ambidexterity and open innovation that affect the performance of international firms from developing countries. Although empirical research shows that international ambidexterity significantly fosters international expansion (Luo & Rui, 2009; Hoque et al., 2022; Xiao et al., 2022), little attention has been paid to how international firms in developing countries carry out exploitation and exploration activities and whether they are ambidextrous (Jacob et al., 2022; Fayos et al., 2017).

Studies on open innovation in SMEs have addressed openness without distinguishing between domestic and international contexts, assuming both face the same challenges and generate similar results. However, according to Fu et al. (2022), the risks and benefits of domestic and international collaboration differ significantly. Most research has focused on domestic open innovation for greater international competitiveness (Santoro et al., 2019). In this study, we propose international open innovation as a new area of research that goes beyond the domestic perspective.

The literature presents limited knowledge of the factors that enable cluster firms to adopt ambidexterity and engage in international open innovation (Vanhaverbeke et al., 2014). Some studies indicate that international ambidexterity and open innovation (Chesbrough, 2003; Fu et al., 2022) can improve performance, while others suggest that their effects may be contingent, negative, and non-significant (Hrivnák, 2022). Empirical findings indicate that the relationship between ambidexterity, open innovation, and performance is not straightforward and that its implementation is challenging.

1.3 Proposals and objectives

This doctoral dissertation aims to empirically demonstrate how international dynamic capabilities can improve the performance of international firms in developing countries.

The specific objectives are:

1. To identify in the literature the international dynamic capabilities, their antecedents, and the effect they have had on the performance of international firms

2. To analyze how International Entrepreneurial Culture affects International Ambidexterity and International Open Innovation and the possible mediators and moderators of these relationships.

3. To analyze the effect of International Ambidexterity and International Open Innovation on performance and the possible moderators of these relationships

4. To examine the moderating effect of cluster membership on the relationship between International Entrepreneurial Culture, International Ambidexterity, International Open Innovation, and performance.

About these objectives, this doctoral thesis aims to address the following research questions:

The first objective seeks to answer the question: What are international dynamic capabilities, their antecedents, and their effect on the performance of international firms? The second objective answers: How do antecedents affect international dynamic capabilities? How does absorptive capacity mediate these relationships, and what is the moderating role of environmental dynamism? Objective three will seek to answer the question: How do international open innovation and international ambidexterity affect performance? How do the political and commercial ties of the top management team (TMT) moderate these relationships?

Objective four will seek to answer the question: How does international entrepreneurial culture affect international open innovation, ambidexterity, and performance in cluster and non-cluster firms? What is the mediating role of absorptive capacity, the moderating role of the political and business environment, and the ties of the top management team (TMT)?.

1.4 Theoretical framework

In 1997, Teece introduced an innovative approach to dynamic capabilities, defining them as a firm's ability to adapt to changing environments by integrating, building, and reconfiguring internal and external competencies. Later, Teece (2007) discussed second-order dynamic capabilities, such as sensing, capturing, and transforming capabilities, which are inherently idiosyncratic and cannot be purchased (Teece, 2007). Teece's work on dynamic capabilities and their effect on firm outcomes has been widely debated. Eisenhardt and Martin (2000) present a notable critique, contending that dynamic capabilities alone cannot adequately account for sustained competitive advantage in high-velocity environments, as they may become standardized best practices over time.

In light of this debate, Peteraf et al. (2013) found that the field of dynamic capabilities has developed under the strong influence of the articles by Eisenhardt and Martin, 2000, and Teece et al. (1997) and reveal a field divided into two groups, each with its worldview regarding the construction and its operation (Peteraf

et al., 2013). In light of the assumptions raised by Peteraf et al. (2013) and later Teece (2023), this research proposal aims to investigate whether the field of international dynamic capabilities, which is the specific focus of the study, exhibits divergent perspectives. Whether such divergence is indeed present and whether it correlates with the results observed in companies in developing countries.

This theory of dynamic capabilities includes exploration and exploitation capabilities. Exploration involves search, experimentation, and increasing variance, while exploitation involves refinement, efficiency, selection, and implementation. Integrating and balancing both sources of knowledge create ambidexterity, a dynamic capability that enhances firm survival and growth in dynamic environments. In addition to ambidexterity, it is necessary to collaborate with international partners (Teece, 2023), promoting open innovation in the international context to overcome domestic market limitations and adapt to competitive global environments, resulting in tremendous success in the international market.

1.5 Doctoral thesis structure and content

This doctoral thesis is organized into six chapters. Chapter 1 is the introductory Chapter, in which the general idea of the research and the general description of the purpose of the research, the questions, and the objectives that will be answered in the main body of this thesis are defined. Chapter 2 proposes the theoretical model based on a literature review of international dynamic capabilities.

Chapter 3 evaluated how international entrepreneurial culture affects international dynamic capabilities, the mediating role of absorptive capacity, and the mediating role of environmental dynamism. 6 hypotheses will be tested.

In Chapter 4, the study examined how international dynamic capabilities affect international, innovative, and brand performance. Likewise, the moderating role of senior management teams was evaluated. The proposed research will test 18 hypotheses.

Chapter 5 integrates the two previous models but evaluates the behavior in cluster and non-cluster companies. For this study, 24 hypotheses were proposed. Finally, chapter 6 shows the conclusions, limitations, and future lines of research.

Table 1-1. Structure and main contents of the thesis

	Objective	Theory	Methodology	Resulted
Chapter 2: International dynamic capabilities, antecedents and its influence on the performance of the international firms	Identify in the literature the international dynamic capabilities, their antecedents, and the effect they have had on the performance of international companies	Dynamic capabilities and resource and capability theory	Systematic literature review	Some international dynamic capabilities were identified, mostly in line with the postulates of Teece et al. (1997). In addition, international ambidexterity and international open innovation were identified as two dynamic capabilities that improve the performance of international companies. A theoretical model was proposed, including some moderating and mediating variables.
Chapter 3: International dynamic capabilities: What role do international entrepreneurial culture and absorptive capacity play?	To analyze how international entrepreneurial culture affects international ambidexterity and open innovation and the possible mediators and moderators of these relationships	International Dynamic Capabilities, international entrepreneurship theory	Empirical research with 400 international companies. We use structural equations	The results showed that International Entrepreneurial Culture positively affects international open innovation, and international ambidexterity negatively. In these relationships, capability was not found to have a mediating effect, and environmental dynamism was not found to have a moderating effect.
Chapter 4: How do international ambidexterity and open innovation improve the performance of international companies in emerging countries: the relevance of the Top Management Team (TMT) political and business ties.	To analyze the effect of international ambidexterity and international open innovation on performance and the possible moderators of these relationships	International Dynamic Capabilities, microfoundational theory	Empirical research with 400 international companies. We use structural equations	The results showed that International Entrepreneurial Culture negatively affects international open innovation and ambidexterity. In these relationships, capability was not found to have a mediating effect, and environmental dynamism was not found to have a moderating effect.
Chapter 5: Does belonging to clusters enhance firm performance through their international dynamic Capabilities and International Entrepreneurial Culture?	To examine the moderating effect of cluster membership on the relationship between international entrepreneurial culture, international ambidexterity, international open innovation and performance.	agglomeration theory, International Dynamic Capabilities	Empirical research with 400 international companies. We use structural equations and multigroup analysis	International entrepreneurial culture encourages international open innovation but limits ambidexterity, although no significant differences were found between groups. Likewise, the effect of international dynamic capabilities was not different for cluster and non-cluster companies. However, it was found that the political ties of senior management teams have different impacts on the

				performance of cluster and non-cluster companies.
Chapter 6: Conclusions		Contributions and Limitations		

CHAPTER 2

2 International dynamic capabilities, antecedents and its influence on the performance of international firms

Abstract:

This Chapter presents a bibliometric analysis of international dynamic capability, where it has been identified that its theoretical framework adheres to the postulates of Teece et al. (1997). In addition, it has been determined that international ambidexterity and open innovation are two dynamic capabilities that improve the performance of companies internationally. In order to promote the creation of competitive advantage, a theoretical framework based on the effects of background on international ambidexterity and international open innovation has been proposed, including some moderating variables. The application of the model in clusters is suggested.

2.1 Introduction

The dynamic capabilities approach seeks to establish an evolutionary framework that explains how companies develop and maintain a long-term competitive advantage. In essence, dynamic capabilities seek to identify the key elements that underpin a company's long-term growth and prosperity. Dynamic capabilities are essential in today's context, where international companies face a highly volatile global environment. In particular, dynamic capability at the international level refers to the ability of a multinational company to create, implement, and update resources that improve its competitive advantage in the world market (Pinho & Prange, 2016).

Although it is recognized that the possession of dynamic capabilities is especially relevant for performance and sustainable competitive advantage in turbulent environments such as international markets, an ongoing debate persists in the literature as to whether they generate competitive advantage (Teece, 2023). Therefore, the objective of this research is, first of all, to identify the international dynamic capabilities that improve the performance of companies internationally. Second, it seeks to identify the key antecedents that influence dynamic international capabilities and lead to better performance. Finally, a conceptual model is proposed to analyze this phenomenon.

The present review has several significant contributions. First, it is the first systematic review to offer a comprehensive picture of the dynamic capabilities that enhance the performance of international companies. However, Jie et al. (2021) made the first bibliometric analysis to inquire about the capability, performance, and international entrepreneurship. Second, using a theoretical model, we have identified the different antecedents of international dynamic capabilities that influence performance and competitive advantage. Finally, we have discovered that clusters are little studied since most of the research has focused on the perspective of dynamic capabilities to examine the internationalization processes of Born Global companies (Kim et al., 2022). However, some studies show that companies organized in clusters experience faster growth in innovation and internationalization. (Kim et al., 2022).

This document is organized into three principal sections. First, we establish the theoretical framework by examining the current state of knowledge on international dynamic capabilities. The subsequent methodological section details our systematic analysis, including: (1) the conceptual evolution of dynamic capabilities, (2) key contributing scholars, (3) leading academic journals in the field, (4) dominant theoretical perspectives, and (5) emergent typologies of dynamic capabilities. Building on this foundation, the final section proposes an original theoretical model of international dynamic capabilities. This model, grounded in our comprehensive review, is specifically designed for application within cluster environments in developing economies, addressing a critical gap in both theory and practice.

2.2 International Dynamic Capabilities

Teece's approach to dynamic capabilities was first introduced in 1997, defining them as a company's capacity to adapt and combine internal and external competencies to address evolving conditions. These capabilities are essential to face competition, uncertainty, and regulatory changes. Teece's approach was influenced by the resource-based view that emerged in the 1980s, based on authors such as Penrose (1959), Rumelt (1984), Barney (1986), and others, which centered on the idea that a company can profit by taking advantage of its unique resources.

However, the static conception of competitive advantage adopted by the RBV was based on accumulating adequate resources, considering that companies with rare, valuable, non-substitutable, and imperfectly imitable resources and capabilities would obtain an advantage over their competitors (Barney, 1991). However, Teece argues that these attributes depend highly on context, which is constantly changing (Teece et al., 1997). That is why, in his first article in 1997, Teece proposed a theoretical framework for dynamic capabilities that focused on processes, positions, and pathways. A decade later, in 2007, Teece restated this framework and proposed three main groups of high-level capabilities: detection, capture, and transformation.

According to Teece (2007), a capability refers to a set of processes and activities that allow an organization to achieve a specific result. Ordinary capabilities are the first to emerge, but by themselves, they do not constitute a foundation for sustainable competitive advantage. In contrast, high-level dynamic capabilities such as detection, capture, and transformation are idiosyncratic and cannot be bought. These capabilities are in organizational routines rooted in the culture and history of the company and give the company a unique competitive advantage in the market (Teece, 2007).

There has been extensive discussion surrounding Teece's views on dynamic capabilities and their impact on sustainable competitive advantage. According to Roy & Khokle (2016), various definitions have been proposed based on high-level dynamic capabilities (Teece & Pisano, 2003; Helfat, 1997; Zollo & Winter, 2002), managerial approaches (Adner & Helfat, 2003; Zahra et al., 2006), organizational processes (Eisenhardt & Martin, 2000; Eisenhardt & Sull, 2001), organizational learning and routines (Nelson & Winter, 1982; Pisano, 2000; Zollo & Winter, 2002). Although Eisenhardt and Martin (2000) do not explicitly reference dynamic capabilities, they discuss organizational and strategic routines that enable managers to acquire, dispose of, integrate, and recombine resources in order to generate fresh value. These routines also involve crafting strategies that align with market changes and may even contribute to shaping them.

Likewise, the effects and consequences of dynamic capabilities have been discussed, which can be direct (Teece, 2007; Wang & Ahmed, 2007) or indirect (Winter, 2003; Zahra et al., 2006) in terms of competitive advantage. Through the adoption of best practices (Eisenhardt & Martin, 2000) and the improvement of effectiveness (Helfat, 1997; Zollo & Winter, 2002; Pisano, 2000). According to Teece (2023), dynamic capabilities encompass both organizational routines and business management, where significant decisions are not solely reliant on technical analysis but also on intuition. Broadly speaking, dynamic capabilities represent an organization's aptitude for discovering novel and innovative methods to attain a competitive advantage on the global stage (Teece, 2023).

Precisely, Petricevic and Teece (2019) argue that dynamic capabilities are essential to face the challenges of the global business environment, which is highly volatile and full of uncertainty and complexity. Multinationals need these capabilities to grow in turbulent international environments. According to Pinho & Prange (2016), the international dynamic capacity refers to the ability of the multinational to create, implement, and update integrated resources in the organization, generating a return and seeking sustainable competitive advantages in the global market. Pinho and Prange (2016) describe the dynamic capacity of internationalization as the process by which companies expand their presence abroad and adapt to rapid changes in international markets through constant development, consolidation, and reallocation of resources.

Teece (2007) defined international dynamic capability as the skills and resources that a company develops and uses to adapt and compete in changing international environments. These capabilities focus on an organization's ability to detect, exploit, and respond effectively to opportunities and challenges in foreign markets. This capacity is crucial for the performance of multinational companies due to global competition, technological changes, and underdeveloped markets. In order to thrive in the global market, it is essential to possess not only resources and capabilities but also the agility to continuously reconfigure and adapt them to meet international challenges and circumstances.

The specialized literature on international business has extensively explored the concept of dynamic capabilities, offering valuable insights into their role in explaining the determinants, processes, and effects of cross-border activities (Matysiak et al., 2018). In particular, a dynamic capabilities perspective has been largely adopted to examine internationalization processes (Prange & Verdier, 2011), especially in the context of Born Global companies.

As noted, the possession of dynamic capabilities is especially relevant for the performance of multinational companies in business environments characterized by uncertainty, turbulence, and rapid evolution (Matysiak et al., 2018). However, there is still a lack of a clear understanding of the international dynamic capabilities that can improve performance and achieve competitive

advantage in the international context. The existing literature does not show systematic analyses of international dynamic capabilities, the predominant theoretical perspectives, and the main types of dynamic capabilities that have emerged, nor the background of these dynamic capabilities. Therefore, this research seeks to fill this theoretical gap.

2.3 Methodology

This research is descriptive, using bibliometric analysis as a research method. The literature review was performed in several steps. First, to identify the international dynamic capabilities that affect the performance of the company, the articles were searched through an extensive search in the Scopus database for its exhaustiveness and wide coverage since it indexes 66.07% more journals than WoS and covers a greater number of areas of knowledge (Singh et al., 2021). The following search equation was used (TITLE-ABS-KEY ("dynamic capabilities") OR TITLE-ABS-KEY ("dynamic capability") AND TITLE-ABS-KEY ("international"). This initial search returned 478 articles available in Scopus.

Second, two filters were applied: only one article was collected, and then it was filtered by area of knowledge of interest to the researcher. The areas included were Business, Management and Accounting, Economics, Econometrics and Finance, Social Sciences, Engineering, Decision Sciences, and Psychology. In total, 345 articles remained, with which data analysis was carried out, identifying the evolution of the construct, the most influential authors, the prominent journals, as well as the most predominant theories.

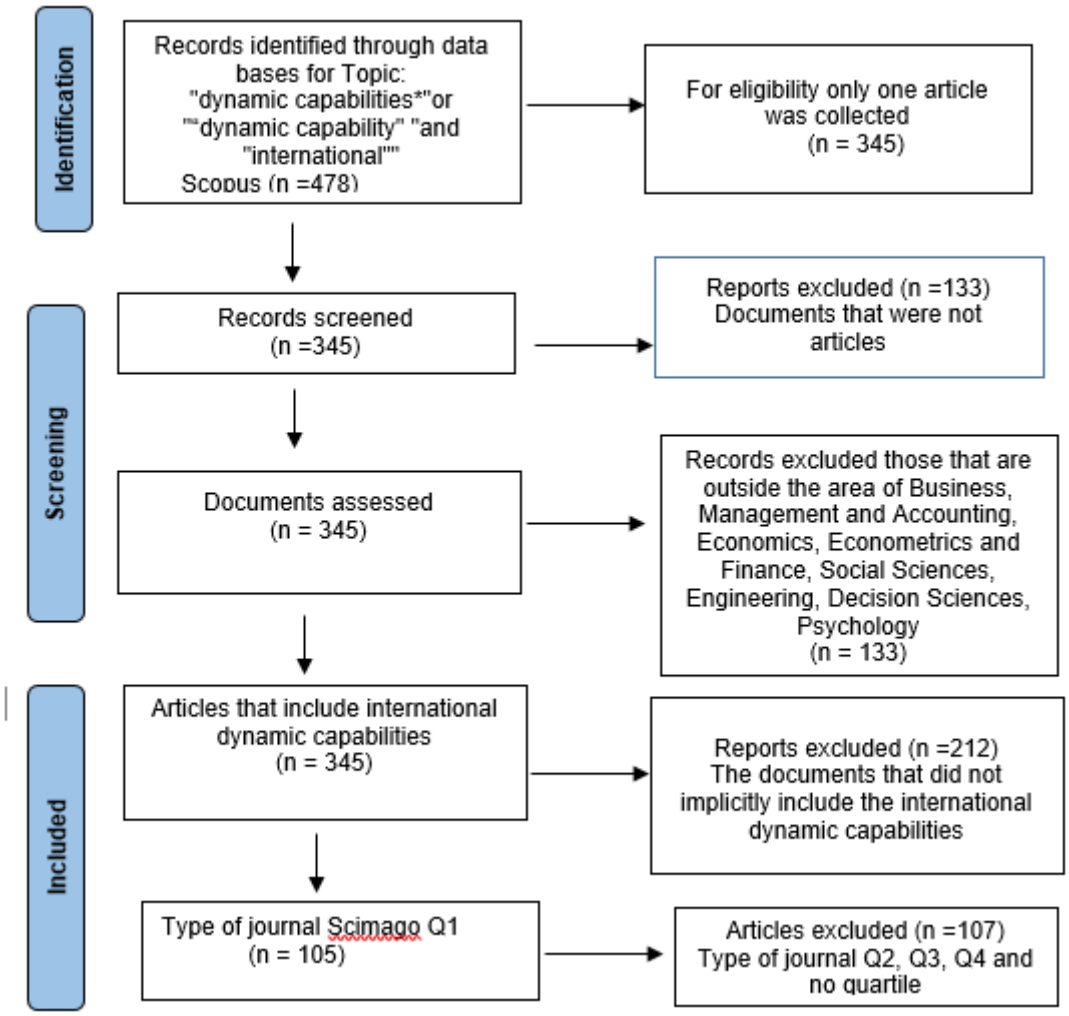
Third, VOS viewer, a free software and effective mapping techniques that allow the generation of large networks (Van Eck & Waltman, 2010) were used. In order to carry out a co-citation analysis to identify the most cited authors and find out if the field of international dynamic capabilities presents divisions in their perspectives, this divergence really exists regarding the results in companies, as demonstrated by Peteraf et al. (2013). Also, through VOS viewer, a bibliographic link was made to identify the types of international dynamic capability.

For this process, the 345 articles previously extracted from Scopus were first reviewed, and the abstract and introduction (and, in some cases, other sections of the document) were carefully read to ensure that they best fit the objective of the study. With this, the documents that did not implicitly include the international dynamic capabilities were discarded and then filtered by the type of journal, ensuring that only the 1st quartiles of Scimago remained. 105 articles were obtained.

This study focuses on journals indexed in the Q1 quartile of Scopus, which are widely considered to offer the highest levels of scientific rigor and academic impact. Researchers such as Feenstra and Delgado (2022) and Jie et al. (2021) point out that publications in Q1 journals are

characterized by their methodological rigor, high scientific impact, and greater influence in their respective fields. From our perspective, this strategic selection strengthens the reliability and credibility of our review findings and provides a robust foundation for the theoretical framework developed in the study

Figure 2-1.PRISMA flowchart.

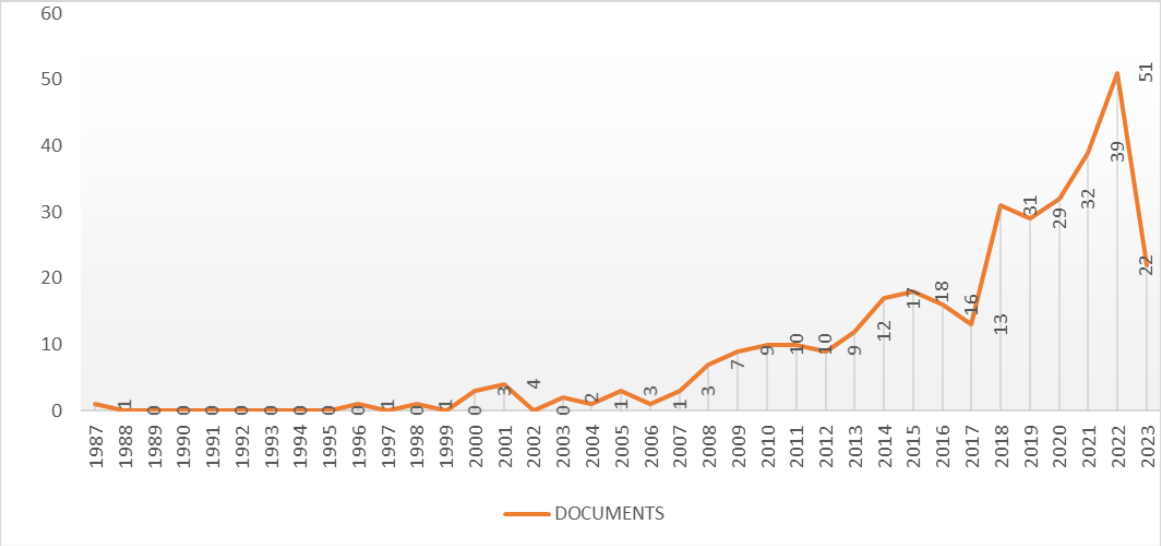


2.4 Data analysis

In 36 years (from 1987 to 2023), Scopus records 345 publications on international dynamic capabilities. Of the 345 publications, 51.4% of the articles belong to the areas of Business, Administration, and Accounting, followed by Economics, Econometrics, and Finance 15.7%, and 11.9% in the Social Sciences. Research on international dynamic capabilities has had an upward trend and a greater number of publications since 2008. The year 2022 was of high production, with a total of 51 documents (Figure 2-2). Between 1987 and 2007, there were 20 publications.

There was a decrease in the number of publications in 2017. A significant increase was evidenced in 2022, with 38 more publications than in 2017.

Figure 2-2. Articles per year international dynamic capabilities



Source: own elaboration from Scopus

The first article on international dynamic capability was published in 1987, and over the next two decades, 20 articles were published on the subject until 2007. During this period, research linked dynamic capability with technology transfer in industrial and biotechnology firms (Osegowitsch & Madhok, 2001), as well as with theories on administrative efficiency and risk management in international franchises (Fladmoe-Lindquist, 1996). Studies also explored the possession, deployment, and updating of capacities asset specificity, market predictability, and knowledge gaps (Griffith & Harvey, 2001), as well as entrepreneurial orientation and international performance in entrepreneurial firms (Jantunen et al., 2005). Additionally, Yalcinkaya et al. (2007) highlighted that exploration and exploitation are dynamic capabilities that impact product innovation and the performance of importing companies.

Between 2008 and 2018, a total of 123 articles were published on dynamic capabilities. In 2008, studies focused on multinationals from developing countries (Zhan & Luo, 2008), New International Companies, and Joint Ventures (Zettinig & Benson-Rea, 2008). By 2009, research had expanded to link dynamic capabilities with innovation (Liao et al., 2009; Chen & Jaw, 2009) and dynamic marketing capabilities (Fang & Zou, 2009). In 2010, studies explored dynamic capabilities in the context of clusters (Irawati & Charles, 2010), the chemical industry, and state-owned companies. In 2011, the focus shifted to internationalization processes, performance (Prange & Verdier, 2011), institutional entrepreneurship (McKague, 2011), and social capital (Carlos, 2011) in the context of exporting companies (Evers, 2011).

In 2012, studies explored export marketing capabilities and began to analyze dynamic capabilities at the micro level (Rodenbach & Brettel, 2012). In 2013, the concept of strategic flexibility of multinational companies from emerging countries and moderating variables such as institutional support was introduced (Liu et al., 2013). For this year, the research focused on internationalization processes (Vahlne & Johanson, 2013). In 2014, Dries et al. (2014) related dynamic capabilities to open innovation. The year 2015 was the most productive, with 18 publications that analyzed the effect of strategic orientations (Faroque, 2015; Monferrer et al., 2015) on dynamic capabilities, including the emergence of dual dynamic capabilities (Weerawardena et al., 2015). For this period, the studies were more oriented towards Born Global.

In 2016, dynamic capabilities' impact on business model innovation and the tendency of companies to cluster together for dynamic capabilities were studied, while in 2017, dynamic internationalization capabilities for SMEs, the relationship between belonging to a cluster and the development of international dynamic capabilities, and absorption ability in the study of dynamic capability were analyzed.

Between 2018-2023, scholarly output surged to 201 publications, reflecting expanded research domains including: cultural dimensions of dynamic capabilities, crisis resilience mechanisms, international experience and professional capital, network-based capability configurations, export-oriented dynamic capabilities, eco-innovation systems, institutional environments and network competition dynamics, entrepreneurial orientation-export performance linkages, and Brexit-related market adaptations.

In 2020, 32 articles were published. In the literature, a new concept related to dynamic capabilities appears in the international entrepreneurial culture (Buccieri, 2020). In this period, studies on SMEs gained more strength (Ali et al., 2020). It studied how dynamic capabilities affect international market entry (Liu & Kang, 2020), ambidextrous innovation, and dynamic marketing capabilities (Buccieri et al., 2020). Artificial intelligence appears as an enabler for dynamic capabilities, and international ambidexterity is considered (Ciasullo et al., 2020) as a third-order international dynamic capability, in the same way international cultural ambidexterity (Bruyaka & Prange, 2020).

Thirty-nine articles were published in the year 2021, analyzing topics such as organizational ambidexterity (Ubeda-Garcia et al., 2021), the capacity of human resources as dynamic capability in multinational companies (Tasavori et al., 2021), and the micro-foundations of dynamic capabilities. Aggarwal and Kapoor (2021) investigated the effect of organizational factors on knowledge transfer and innovation performance. The concept of agile multinationals was also introduced (Shams et al., 2021).

The year 2022 was the most productive, with 53 articles published. The topics studied from the perspective of dynamic capabilities include the capacity of information technologies to enhance supply chain resilience, the dynamic capabilities for internationalization (Ali & Mathur, 2022), and the relationship between dynamic marketing capabilities and brand innovation, communication, experience (Hariandja & Sartika, 2022). Lopes et al. (2022) related open innovation to the internationalization process of companies and examined the limits for its adoption within international SMEs (Tchouwo et al., 2022). The impact of dynamic innovation capabilities on export performance during economic crises was also analyzed (Ledesma-Chaves & Arenas-Gaitán, 2022).

From 2023 up to the observation date of this study (April 10, 2023), 17 articles have been published. During this period, investigations were focused on the use of dynamic capabilities to confront crises such as the COVID-19 pandemic (Behl et al., 2023), explaining the scaling models of digital Born Globals (Mihailova, 2023). Vuorio and Torkkeli (2023) introduced dynamic managerial capabilities, and some micro-foundations of dynamic capabilities for SMEs were presented (Chebbi et al., 2023). The mediating role of international entrepreneurial orientation between international success and dynamic capabilities was studied. The study also investigated whether social networks and foreign market orientation enhance dynamic internationalization capabilities (Peng & Chang, 2023), and the concept of dynamic international marketing ability was introduced for the first time (Zahoor & Lew, 2023).

2.5 Most important journals

The top three journals with the highest number of publications on the topic of international dynamic capabilities are International Business Review, International Marketing Review, and Journal of Business Research (see Table 2-1). However, the most highly cited articles were found in the Journal of International Business Studies, with 1000 citations and 11 articles; International Business Review, with 838 citations and 20 articles; and the Journal of World Business, with 816 citations and nine articles. It is important to note that the most highly cited journals are not necessarily the ones with the largest number of publications. In terms of influence, the Journal of International Business Studies and the Journal of World Business are the most influential journals on the topic of international dynamic capabilities. It is worth mentioning that out of the first 15 journals that contain 35% of the publications, 88% are ranked in quartile 1 of Scimago.

Table 2-1. Most cited sources by number of documents

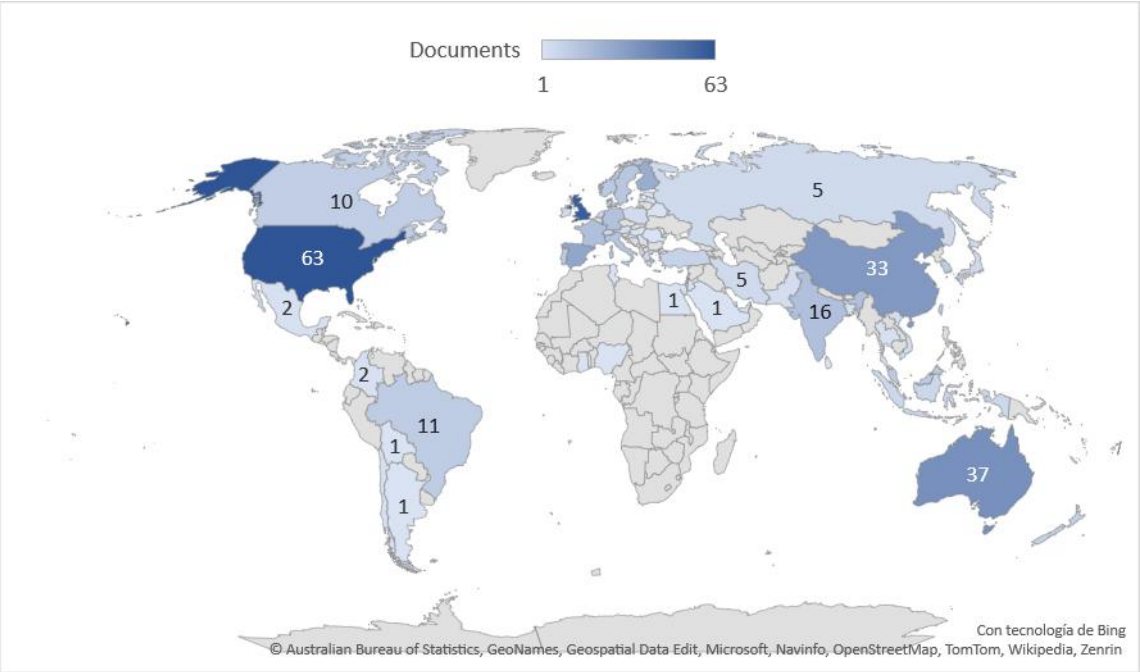
SOURCE	Documents	Citations	Q (Scmago)
International Business Review	20	838	Q1
International Marketing Review	16	605	Q1

Journal Of Business Research	14	797	Q1
Journal Of International Business Studies	11	1000	Q1
Journal Of World Business	9	816	Q1
Journal Of International Entrepreneurship	8	597	Q1
Journal Of International Management	6	246	Q1
Management International Review	6	284	Q1
Journal Of Small Business Management	5	268	Q1
Management Decision	5	193	Q1
Review Of International Business And Strategy	5	4	Q2
Sustainability Switzerland	5	14	Q2
Thunderbird International Business Review	5	38	Q1
Industrial Marketing Management	4	82	Q1
International Journal Of Emerging Markets	4	33	Q2

Source: self-made

The research on international dynamic capabilities has been conducted in 63 different countries, including 23 European countries, 25 Asian countries, 4 African countries, 8 Latin American countries, and 2 countries from Oceania (refer to graph 2). The countries that have made the most significant contributions to the research are the United States with 62 articles, the United Kingdom with 60 articles, Australia with 37 articles, and China with 32 articles, accounting for approximately 35% of the total publications per country. Spain comes next with 27 articles, while Finland, France, and India have contributed 16 articles each. In Latin America, Brazil has contributed the most with 11 articles, followed by Chile, Colombia, and Mexico with 2 articles each, and Argentina, Bolivia, and Jamaica with 1 article each.

Figure 2-3. Documents by country



Source: self-made

The countries with the highest number of publications on international dynamic capabilities are the United States (62), the United Kingdom (60), Australia (37), and China (32). These four countries account for around 35% of the publications analyzed. Spain (27), Finland (16), France (16), and India (16) also made significant contributions to the research. In Latin America, Brazil had the most publications, with 11, followed by Chile, Colombia, and Mexico, with two each, and Argentina, Bolivia, and Jamaica, with one each.

Regarding the unit of analysis, most studies in the United States, Asia, Africa, and Europe have focused on multinationals (Petricevic & Teece, 2019; Chatterjee et al., 2022; Fu et al., 2022) and SMES (Gnizy et al., 2014; Weerawardena et al., 2020; Hermawati & Gunawan, 2021; Peng & Chang, 2023). In Latin America, they concentrated on multinationals (Salvini & Galina, 2015), the tourism sector (Costa & Pereira, 2019), information technology (Jarvenpaa & Leidner, 1998), and export companies.

On the other hand, 160 authors published articles on international dynamic capabilities. The authors who presented the greatest number of academic documents were Lew, Yong Kyu and Vrontis, Demetris with 6 documents each (see figure 2-4). Kok, Seng Kiat published 5 articles and the rest of the authors, including Teece, published 4 articles. 16 authors published 3 articles, 68 authors published 2 articles, and 66 authors published 1 article.

Figure 2-4. Most influential authors

Source: own elaboration – Scopus

Besides, international dynamic capabilities draw on a variety of theories, including but not limited to dynamic capabilities theory, organizational learning theory, internationalization theory, institutional theory, the knowledge-based view, and resource-based view. These frameworks vary in terms of the specific dynamic capability being examined and its impact on performance. It is clear that these studies are primarily focused on the resources and capabilities of firms operating in international contexts, with a primary concern being how they can survive, grow, and maintain a competitive advantage in foreign markets.

2.5.1 Perspectives and typologies of international dynamic capabilities

As previously mentioned, dynamic capabilities have different definitions, and their effects are diverse. The first approach to the construct was carried out by Teece et al. (1997), and a second was done by Eisenhardt & Martin (2000), who reconceptualized the construct by challenging the purpose and mechanisms. According to Peteraf et al. (2013), the authors agree that dynamic capabilities focus on the role of organizational routines, both refer to administrative and organizational processes, and both represent the dynamic capabilities framework as an extension of the resource-based view.

Nevertheless, a fundamental distinction exists regarding the capacity of dynamic capabilities to elucidate sustainable competitive advantage in swiftly evolving contexts. Teece contends that dynamic capabilities are particularly valuable in environments characterized by rapid technological changes. Conversely, Eisenhardt & Martin (2000) propose that dynamic capabilities themselves become arduous to sustain in high-speed markets, thereby rendering the notion of sustainable competitive advantages untenable. As per Eisenhardt & Martin (2000), dynamic capabilities are regarded as mutable and replaceable best practices. Unless these capabilities are both scarce and heterogeneous, they fail to confer a competitive advantage upon a company

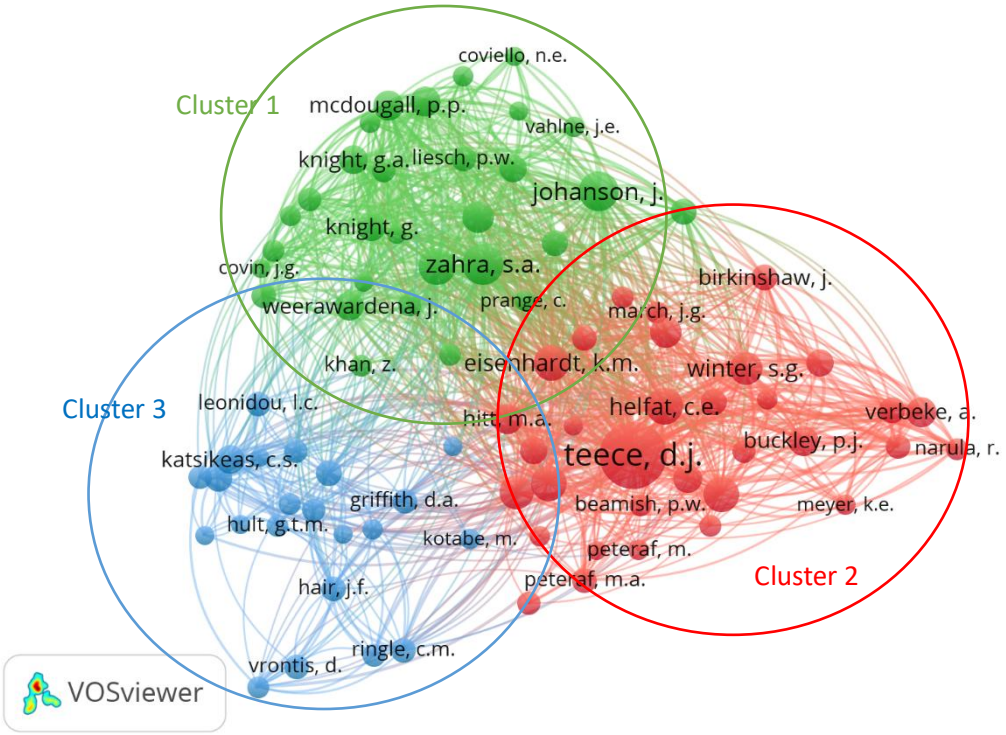
(Barney, 1991). Moreover, Teece et al. (1997) affirm that any capacity lacking heterogeneity cannot be deemed strategic.

Peteraf et al. (2013), in their systematic review of the dynamic capabilities' literature, identified Eisenhardt & Martin (2000) and Teece et al. (1997) as seminal contributions that have profoundly influenced the field's development. Their analysis revealed a notable epistemological divide, with subsequent scholarship demonstrating distinct citation patterns that typically reference either the Teecian or Eisenhardtian perspectives, but seldom integrate both. This indicates the presence of two distinct groups of authors, each with their own perspectives on the development and functioning of dynamic capabilities. Additionally, Peteraf et al. (2013) proposed that other structural factors could be impeding the flow of information between these two domains, acting as limitations

The aim of this study is to examine whether there are any divisions in the perspectives of the field of international dynamic capabilities and whether such divergence exists in terms of their impact on companies, in light of the assumptions made by Peteraf et al. (2013) and Teece (2023). Additionally, the study seeks to identify the typologies of international dynamic capabilities (Teece, 2007) and their orientation in the research field. To conduct the research, co-citation analysis by the author was performed to identify the most cited authors and the clusters that were formed. Bibliographic coupling was then carried out to measure the similarity between documents and identify the international dynamic capabilities from related perspectives.

In this study, 105 articles from Scimago Q1 journals were analyzed using the methodology of co-citation and bibliographic coupling. The co-citation analysis by the author was used to identify a particular research area by measuring the co-occurrence frequencies of individual papers by different authors in the bibliographies. According to the methodology used by Peteraf et al. (2013), a score higher than the average citation score of 27 citations, out of 9318 authors, was used to obtain 85 documents. Figure 2-5 shows the co-citation analysis of international dynamic capabilities.

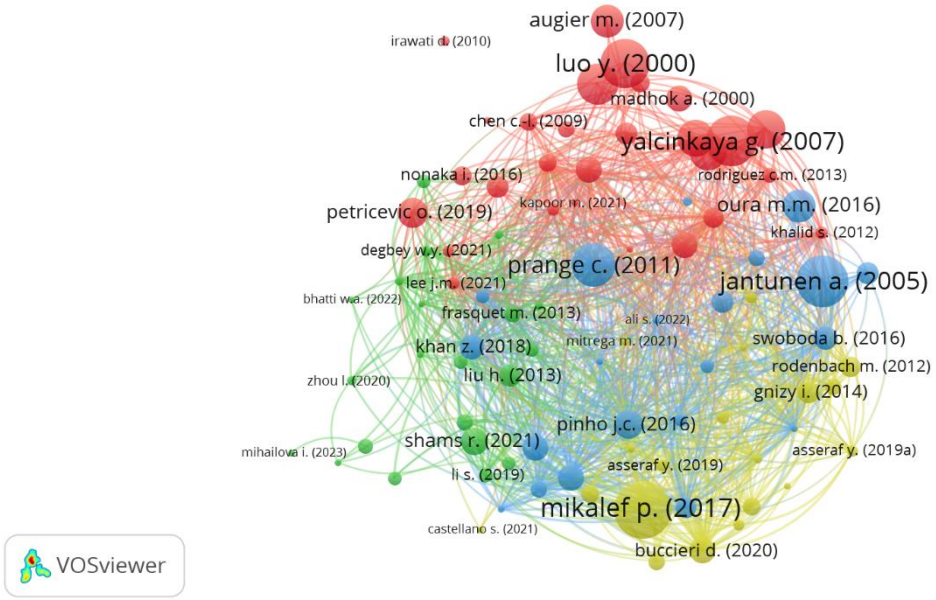
Figure 2-5. Co-citation by authors of the international dynamic capabilities



Source: self-made

The co-citation analysis presented in Figure 2-5 reveals that Teece is the most cited author with 317 citations and a total link strength of 14466, while Eisenhard received 89 citations and a total link strength of 3819. However, both authors are in cluster 2, indicating that they are intellectually related and have many interconnections. This finding challenges Peteraf et al.'s (2013) thesis regarding divergent perspectives in dynamic capabilities literature. Contrary to their view, both Teece's and Eisenhardt's works demonstrate theoretical alignment. Bibliographic coupling was employed to identify the similarity between the documents and connect the topics among authors. Out of the 105 articles analyzed, 10 were discarded for not meeting the study's objectives and could not be eliminated in Scopus. Thus, 90 articles were filtered based on the presence of at least one citation. Using VosViewer, the analysis resulted in four clusters, as presented in Figure 2-6.

Figure 2-6. Bibliographic Coupling International Dynamic Capabilities



Source: own elaboration from VOSviwer

Table 2-2 shows the authors of the bibliographic coupling divided into the 4 clusters, which are differentiated by themes and by the perspective that have addressed international dynamic capabilities, that is, since Eisenhardt & Martin (2000), Teece et al. (1997) or both authors.

Table 2-2. Authors on international dynamic capabilities

Perspective	Cluster 1- Authors	Cluster 2- Authors	Cluster 3- Authors	Cluster 4- Authors
Teece et al 1997	Ahn J.M. (2018) Al-Aali A. (2014) Apriliyanti I.D. (2017) Augier M. (2007) Battaglia D. (2022) Fu X. (2022) Grøgaard B. (2022) Kapoor M. (2021) Khalid S. (2012) Lee J.M. (2021) Lew Y.K. (2013) Liao J. (2009) Luo Y. (2000) Madhok A. (2000) Matysiak L. (2018) Moon T. (2010) Nonaka I. (2016) Petricevic O. (2019) Rodriguez C.M. (2013) Tasheva S. (2022) vahlne j.-e.	Bianchi C. (2022) Bruyaka O. (2020) Frasquet M. (2013) Frasquet M. (2018) Jafari-Sadeghi V. (2022) Jafari-Sadeghi V. (2022) Mihailova I. (2023) Panibratov A. (2020) Roy K. (2016)Ciasullo M.V. (2020)Degbey W.Y. (2021) Elo M. (2022) Gölgeci I. (2019) Shams R. (2021)	Ahsan M. (2019) Ali S. (2022) Andersson S. (2015) Blesa A. (2008)Crespo N.F. (2022)Donbesuur F. (2020) Freixanet J.(2020) Jantunen A. (2005)Lopes J.M. (2022) Mudalige D. (2019) Oura M.M. (2016) Pinho J.C. (2016) Prange C. (2011) Swoboda B. (2016) Torkkeli L. (2019) Uner	Asseraf Y. (2019) Asseraf Y. (2019a) Buccieri D. (2020) Castellano S. (2021) Chang K.-H. (2020) Chatterjee S. (2022) Chatterjee S. (2022a) Duarte Alonso A. (2019) Efrat K. (2018) Gnizy I. (2014) Gnizy I. (2019) Khan H. (2020) Mitrega M. (2021) Monferrer D. (2021) Rodenbach M. (2012) Scuotto

	(2014) wu h. (2016)		M.M. (2020) Weerawardena J. (2019) Weerawardena J. (2020)	V. (2022) Xu H. (2018)
Eisenhardt & Martin, 2000	Chen C.-L. (2009) Fang E. (2009) Irawati D. (2010)	Bhatti W.A. (2022), Jafari-Sadeghi V. (2021)	Evers N. (2012)	
Teece et al 1997/Eisenhardt & Martin, 2000	Griffith D.A. (2001) Yalcinkaya G. (2007)	Ayden Y. (2021), De Silva M. (2021) Zhou L. (2020) Li S. (2019) Liu H. (2013) Pehrsson A. (2015)	Khan Z. (2018) Vuorio A. (2023)	Mikalef P. (2017) Mikalef P. (2021) Pehrsson A. (2019)

Source: self-made

Cluster 1 consists of 28 documents, of which three studies have supported Eisenhardt & Martin's postulates using a quantitative approach. Chen and Jaw (2009) analyzed global dynamic capabilities, firm-specific advantages, and international expansion. Irawati and Charles (2010) used a case study to demonstrate how the Indonesian government implemented a cluster public policy to enhance the dynamic capabilities of the automotive sector. Fang & Zou (2009) examined how marketing capabilities influence competitive advantage and performance in international Joint Ventures, demonstrating that dynamic capabilities significantly enhance firm performance.

Griffith & Harvey (2001) and Yalcinkaya et al. (2007) integrated both Eisenhardt & Martin (2000) and Teece et al. (1997) perspectives. They started with the assumption that dynamic capabilities entail the adaptation, integration, and reconfiguration of internal and external assets to seize global market opportunities. Griffith & Harvey (2001) focused on international business networks and stated that a company's possession of internal and external assets enables the development of global dynamic capabilities. Yalcinkaya et al. (2007) employed structural equations to explore the transformation of firm resources into dynamic capabilities and their influence on market performance and product innovation.

The studies supporting Teece's approaches were 23 and can be classified into two types: those that use quantitative methodology and those that use qualitative methodology. Within the quantitative studies, Ahn et al. (2018) assert that international open innovation is a dynamic capability that enhances the resilience of firms and enables them to achieve sustainable growth, while Battaglia & Neirotti (2022) demonstrate that dynamic capabilities, such as collaboration

with universities and experience in international markets, aid small and medium-sized enterprises in coordinating R&D and export activities to improve their profitability.

Lew et al. (2013) investigated the impact of resource governance mechanisms on the exploratory capabilities of firms, while Rodríguez et al. (2013) found that highly exporting companies enhance their performance by developing capacities for exploration, exploitation, innovation, and entrepreneurial orientation. In another study, Liao et al. (2009) examined the role of a company's resources and its integration capabilities in the innovation process.

Tasheva and Nielsen (2020) use the term global dynamic managerial capacity to describe the abilities of managers to create and modify the resources of the company, and they discovered that this capacity enables the coordination of global assets to improve performance. On the other hand, Wu et al. (2016) demonstrated that international diversification is critical for innovation performance, but its impact is mediated by the dynamic capabilities of each company to identify and capitalize on opportunities.

The need for companies to develop and maintain unique and dynamic capabilities to succeed in the global market has been emphasized in three qualitative studies conducted in collaboration with Teece and other authors (Al-Aali & Teece, 2014). The relationship between dynamic capabilities and multinational enterprises (MNEs) has been further examined through a Penrosean lens, emphasizing how these capabilities sustain competitive advantage in global markets (Augier & Teece, 2007). This analysis builds on Penrose's foundational insights while addressing theoretical gaps in their application to international business contexts. Moreover, the importance of addressing challenges of the contemporary international business environment, such as volatility, uncertainty, complexity, and ambiguity (known as VUCA conditions), and how dynamic capabilities can be a tool to face these challenges have been explored (Petricevic & Teece, 2019).

Authors such as Apriliyanti and Alon (2017) emphasize that absorptive capacity is a dynamic capability that generates competitive advantages for international companies, while Grøgaard et al. (2019) use dynamic capabilities to investigate how multinational companies develop skills to achieve flexibility between global integration and local responsiveness. Lee et al. (2021) suggest that continuous improvement of assets can be achieved through dynamic asset recombination capability.

One of the influential texts in the study of international dynamic capabilities is Luo (2000), which emphasized that possession of capabilities is crucial to obtaining competitive advantages. Proper deployment of capabilities helps mitigate the drawbacks of being a foreign company and anticipate emerging opportunities. Additionally, constant improvement of capabilities is essential for the evolutionary development of sustainable advantages and the creation of new resources. In

contrast, Nonaka et al. (2016) explored the theoretical foundations of dynamic capabilities through the lens of organizational knowledge generation. They emphasized the differentiation between the creative and adaptive dimensions of these capabilities and proposed the notion that the creative aspect is rooted in team-based efforts at middle levels in organizations.

Cluster 2 encompasses 21 documents, with a predominant focus on Teecian perspectives (13 documents aligning with Teece et al., 1997) compared to Eisenhardt & Martin's (2000) approach (2 documents). Six documents integrate both theoretical perspectives. Notably, 80% of this cluster employs case study methodology. Among Eisenhardt-aligned studies, Bhatti et al. (2022) adopted a longitudinal case study design following Eisenhardt's (1989) methodology to examine firms' dynamic capabilities, market commitment, and knowledge development processes during internationalization.

Jafari-Sadeghi et al. (2021) examined the micro-foundations of the context that affect the internationalization of SMEs in emerging markets, focusing on resources and managerial capabilities in international networks in terms of vision, experience, and competence. The authors argue that, according to the ideas of Eisenhardt and Martin (2000), the dynamic capabilities of managers are essential to identifying, creating, combining, integrating, and exploiting the resources necessary for the survival and success of SMEs at both the national and international levels.

Following this, Jafari-Sadeghi et al. (2022) undertook a case study employing the framework proposed by Teece et al. (1997) to investigate and assess the drivers that cultivate agility in international high-tech SMEs. Through their study, they identified nine dynamic capabilities, comprising six first-order capabilities (technological, innovation, knowledge management, networking, and management decision-making) and three second-order capabilities (flexibility, responsiveness, and speed). Their definition of agility drew upon Teece et al.'s (2016) characterization, which emphasizes a company's ability to swiftly and effectively reallocate and reassign resources in response to both internal and external changes.

Similarly, several authors have utilized the theoretical assumptions of Teece et al. (1997) to conduct their case studies (Mihailova, 2023; Shams et al., 2021). For instance, Frasquet et al. (2013) identified first- and second-level dynamic capabilities employed in firms' internationalization process, while Panibratov and Klishevich (2020) identified dynamic capabilities employed by emerging market companies. Roy and Khokle (2016) focused on international joint ventures, and Degbey et al. (2021) explored how dynamic capabilities enhance the competitiveness of African firms through cross-border mergers and acquisitions. Additionally, Bianchi & Stoian (2022) investigated inbound internationalization, which involves attracting

foreign customers to the domestic market, and found that both managerial and organizational capabilities drive this process.

Although there is little quantitative research in this cluster, Bruyaka and Prange (2020) examined international cultural ambidexterity, which is a dynamic capability of firms to manage culturally distant and close foreign markets. Ciasullo et al. (2020) studied how dynamic capabilities supporting international ambidexterity can drive corporate sustainability, while Gölgeci et al. (2019) studied how host country institutions affect the link between dynamic capabilities and international performance of emerging market firms.

The studies in this cluster have employed the theoretical assumptions of Teece et al. (1997) and Eisenhardt & Martin (2000) to investigate dynamic capabilities in the internationalization process. Although some authors have shown discrepancies in their interpretation of the assumptions, six articles have used both postulates, such as Ayden et al. (2021) who identified the role of dynamic capabilities in international expansion, and Li et al. (2019) who suggest that dynamic capabilities in high-velocity markets are based on combined knowledge derived from global processes and local knowledge.

Zhou et al. (2020) analyzed how emerging market companies use strategic ambidexterity to pursue international opportunities in product and market domains, while Liu et al. (2013) investigated how strategic flexibility affects the internationalization of these companies, finding that institutional support and ties with foreign organizations improve this positive relationship.

Cluster 3 consists of 21 documents, of which 1 focuses on the theoretical perspectives of the international dynamic capabilities of Eisenhardt and Martin (2000), 18 authors align with the approaches of Teece et al. (1997), and two documents address both perspectives. The Cluster 3 comprises 52% of quantitative studies, while the remaining are qualitative studies. The article that supports the premises of Eisenhardt & Martin (2001) was that of Evers et al. (2012), who used a case study approach to investigate the interaction between stakeholders and marketing capabilities in international start-ups, with the goal of aligning resource deployment with the market environment and gaining competitive advantage at a global level. International.

In addition, two authors used the assumptions of Teece et al. (1997) and Eisenhardt & Martin (2000). Vuorio and Torkkeli (2023) used dynamic managerial capabilities to demonstrate how various combinations of business decision-making capabilities and network capabilities explain the early internationalization of SMEs. They used bricolage, which is defined as the application of combinations of available resources to new problems and opportunities. In their study, they adopted the build, integrate, and reconfigure typology (Teece et al., 1997) in a case study approach (Eisenhardt & Martin, 2000). On the other hand, Khan (2020) discovered that marketing agility

influences the performance of Pakistani exporting firms, and this impact is stronger in highly complex markets.

Six qualitative studies were identified from the perspective of Teece et al. (1997). Ahsan and Fernhaber (2019) investigated the recursive relationship between opportunities and dynamic capabilities. Andersson and Evers (2015) presented a conceptual framework that explains how dynamic capabilities can be created and promoted through dynamic managerial capabilities and actions to identify opportunities for international growth. Lopes et al. (2022) examined the strategic processes of companies situated in peripheral regions during the COVID-19 pandemic, focusing on dynamic capabilities and open innovation in the context of internationalization.

Prange and Verdier (2011) argued that two opposing classes of exploratory and exploitative capabilities are differentially linked to the rate of growth and survival of international companies from the perspective of Teece et al. (1997). They introduced the concept of international ambidexterity to balance trade-offs and maximize performance in internationalization. Uner et al. (2020) examined how network capabilities can mediate the influence of institutional factors on business internationalization.

Several quantitative studies were highlighted from the perspective of Teece et al. (1997). Blesa & Ripollés (2008) demonstrated that marketing capabilities impact both the company's international commitment and the selection of the appropriate international entry mode. Crespo et al. (2022) empirically confirmed that entrepreneurial orientation, knowledge of the foreign market, and absorption capacity significantly influence the level of business alertness, which in turn affects the international performance of new international companies.

Donbesuur et al. (2020) have suggested that dynamic technological and organizational innovation capabilities can affect international performance, and this impact depends on unique national institutional factors. Mudalige et al. (2019) found that the owner's specific dynamic capabilities positively affect both the company's dynamic capabilities and internationalization. In contrast, Pinho and Prange (2016) investigated the connection between social networks, dynamic internationalization capabilities, and their impact on the international performance of SMEs. Swoboda and Olejnik (2016) discovered that international entrepreneurial orientation fully mediates the relationship between scanning and planning and international performance.

Cluster 4 is predominantly quantitative (85% of studies), consisting of 20 publications. The majority (17 papers) adopt Teece et al.'s (1997) theoretical framework, while three articles integrate both Teecian and Eisenhardt & Martin's (2000) perspectives. Building on these foundations, Mikalef & Pateli (2017) demonstrate that organizational agility mediates the relationship between IT-enabled dynamic capabilities and competitive performance. The study revealed that IT-enabled dynamic capabilities foster two forms of agility, namely market

capitalization agility and operational adjustment agility, which subsequently enhance competitive performance. for his part, Pehrsson (2019) demonstrated a direct and positive relationship between innovation capability, responsiveness capability, and the performance of foreign firms.

In this cluster, two studies are presented that use the assumptions of Teece et al. (1997). Castellano et al. (2021) conducted an analysis of international entrepreneurship and dynamic capabilities that enable nomadic entrepreneurs to manage these capabilities in global contexts. On the other hand, Duarte Alonso & Kok (2019) proposed a conceptual framework based on dynamic capabilities to understand how companies face turbulence, such as the Brexit phenomenon. Both studies are qualitative.

Fifteen quantitative studies based on the postulates of Teece et al. (1997) have used structural equations and regressions to investigate different aspects. For example, Asseraf et al. (2019) conducted empirical tests of a new conceptualization of international marketing agility to measure performance in the international market. Buccieri et al. (2020) discovered that international entrepreneurial culture influences both innovation and dynamic marketing capabilities, and both are related to the performance gains of new international firms.

According to several researchers, dynamic capabilities, such as a proactive learning culture, dynamic innovation, and marketing capabilities, have a positive impact on international performance. For instance, Monferrer et al. (2021) suggest that the ambidextrous dynamic capabilities mediate the relationship between strategic orientations and international performance, which explains the international competitiveness of Born Global. Meanwhile, Rodenbach and Brettel (2012) demonstrate how the CEO's micro foundations influence the development of dynamic marketing and R&D capabilities.

After analyzing the clusters, it becomes clear that Teece's perspectives provide the main theoretical support for international dynamic capabilities. Although some articles from the 1990s were based on the postulates of Eisenhardt & Martin (2000), most researchers oriented their studies to Teece's assumptions that dynamic capabilities allow companies to identify, integrate and build, and reconfigure knowledge and resources to improve performance and gain a competitive advantage. Some studies approached their research from both perspectives, suggesting that dynamic capabilities improve company performance.

Most studies confirm that international dynamic capabilities improve the performance of companies operating in foreign markets, and this concept goes back to Teece et al. (1997), who referred to a set of different capabilities that explain how companies create, exploit, and reconfigure knowledge to counteract variations in the business environment and exploit opportunities in the international context.

According to the systematic review of literature, dynamic capabilities rely on various fundamental managerial and organizational skills, and two recurring capabilities that have been identified are open innovation and ambidexterity. These capabilities encompass innovation processes, as well as the coordination of resources and capabilities, which are crucial factors in maintaining competitiveness in turbulent environments like the current one (Teece, 2023). Exploration and exploitation are highlighted in the coordination of resources related to the search, experimentation, and increase of variability, as well as refinement, efficiency, selection, and implementation.

Ambidexterity arises as a dynamic capability by integrating and balancing exploration and exploitation (Teece et al.,1997), which can enhance the survival and growth of companies in dynamic environments (Luo & Rui, 2009). From the perspective of ambidexterity, exploration and exploitation can complement each other, leading to international ambidexterity (Luo & Rui, 2009; Prange & Verdier, 2011), thereby enhancing the competitiveness of the company in international markets

Teece (2023) points out that innovation remains crucial for building business capabilities, but global R&D outsourcing makes it challenging to rely solely on in-house R&D. Therefore, as noted by Romero-Martínez et al. (2017), establishing ties with international partners can facilitate the development of innovation and success in international markets. International open innovation involves companies obtaining external knowledge from different international partners, enabling them to reduce risks, enter international markets in a timely manner, and improve their global performance (Albats et al., 2020).

2.5.2 International ambidexterity and international open innovation as international dynamic capabilities

Companies must be ambidextrous, meaning they must possess the capability to exploit and explore to enhance their performance and competitive advantage (Gibson & Birkinshaw, 2004). Exploitation and exploration are distinct learning activities companies allocate their attention and resources to. Exploitation involves refinement, efficiency, selection, and implementation, while exploration encompasses search, variation, experimentation, and discovery (March 1991). Ambidexterity refers to an organization's capacity to engage in strategic actions that are diverse and competitive, resulting in a trade-off between exploration and exploitation.

Ambidexterity is a vital capability for firms operating in emerging economies, enabling them to strengthen their position in the domestic market while exploring new opportunities in foreign markets. According to scholars, international ambidexterity is a response to the challenges posed by complex and diverse international markets and allows firms to balance conflicting

internationalization activities (Prange & Verdier, 2011). International ambidexterity is a crucial dynamic capability for the growth and success of international companies from emerging economies (Prange, 2012).

International exploration is crucial to a company's survival and growth (Pinho & Prange, 2016). During internationalization, companies actively seek growth opportunities and enhance their innovation capabilities. Exploration capabilities are vital for achieving innovative and disruptive competitive advantages in the international market (Prange & Verdier, 2011). On the other hand, international exploitation is a dynamic capability that involves path-dependent learning and knowledge accumulation. Companies typically concentrate on developing existing markets initially and expand into new markets once they have sufficient capabilities, leading to improved chances of survival (Prange & Verdier, 2011). Moreover, developing international exploitation capabilities can establish reliable processes that enable international companies to pursue greater efficiency and even foster innovative advancements.

International ambidexterity is vital for the success of companies venturing into foreign markets (Han & Celly, 2008). This holds particular significance for multinationals from emerging economies, as they require strategic flexibility and a learning mindset to secure their survival and achieve growth in international markets. International ambidexterity empowers these companies to engage in both incremental and radical expansion endeavors.

Despite being a proven dynamic capacity that enhances performance and competitive advantage, the current pandemic crisis has forced companies to innovate and adopt a new paradigm of open innovation to become internationally competitive. This involves collaborating with other organizations to allow the free flow of ideas within and outside the organization, taking advantage of international exploration and exploitation of internal company resources (Love et al., 2014; Chesbrough, 2003).

Foreign partners can help reduce knowledge redundancy and overcome the familiarity trap (Love et al., 2014). International open innovation is an effective way to leverage the knowledge and experience of people and organizations around the world, which can lead to more innovative and effective solutions. Moreover, international open innovation can share costs and risks, enabling organizations to access resources that may not otherwise be available (Johannsson et al., 2015).

Most scholars have primarily examined open innovation in the national context to enhance international competitiveness. However, for developing countries that have limited resources and are quickly internationalizing due to globalization, international open innovation is crucial. International open innovation involves integrating external knowledge from various international partners, necessitating the coordination and integration of partners with distinct cultures, experiences, and knowledge (Santoro et al., 2019; Sampson, 2007).

International open innovation can be viewed from two perspectives: incoming international open innovation and outgoing international open innovation. Incoming international open innovation focuses on establishing networks between a company and foreign partners to identify and access resources and capabilities, thereby improving competitive advantage and performance. On the other hand, outgoing international open innovation involves sharing and leveraging specific technologies with external parties (Fosfuri, 2006). Research consistently indicates that companies tend to engage in more input activities than output activities (Bianchi et al., 2011).

Both international ambidexterity and international open innovation have been identified as dynamic capabilities that positively impact the performance and competitiveness of companies in the international arena. Nonetheless, an analysis that clearly identifies the underlying factors behind these dynamic international capabilities that lead to improved performance is still lacking. Hence, we will explore this topic in detail in the following paragraphs.

2.6 Antecedents of international ambidexterity and international open innovation

A two-step process was followed to identify the antecedents of international ambidexterity and international open innovation. First, we use a deductive approach based on the literature review; using the initial search equation on dynamic capabilities in Scopus, we add the equation (international AND ambidexterity) OR (ambidextrous AND internationalization) OR (international exploitation AND international exploration), which yielded 1327 documents. Then, we filter the results by type of article and areas of knowledge, resulting in 415 articles. Of these, we selected 83 high-quality quantitative articles that focused on the work methodology and were in Scimago quartile 1 for the past three years. From these articles, we identified one category for the antecedents of international ambidexterity: internal factors.

For international open innovation, the same process was followed, but with the addition of the equation (international AND open innovation) to Scopus. The articles with the highest impact in quartiles 1, 2, and 3 of the Scimago Journal & Country Rank were selected, resulting in a total of 122 articles. Then, quantitative articles that were related to the international context were selected, resulting in the review of 23 documents. From these, internal factors were identified as a category for the antecedents of international open innovation. This category will be discussed in the following sections.

2.6.1 Antecedents from the perspectives of internal factors

Various studies have identified a series of internal factors that precede international ambidexterity from the perspective of internal factors of the organization. These elements include the structure, hierarchy, resources capabilities, and organization of the company, as well as the micro-foundations that refer to the individual skills, knowledge, and capabilities of the members of the organization, which are sources of performance factors (Ardito et al., 2019) as shown in Table 2-3.

Zhang et al. (2020) provided a micro-foundation example by demonstrating that self-efficacy and resilience are antecedents of international ambidexterity, and the relationship varies across economic and institutional settings. Faroque et al. (2021) found that the founders' previous experience is an antecedent of the network's exploration and exploitation capacity. Huang et al. (2021) examined managerial incentive factors and managerial cognitive factors as micro-foundations of ambidexterity in the context of foreign investment. The results confirmed that both factors are important to achieve a high level of ambidexterity in foreign investment. Furthermore, Vaillant and Lafuente (2019) point out that entrepreneurs with previous business experience are more likely to export.

Chang & Hughes (2012) and Rao-Nicholson et al. (2020) suggest that SMEs can achieve a balance between exploratory and exploitative innovation through appropriate organizational structures and leadership styles. Ardito et al. (2019) found that the decision to establish alliances with partners of different types and geographic locations has a U-shaped effect on a firm's ability to balance radical and incremental innovation efforts.

Buccieri et al. (2021) analyzed the role of international entrepreneurial culture in the development of ambidextrous innovation and dynamic marketing in international startups. According to the authors, international entrepreneurial culture encourages the generation of new ideas and creativity in the search for international opportunities. The study highlights the importance of this culture in the development of ambidextrous innovation, especially in dynamic environments.

Other internal factors are supported by the theory of Resource-Based View, which suggests that companies that manage to accumulate resources and capabilities that are rare, valuable, not substitutable, and imperfectly imitable will gain a competitive advantage over their competitors (Barney, 1991). Several studies have examined how firms' resources and capabilities can influence their ability to compete internationally and how this, in turn, affects their performance in the global market.

For example, Peng and Lin (2021) found a positive association between international network resources and dynamic internationalization capability, as well as a positive connection with international performance. Zhang and Zhang (2022) demonstrated that network orientation leads to both exploratory and exploitative innovations, and this effect is mediated by organizational improvisation. Yalcinkaya et al. (2007) discovered that marketing resources influence exploitative capabilities, while technological resources influence exploratory capabilities. Tolstoi et al. (2022) showed that online marketing capabilities affect marketing ambidexterity and international performance.

Meanwhile, Hughes et al. (2010) found that ambidexterity in innovation contributes to better outcomes for high-tech exporting firms, particularly for marketing differentiation and cost leadership. Chung & Ho (2021) found that cost leadership strategy has a positive impact on market share and is strengthened by exploratory learning and mitigated by exploitative learning.

Nielsen & Gudergan (2012) highlight the importance of fit constructs in alliances, which combine capabilities and resources such as experience, trust, similarity of competencies, and cultural distance, affecting the fit of exploration and exploitation and generating a positive impact on performance. Beletskiy and Fey (2021) found a positive relationship between human resource management capabilities and ambidexterity in subsidiaries of multinational companies. Úbeda-García et al. (2021) suggest that implementing knowledge management processes in Spanish hotel chains improves their internationalization and organizational ambidexterity, which leads to better performance.

Chang and Gotcher (2020) found that co-production positively affects the ambidexterity of environmental innovation, particularly when institutional pressures are high. Similarly, Khan et al. (2021) revealed a positive relationship between corporate social responsibility, sustainable supply chain management, sustainable innovation ambidexterity, and social capital.

Another important internal factor is the strategic orientations that help improve ambidexterity capabilities and achieve better performance in the international context. A strategic orientation refers to the set of strategies that integrate and direct the necessary commercial actions with the objective of creating superior value (Mintzberg, 1987). Monferrer et al. (2015) propose market orientation and dynamic capabilities as two key factors associated with knowledge for the sustainability of Born Global. They confirm that market orientation in the network facilitates the development of exploratory dynamic capabilities, such as adaptation and absorption of knowledge, which influence the ability of the company to exploit knowledge through innovations and improve its performance in the international arena.

Monferrer et al. (2021) further show that market orientation and entrepreneurial orientation in a network context contribute to building an inter-business environment and that exploratory

capabilities influence the ability to exploit knowledge, leading to higher performance in the international arena. The market orientation of the network is crucial for the company's interaction with external agents in a highly competitive and dynamic globalized environment.

Ren and Peng (2021) have confirmed a positive correlation between market orientation, learning orientation, and global dynamic capabilities. Furthermore, they have demonstrated that the development of global dynamic capabilities influences the choice of governance structure in companies. Specifically, internationalized SMEs effectively utilize global marketing capability and global design capability, either individually or in combination. Global marketing capability pertains to the ability to coordinate and integrate internal resources and skills in a timely manner to respond to changes in foreign markets or customer needs. On the other hand, global product design capabilities are associated with the creation of products, processes, and knowledge architectures that are resilient to usage, technological advancements, and contextual variations.

Table 2-3. Antecedents associated with the internal factors of the organization

ANTECEDENTS	VARIABLES
	Self-Efficacy, Resilience, Previous Experience, The Diversity of Tenure of Senior Management Teams (TMT), Leadership Characteristics, Structural Characteristics, Formalized HR Practices, Characteristics of the Management Team, Aspirations, Perceptions, Knowledge Integration, Employee Welfare, Entrepreneurial Experience, Managerial Incentive Factors, Managerial Cognitive Factors.
Internal factors international ambidexterity	International competitive strategy, international network relationship, co-production, marketing resources, Technological resources, Partner experience, Partner Trust, Similarity of skills, cultural distance, Strategic human resource management capabilities, Human resource management operational capabilities, global marketing capabilities, overall, design capabilities, knowledge management, degree of internationalization, corporate social responsibility, social capital, sustainable supply chain management, network orientation, online marketing capabilities, market orientation, learning orientation
Internal factors international open innovation	Investment in R&D Financial capabilities, Organizational culture (Individual resistance to RO, Group resistance to RO, Resistance to RO systems), Manager characteristics, ICT capabilities of the firm, Global Discovery Management; Global Footprint; Use of transnational global new product development team, Cumulative conditions; Dissemination capabilities; International ties, Fortuitous knowledge spillage (SSK), Purposeful Knowledge Sharing (PKE), knowledge flow, breadth of knowledge, height of knowledge, External knowledge transfer

Source: self-made

To enable international open innovation (OI) in organizations, certain prerequisites must be fulfilled. It is crucial to examine the internal factors of the organization as antecedents to OI. Trzeciak (2022) defines the internal characteristics of the organization as the resources and

structures required for innovation processes to occur, including selection and prioritization, accounting and delegation of authority, and the necessary skills to develop R&D.

O'Connell et al. (2022) found a direct and negative relationship between a company's financial capacities and its investment in R&D. However, when R&D projects are successful, this negative relationship is diminished as innovation success decreases the risks related to R&D investments, which encourages higher levels of debt financing to fund future R&D investments.

Bilichenko et al. (2022) stress the significance of individual characteristics as antecedents to Open Innovation, particularly those related to resistance to innovation among employees. They emphasize the importance of organizational culture in successful innovation processes and the need to consider both cultural and individual aspects when implementing Open Innovation strategies in companies (Harel, 2021). The study concludes that the success of Open Innovation may rely not only on managers' resistance to innovation but also on organizational culture and employee perspectives on the importance of R&D, which can lead to benefits in terms of spaces and perspectives for innovation.

In relation to the capabilities of the company, it is relevant to highlight that technological capabilities play a fundamental role in understanding open innovation (Cepeda & Aria, 2019; Fu et al., 2022; Blanc et al., 2022). In the literature, the technological capabilities of the company are defined as those abilities to acquire, implement, combine, and reconfigure the resources derived from information technologies in order to achieve competitive advantages (Cepeda & Aria, 2019).

The reviewed studies highlight the importance of the company's technological capabilities for an agile response to changes in the environment (Shang & Seddon, 2002) and to improve the portfolios of products and services that satisfy the new demands of customers. Cepeda and Aria (2019) show that the information and communication technology (ICT) capabilities of the company contribute to establishing a continuous flow of knowledge and the integration of companies with their environment, thus improving their understanding of it, especially in companies from emerging countries.

There is a clear tendency on the part of the authors to determine that knowledge is an internal factor of open innovation (see Table 2-3) (Pateli & Lioukas, 2019; Hrivnák, 2022; Trzeciak et al., 2022; Ferreira et al., 2023). Knowledge is the result of the combination of information, skills, values, experiences, ideas, and beliefs that have been acquired throughout a person's life in the organization and are used to understand, interpret, and make decisions about their environment.

Knowledge is an essential factor in the competitive dynamics of the company and encourages open innovation activities, according to the study by Ferreira et al. (2023). The authors operationalize knowledge through two variables: serendipitous spillover of knowledge (SSK) and

purposeful knowledge sharing (PKE). The SSK occurs when the unintentional acquisition of knowledge by an economic agent influences the results of other economic agents, while the PKE is constituted as a process in which knowledge is acquired consciously and with specific objectives. The authors find a direct and positive relationship between SSK and PKE with open innovation and suggest that management should strive to hone their knowledge management capabilities and network ties to maintain a competitive advantage.

Hrivnák (2022) proposes a different approach to knowledge as an antecedent of OI, taking into account three variables: knowledge flow, breadth, and height. The study suggests that collaborative networks are crucial for the emergence of new and innovative ideas at a higher spatial level. In addition, interregional external interactions and knowledge sharing play a central role in innovation processes in small companies with limited internal resources. This study suggests that external knowledge supports the emergence of both more and less novel innovations.

Another perspective on knowledge as an antecedent of open innovation is the study by Pateli and Lioukas (2019), which considers the transfer of external knowledge. The research evaluated the degree of commitment of 131 international companies involved in open innovation projects in the early and late phases of the project. The results showed that companies that promote the transfer of knowledge in the early stages of development achieve better performance in the context of open innovation.

After analyzing the literature, it has been shown that the antecedents of international ambidexterity have focused on internal factors such as resources and capabilities and open innovation in knowledge. These internal factors are then complemented by the moderating effects of international dynamic capabilities.

2.7 Moderators among antecedents and international dynamic capabilities

Table 2-5 presents various moderators addressed in the literature on international dynamic capabilities. These moderators include institutional perspectives of countries (Zhang et al., 2020), absorptive capacity, market change (Faroque et al., 2021), and distributed leadership, which refers to a collaborative approach to leadership resulting in leadership distribution throughout the organization (Rao-Nicholson et al., 2020). The dynamic environment (Buccieri et al., 2019) is also a significant moderator.

Absorptive capacity has been studied as a moderator in the relationship between firm knowledge acquisition and innovation performance (Kim et al., 2021) and the relationship between network capability and dynamic internationalization capability (Peng & Lin, 2021). Additionally, micro-

foundation theory-related variables related to top management teams have been included when analyzing dynamic capabilities (Wu & Chen, 2020).

Table 2-4. Moderators

MODERATORS	VARIABLES
international ambidexterity	Cultural Distance, Normative Institution, Absorption Capacity, National Collaborations, International Collaborations, Organizational Slack, International Entrepreneurial Orientation, Institutional Distance, Risk Aversion CEO, Opportunity Preference, Technological Uncertainty, Competitive Tension, Organizational Innovation, Generation In Charge, Family Involvement In The TMT, Home Government Institutional Pressures, Host Government Institutional Pressures, Economic Freedom, Market Change, Institutional Pressures, The Geographic Diversity Of Partners, Distributed Leadership, Individual Financial/Non-Financial Incentives, Environmental Dynamics, Munificence Environmental, TMT's Political Ties, TMT's Commercial Ties
international open innovation	The Capabilities of the Digital Alliance, Intellectual capital, government-business relationship, international market approach, exploration relationships, exploitation relationships, R&D

Source: self-made

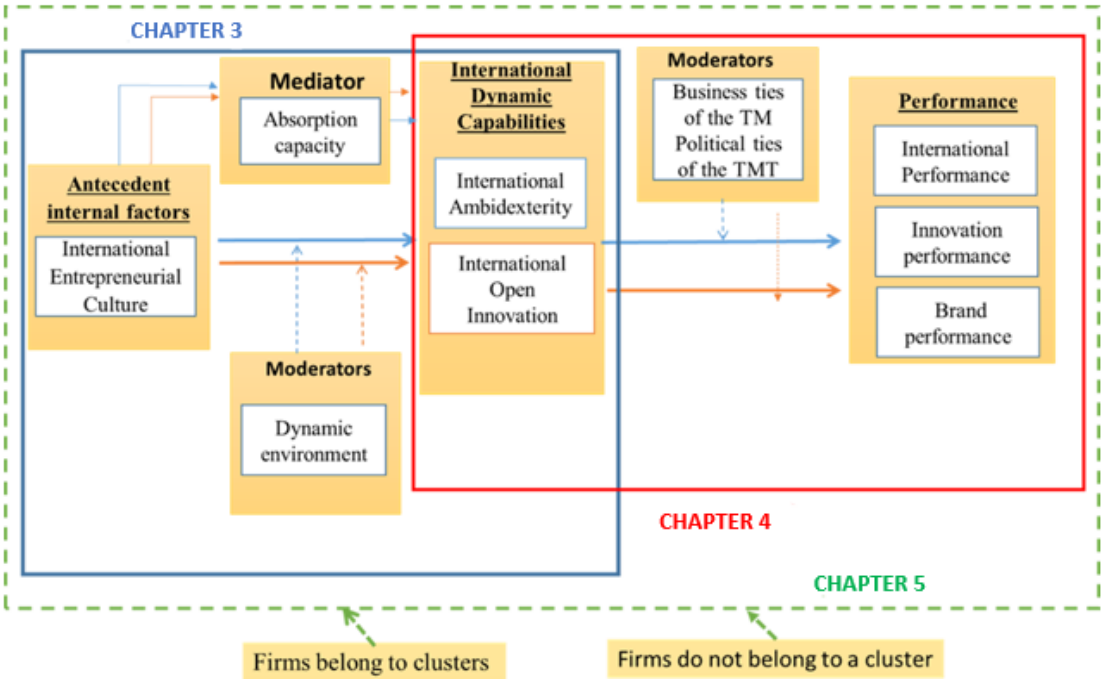
After exhaustive literature analysis, several internal factors influencing international ambidexterity and open innovation, which drive the performance of international firms, were evident, along with moderators influencing these relationships. Based on these findings, a model was developed to provide a classification of the numerous antecedents that have a direct impact on international dynamic capabilities. This conceptual framework aims to integrate research on this topic and enable the development of new empirical models that can be applied in various international contexts. The need for this conceptual synthesis arises from the lack of consensus on the antecedents influencing dynamic capabilities to achieve superior performance (Teece, 2023).

2.8 Model to measure how dynamic capabilities improve the performance of international companies from developing countries

Figure 2-7 shows a model based on the literature review that will be applied in international companies. To analyze this model, we will develop 3 stages. In the first stage, we will focus on the antecedents of dynamic capabilities and their moderators, which were identified through a systematic analysis of the literature. In the second stage, it is proposed to carry out an empirical analysis to determine how dynamic capabilities affect the performance of international companies, considering also possible moderators identified in the literature. In the third stage, we will evaluate how international dynamic capabilities play a mediating role between antecedents

and performance in firms that belong to clusters, compared to those that do not belong to clusters, including also possible moderators.

Figure 2-7. Conceptual model- international firms



Source: self-made

2.9 Stage 1: Antecedents of international dynamic capabilities

Following the model proposed above, organizational culture is proposed as an antecedent, as an internal factor that affects both international ambidexterity and international open innovation. Some studies (Buccieri et al., 2019; Bilichenko et al., 2022) have confirmed that organizational culture is a key antecedent for the development of innovation processes and the search for opportunities abroad. Likewise, Teece (2023) affirms that international dynamic capabilities are embedded in organizational routines that are rooted in culture. One of the types of organizational culture is the International Entrepreneurial Culture (IEC).

The IEC promotes and accommodates the commercial activities of a company at an international level. According to Dimitratos & Jones (2005), the IEC is based on a comprehensive approach to the organization that seeks to generate value by exploiting opportunities in the international market. However, research on the IEC is still fragmented in its current state. Some scholars maintain (Buccieri et al., 2021) that this construct is typical of entrepreneurs, Born Global companies, and New International Companies.

However, Dimitratos and Jones (2005) developed the construct as the approach to entrepreneurship at the business level. This concept allows capturing the international activities of a company that constantly seeks to identify and take advantage of opportunities abroad (Dimitratos & Jones, 2005; Zahra et al., 2005). It has been shown that companies with a high IEC are more likely to participate in international innovation projects and to learn about and take advantage of international opportunities.

The IEC offers a comprehensive conceptualization that considers the company's opportunities and embraces new ideas and creativity. It encompasses various dimensions of behavior that collectively influence the anticipation, identification, and pursuit of opportunities in international markets (Dimitratos & Jones, 2005). The IEC consists of several dimensions, including international entrepreneurial orientation, international market orientation, international learning orientation, international network orientation, and international motivation (Dimitratos et al., 2012).

Companies leverage relationships and collaborations to access critical resources that are necessary for their open innovation activities, as international ambidexterity can be resource-intensive (Buccieri et al., 2020). A recent study by Buccieri et al. (2020) revealed that international entrepreneurial culture influences ambidexterity and enhances performance. However, despite these findings in the existing literature, there is currently no empirical evidence linking international entrepreneurial culture and international ambidexterity. Similarly, there is a lack of research that explores the connection between international open innovation and international entrepreneurial culture.

Although open innovation has been widely studied in relation to each of the dimensions of international entrepreneurial culture, this new paradigm has not been investigated in conjunction with international entrepreneurial culture. There is only one notable investigation in this regard, carried out by Fu et al. (2022), who evaluated how strategic orientation in technological or market leadership, as well as international orientation, can affect a company's commitment to international open innovation.

The existing literature shows that both international entrepreneurial culture, international open innovation, and international ambidexterity are not clear concepts, so it is necessary to develop frameworks that help us improve our understanding. These constructs hardly receive research attention, and a model that measures their impact on clusters has not yet been developed. This study has the potential to improve the academic view on the positive impact that international entrepreneurial culture has on international open innovation and international ambidexterity.

2.9.1 Moderating variables between the antecedents and the international dynamic capabilities

2.9.2 Environment

Regarding moderating effects, Buccieri et al. (2020) proposed that the relationship between international entrepreneurial culture and ambidextrous innovation becomes stronger when firms operate in markets characterized by a high level of environmental dynamism. Environmental dynamism pertains to the rapid pace and constant state of change in an environment, leading to increased uncertainty (Miller & Friesen, 1983). In stable and predictable environments, companies tend to focus on developing core competencies. However, in highly dynamic and unpredictable environments, companies must continually adapt and update their resources to foster more effective dynamic capabilities (Wang & Ahmed, 2007). Therefore, we believe that the dynamic environment positively moderates the relationship between international entrepreneurial culture and international ambidexterity, as well as the relationship between international entrepreneurial culture and international open innovation.

2.9.3 Absorption capacity

In 1990, Cohen and Levinthal introduced a definition of absorptive capacity as the "ability of a firm to recognize the value of new external information, assimilate it, and apply it to commercial purposes." Absorptive capacity encompasses four dimensions: knowledge acquisition and assimilation, representing potential absorptive capacity; and knowledge transformation and exploitation, representing realized absorptive capacity (Apriliyanti & Alon, 2017).

Lu et al. (2020) found that absorptive capacity serves as a mediator in the relationship between open innovation performance. Crespo et al. (2022) confirmed that absorptive capacity significantly influences international dynamic capabilities. Peng and Lin (2021) demonstrate that absorptive capacity has a positive moderating effect on the relationship between international networks and international exploitation. We propose that absorptive capacity will positively mediate the relationship between international entrepreneurial culture and international ambidexterity. It will also mediate the relationship between international entrepreneurial culture and international open innovation.

2.10 Stage 2: International dynamic capabilities and performance

The main premise of international dynamic capabilities is to improve the performance of companies that are exposed to international contexts in order to acquire a sustainable competitive

advantage. In the systematic analysis of the literature, it was evidenced that the performance was operationalized in its different forms. From the formation of international companies (Lee et al., 2021), internationalization (Vaillant & Lafuente, 2019), the general performance of the company (Chang & Hughes, 2012), the ability to identify opportunities in the international context (Faroque et al., 2021) among others. However, the most used variables, both in ambidexterity and in open innovation, were international performance (Peng & Lin, 2021; Zhang & Zhang, 2022; Sousa et al., 2020) and innovative performance (Ardito et al., 2019; Buccieri et al., 2019; Pateli & Lioukas, 2019), thus demonstrating the effectiveness of these international dynamic capabilities on these two performance measures.

The literature, both theoretical and empirical, suggests that international ambidexterity and international open innovation have a positive impact on the performance of international companies. However, since these studies are still in their early stages, their findings are not conclusive. Some researchers propose that multiple dimensions of performance should be considered, as studies have mainly focused on growth and profitability, which are just one aspect of performance (Lin et al., 2007). Studies that solely focus on these indicators may produce biased estimates of the contributions of international ambidexterity and international open innovation to the success of international firms. Therefore, this research measures international performance, innovative performance, and brand performance to provide a more comprehensive analysis.

International performance refers to the extent to which a company accomplishes its performance objectives in global markets (Knight & Cavusgil, 2005). The assessment of international performance in the literature encompasses different measures, such as the proportion of foreign sales in relation to total sales, foreign sales in relation to total assets, and the number of countries in which a company operates (Kotabe et al., 2002).

Certain studies have provided empirical evidence indicating a negative association between an extensive network of international partners and company performance (D'Ambrosio et al., 2016). Conversely, findings from other studies suggest a positive relationship between open innovation and international performance (Lopes et al., 2022). Additionally, numerous researchers have demonstrated that international performance is influenced by international ambidexterity (Bruyaka & Prange, 2020; Buccieri et al., 2021). Under these assumptions, we can propose that international ambidexterity and international open innovation positively affect international performance.

Innovation performance refers to the outcome of innovation efforts, such as the development of new products, processes, marketing, and organizational activities, as well as the exploration of new sources of supply, markets, and ways of organizing the business (Lu et al., 2020). Indicators such as R&D spending, patent count, and patent citations are commonly used in the literature to

measure innovation performance. Other aspects related to R&D intensity, the number of employees working in R&D, the reduction of R&D costs, costs and sales of new products, the success of service and service innovation, the number of new products developed and marketed, and the speed of innovation have also been used as objective measures of innovation performance (Berchicci, 2013; Laursen & Salter, 2006).

Open innovation activities can contribute significantly to improving a company's innovative performance and reducing challenges related to scarce resources (Chesbrough et al., 2006). Studies have shown a positive relationship between open innovation and innovation performance, as well as between international ambidexterity and innovative performance (Ovuakporie et al, 2021; Yalcinkaya et al., 2007). Therefore, it is reasonable to believe that both international ambidexterity and international open innovation will have a positive impact on innovation performance.

Similarly, with regard to brand performance, brands are crucial for organizations in multiple ways, as they help generate higher sales, enhance customer and employee retention, and reduce the risks associated with expanding into international markets (Chang et al., 2018). Santos Vijande et al. (2013) emphasize the significance of brand adaptability and recommend that companies' competitive advantage depends on how effectively they adjust their branding practices in response to environmental changes.

Numerous studies have emphasized the significance of a strategic brand management process for the development and sustenance of successful brands within organizations (Urde, 2016). In a study conducted by Iyer et al. (2022), it was found that both exploitative innovation and exploratory innovation indirectly influence brand performance. The authors evaluated brand performance based on factors such as brand image, brand awareness, market share, and net profit margin. Additionally, Hariandja and Sartika (2022) argue that exploratory innovation can contribute to improving brand/customer value, thereby enhancing the relationship between brand management and performance. Based on the assumptions of Iyer et al. (2022), we believe that brand performance is directly related to international open innovation and international ambidexterity.

2.10.1 Top Management Teams (TMT)

From the micro-foundations, the specific characteristics of resources such as top management teams (TMTs) can generate a competitive advantage. The research conducted by Wu & Chen (2020) revealed that the association between international ambidexterity and innovation performance is enhanced when top management teams (TMTs) cultivate robust relationships with external business partners and political entities. The TMT, comprising senior managers entrusted

with strategic decision-making, organizational oversight, and coordination across the entire company (Asghar et al., 2018), plays a pivotal role in shaping this dynamic relationship.

The involvement of senior managers in international companies is crucial for facilitating the establishment of external connections aimed at resource accumulation. These connections can take the form of both commercial and political affiliations (Wu & Chen, 2020). TMT business ties encompass the relationships that TMT members foster with external business partners, including customers, suppliers, and competitors, who possess valuable resources that can benefit the firm (Peng & Luo, 2000). In the context of this study, we believe that TMT business ties can provide firms in international clusters with the resources needed to effectively implement international ambidexterity and international open innovation and improve their performance.

TMT political ties encompass the interpersonal connections formed by TMT members with officials from government agencies, industry bodies, regulatory bodies, and supportive organizations like state banks, tax offices, trade administration offices, and various governmental entities. These connections serve as a valuable form of social capital, particularly in emerging economies (Prange & Vadier, 2011). Senior executives of multinational corporations often devote significant time and effort to establishing and nurturing relationships with government officials (Wu & Chen, 2020). These political ties of TMTs can enhance the relationship between international ambidexterity and performance, as well as the relationship between international open innovation and performance.

2.11 Stage 3: how the fact of belonging to a cluster moderates the relationships among antecedent, international dynamic capabilities and performance

In this stage, we will analyze how belonging to a cluster moderates all the hypotheses mentioned earlier. Because international firms face highly dynamic and unpredictable environments, being part of a cluster helps companies continuously adapt and update their resources to foster more effective dynamic capabilities (Wang & Ahmed, 2007).

Cluster formation brings benefits such as increased productivity and innovation capacity, stimulates the formation of new businesses, and internationalization. For this reason, from the 1990s onwards, policies aimed at consolidating clusters were created (Gjelsvik & Haus-Reve, 2016). Due to their dynamism, clusters have increased in importance and popularity over the last three decades, both as an instrument within countries' economic policies and as a business model (Kowalski & Mackiewicz, 2021).

Positive examples of competitive clusters in many regions worldwide (such as Baden-Württemberg, the Third Italy, Silicon Valley, Route 128-Boston, and Cambridge) encourage developing countries to formulate cluster strategies and structures, seen as a way to overcome economic crises (Irawati & Charles, 2010), structural deficiencies in internationalizing companies, and increasing innovation and economic competitiveness.

Some studies show that regions hosting clusters present a more complex environment conducive to attracting talent and foreign investment (Fayos et al., 2017; Kim et al., 2022). The reason for this focus is that, in today's globalized world, local contexts and clusters are becoming a comprehensive source of international competitive advantage

Furthermore, in clusters with high levels of international entrepreneurial culture, participating firms are more likely to adapt and reconfigure their international ambidexterity strategy and international open innovation activities to adapt to changing environments and improve their performance (Huang et al., 2014). Therefore, we suggest that the relationship between international entrepreneurial culture and international ambidexterity and international open innovation will be strengthened in cluster firms. That is, we hypothesize that the relationship between antecedents, international dynamic capabilities, and performance, along with the mediating and moderating effects, will be stronger for cluster firms than for non-cluster firms.

2.12 Conclusions

As Teece (2023) points out, the concept of dynamic capabilities is a rich area for research, particularly due to the high level of uncertainty and the increasingly complex and turbulent environments that companies face, particularly those operating in international contexts. Dynamic capabilities can be integrated into the theory of international firms through the concept of international dynamic capabilities, in order to establish sustainable competitive advantages.

Opinions in the literature are divided when it comes to the impact of dynamic capabilities. Teece et al. (1997) put forth a framework that supports the notion that dynamic capabilities can yield competitive advantages, especially in dynamic international environments. In contrast, Eisenhardt & Martin (2000) contend that dynamic capabilities are guided by "simple rules" (Bingham et al., 2007), representing repetitive routines that may not always lead to a durable competitive advantage.

In light of these arguments, this study confirms that international dynamic capabilities are based on Teece's (2007) framework of detection, capture, and transformation. These are critical activities for organizations and management to identify the direction of international markets.

Research on international dynamic capabilities tends to be more prescriptive in nature. Co-citation analysis indicates that authors have drawn upon both Teece et al. (1997) and Eisenhardt & Martin (2000) to demonstrate that international dynamic capabilities enhance the performance of international firms.

For its part, the bibliographic coupling analysis rescued two crucial dynamic capabilities to counteract the effects of an environment as complex and uncertain as the current one: international open innovation and international ambidexterity. Teece (2023) made it clear that dynamic capabilities involve a combination of organizational routines, innovation, and orchestration of capabilities. Ambidexterity represents the way to combine organizational routines and international open innovation, the new paradigm for managing innovation in international companies.

As researchers have examined the effects of international open innovation and international ambidexterity on performance for competitive advantage, the domain has gained empirical credibility and has become a comprehensive, if fragmented, field of research (Lopes et al., 2022; Pinho & Prange, 2016). Therefore, it was necessary to review the antecedents that affect these two international dynamic capabilities in the literature. To fill this gap, a model based on the background of international open innovation and international ambidexterity affecting performance was proposed to organize abundant research on the subject and advance scientific knowledge. This would be the first model that covers the combination of two international dynamic capabilities.

The model suggests internal factors that characterize the background of international dynamic capabilities. Different sets of backgrounds lead to different performance outcomes: international, innovation, export, internationalization, and opportunity recognition, among others. The international ambidexterity is more oriented to the antecedents of resources and capabilities and the international open invocation is oriented to the knowledge.

Also, in the model, moderators were rescued, which included the relationships of dynamic capabilities with their antecedents and performance. Among them, what has to do with the characteristics of the manager is that dynamic capabilities are idiosyncratic and must be built by managers (Adner & Helfat, 2003). Also, moderators of the environment, as Teece (2023) mentioned, international environments are plagued by deep uncertainty. Also noteworthy is a company-level capacity, such as absorptive capacity, to identify new information from foreign markets and convert it into results.

The proposed model, under the outlines of international dynamic capabilities, can be replicated in various international contexts. In this proposal, we suggest clusters. The formation of clusters brings benefits such as increased productivity and the capacity for innovation and stimulates the

formation of new companies. Due to their dynamism, clusters have increased in importance and popularity in the last three decades, both as an instrument within the economic policy of countries and as a business model (Kowalski & Mackiewicz, 2021).

In summary, by examining international dynamic capabilities within clusters and considering their antecedents, moderators, and diverse performance metrics, this study has the potential to advance the understanding of international dynamic capabilities. It aims to move closer to fulfilling the promise of integrating multiple strands of managerial research into a unified theory on how international firms establish a lasting competitive advantage.

2.13 Limitations and future lines of research

This research is not exempt from limitations, mainly considering that an extensive analysis of the literature was used in the Scopus database, which has different detractors because it is very broad. Other databases with extensive experience and recognition, such as Web of Science, should be reviewed. In addition, to identify the background of international dynamic capabilities, articles that were in quartiles 1, 2, and 3 of Scimago were used, leaving out other types of documents that can contribute to the investigation.

In the proposed model, other lines or factors of study are not considered. For the background, we suggest carrying out more studies on strategic orientations and micro-foundations, as well as capabilities such as resilience. Provide guidance on some control variables and possible additional study units such as the technology sector, services, franchises, and export companies, among others. Carry out longitudinal empirical studies to explain how dynamic international capabilities generate a sustainable competitive advantage over time.

On the other hand, future studies could systematically review and analyze the link between different dynamic capabilities, widely listed and interesting, such as International cultural ambidexterity, Global dynamic managerial capability, Dynamic managerial capabilities, Dynamic marketing capabilities, Dynamic export capabilities, dynamic capabilities for internationalization (Ali & Mathur, 2022). All of them look for their relationship with the background and different performance measures.

CHAPTER 3

3 International dynamic capabilities: What role do international entrepreneurial culture and absorptive capacity play?

Abstract:

In the uncertain climate of emerging economies, businesses must build adaptive international competencies to successfully operate through global markets. This study aims to examine the influence of International Entrepreneurial Culture (IEC) on two essential dynamic capabilities: International Ambidexterity (IAMB) and International Open Innovation (IOI). The research examines both large and small enterprises in Colombia, utilizing insights from Dimitratos et al. (2012) and Peng & Lin (2021). A self-administered questionnaire, confirmed by a literature study and pilot testing with five managers, was utilized to collect data on management perceptions about worldwide activities. Data has been collected from 400 foreign corporations located in major cities, representing approximately 11,700 international businesses in Colombia. The results show that IEC has a beneficial effect on IOI but a negative effect on IAMB. These findings indicate that managers need to prioritize developing an IEC to improve innovative capabilities while managing exploration and exploitation. By developing an adaptive culture, organizations may more effectively utilize their resources in international markets, modify successfully to changes, and develop important relationships that improve competitiveness and guarantee long-term success.

3.1 Introduction

Globalization has facilitated the transnational expansion of firms; However, they increasingly confront volatile and turbulent business environments. Peng and Lin (2021) emphasize the importance of developing dynamic international capabilities that allow firms to respond to these changes. These competencies relate to a company's ability to generate, execute, and improve resources that increase its advantages in the worldwide marketplace (Pinho & Prange, 2016).

In the current dynamic worldwide context, competencies include innovative procedures and effective resource and skill coordination. International ambidexterity and international open innovation are essential for success in turbulent environments (Teece, 2023). International ambidexterity implies a dynamic capability that integrates international exploration and exploitation (Luo & Rui, 2009). The exploitation aspect allows companies to confront obstacles in various regional marketplaces while incorporating important innovations into their worldwide operations (Prange & Verdier, 2011). In contrast, international exploration generates new value by utilizing foreign expertise and technology to create unique products or services designed for global markets (Pinho & Prange, 2016).

Although the importance of international ambidexterity is recognized, dependence only on this ability does not ensure success in global marketplaces (Fu et al., 2022). The conflicts within ambidexterity might hinder efficiency, prompting businesses to pursue information from external sources. In this context, adopting the model of international open innovation is especially pertinent, as it allows organizations to innovate by integrating external information or collaborating with global partners (Zahoor et al., 2021). This method requires the collaborative coordination of multiple partners from different cultures, integrating experience and expertise for efficient collaboration.

Research recognizes the impact of national culture on organizational culture; nonetheless, a significant gap continues in comprehending the particular organizational culture that promotes international dynamic capacities, particularly in emerging economies (Scaliza et al., 2022). While certain studies affirm the influence of international dynamic capacities on performance, limited research has researched the antecedent elements that develop these capabilities (Pinho & Prange, 2016; Prange & Verdier, 2011; Peng & Lin, 2021; Peng & Chan, 2023). This study investigates International Entrepreneurial Culture (IEC) as a forerunner to international dynamic skills, seeking to address a notable gap in the literature.

Intrapreneurship theory recognizes IEC as an important tool for promoting innovation and identifying international market prospects (Buccieri et al., 2019; Bilichenko et al., 2022). Teece (2023) argues that dynamic capabilities are expressed via organizational culture, driving organizations to perpetually pursue international prospects (Dimitratos & Jones, 2005). Organizations that promote an IEC are more likely to participate actively in global innovation initiatives and capitalize on international opportunities. Nonetheless, although the IEC's function is completely documented in new international enterprises, there is an urgent necessity for expanding this examination to include older international corporations (Acosta et al., 2018).

Notably, extant research lacks comprehensive empirical examination of how internal and external factors jointly influence the antecedent-dynamic capability relationship in global contexts (Peng & Lin, 2021). Addressing this gap, the present study specifically analyzes environmental dynamism as a critical moderating variable, accounting for cross-national variations in institutional and market conditions.

Furthermore, previous studies have indicated that absorptive capacity moderates the ability of organizations to receive and internalize knowledge from external sources (Peng & Chan, 2023). This skill facilitates the creation of new knowledge through integration and meets the demands of worldwide markets (Escribano et al., 2009). The mediating effect of absorptive ability in the relationship between International Environmental Change (IEC) and dynamic capacities at the international level has yet to be investigated (Peng & Chan, 2023).

Current research on international dynamic capacities has primarily concentrated on Western (Pinho & Prange, 2016) and Asian (Peng & Lin, 2021) enterprises, resulting in a deficiency in knowledge regarding the applicability of these dynamics to international firms from Latin America. This work precisely examines the emergence of two dynamic capacities stemming from IEC, hence offering significant contributions to this field of research.

The article is organized in the following manner: Initially, it formulates a theoretical framework that leads to the study hypotheses. It subsequently elucidates the methods employed for empirical testing, accompanied by a comprehensive explanation of the outcomes. A thorough discussion encompasses conclusions derived from the findings, management implications, limits, and recommendations for future study directions.

3.2 Theoretical background and hypotheses

3.2.1 International Dynamic Capabilities

Teece (1997) introduced the concept of dynamic capabilities, referring to an organization's ability to integrate, build, and reconfigure internal and external competencies in response to constantly changing environments. The term "dynamic" emphasizes adaptability to ongoing changes, emphasizing continuous updating. Teece (2007) defined capabilities as acquired processes and activities that enable specific results. In the case of dynamic capabilities, they have a prospective perspective, focusing on identifying, capturing, and transforming opportunities. In essence, dynamic capabilities denote an organization's ability to discover innovative methods to achieve sustainable global competitive advantage (Teece, 2023).

Dynamic capabilities are fundamental to facing challenges in the global business environment marked by volatility, uncertainty, and complexity (Petricevic & Teece, 2019). Pinho and Prange (2016) argue that dynamic capabilities developed internationally differ from those at the national level, challenging context-independent views on dynamic capabilities. They propose that dynamic capabilities gain value from their inherent relationship with context, allowing adaptation and transformation in diverse environments. This perspective aligns with Peng & Chang's (2023) dynamic internationalization capability, in which firms expand into international markets, adapt to changing dynamics, and engage in a continuous development cycle, consolidation, and resource reallocation.

International dynamic capabilities, as highlighted by Prange & Verdier (2011), extend beyond merely analyzing internationalization processes. They denote a company's capacity to enhance, integrate, or reconfigure existing resources and capabilities to tackle challenges in dynamic global environments (Peng & Lin, 2021). This concept showcases multinational companies' competence in creating, implementing, and updating integrated resources to yield returns and maintain sustainable competitive advantages in the global market (Pinho & Prange, 2016).

The international business literature explores various international dynamic capabilities and their significance in elucidating determinants, processes, and impacts of cross-border activities (Buccieri et al., 2020; Zahoor & Lew, 2023). However, there's a need to grasp the international dynamic capabilities of companies from developing countries. Drawing on concepts from authors like March (1991) and Pinho & Prange (2016), international ambidexterity surfaces as a crucial dynamic capability for companies in these nations. This capability enables firms to navigate complexities and seize opportunities in the global arena effectively.

International ambidexterity indicates a company's capacity to successfully balance operational efficiency with adaptability to developing global circumstances (Luo & Rui, 2009). This suggests

that enterprises must optimize their current resources in international markets while maintaining receptivity to identifying new opportunities. A significant business may successfully manufacture and disseminate its items throughout multiple countries while concurrently exploring new markets for organic snacks. This dual strategy allows organizations to improve their presence in established markets while exploring expansion in new sectors (Prange, 2012). For successful international ambidexterity, organizations require particular benefits, an openness to learn, and the adaptability to modify their tactics as needed.

Accompanying ambidexterity, organizations need to promote a strong entrepreneurial attitude, which is important for influencing their business ecosystems through worldwide innovation and involvement with external partners. This methodology facilitates global open innovation implementation. For instance, pharmaceutical firms frequently engage in tripartite collaborations with research universities and biotech startups to develop innovative therapeutics, leveraging complementary resources and specialized expertise. As Arranz et al. (2020) demonstrate, successful open innovation requires both the identification of strategic partnerships and the effective utilization of external knowledge. This process enables organizations to transform combined internal and external assets into novel solutions (Teece et al., 2016), particularly in knowledge-intensive industries where innovation ecosystems prove critical.

International open innovation involves active global collaboration, facilitating the exchange of ideas and knowledge, efficiently integrating global knowledge, and fostering innovative solutions (Zahoor et al., 2021). It offers benefits such as shared costs and risks, access to untapped resources, and greater efficiency and innovation. It improves the resolution of global problems, expands market opportunities, and makes it possible to leverage diverse international knowledge to obtain technological advances (Wu & Liu, 2018). This capability is developed through collaboration with various entities, such as universities, R&D institutes, governments, customers, suppliers, competitors, and international business organizations (Rasiah, 2019).

Some researchers (Wu & Liu, 2018; Zahoor et al., 2021; Ferreira et al., 2023) debate the optimal choice between national and international open innovation, driven by substantial investments in communication and coordination across geographical distances and cultures. Fu et al. (2022) emphasized the fundamental role of open innovation at the national level in the short term, recognizing the possible obsolescence of knowledge. Despite achieving faster innovation and initial international success, the long-term sustainability of such success may be questionable due to rapid technological and market changes in international environments (Wu & Liu, 2018).

3.2.2 The international entrepreneurial culture as an antecedent of international dynamic capabilities

Numerous studies explored the internal factors that precede international ambidexterity and open innovation. Regarding ambidexterity, scholars investigated hierarchy (Rao-Nicholson et al., 2020), micro-foundations (Zhang et al., 2020), strategic orientations (Ren & Peng, 2021), and organizational culture (Buccieri et al., 2021). In open innovation, the factors were an investment in R&D (O'Connell et al., 2022), organizational culture (Bilichenko et al., 2022), the characteristics of managers (Fu et al., 2022), and knowledge (Ferreira et al., 2023). Organizational culture emerges as a key influencing factor in both international dynamic capabilities, particularly with the discovery by scholars such as Buccieri et al. (2019) and Bilichenko et al. (2022) that international entrepreneurial culture (IEC) improves the innovation processes and ambidexterity of companies in the international context.

Dimitratos et al. (2016) emphasized the importance of national culture in shaping the behavior of a company internationally within the scope of international entrepreneurship theory. They underline the tendency to overlook high theoretical aspects at the organizational level that could inform the international behavior of established companies. International entrepreneurship, as highlighted by Dimitratos & Plakoyiannaki (2003), is a holistic organizational process deeply integrated into organizational culture, which actively seeks opportunities beyond national borders.

Dimitratos and Jones (2005) defined IEC as a comprehensive approach within an organization, aiming to create value and capitalize on opportunities in the international market. Despite its importance, research on IEC is considered fragmented, and some scholars (Buccieri et al., 2021) mainly associate it with entrepreneurs, born global companies, and international startups. However, Dimitratos and Jones (2005) present a framework that sees it as a business approach applicable to any international company, regardless of its age, size, or speed of internationalization.

The IEC empowers organizations to systematically identify and exploit international opportunities, cultivating a sustained orientation toward global market exploration (Dimitratos & Jones, 2005). This cultural framework is intrinsically linked to the core tenets of dynamic capabilities theory, as it facilitates the continuous building, integration, and reconfiguration of organizational competencies. Such adaptive capacity enables firms to navigate complex international environments while accounting for their unique historical trajectories and path dependencies (Teece et al., 1997).

Companies with a robust IEC are more inclined to participate in international innovation projects and are adept at identifying and capitalizing on global market opportunities. The IEC framework, outlined by Dimitratos and Jones (2005), encompasses dimensions such as international entrepreneurial orientation, international market orientation, international learning orientation, international network orientation, and international motivation. These dimensions provide a comprehensive framework for companies seeking to capture opportunities, embrace new ideas, and foster creativity (Dimitratos et al., 2012).

International entrepreneurial orientation reflects a company's use of innovative, proactive strategies in international markets. International motivation propels proactive entry into global markets, encouraging employee engagement in international projects and fostering a pervasive international vision (Dimitratos et al., 2012). International market orientation involves the search for information in international markets to generate value at a global level and monitor the actions of competitors (Escandón-Barbosa et al., 2016). The international learning orientation indicates a company's inclination to apply new knowledge in global markets. Finally, the orientation to international networks allows us to establish connections with global clients and create alliances and social links to access knowledge and trends that improve activities in international markets (Zhan & Zhang, 2022).

Existing studies highlight (López-Zapata & Ramírez-Gómez, 2023; Gimenez Espín et al., 2023) that an entrepreneurial culture characterized by openness, flexibility, proactivity, and permeability to diverse forms of knowledge plays a positive role in enhancing ambidexterity outcomes. Moreover, it enables effective coordination of business activities, especially in turbulent environments. Matzler et al. (2013) proposed that companies with an outward-oriented culture toward international markets experience greater success by mitigating the constraining effects of the domestic industry.

Matzler et al. (2013) link IEC with an adhocracy-type culture, emphasizing entrepreneurship, flexibility, creativity, innovation, risk tolerance, and the development of new resources. López-Zapata and Ramírez-Gómez (2023) corroborate this, pointing out its prevalence in companies with prospective or ambidextrous strategies. IEC allows international companies to skillfully combine the exploration of opportunities abroad with their exploitation to build efficient businesses, generating short-and long-term returns (Wang & Rafiq, 2009). This strategic approach helps companies balance the exploration of new possibilities and the exploitation of existing resources, improving overall effectiveness in the international market.

While the literature has documented various research exploring the relationship between different types of organizational cultures and organizational ambidexterity (López-Zapata & Ramírez-Gómez, 2023; Mustafa et al., 2023; Matzler et al., 2013), innovation ambidexterity (Lin &

McDonough, 2011; Limaj & Bernroider, 2019; Yang et al., 2015), and contextual ambidexterity (Khan & Mir, 2019; Wang & Rafiq, 2014), There exists a void in understanding the evaluation of the influence of organizational culture, specifically the IEC, on the phenomenon of international ambidexterity.

In the literature, certain dimensions of the IEC are associated with ambidexterity. For example, Buccieri et al. (2021) discovered a close alignment between international orientation and exploratory efforts. Özkaya et al. (2015) emphasized the importance of collecting and integrating data from international markets to understand customer trends and competitive strategies, facilitating exploration and exploitation in new markets. This perspective is supported by Peng et al. (2023), establishing a positive relationship between international market orientation and ambidexterity.

Peng and Shao (2021) suggest a close relationship between international learning orientation and ambidexterity. Companies that prioritize learning in an international context focus on innovative strategies, refine their offerings, and advance technologically with limited resources. Similarly, Peng and Lin (2021) highlight the importance of an international network orientation to acquire foreign knowledge, establish connections, and gain exploration advantages, thereby creating value and improving innovative processes. Buccieri et al. (2021) propose that the IEC influences dynamic capabilities, although more research is needed that specifically explores the relationship between the IEC and international ambidexterity. Based on these discussions, the following hypothesis is formulated

H1. International entrepreneurial culture positively impacts international ambidexterity.

Considerable attention has been given to the role of organizational culture in open innovation, as evidenced by empirical analyses (Naqshbandi et al., 2015; Srisathan et al., 2020). However, a research gap exists regarding the impact of IEC on international open innovation. Naqshbandi et al. (2015) suggest that certain organizational cultures can either encourage or impede open innovation. IEC is beneficial as it enables international companies to tackle the evolving challenges of the global market environment. Introducing international open innovation requires not just a modification of corporate innovation processes but also cultural change, as successful open innovation demands a dynamic culture adaptable to risk and uncertainty

While research on the link between international open innovation and IEC is scarce, Freixanet et al. (2021) highlight a positive correlation between international entrepreneurial orientation and open innovation. Zahoor et al. (2021) note that intercultural competencies moderate the impact of international open innovation on international SMEs' performance. Fu et al. (2022) assess how strategic orientations and international focus affect a company's commitment to international open innovation. An entrepreneurial international organizational culture, characterized by openness

and receptivity, fosters knowledge acquisition and promotes international open innovation, as proposed by Naqshbandi and Kamel (2017). Thus, we posit.

H2. International entrepreneurial culture positively impacts international open innovation.

3.2.3 The mediating role of absorptive capacity in international dynamic capabilities

Achieving international ambidexterity requires an intrinsic capability that enables acquiring, adapting, and utilizing knowledge for simultaneous international exploitation and exploration (Solís-Molina et al., 2018). Cohen and Levinthal (1990) introduced absorptive capacity as a firm's ability to recognize, assimilate, and apply external information. In low absorptive capacity contexts, specialization in either exploitation or exploration is more effective, according to Solís-Molina et al. (2018). In contrast, high absorptive capacity favors ambidexterity, allowing seamless integration of existing and newly acquired knowledge and promoting increased ambidexterity.

Peng and Lin (2021) stress that absorptive capacity aids in identifying and exploiting foreign opportunities, requiring a robust knowledge base for interpretation (Peng et al., 2023). Companies with high absorptive capacity proactively detect and exploit opportunities in foreign markets, showcasing greater adaptability and speed (Peng & Lin, 2021). Consequently, absorptive capacity enables an international company with high IEC to concurrently conduct international exploitation for current market income security and allocate resources to search and explore international opportunities for future viability (March 1991).

A well-developed IEC provides firms with the capability to systematically integrate heterogeneous knowledge from global markets. As Mao et al. (2021) demonstrate, the proactive acquisition and assimilation of cross-border knowledge are critical for driving organizational transformation and facilitating international exploration. In this context, absorptive capacity serves as a pivotal mechanism for multinational enterprises, enabling both the rapid internalization of external knowledge and its strategic application to meet diverse market demands. Consequently, the synergistic development of entrepreneurial culture and absorptive capacity emerges as a fundamental prerequisite for attaining international ambidexterity (Mao et al., 2021).

Various authors consistently confirm the positive moderating effect of absorptive capacity on ambidexterity (Solís-Molina et al., 2018; Peng & Lin, 2021; Peng et al., 2023). Peng & Lin's (2021) research emphasizes the significant moderating role of absorptive capacity in the relationship between international networks and international exploration and exploitation. Notably, the absence of studies addressing the mediating effect of absorptive capacity on these

international dynamic capabilities is highlighted by Peng and Lin (2021). Based on these observations, we propose the following hypothesis:

H3: Absorptive capacity positively mediates the relationship between international entrepreneurial culture and international ambidexterity.

Previous research emphasizes absorptive capacity as a fundamental requirement for the success of open innovation (Radziwon & Bogers, 2019). The literature has explored absorptive capacity as both a moderator (Chiu et al., 2023) and a mediator (Bashir & Pradhan, 2023; Chiu et al., 2023; Naqshbandi & Kamel, 2017). This study aims to unveil how absorptive capacity strengthens the relationship between IEC and international open innovation.

The IEC is vital for firms, facilitating the exploration of opportunities and external knowledge while bolstering internal systems. According to Naqshbandi and Kamel (2017), IEC aids in developing the capacity to acquire, assimilate, transform, and exploit knowledge, thereby supporting open innovation in international markets. Absorptive capacity is emphasized as a prerequisite for successful open innovation, necessitating the acquisition and integration of internal and external knowledge by international partners (Naqshbandi & Jasimuddin, 2022).

Naqshbandi and Tabche (2018) stated that companies with a strong culture of open innovation may need help achieving success if they can obtain, acquire, transform, and use knowledge. Higher levels of absorptive capacity are likely to enhance the characteristics of the IEC, which involves identifying and continuously pursuing international activities with a commitment to recognizing and taking advantage of opportunities abroad. International companies can effectively search, acquire, and internalize new knowledge (Naqshbandi & Kamel, 2017).

Only some studies explore how organizational culture influences open innovation (Chiu et al., 2023). Naqshbandi and Tabche (2018) found that the impact of the interaction between organizational culture and absorptive capacity on open innovation was insignificant. In contrast, Naqshbandi and Kamel (2017) demonstrated the mediating role of absorptive capacity between organizational culture and open innovation. Companies with greater absorption capacity will help the IEC to capture new knowledge from foreign markets. Therefore, we believe that:

H4: Absorptive capacity positively mediates the relationship between international entrepreneurial culture and international open innovation.

3.2.4 The moderating role of the environment dynamism

Even though international entrepreneurial culture plays a fundamental role in achieving international ambidexterity and international open innovation, it is important to highlight that environmental factors can influence this relationship (Khan & Mir, 2019). Buccieri et al. (2020), for example, have proposed that the relationship between IEC and ambidexterity is significantly reinforced when companies operate in markets characterized by a high level of environmental dynamism.

Environment dynamism, linked to the speed and constant unpredictable evolution in the business environment, increases uncertainty (Miller & Friesen, 1983). It encompasses factors such as the industry's change speed, operational routine changes, product and process innovation pace, and research and development intensity (Frank et al., 2017). Companies develop static and routine capabilities in stable and predictable business environments. In contrast, highly changing and unpredictable environments compel them to rely on more agile and flexible dynamic capabilities (Teece, 2007).

Petricevic and Teece (2019) argued that dynamic capabilities are essential to meet challenges in the international business environment marked by high volatility, uncertainty, complexity, and ambiguity. Some researchers, such as Wang & Li (2008), perceived ambidexterity as even more valuable in highly dynamic environments. For example, Frank et al. (2017) found a significant relationship between environmental dynamism and the importance of dynamic capabilities. As environmental dynamism increases, dynamic capabilities become more crucial.

In this sense, the IEC emerges as a factor of great relevance in highly dynamic environments since it allows international companies to adapt and reconfigure their capacities for ambidexterity and international open innovation to adapt to these constant changes (Buccieri et al., 2020). Therefore, the relationship between IEC and international ambidexterity and international open innovation will strengthen as international companies operate in markets characterized by greater environmental dynamism.

H5: The environmental dynamism plays a positive moderating role in the connection between international entrepreneurial culture and international ambidexterity.

H6: The environmental dynamism plays a positive moderating role in the connection between international entrepreneurial culture and international open innovation.

3.3 Methodology

This study, aligning with suggestions from researchers like Dimitratos et al. (2012) and Peng & Lin (2021), acknowledges the potential significance of dynamic capabilities and IEC for international firms, emphasizing their relevance across diverse sectors, irrespective of company size, age, or time of internationalization. The research aims to encompass large and small companies in developing countries, explicitly drawing data from Colombia. A self-administered questionnaire tailored for the study was employed to collect the necessary data, validated through an extensive literature review. A pilot test involving five managers was conducted to assess its suitability, leading to necessary adjustments.

The questionnaire was to gain management's views concerning the company's international operations in significant markets. A survey company participated with 400 international firms operating in Colombia, concentrating on the country's four primary cities (Cali, Medellín, Bogotá, and Barranquilla) for data collection. The study in Colombia is relevant given its status as an emerging nation that has established itself as a model in export dynamics across Latin America. In recent years, Colombia has made significant improvements in its international operations, which has increased its competitiveness in the global arena. The National Association of Foreign Trade (ANALDEX, 2023) reports that the country is home to roughly 11,000 exporting companies and 700 firms involved in alliances and foreign investment, resulting in about 11,700 international enterprises. To achieve a target margin of error of 5% and a confidence level of 95%, the survey needed a representative sample size of 372 companies, which was rounded to 400 for practical implementation. The firms under consideration utilized various internationalization strategies, such as exports, joint ventures, and wholly-owned subsidiaries. The main sources of information for the survey were individuals overseeing the company's international and research activities, usually the owner, CEO, or senior management staff.

The analysis was conducted utilizing the Structural Equation Model (SEM) through Smart PLS software, selected for its competence in managing models with limited sample sizes. The ability of PLS-SEM to deal with non-normally distributed data stands out as a significant benefit, particularly in light of the particular features of our dataset. Furthermore, our model incorporates a construct measured formatively, a feature that PLS-SEM is well-equipped to manage.

3.3.1 Measures

The independent variable, international entrepreneurial culture (IEC), comprises five interrelated dimensions reflecting its latent and intangible nature. We employed the 23-item scale developed by Dimitratos et al. (2012) for IEC. The scale for international open innovation was adapted from Zahoor et al. (2021), measuring the construct in 8 items. International ambidexterity considered a reflective-formative second-order construct, consists of two formative dimensions: international

exploration (7 items) and international exploitation (9 items) adapted from Wu & Chen's (2020) scales. For the mediating variable, absorptive capacity (6 items), we used the scale of Su et al. (2013), and for the moderating variable, environmental dynamism (4 items), the scale of Buccieri et al. (2020). All scales were rated on a seven-point Likert scale ranging from (1) "strongly disagree" to (7) "strongly agree."

3.3.2 Validation instrument

First, all first-order reflective constructs' reliability and convergent validity were evaluated. The results are presented in Table 3-1. The IEC scale, which consisted of 23 items, was reduced to 21 after the pretest, eliminating two items related to international entrepreneurial orientation. Following the principles of Hair et al. (2019), items with loadings less than 0.5 were discarded. In this first stage, the IEC scale was left with 7 items; the elimination of 16 items shows that it may be better appropriate to measure the IEC due to the context and type of companies studied. This is one of the limitations of the study.

International motivation and learning orientation were excluded because only one item showed significant loading values. The International Entrepreneurial Orientation (IEO) scale was reduced to 3 items, focusing on proactivity, new operational technologies, and marketing new product or service lines. Three items were removed from the International Market Orientation (IMO), leaving 2 items centered on developing products and services based on international market information and understanding how international customers value their products. Finally, the International Network Orientation (INO) was limited to 2 items, indicating that these companies do not collaborate with competitors but establish networks with non-competitors for joint research and marketing and advertising activities.

Furthermore, although item loadings for other constructs exceeded 0.7, some items presented correlation and collinearity problems during model fitting. As a result, 6 items of international open innovation (IOI) were retained, which addressed the active search for international alliances to acquire knowledge and technology, the incorporation of technology and knowledge from foreign partners in R&D, and the purchase and sale of intellectual property. 3 items of international exploration items were maintained, involving the hiring of I&D talents, the search for technological and marketing resources, and acquiring management knowledge and global business data. On the other hand, international exploitation was reduced to 3 items, focused on taking advantage of technological advantages, understanding foreign customers' requirements, and strengthening contacts in current international markets.

Absorption capacity initially had 6 items, leaving 3 that addressed the search, analysis, interpretation, identification, acquisition, and understanding of external knowledge. Regarding

the environment's dynamism, 3 items were retained that evaluated how production methods and new business models evolve frequently and quickly in the industry or sector. As shown in Table 3-1 for the OEI construct, Crobach's alpha is below 0.7 for Hair et al. (2017), which is considered "acceptable in exploratory research." Furthermore, the reliability values of the construct range between 0.705 and 0.806, which is considered appropriate (Hair et al.,2017). The other constructs exceeded reliability and convergent validity.

Table 3-1. Reliability and convergent validity of the reflective construct- first-order

International Entrepreneurial Orientation (IEO) α =0.660 ; rho_c =0.806 ; rho_a= 0.705; AVE = 0.584					
Items	OEI1	OEI4	OEI6		
Outer loadings	0.814	0.818	0.648		
International Market Orientation (IMO) α =0.718 ; rho_c = 0.875 ; rho_a=0.735 ; AVE = 0.778					
Items	IMO 2	IMO 3			
Outer loadings	0.858	0.906			
International Network Orientation (INO) α =0.784; rho_c =0.899 ; rho_a=0.883 ; AVE = 0.817					
Items	INO4	INO5			
Outer loadings	0.862	0.943			
International Exploration (IEX) α =0.809 ; rho_c =0.887 ; rho_a=0.814 ; AVE = 0.724					
Items	IEX1	IEX2	IEX7		
Outer loadings	-0.904	-0.811	-0.834		
International Exploitation (IEXP) α =0.867; rho_c = 0.919 ; rho_a=0.878; AVE = 0.791					
Items	IEXP1	IEXP7	IEXP8		
Outer loadings	0.854	0.943	0.870		
International Open Innovation (IOI) α =0.862; rho_c =0.898 ; rho_a=0.901; AVE = 0.643					
Items	IOI1	IOI3	IOI4	IOI5	IOI6
Outer loadings	0.837	0.798	0.578	0.920	0.836
Absorptive Capacity (AC) α =0.881 ; rho_c =0.927 ; rho_a= 0.877 ; AVE = 0.808					
Items	AC1	AC5	AC6		
Outer loadings	0.907	0.865	0.923		
Environment Dynamism (ED) α =0.871 ; rho_c =0.938 ; rho_a= 0.943 ; AVE = 0.883					
Items	ED1	ED2			
Outer loadings	0.919	0.960			

Table 3-2 shows IEC as a second-order construct. The INO had collinearity problems with the model, so the construct was eliminated. The AVE, composite reliability, and Cronbach's alpha exceeded the values suggested by Hair et al. (2019). Furthermore, the constructs met the HTMT (Heterotrait-Monotrait) criterion; all HTMT values are less than 1, as shown in Table 3-3.

Table 3-2. Reliability and convergent validity of the second–order reflective construct

International Entrepreneurial Culture (IEC) α =0.749; rho_c = 0.888 ; rho_a=0.753; AVE = 0.799		
Items	IEO	IMO
Outer loadings	0.884	0.904

Table 3-3. Discriminant validity

HTMT values	**AC**	**ED**	**IEC**	**IOI**
AC				
ED	0.446			
IEC	0.086	0.184		
IOI	0.799	0.536	0.348	

In the case of international ambidexterity as a formative construct, the collinearity between individual variables and the relative and absolute importance of each variable with the construct were analyzed, verifying that this indicator had a value of less than 5.0 (Hair et al., 2019). Then, each dimension's relative and absolute importance was analyzed through its external loadings, and finally, the level of significance was obtained from the bootstrapping procedure. Both variables were highly significant, but exploration had greater weight than exploitation, as shown in Table 3-4.

Table 3-4. Collinearity weights and loadings of the second order

Higher-order construct	**Lower-order construct**	**VIF**	**Outer weight**	**Outer loading**
IAMB	IEX	1.290	0.621***	0.878***
	IEXP	1.290	0.543***	0.837***

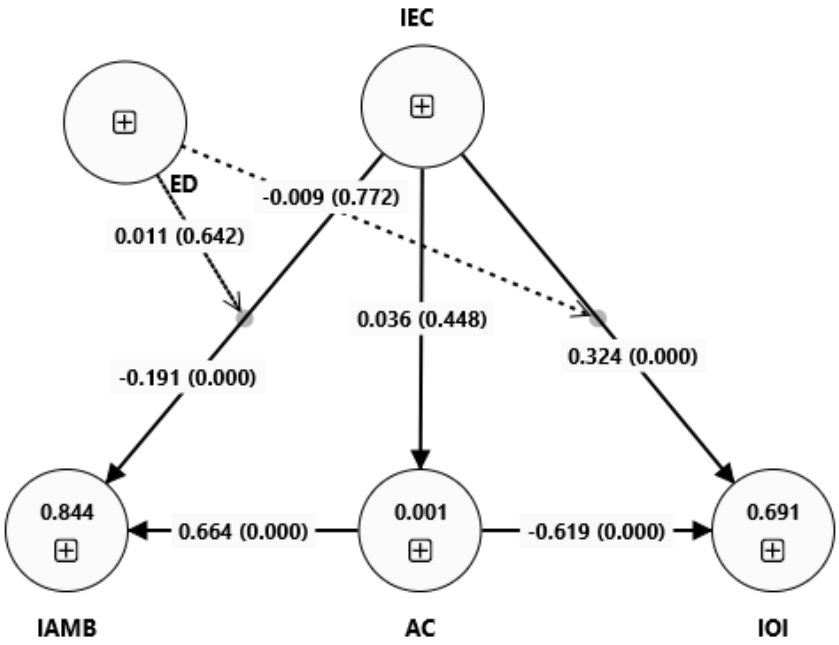
***p < 0.01

3.3.3 Evaluation of the structural model

Figure 3-1 shows the structural model, where it was evident that the R2 for international ambidexterity was substantial; the IEC, absorption capacity, and environmental dynamism together represent 84.4% of its variation. Furthermore, IEC, environmental dynamism, and absorptive capacity moderately explain 61.9% of the variance of international open innovation. The model showed an acceptable SRMR fit of 0.12, a Chi-square value of 1821.38, and an NFI of 0.644. Hair et al. (2019) stated that these values can vary depending on the context and complexity of the model. Therefore, an indicator of greater predictability of the model is the indicator of predictive relevance Q2, which must be greater than 0 for the endogenous latent

constructs (IAMB-> 0.398) (IOI-> 0.301). According to Hair et al. (2018), values greater than 0.35 indicate that an exogenous construct has high predictive relevance for an endogenous construct.

Figure 3-1. Structural model



To evaluate direct effects, a bootstrapping process was run with 5,000 samples. Hypotheses were tested with a t-value>1.96 and a P-value <0.05. hypothesis 1 was rejected. Although the effect of IEC on international ambidexterity was significant, the relationship was negative (β = -0.191, t = 7.820). Hypothesis 2 confirmed that IEC significantly and positively affected international open innovation (β = 0.324, t = 10.790). According to the results, hypotheses 5 and 6 are rejected; the dynamism of the environment had no impact on the relationship between IEC-IAMB (β = 0.011, t = 0.465), nor on the IEC-IOI (β = -0.009, t = 0.290. These results are shown in Table 3-5.

Table 3-5. SEM Results

Hypothesis	**Relationship**	**Path Coefficient**	**t- Value**	**P- values**
H1	IEC -> IAMB	-0.191	7.820	0.000***
H2	IEC -> IOI	0.324	10.790	0.000***
H3, H4	IEC -> AC	0.036	0.758	0.448
H3	AC -> IAMB	0.664	24.134	0.000***
H4	AC -> IOI	-0.619	22.963	0.000***
H5	ED -> IAMB	-0.417	14.328	0.000***

H5	ED x IEC -> IAMB	0.011	0.465	0.642
H6	ED -> IOI	0.305	9.748	0.000***
H6	ED x IEC -> IOI	-0.009	0.290	0.772

***p < 0.01

According to Zhao et al. (2010) and Hair et al. (2019), the variance accounted for (obtained by dividing the indirect effect by the total effect) provides information about the strength of the mediation (refer to Table 3-6). As per Hair et al. (2016), the threshold limits for the variance accounted for are as follows: from 0% to 20%, there is no mediation; from 20% to 80%, there is partial mediation; and above 80%, there is complete mediation. Table 3-6 shows that hypotheses 3 and 4 were not met; there is no mediation of absorptive capacity in the relationship between IEC and international ambidexterity and IEC and international open innovation, and the values remained below 20%.

Table 3-6. Variance accounted for - indirect effects.

Relationship	**Direct effect**	**Indirect effect**	**Total effect**	**VAF**	**t-Value**	**H**	**Bias CI(L)**	**Bias CI(H)**	
IEC -> IAMB	-0.191	0,024	-0,167	-14%	0.754	H3	-0.040	0.086	No mediation
IEC -> IOI	0.324	-0,022	0,302	-7%	0.750	H4	-0.081	0.037	No mediation

3.4 Discussion

Previous research has emphasized spillover effects on international dynamic capabilities (Peng & Lin, 2021). However, empirical evidence must be improved to explore how international entrepreneurial culture, mediated by absorptive capacity, impacts international dynamic capabilities. To fill this gap, a model was analyzed using structural equation modeling with data from a sample of 400 international companies in Colombia. This study aims to advance dynamic capabilities theory within international business literature by empirically validating these relationships.

Hypothesis 1, which suggested that the IEC would encourage international ambidexterity, did not receive support in this study. The combination of proactivity, risk-taking, use of knowledge in foreign markets, and participation in international networks does not allow companies to innovate and leverage their capabilities in the international market simultaneously. The IEC also makes exploring new markets while exploiting existing ones difficult. These findings indicate that the

IEC hinders the coordination of exploration and exploitation activities at the international level. It is intriguing to contrast these findings with previous research that identifies positive relationships between external and flexible organizational culture and ambidexterity (Khan & Mir, 2019; Matzler et al., 2013).

On the other hand, confirming hypothesis 2, the company's willingness to take risks, be innovative, seek international business opportunities, have experience in managing international networks, and be predisposed to international learning drives knowledge exchange processes with international partners (Naqshbandi et al., 2015). Organizations promoting IEC can obtain external resources through global collaborations (Dimitratos et al., 2012). Furthermore, international open innovation acts as a catalyst for knowledge exchange and continuous learning.

The third hypothesis reveals no evidence of absorption capacity mediating the relationship between IEC and international ambidexterity. Although no literature directly contrasts this mediating effect, the findings contradict previous research on the moderating role of absorption capacity and international dynamic capabilities (Peng & Lin, 2021; Peng et al., 2023). The results suggest that absorption capacity enables international firms to leverage existing competencies and develop new ones through assimilated knowledge (Cohen & Levinthal, 1990), thus enhancing international ambidexterity. However, the lack of relationship between IEC and absorption capacity implies that organizational culture does not affect the firm's ability to adapt acquired knowledge to the existing base and apply it effectively in international markets.

The results reject Hypothesis 4 because absorptive capacity has no moderating effect on the relationship between IEC and IOI. IEC has a greater direct impact on international open innovation. Meanwhile, absorptive capacity negatively affects IOI, which is explained by the need for highly skilled human resources to assimilate knowledge from global partners. Naqshbandi and Tabche (2018) suggest that absorptive capacity may decrease in firms requiring higher investments in R&D. Contrary to popular belief, a strong absorptive capacity does not necessarily facilitate knowledge exchange with global partners. To enhance international open innovation, it is recommended that firms develop a stronger IEC and reduce their reliance on absorptive capacity to some extent.

The study found no evidence supporting the moderating effect of environmental dynamism on the relationships between IEC and international dynamic capabilities; thus, hypotheses 5 and 6 were rejected. This aligns with the conclusions of Buccieri et al. (2020), suggesting that the significance of the IEC remains consistent in both turbulent and stable market environments. This contrasts with the perspectives of other authors, such as Martin and Javalgi (2016). The results indicate that environmental dynamism positively influences open innovation but has a negative impact on international ambidexterity. This suggests that open innovation assumes a more

significant role in the context of dynamic capabilities, especially in highly uncertain and turbulent environments (Teece, 2007).

Having discussed all these results, we were intrigued by the fact that the IEC exhibited a surprising negative impact on international ambidexterity. Consequently, a second model was devised, dividing international ambidexterity into its international exploration and exploitation components. The goal was to understand the reasons behind the significant but harmful effects comprehensively. This approach sought to provide a detailed understanding of the individual elements of international ambidexterity and their connections to the IEC and absorptive capacity. The results of this analysis are detailed in Tables 3-7.

Table 3-7. SEM results in the second model

Effect	**Hypothesis**	**Relationship**	**Coefficient**	**t- Value**
Direct Effect	H3	IEC -> AC	0.034	0.723
	H3	AC -> IEX	-0.368	11.860***
	H1	IEC -> IEX	0.314	9.515***
Indirect Effect	H3	IEC -> AC -> IEX	-0.013	0.718
Direct Effect	H3	AC -> IEXP	0.796	38.624***
	H1	IEC -> IEXP	0.026	0.759
Indirect Effect	H3	IEC -> AC -> IEXP	0.027	0.723
Direct Effect		AC -> IOI	-0.621	22.447***
		IEC -> IOI	0.314	9.501***
Indirect Effect		IEC -> AC -> IOI	-0.021	0.714
Direct Effect		ED -> IEX	0.606	20812***
		ED -> IEXP	-0.066	2022**
		ED -> IOI	0.299	9482***
Moderation Effect		ED x IEC -> IEX	-0.029	0.934
		ED x IEC -> IEXP	-0.011	0.365
		ED x IEC -> IOI	-0.014	0.456

The findings show a significant positive impact of the IEC on international exploration. Companies with an entrepreneurial culture capture, identify, and foster new ideas, especially in foreign markets (Dimitratos & Jones, 2005). The IEC facilitates international exploration by encouraging flexibility and improvisation, particularly in international contexts, and encouraging

innovative solutions. International exploration is a dynamic capability that thrives in environments that value experimentation, idea development, and risk-taking.

Contrary to expectations, the IEC's effect on exploitation is not significant. The search for international opportunities does not lead companies to fully leverage resources, gain control and certainty, or reduce risks. Companies with a defensive strategy, prioritizing exploitation and efficiency, tend to foster an internal culture of control. Exploitation is linked to an incremental internationalization approach, which aims to mitigate uncertainty, accumulate knowledge, and improve understanding of international markets (Peng & Lin, 2021).

This finding highlights that international companies in Colombia demonstrate greater competence in exploration compared to exploitation. These results are consistent with the research of Jurado-Salgado et al. (2022), who found that Colombian companies excel more in exploratory activities. These findings contradict the statements of authors such as Solís-Molina et al. (2018), who argued that Colombian organizations were inclined to develop exploitation capabilities characterized by a high aversion to uncertainty, a collectivist perspective, and a short-term orientation.

Absorptive capacity did not mediate the relationship between IEC and international exploitation (see Table 3-7). Absorptive capacity is crucial for leveraging existing competencies and developing new ones through assimilating acquired knowledge (Cohen & Levinthal, 1990). This process involves internalizing and integrating new knowledge with the organization's existing knowledge base, facilitating entry into international markets (Peng et al., 2023). Absorptive capacity is an effective mediator in environments that prioritize exploiting existing markets over exploring new opportunities, especially when combined with a highly entrepreneurial organizational culture.

Absorptive capacity was also found not to act as a mediator in the relationship between IEC and international exploration. According to López-Zapata and Ramírez-Gómez (2023), exploration involves searching for new knowledge and distancing existing knowledge to foster new combinations, indicating a discrepancy with absorptive capacity. Therefore, an international firm seeking to enhance its international exploration capability must dispense with the dependence on absorptive capacity and foster an entrepreneurial organizational culture.

This study uniquely explores the impact of IEC on international dynamic capabilities in established non-New Venture or Born Global international companies. Examining the mediating role of absorptive capacity illuminates the potential contributions of IEC and absorptive capacity to international dynamic capabilities. Further research is crucial to enhance our comprehension of these relationships, considering diverse external environmental conditions.

3.4.1 Theoretical implications

The first theoretical contribution is linked to the need for international entrepreneurship theory to focus on new ventures (INV), Born Globals, and consolidated international companies (Acosta et al., 2018). A company's international activity constitutes an entrepreneurial act since it involves the identification and exploration of new business opportunities in new environments (Acosta et al., 2018). Therefore, validating the IEC scale with international dynamic capabilities in established companies is a valuable contribution to international business theory.

This research examines the impact of the IEC on the international dynamic capabilities crucial for companies established in developing countries in Latin America. Contrary to expectations, our findings reveal that the IEC needs to facilitate the simultaneous development of international exploration and exploitation capabilities. IEC's focus on opportunity seeking is identified as an obstacle to both exploring and acquiring new international markets and continuously exploiting and improving current international markets. This results in reduced levels of international ambidexterity.

An entrepreneurial culture that emphasizes risk-taking, proactivity, innovation, and international customer orientation to strategically acquire assets abroad, ensuring long-term capabilities. In contrast, an opportunity-focused entrepreneurial culture can impede the transfer of advantages, capabilities, and resources to international markets. Additionally, the IEC promotes collaboration, the pursuit of knowledge, and the exchange of intellectual property with international alliance partners.

Absorptive capacity significantly influences international ambidexterity, particularly in international exploitation, as this ability is linked to control and deep learning within a well-defined knowledge domain. Regarding the outcomes of international open innovation, the firm's lack of sufficient absorptive capacity can lead to uncertainty. Mubarak and Petraite (2020) use the metaphor of a sponge and a strainer to illustrate that while both can capture fluids, only the sponge can effectively retain them for future use. However, Cohen and Levinthal (1990) underscore that successful open innovation implementation necessitates sustained investments in developing absorptive capacity. Moreover, within international strategic alliances, research suggests that knowledge transfer for complex open innovation initiatives depends more significantly on organizational cultural factors than on firm-specific internal capabilities

Finally, although the moderating role of environmental dynamism was not demonstrated, it was evident that, in the international context, exploration and open innovation are considered dynamic capabilities necessary to face uncertain and turbulent scenarios. On the contrary, international exploitation is a capacity inversely related to uncertainty, risk, and threats.

3.4.2 Managerial Implications

The critical managerial implication concerns developing an organizational culture for internationalized companies undertaking projects abroad. In unpredictable international environments, an IEC becomes crucial, enabling companies to devise strategies for new markets and collaborate with diverse international partners for knowledge exchange. When aiming to exploit capabilities and enhance current offerings, companies should prioritize absorptive capacity—identifying, assimilating, and applying existing knowledge—over IEC. International companies must embrace international open innovation, as national open innovation may limit collaboration due to shared tools and common market knowledge. To leverage these benefits, fostering an entrepreneurial organizational culture is essential for effective knowledge transfer and exchange.

International companies across various sectors demonstrate higher competence in exploration compared to exploitation. According to Wang & Rafiq (2014), when the sample encompasses traditional sectors, including low-value activities may restrict companies' ability to exploit their competencies abroad fully. In response, international companies face strategic decisions, focusing exclusively on exploitation in a stable domain or exploration in a dynamic domain—adopting a specialization approach and delegating the remaining function. It is suggested that companies with a high international entrepreneurial culture specialize in either exploitation or exploration, establishing relationships with complementary partners contributing to the opposite function (Solís-Molina et al., 2018).

3.4.3 Limitations and future research directions

This study encountered a limitation by adopting IEC as a second-order construct, necessitating the exclusion of the international motivation dimension, reducing it from five to four dimensions. Dimitratos et al. (2012) indicate that international motivation tends to diminish over time, especially for well-established international companies shifting focus from seeking new markets to integrating operations for synergies and efficiency. In the Colombian context, many international companies are classified as "accidental internationalizers," where international motivation is not a prominent characteristic.

The exclusion of International Learning Orientation (ILO) and International Network Orientation (INO) from the IEC contradicts previous findings (Gabrielsson et al., 2014), suggesting that these international companies lack an active and conscious approach to knowledge acquisition and application (ILO). Furthermore, International Open Innovation (IOI) could replace ILO, as unlike the latter, IOI has a broader scope. While ILO focuses on creating and managing international

relationships, IOI seeks and leverages external innovation, including collaboration with international partners.

Our findings partially contradict the results of Acosta et al. (2018), who demonstrated that Mexican SMEs improve their internationalization capability through their network capability and international entrepreneurial orientation (IEO) but not through international market orientation (IMO). Consistent with Escandón-Barbosa et al. (2016), our study shows that international firms in Colombia achieve success in international markets due to their high international market orientation, which they combine with high levels of entrepreneurial orientation.

Recognizing our limitations, we identified a research gap in creating an organizational culture scale suitable for well-established international companies that actively explore and exploit overseas opportunities while sharing knowledge with international partners. The existing scale of Dimitratos & Plakoyiannaki (2003) needs to be revised to address intrapreneurship within an organizational culture of international companies in developing countries.

Aligned with Dimitratos et al. (2012), IEC is recognized to evolve, suggesting variances in identifying and exploiting opportunities within each dimension. Therefore, evaluating these dimensions separately, rather than as a second-order construct, is more appropriate. Buccieri et al. (2020) took a similar approach when explaining non-significant results in innovation ambidexterity. The moderating impact of absorptive capacity was notably beneficial for international exploitation. However, regarding international open exploration and innovation, the observed negative indirect effect calls for future research to explore alternative mediators conducive to a positive indirect effect.

This study examined international firms across multiple sectors in Colombia. While our findings provide broad insights, Jurado-Salgado et al. (2022) posit that international ambidexterity may be particularly pronounced in high-technology industries or firms with established collaborative practices. Ferrari (2011) further suggests that in open innovation ecosystems, ambidexterity often manifests through interorganizational coordination - particularly within clusters where smaller firms typically drive exploration while larger partners focus on exploitation. These contextual differences suggest the need for future research specifically examining clustered firms to assess potential variations from our findings.

CHAPTER 4

4 How do international ambidexterity and open innovation improve the performance of international companies in emerging countries: the relevance of the Top Management Team (TMT) political and business ties.

Abstract:

This study addresses the influence of international dynamic capabilities on the success of companies from emerging markets operating globally. Specifically, it focuses on two capabilities: international ambidexterity and international open innovation. Through a multivariate analysis with structural equations, using a sample of 400 Colombian international companies, our findings indicate that the balance between international exploration and exploitation substantially enhances international performance and, to a lesser extent, innovative performance. Additionally, with international open innovation, companies will achieve a more comprehensive performance encompassing international, innovative, and branding performance. Moreover, it was evidenced that the relationships between international dynamic capabilities and performance are reinforced when Top Management Teams (TMTs) establish strong political ties compared to business ties. The article concludes with a comprehensive discussion of these findings' implications for academic research and business practice.

4.1 Introduction

The article highlights a gap in international business literature by explaining companies' internationalization in emerging countries and various entry modes while neglecting research on success probability in international markets. Teece (2023) argues that incorporating the theoretical principles of dynamic capabilities is essential in analyzing companies' internationalization in these countries. Dynamic capabilities encompass organizational routines and business management, reflecting an organization's ability to devise innovative and disruptive approaches to optimize performance and achieve international competitive advantage (Teece, 2023).

According to Luo (2020), multinational corporations from emerging countries possess international dynamic capabilities, enabling them to generate, deploy, and update integrated resources within their organizational structure to attain sustainable competitive advantages in the global market. These capabilities allow them to enhance, adjust, transform, and merge their existing resources and capabilities (Teece, 2007). One of these capabilities is international ambidexterity, crucial for ensuring both short-term survival and long-term growth of international companies from developing countries.

International ambidexterity refers to a company's dynamic capability to manage potentially conflicting internationalization activities, such as international exploration and exploitation (Prange, 2012). This capability enables companies to identify opportunities, access resources, and innovate in international markets while effectively integrating these elements with existing ones (Xiao et al., 2022). This balance between international exploration and exploitation enhances the performance of international companies. International ambidexterity has attracted researchers' attention (Wu & Chen, 2020; Xiao et al., 2022), primarily to determine its effect on the performance of multinational corporations in developing countries. However, some researchers (Wu & Chen, 2020) suggest expanding these studies to include other international dynamic capabilities focused on external international knowledge (Yao-Ping & Shao, 2021).

The use of foreign knowledge is relevant because technological advancements are embedded in international markets, which has led to increased attention to the importance of external sources of knowledge in internationalization processes (Chesbrough, 2003). From this perspective, international companies are increasingly compelled to collaborate with various international actors and embrace the new paradigm of international open innovation (Lopes et al., 2022). Collaborating with other organizations enables the free flow of ideas both within and outside the organization, which is crucial for enhancing innovation capability and maintaining international competitiveness.

International open innovation involves creating networks with partners abroad to identify and access strategic resources and capabilities, thus strengthening competitive advantage and improving company performance (Romero-Martínez et al., 2017). International open innovation focuses on using international knowledge inputs and products to accelerate internal innovation and expand the company, facilitating the external use of innovation (Lopes et al., 2022). This capability is crucial to building competitive advantages and achieving success in the international market (Guo & Zheng, 2019).

Given the global competition, international ambidexterity and open innovation have become critical for multinational enterprises. However, according to Peteraf et al. (2013) and Teece (2023), there is a broad academic debate on whether dynamic capabilities enhance performance and generate sustainable competitive advantage in international markets. Empirical evidence shows inconclusive results (Peng & Lin, 2021; Hsu et al., 2013; Peng & Chang, 2023), highlighting the complexity of the path from international dynamic capabilities to performance. Additionally, no evidence of studies addressing international dynamic capabilities across various performance dimensions (Peng & Lin, 2021).

This study aims to empirically examine the impact of international ambidexterity and international open innovation not only on international performance and innovation aspects but also on brand performance. The objective is to identify the conditions under which dynamic capabilities effectively achieve a more comprehensive performance. This choice is based on the suggestion of researchers such as Peng & Chang (2023), who emphasized the importance of considering multiple dimensions of performance, as studies on international dynamic capabilities often focus on a single type of performance, whether profitability or innovation. Exclusive approaches may lead to biased estimations of the contributions of international dynamic capabilities.

This study provides valuable insights for business leaders, particularly in developing nations, on how ambidexterity and open innovation can improve their firms' overall performance. In periods of market changes and rapid technological advancements, establishing a strong framework to manage these dynamics is crucial for maintaining an advantage in the market. Furthermore, decision-makers can leverage the findings to develop frameworks and support systems that promote entrepreneurial ecosystems, creating conditions where businesses may succeed through innovation and efficient resource integration.

Peng and Chang (2023) highlight the importance of examining various aspects of performance. Studies into international dynamic capabilities frequently concentrate on disconnected metrics, such as profitability or innovation. This simplified perspective might result in distorted examinations of the capabilities' actual contributions. Thus, developing a more comprehensive

understanding of performance metrics can offer a clearer insight into how companies can leverage dynamic capabilities to experience and prosper in the global market.

Likewise, researchers (Wu & Chen, 2020; Xiao et al., 2022) suggest the consideration of contingencies that allow companies in developing countries to transform international dynamic capabilities into superior performance. According to Xiao et al. (2022), the performance impact and moderating mechanism of international dynamic capabilities have yet to be fully explored. From a micro-foundations perspective, Wu and Chen (2020) argued that the top management team (TMT) plays a crucial role inaccumulatingf external resources, especially in external business and political relationships. These linkages are hypothesized to provide significant resources to international firms from developing countries, strengthening the positive effect of international dynamic capabilities on performance. The research will examine the moderating role of TMT networks in this relationship.

This study aims to improve our comprehension of the impact of international dynamic capabilities on the performance of global enterprises, thereby providing valuable insights and support to various stakeholders. Professionals in the industry will acquire practical insights that can be immediately utilized to improve organizational performance, while scholars will discover an essential basis for additional exploration. Furthermore, decision-makers can formulate strategies that promote the development of dynamic capabilities within international companies, promoting economic growth in emerging markets. In pursuit of this objective, we have constructed a model that empirically tests our theoretical propositions and aims to tackle the main inquiry of our study: How do international ambidexterity and international open innovation affect the performance of global firms, and what influence do the business ties and political connections of top management teams exert on the interplay between these dynamic international capabilities and the performance of international enterprises?

In the following section, we offer a theoretical foundation and formulate the hypotheses that explain the relationships between the constructs incorporated in the model. Below, we detail the methodology used to implement our ideas and present the empirical results. We conclude with a discussion of our findings, address their implications, and outline directions for future research.

4.2 Theoretical background

4.2.1 International dynamic capabilities and performance

The dynamic capabilities theory constitutes a solid theoretical foundation for analyzing internationalization from the perspective of business resources and capabilities (Prange & Verdier, 2011). As companies expand internationally, they acquire competencies and become

more adaptable to change (Sapienza et al., 2006). Multinational enterprises from emerging countries face the constant challenge of adjusting their resource base to rapid transformations (Deng et al., 2020). While dynamic capabilities drive internationalization and global learning, they are also important for entry and survival in foreign markets and maintaining a long-term competitive advantage (Peng & Chang, 2023; Teece, 2014). Cavusgil and Knight (2015) argued that the value of dynamic capabilities is intrinsically linked to context dependence, facilitating essential adaptations in different environments, especially at the international level.

Pinho and Prange (2016) propose that dynamic capabilities change the international context, giving rise to international dynamic capabilities. These capabilities refer to a company's ability to enhance, combine, or reconfigure various existing resources and capabilities to adapt to global environments (Peng & Lin, 2021). They represent how companies carry out their internationalization and accumulate experience to address rapid transformations in foreign markets through continuous development, consolidation behaviors, and strategic reallocation of resources (Pinho & Prange, 2016; Peng & Lin, 2021). These dynamic capabilities can enhance the firm's resources and capabilities, positively impacting its performance (Helfat & Raubitschek, 2018).

Several studies indicate that competitive advantage, through the resource-capability-performance triad, implies that the resource leads to capability, which influences performance (Chang & Gotcher, 2007). Lopes et al. (2022) validate that strengthening dynamic capabilities enhances international business models and economic performance. However, empirical evidence on this relationship has not reached a clear conclusion (Xiao et al., 2023; Peng & Chang, 2023).

Furthermore, there needs to be more empirical evidence that examines how various dynamic international capabilities can impact the success of international firms in emerging markets. Eisenhardt and Martin (2000) argue that developing a company's dynamic capabilities requires international ambidexterity. Peng and Lin (2021) suggest that disparities in international sources of knowledge will lead to adjustments in the knowledge base necessary to implement dynamic capabilities effectively. In this context, companies that operate internationally must integrate their resources through relationships with international partners and manage international open innovation (Fu et al., 2020). These two approaches are considered essential for effectively acquiring and applying the dynamic capabilities required in international environments.

To advance strategic research on firms from emerging economies, it is essential to evaluate the applicability of dynamic capability theory's core tenets within high-volatility contexts (Peng & Lin, 2021). While extant literature suggests that international ambidexterity and open innovation positively influence firm performance (Peng & Lin, 2021; Zhang & Zhang, 2022; Sousa et al., 2020; Ardito et al., 2019; Buccieri et al., 2019), these findings remain preliminary and require

further empirical validation. The current evidence base, though promising, lacks the robustness needed for definitive theoretical conclusions.

4.2.2 International ambidexterity and performance

International ambidexterity refers to the ability of international firms from emerging countries to balance international exploration and exploitation (Prange & Verdier, 2011). Exploration focuses on acquiring strategic resources in the global market to secure new capabilities and long-term competitive advantages (Xiao et al., 2023), while exploitation involves transferring capabilities abroad to strengthen short-term profitability and add value to existing resources (Wu & Chen, 2020). In contrast to traditional theories of international business, which solely emphasized exploiting existing advantages abroad, the perspectives of Luo & Rui (2009) highlight that international ambidexterity is more effective for firms from developing countries as it compensates for the disadvantage of entering international markets late and having limited resources.

Emerging market multinationals develop country-specific capabilities, enabling asset incorporation abroad (Hsu et al., 2013). International exploitation integrates and reconfigures resources, accumulating knowledge, reducing uncertainties, and improving survival chances (Deng et al., 2020). Exploration involves acquiring resources from abroad, promoting innovative competitive advantages, and adapting to radical changes (Wang & Ahmed, 2007). However, excessive exploration may hinder the improvement of existing capabilities, increasing failure risk, while exploitation may limit learning new skills and lead to organizational myopia. Balancing exploration and exploitation ensures sustainable competitive advantage (Prange & Verdier, 2011).

International ambidexterity allows you to maximize the benefits of globalization and minimize the risks associated with international expansion (Hsu et al., 2013). Empirical results suggest that the implementation of international ambidexterity contributes to international success (Pinho & Prange, 2016; Peng & Chang, 2023; Hsu et al., 2013) by controlling the profitability of existing markets and reducing risks in new one's markets (Peng & Lin, 2021). Xiao et al. (2022) highlighted that the initial research considered that the main objective of internationalization is to achieve international performance and obtain resources that the home region lacks.

Peng and Chang (2023) conceptualized international performance as the achievements obtained after entering a foreign market. These achievements translate into an increase in international sales, an expansion and deepening of knowledge about international markets, and the positioning of products in them (He & Wong, 2004). Exploitation improves performance by refining and reducing differences in existing markets, while exploration contributes to performance by generating new opportunities in new markets (Xiao et al., 2023). International ambidexterity

enables a company to optimize the benefits derived from the opportunities generated by internationalization while mitigating the risks and responsibilities linked to international expansion, thus improving international performance (Hsu et al., 2013). Therefore, we assume that:

H1. International ambidexterity positively affects international performance

Recent research (Wu & Chen, 2020; Ardito et al., 2020; Ovuakporie et al., 2021; Xiao et al., 2022; Xiao et al., 2023) highlights the relevance of international ambidexterity for multinationals from emerging countries, not only to achieve international performance but also to improve innovation. Despite this, studies are scarce (Du et al., 2022). Innovation performance encompasses the results of innovative efforts, including the development of new products, processes, marketing strategies, and organizational activities, as well as the exploration of new sources of supply, markets, and forms of business organization (Lu et al., 2020).

Wu and Chen (2020) conceptualize international ambidexterity as the synergistic combination of novel and established knowledge, coupled with the refinement and market-specific adaptation of technological discoveries. This dual capability enables firms to develop successful new products that meet foreign market demands while simultaneously enhancing their innovative capacity (Wu & Chen, 2020). International exploitation, rooted in learning and experience, ensures efficiency and innovation in the short term, while international exploration facilitates radical innovation in the long term by encouraging the extension of learning and the acquisition of new knowledge (Xiao et al., 2022; Wu & Chen, 2020). Consequently, we consider that:

H2. International ambidexterity positively affects innovative performance

On the other hand, few studies have analyzed how implementing ambidexterity can influence brand performance (Iyer et al., 2022). Brands are crucial in driving sales, improving customer and employee retention, and mitigating the risks of expanding into international markets (Iyer et al., 2022). Ambidexterity allows the company to adjust the brand in different contexts and perform better (Santos Vijande et al., 2013; Zhang et al., 2020; Nguyen et al., 2016). For Nguyen et al. (2016), constantly acquiring new resources through exploring and exploiting existing resources and improving products and services positively impact brand performance.

We argue that the underlying processes of international ambidexterity led to improved international market position, allowing brands to adapt to different environments. Companies capable of efficiently adapting to international changes will likely maintain and improve their brand performance (Raisch & Birkinshaw, 2008). A successful presence in multiple markets can also increase the brand's international visibility and reputation. Based on these assumptions, we propose the following hypothesis:

H3. International ambidexterity has a positive impact on brand performance

4.2.3 International open innovation and performance

According to Peng & Lin (2021), developing dynamic capabilities involves obtaining resources and knowledge through internal and external information flows and building new capabilities through relationships with international partners. Griffith and Harvey (2001) argue that international dynamic capabilities must be formed from international networks to improve firm performance. Furthermore, given the rapid technological evolution and globalization, international companies cannot develop all the knowledge necessary to compete internationally internally (Ardito et al., 2018). Faced with current challenges, international companies adopt international open innovation to acquire and share knowledge with foreign partners (Chen & Liu, 2018).

International open innovation is perceived as a dynamic capability that implies the ability of an organization to actively integrate and take advantage of foreign knowledge, ideas, and resources in favor of innovation (Ruano-Arcos et al., 2024). This capability requires rapid adaptation to emerging technologies, market trends, and global changes, facilitating continuous learning through interactions with diverse international partners. This allows them to form strategic alliances and foreign collaborations, efficiently integrating external knowledge into their innovation processes to achieve success in international markets (Ardito et al., 2020).

International open innovation is crucial for international companies from developing countries, providing access to knowledge and resources that could be out of their reach and ensuring competitiveness in a globalized environment (Romero-Martínez et al., 2017). By collaborating with international partners, companies can develop culturally relevant solutions better aligned with international market demands (Yoon et al., 2020). When companies access ideas and resources from abroad, they can accelerate the launch of new products or services in the international market, allowing them to capitalize on opportunities and improve their sales (Zahoor et al., 2021). Additionally, companies can use international partners' experience and distribution networks to increase international sales. Consequently, we maintain that:

H4. International open innovation positively affects international performance

Open innovation has always been linked to innovative performance (Romero-Martínez et al., 2017). By collaborating with foreign actors, companies expand their existing knowledge, take advantage of current resources, and improve their international markets' products or services, marketing, commercialization, and organizational processes (Fu et al., 2022). Ryu et al. (2021) indicated that, through international collaborations, companies can access knowledge, ideas, new approaches, and more advanced technologies unavailable locally, contributing to better

innovative performance. Additionally, by accessing these resources, a company can improve its ability to develop and commercialize innovations more efficiently and effectively. Therefore, we believe that:

H5. International open innovation positively affects innovative performance

Given today's intense competition with similar products and services, brands play a crucial role in building strong relationships (Kumar, 2010). Furthermore, maintaining a strong reputation is essential for international companies (Trotta et al., 2011). However, multinationals from developing countries may need more money when entering international markets, which will not allow them to position their brand. Therefore, these companies can resort to open innovation and collaborate with international partners to obtain better performance from their brands (Agostini et al., 2017).

The literature reveals that some studies have evaluated the benefits of open innovation, such as customer community participation in customer performance (Agostini et al., 2017), brand loyalty (Shin et al., 2023), and brand perceptions (Van Dijk et al., 2014). However, no evidence from studies has linked open innovation from the perspective of international partners to brand performance. Alliances with international partners allow companies to improve their image and develop innovative and high-quality products that satisfy the needs of consumers, thus achieving a position in the international market as leaders and having a solid reputation with customers, improving the brand's performance (Agostini et al., 2017). Therefore, we consider that:

H6. International open innovation positively affects brand performance

4.2.4 Top Management Team (TMT) business and political ties as moderators in the dynamic capabilities-performance relation.

The microfoundational movement, which refers to the individual actors responsible for organizational results, highlights the importance of analyzing the various influences of the behaviors and strategies of top management teams (TMT) on dynamic capabilities (Venugopal et al., 2020). The TMT is responsible for strategic decision-making and organizational coordination and is crucial in obtaining external resources (Wu & Chen, 2020) to generate competitive advantages. The active participation of senior managers in international companies is crucial to establishing external business and political connections, contributing to integration and resource accumulation (Wu & Chen, 2020).

TMT business ties refer to the relationships they build with external partners, such as customers, suppliers, and competitors, who possess valuable resources that benefit the company (Peng & Luo, 2000). Previous studies have highlighted the importance of these management team business ties in the international success of emerging market multinationals (Wu & Chen, 2020). TMT's

political ties include connections with government officials, regulatory bodies, and other supporting entities (Peng & Luo, 2000). Multinational executives devote significant efforts to cultivating these relationships, as these officials control and allocate key resources (Wu & Chen, 2020), which is critical to strengthening risk-taking capacity in foreign operations (Prange & Vadier, 2011).

Implementing ambidexterity is a complex process, and its link to performance depends on the accumulation, facilitation, and integration of resources (O'Reilly & Tushman, 2004). The TMT network bridges the organization and its environment, compensating for the need for more experience and resources in international expansion (Tsai & Ren, 2019). When TMTs cultivate strategic relationships with suppliers, competitors, and customers, they enhance organizational productivity while reducing operational costs, thereby strengthening international performance. These external linkages enable more effective resource allocation between domestic exploitation and foreign exploration activities (Wu & Chen, 2020; Venugopal et al., 2020), facilitating balanced ambidextrous capabilities in international markets. At the same time, it penetrates existing international markets and opens new opportunities, facilitating entry into new international markets (Xiao et al., 2023). Therefore, we assume that:

> *H7a: TMT business ties positively moderate the relationship between international ambidexterity and international performance.*

According to Wu & Chen (2020), the relationship between international ambidexterity and innovative performance is strengthened when the TMT establishes strong relationships with business partners (Wu & Chen, 2020). According to Wu & Chen (2020), linking with suppliers, customers, and competitors can generate business awareness about technologies, user needs, and market trends, allowing companies to innovate. Therefore, we believe that:

> *H7b: TMT business ties positively moderate the relationship between international ambidexterity and innovative performance.*

International ambidexterity, a company's ability to operate effectively in established and new international markets (Luo & Rui, 2009), involves continuous adaptation to specific demands and dynamics. Senior managers who maintain strong business ties in international markets have the ability to facilitate this brand adaptation to diverse environments, leveraging their business networks to obtain accurate information about those markets and strategically adjusting their operations to meet their needs (Agostini et al., 2017). This ability to adapt contributes significantly to improving the brand's image and reputation and achieving a stronger positioning in the international market. Consequently, it is reasonable to affirm that:

H7c: TMT business ties positively moderate the relationship between international ambidexterity and brand performance.

The political ties of the TMT provide access to foreign markets, facilitate the acquisition of government contracts, influence the formulation of trade and investment policies, and secure governmental financial support, such as loans and subsidies (Wu & Chen, 2020). Political ties refer to the connections and networks that executives or board members establish with government officials, policymakers, and key figures within the world of politics. These connections facilitate access to international markets by streamlining the regulatory procedures required for entering new jurisdictions. Furthermore, they can aid in obtaining government contracts, as companies with well-established political connections frequently possess an advantageous position when bidding on profitable projects that necessitate government recommendations.

Political connections significantly influence trade and investment policy formulation, enabling firms to lobby for favorable regulatory conditions. Organizations with established political networks may successfully negotiate reduced import tariffs, enhanced market access, or preferential tax regimes. Such connections also provide access to government-backed financial support mechanisms—including subsidized loans, grants, and tax incentives—that mitigate the costs and risks associated with international expansion (Wu & Chen, 2020; Lu et al., 2010).

Political ties show significant importance for global enterprises functioning in developing markets, where institutional structures can show instability and regulatory environments can be erratic. Utilizing these connections, companies can improve their ability to participate in international exploration—pursuing new prospects in overseas markets—and exploitation—maximizing their current operations worldwide. The robustness of these political relationships plays a role in improving international performance, enabling firms to move through market dynamics with greater efficacy.

Therefore, it is important to understand the significance of political connections within the TMT to thoroughly evaluate their influence on the success of international companies operating in emerging markets. Consequently, we believe that:

H8a: TMT political ties positively moderate the relationship between international ambidexterity and international performance.

Political connections provide the company with access to resources and opportunities that can stimulate innovation and offer opportunities for TMTs to acquire advanced technological knowledge, which is beneficial for both leveraging existing advantages and seeking novel ideas abroad (Wu & Chen, 2020). Therefore, when the TMT has established a strong link with

governmental entities, international ambidextrous activities will be carried out more effectively (Wu & Chen, 2020), and it will be more likely for companies to generate and apply new ideas, products, or processes that drive their growth. Given these arguments, we propose that:

> *H8b: TMT political ties positively moderate the relationship between international ambidexterity and innovative performance.*

The political connections of TMT support participation in international fairs where international marketing knowledge is acquired (Wu & Chen, 2020). These political connections may enable the company to tailor its marketing and branding strategies to meet expectations and gain the trust of consumers and other stakeholders in international markets. Additionally, political ties can give the company some protection and governmental support, benefiting its brand image (Agostini et al., 2017). It is suggested that supported by international ambidexterity and TMT political connections, business activities in international markets are more effective in brand performance. Based on these foundations, we propose that:

> *H8c: TMT political ties positively moderate the relationship between international ambidexterity and brand performance.*

Röd (2019) highlights that the behavioral characteristics of the TMT influence the decision to involve international partners in open innovation. When making strategic decisions, executives evaluate the external institutional environment before opting for the open innovation strategy (Jiao et al., 2023). The TMT plays a key role in forming international linkages, whether business or political, to gain competitive advantages (Theoharakis et al., 2009). Dai et al. (2018) suggest that more business ties strengthen the business support base, improving the chances of success and network effects.

TMTs maintaining strong business connections can facilitate international open innovation by establishing strategic relationships with potential partners abroad (Röd, 2019). These connections can create opportunities for collaboration with customers, suppliers, and competitors in research and development, as well as for knowledge exchange and joint creation of innovative products that are relevant and competitive in international markets (Ryu et al., 2021). Additionally, these business ties can provide access to financial, technological, or other resources necessary to drive international open innovation and reap benefits from internationalization. Therefore, we propose that:

> *H9a: TMT business ties positively moderate the relationship between international open innovation and international performance.*

The integration of TMT's business links with international partners through international open innovation offers a broader opportunity for knowledge and information exchange, enabling

companies to achieve superior, innovative performance (Agostini et al., 2017). When TMTs establish connections with business and international partners, they can develop a deeper business understanding of technologies, new products, user needs, and international market trends (Brunswicker & Vanhaverbeke, 2015). Based on these assumptions, we believe that:

H9b: TMT business ties positively moderate the relationship between international open innovation and innovative performance.

According to Ryu et al. (2021), collaborating with both national and international business partners of TMTs could enrich the company's knowledge base. Customers provide insights to better tailor products or services to market demands. Suppliers can offer information on improving quality and reducing costs. Although collaborating with competitors may be complex, it can be leveraged to develop innovative products or services (Agostini et al., 2017). Therefore, in terms of brand performance, international open innovation can help the company develop innovative products or services that meet the needs and expectations of customers globally. Additionally, partnering with prominent international partners can enhance the brand's value by associating it with excellence and leadership in global innovation. Therefore, we assume that:

H9c: TMT business ties positively moderate the relationship between international open innovation and brand performance.

Dai et al. (2018) emphasize that business ties provide crucial resources, while political connections offer institutional resources such as information on reputation, subsidy opportunities, and participation in various activities. Companies backed by political connections may receive preferential treatment and enhance their international performance through government subsidies and tax exemptions that reduce operating costs (Sheng et al., 2011). Legal protection can benefit companies by enabling them to profit from innovation projects (Peng, 2003), and public procurement, financial support, and resource exchange contribute to profitability (Tellis et al., 2009). Therefore, we believe that:

H10a: TMT political ties positively moderate the relationship between international open innovation and international performance.

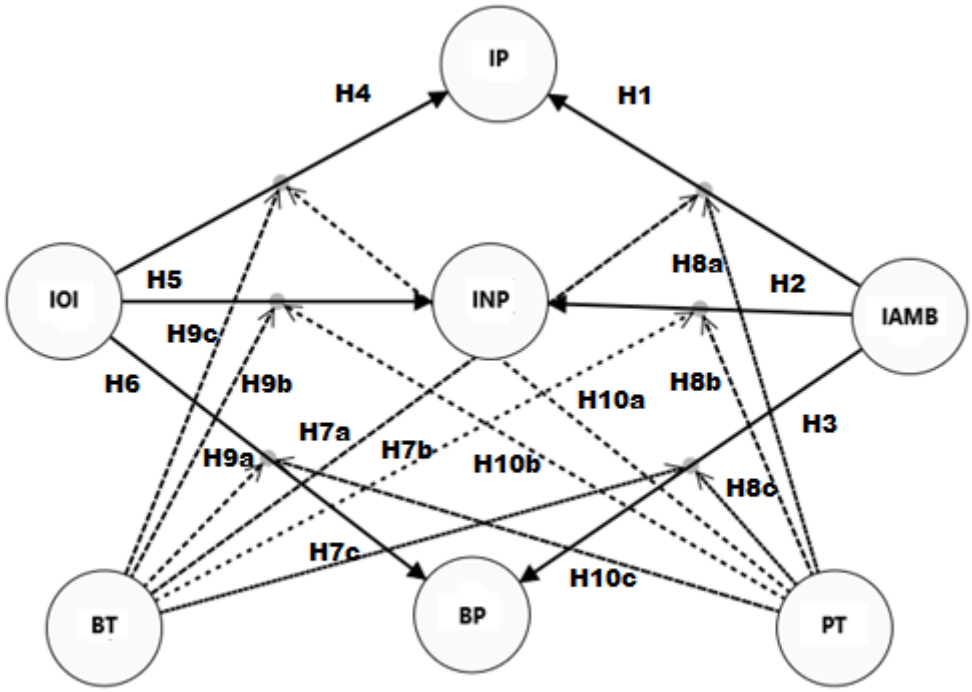
The political connections of TMTs provide governmental support through specific policies and regulations for building business network platforms that drive international open innovation (Jiao et al., 2023). With government connections, a company can gain insights into technological standards and safeguard intellectual property rights, facilitating knowledge transfer among international partners (Zhou, 2013), thereby boosting innovative performance (Li, 2012). Therefore, we assume that:

H10b: TMT political ties positively moderate the relationship between international open innovation and innovative performance.

Strong political ties of TMTs are beneficial for fostering trust and reciprocity among companies and other stakeholders (Dai et al., 2018). International partners better receive companies with established relationships with governmental authorities and enhance their reputation (Jiao et al., 2023). This, in turn, contributes to brand positioning. Given these assumptions, we believe that:

H10c: TMTs' political ties positively moderate the relationship between international open innovation and brand performance.

Figure 4-1. Hypothesized model.



4.3 Methodology

4.3.1 Sample and data

This study was based on survey data collected from small, medium, and large international Colombian companies. The population framework was defined by the 11,700 companies registered in the National Foreign Trade Association (ANALDEX, 2023). To achieve a representative sample size with a margin of error of 5% and a confidence margin of 95%, 400 companies are selected. These 400 have more than 6 years of international experience and have used various forms of internationalization, from exports to subsidiaries. 55.5% of its main markets are concentrated in developing countries, of which 70% are in Latin America (Venezuela,

Ecuador, Mexico, Argentina, Bolivia, Brazil, Panama, and Peru), with a presence in developed markets such as the United States, Canada, Spain, France, Germany, Japan, South Korea, Portugal and the United Kingdom

The information was provided by the person responsible for the companies' international and research activities, usually the owner, CEO, or senior manager. This choice of respondents is based on what was stated by Martín et al. (2022) that much of the crucial knowledge about the company resides with key decision-makers, thus ensuring the reliability of the information provided. A self-administered questionnaire was used to collect data, and a pilot test was carried out with five managers to evaluate its suitability and make the necessary adjustments. To minimize common method bias, a question unrelated to the main constructs of the model was added. The questionnaires were administered in the third quarter of 2023 by an independent and accredited research firm, thus ensuring the confidentiality of the information..

4.3.2 Measures

The Zahoor et al. (2021) scale was adapted for the independent variables, such as open innovation, which had 8 items. International ambidexterity was assessed by adapting Wu & Chen's (2020) scale, which is considered a second-order reflective-formative construct. The exploration variable had 7 items, and exploitation had 9 items. The dependent variables were evaluated with subjective measures; following the scale of Falahat et al. (2020), seven items were used to measure international performance, and the 5-item scale by Mendes et al. (2023) was used to evaluate innovative performance in the last 3 years. The Iyer et al. (2021) scale was adapted to evaluate brand performance, and it had 5 items.

The moderating variables were the business and political ties of the top management teams (TMT) in their main international market; the scale used was that of Wu & Chen (2020), with 4 items for each variable. On the other hand, most studies in international business use controls such as company age, size, international experience, industry, entry mode, and level of internationalization, among others. However, only some studies have evaluated how operating in developed and developing countries can impact performance differently. As noted by (Yang et al., 2015), debates persist over which context plays a more prominent role in driving performance, which is why we use the country, developed, and developing control variable. All scales were measured on a 7-point Likert scale (where 1 indicates "Strongly disagree" and 7 indicates "Strongly agree").

4.3.3 Validation instrument

The data analysis was conducted utilizing the Structural Equation Model (SEM) through Smart PLS software, chosen for its various benefits relevant to our study. The main factor influencing this decision is the capability of PLS-SEM to manage models effectively, especially those that encompass various relationships and constructs. This is of significant importance due to the nature of our research model, which integrates both direct and indirect effects.

Additionally, PLS-SEM is particularly effective when managing small sample sizes. This aspect allows precise estimation of model parameters, even when data is scarce. A significant benefit is PLS-SEM's ability to effectively manage non-normally distributed data, a frequent situation in social sciences and business studies. The dataset showed non-normality, and PLS-SEM produces reliable results in these circumstances, guaranteeing valid conclusions.

Furthermore, our model incorporates a construct that is measured formatively, indicating that its indicators collectively define the construct instead of merely reflecting it. PLS-SEM is appropriate for this situation as it can manage constructs measured this way, facilitating a more precise depiction of the relationships in our model. The integration of these features positions PLS-SEM as a suitable and efficient data analysis method, as Hair et al. (2019) support.

Initially, the reliability and convergent validity of the first-order reflective constructs were evaluated, following the principles of Hair et al. (2019) and eliminating articles with loadings less than 0.5. Due to problems of collegiality and promotion of international open innovation (IOI), it was left with 4 items. In the case of international exploration (IEX) and international exploitation (IEXP), they were reduced to a scale of 3 items. International, innovative, and brand performance were left with 3 items for each construct, and the TMT's business ties and political ties scales were left with 2 items each.

Table 4-1 presents the remaining items along with the standardized loadings on their respective constructs, the construct reliability values, and the average variance extracted (AVE) corresponding to each one. Although Cronbach's alpha coefficient is below 0.7, according to Hair et al. (2019), an alpha value of 0.6 is acceptable in exploratory studies. Furthermore, all AVE values and composite reliability exceed the threshold of 0.50 and 0.7, respectively, thus supporting convergent validity according to the criteria established by Fornell and Larcker (1981).

Table 4-1. Reliability and convergent validity of the reflective construct- first-order

International Open Innovation (IOI) α =0.862; CR = 0.901; AVE = 0.648		β
IOI1	I actively seek international alliance partners to gain knowledge to develop innovations.	0.819
IOI3	We often bring in technology developed by international alliance partners to use in combination with our own research and development.	0.808
IOI4	We often bring knowledge developed by international alliance partners to use in combination with our own research and development	0.701
IOI5	We purchase intellectual property from international alliance partners for use in our own R&D.	0.909
IOI6	We sell innovative knowledge to international alliance partners	0.774
International Exploration (IEX) α =0.809 ; CR = 0.884 ; AVE = 0.717		**β**
IEX1	We recruit high-level R&D talent in foreign markets	0.888
IEX2	We are looking for marketing resources abroad for the development of the company.	0.840
IEX7	We obtain global business information	0.811
International Exploitation (IEXP) α =0.867; CR = 0.915; AVE = 0.782		**β**
IEXP1	We take advantage of our technological advantages in foreign markets	0.793
IEXP7	The company improves understanding of existing requirements of foreign customers	0.937
IEXP8	The company reinforces its contacts in current international markets	0.917
International Performance (IP) α =0.617; CR = 0.789; AVE = 0.556		**β**
IP1	Benefits from international sales	0.763
IP3	Expansion of market coverage	0.763
1P6	Improve knowledge of international markets	0.709
Innovation Performance (INP) α =0.718 ; CR = 0.831 ; AVE = 0.623		**β**
During the last 3 years the company introduced		
INP1	Innovation in goods and services	0.750
INP4	New forms of organization	0.883
INP5	New marketing methods	0.726
Brand Performance (BP) α =0.663 ; CR = 0.814 ; AVE = 0.594		**β**
BP3	The image and reputation of the company	0.756
BP4	Brand positioning	0.716
BP5	Overall brand performance	0.835
Business Ties (BT) α =0.641 ; CR = 0.843 ; AVE = 0.730		**β**
The top management team…		
BT2	They maintain close cooperative relationships with suppliers	0.794
BT3	They are always ready to cooperate with competitors.	0.911
Political Ties (PT) α =0.678 ; CR = 0.850 ; AVE = 0.740		**β**
The top management team…		
PT1	They pay great attention to establishing close ties with government officials	0.768
PT4	The government and its agencies provide a large number of resources to support the operation of businesses.	0.944

Additionally, when applying the HTMT (Heterotrait-Monotrait) criteria proposed by Henseler et al. (2016), it is observed that all HTMT values are less than 1. Henseler et al. (2016) suggest a threshold of 0.9 in models with conceptually similar constructs and 0.85 in models with conceptually different constructs; According to Table 4-2, the items meet these criteria.

Table 4-2. Discriminant validity

HTMT values	BP	BT	INP	IOI	IP	PT
BP						
BT	0.732					
INP	0.683	0.859				
IOI	0.872	0.865	0.652			
IP	0.568	0.834	0.548	0.592		
PT	0.830	0.363	0.247	0.503	0.350	

In the case of international ambidexterity as a formative construct, the collinearity between individual variables and the relative and absolute importance of each variable with the construct were analyzed, verifying that this indicator had a value of less than 5.0 (Hair et al., 2019). Then, each dimension's relative and absolute importance was analyzed through its external loadings, and finally, the level of significance was obtained from the bootstrapping procedure. Both variables were highly significant, but exploration had greater weight than exploitation, as shown in Table 4-3..

Table 4-3. Collinearity weights and loadings of the second order

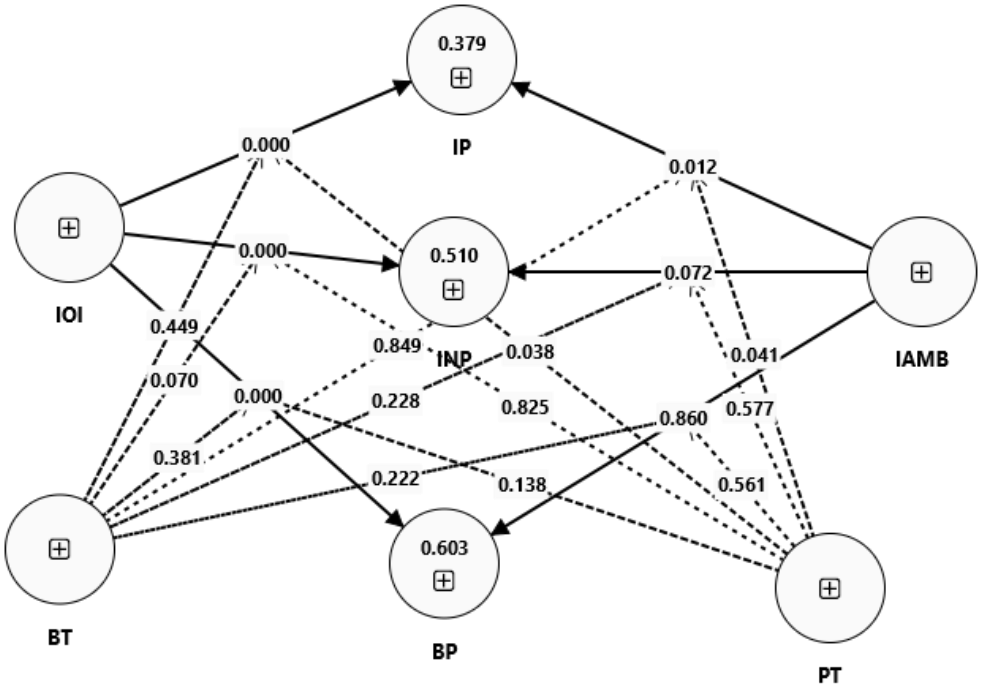
Higher-order construct	Lower-order construct	VIF	Outer weight	Outer loading
IAMB	IEX	1.296	0.475***	0.801***
	IEXP	1.296	0.682***	0.909***

***p < 0.01

4.4 Results

After confirming the reliability and validity of the construct measurements, the structural model was calculated. Figure 4-2 shows that, according to R2, IOI, IAMB, BT, and PT collectively account for 37.9% of the variation in international performance, 51% of innovative performance, and 60,3% of brand performance. The model shows a poor fit with an SRMR indicator of 0.15, a Chi-square value of 3688, and an NFI of 0.443. Hair et al. (2019) say these values can vary depending on the model's context and complexity. However, the predictive relevance indicator of the Q2 model is greater than 0 for the endogenous latent constructs (BP->0.582) (INP->0.483) (IP->0.349). According to Hair et al. (2018), values above 0.35 indicate that an exogenous construct has significant predictive relevance for an endogenous construct.

Figure 4-2. Structural model



A bootstrap analysis was performed with 5,000 samples to evaluate direct effects, and the results are presented in Table 4-4. Hypothesis 1 was confirmed, demonstrating that international ambidexterity positively impacts international performance. Furthermore, hypothesis 2 was also validated, showing that international ambidexterity positively affects innovative performance with a significance level of 10%. However, hypothesis 3 was rejected since the relationship between international ambidexterity and brand performance was insignificant. Regarding international open innovation, a positive and significant relationship was found with international performance, innovative performance, and brand performance, thus supporting hypotheses 4, 5, and 6.

The moderating role of TMT business ties in the relationship between international ambidexterity and international, innovative, and brand performance was not proven, rejecting hypotheses 7a, 7b, and 7c. However, TMTs' political ties significantly moderate the relationship between international ambidexterity and international performance, confirming Hypothesis 8a. At the same time, TMTs' political ties did not moderate the relationship between international ambidexterity and innovative and brand performance, so hypotheses 8b and 8c were rejected.

On the other hand, hypothesis 9b was confirmed, suggesting that the business ties of TMTs moderate the relationship between international open innovation and innovative performance with a significance level of 10%. However, no evidence was found for the moderating role of TMT's business ties in the relationship between international open innovation and international brand

performance. This led to the rejection of hypotheses 9a and 9c. It was observed that the political ties of TMTs do influence the relationship between international open innovation and international performance, thus supporting hypothesis 10a. However, the results did not reach significance for hypotheses 10b and 10c, indicating that political ties do not moderate the relationship between innovative performance and brand. Finally, it was found that the country control variable significantly affected brand performance..

Table 4-4. SEM Results

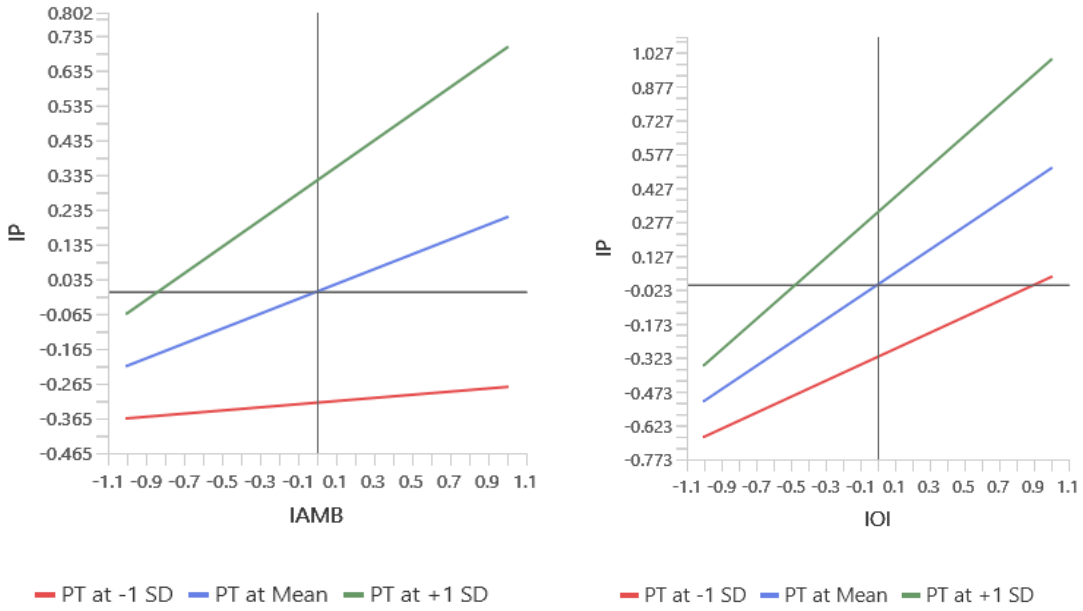
Hypothesis	Relationship	Path Coefficient	t- Value	P- values
H1	IAMB -> IP	0.214	2.510	0.012**
H2	IAMB -> INP	0.130	1.802	0.072*
H3	IAMB -> BP	-0.011	0.177	0.860
H4	IOI -> IP	0.515	4.882	0.000***
H5	IOI -> INP	0.444	5.229	0.000***
H6	IOI -> BP	0.456	5.738	0.000***
H7a	BT x IAMB -> IP	0.014	0.190	0.849
H7b	BT x IAMB -> INP	0.083	1.205	0.228
H7c	BT x IAMB -> BP	0.075	1.223	0.222
H8a	PT x IAMB -> IP	0.169	2.044	0.041**
H8b	PT x IAMB -> INP	0.041	0.558	0.577
H8c	PT x IAMB -> BP	0.037	0.582	0.561
H9a	BT x IOI -> IP	0.054	0.758	0.449
H9b	BT x IOI -> INP	0.131	1.812	0.070*
H9c	BT x IOI -> BP	0.065	0.875	0.381
H10a	PT x IOI -> IP	0.161	2.075	0.038**
H10b	PT x IOI -> INP	0.016	0.221	0.825
H10c	PT x IOI -> BP	0.161	2.075	0.038**

***p < 0.01 Control: Country <- BP (0.108, t = 2.441, p = 0,015**) is significant. Country <- INP (0.053, t = 1.062, p = 0.288). Country <- IP (0.081, t = 1.420, p = 0.156)

When analyzing the moderation slope (see Figure 4-3), it is evident that the political ties of TMTs are more important for international ambidexterity than for international open innovation to achieve better international performance because, at one standard deviation below, it is much flatter.

Figure 4-3. Slope of moderation

Political Ties TMT **Political Ties TMT**



4.5 Discussions and conclusions

This study addressed how international companies from developing countries can succeed in the international market. The results reveal that international ambidexterity has a positive relationship with international performance, thus consolidating previous findings (Prange & Vadier, 2011; Hsu et al., 2013). International companies from developing economies can improve sales abroad, expand the market, and deepen their knowledge of international dynamics by hiring human resources in R&D, international marketing, and obtaining detailed information on global business (international exploration). At the same time, using its technological advantages to understand current customer needs and strengthen contacts in international markets (international exploitation).

Confirmation of hypothesis 2 demonstrates that ambidextrous international companies can integrate knowledge from established and emerging markets, driving innovations in products, services, organizational forms, and marketing methods, thus supporting previous findings (Wu & Chen, 2020; Ovuakporie et al., 2021; Xiao et al., 2022). In contrast, hypothesis 3 did not obtain support, contradicting previous research (Zhang et al., 2020; Iyer et al., 2022), which indicates that efforts to acquire international marketing resources and understand foreign needs do not translate into improvements substantial in the image, reputation, market position or adaptability of the brand to diverse environments.

By verifying hypotheses 4, 5, and 6, it is confirmed that international open innovation represents a relevant dynamic capability that drives comprehensive performance in international companies from developing countries. Our results support the current perspective of not limiting open

innovation exclusively to profitability and innovation but rather adopting a more holistic view of this capability (Romero-Martínez et al., 2017). The active search for collaborations with international partners to acquire knowledge and develop innovations and technologies and for the purchase and sale of intellectual property allows companies to increase sales and successfully enter new international markets. These findings coincide with other studies (Yoon et al., 2020; Zahoor et al., 2021).

Consistently, international open innovation allows international companies to innovate products, explore new markets, and reconfigure themselves organizationally to add value. These findings support previous research (Fu et al., 2022; Ryu et al., 2021). In an environment where national sources of knowledge are insufficient, taking advantage of international networks of knowledge and technological development becomes essential to obtain a sustainable competitive advantage (Fue et al., 2020). A finding of great relevance to international business theory lies in the evidence supporting the idea that collaboration with foreign partners significantly improves the company's image, reputation, and international positioning. International open innovation emerges as a capacity that helps overcome the limitations of financial resources to innovate and effectively position brands in international markets (Agostini et al., 2017).

By rejecting hypotheses 7a, 7b, and 7c, a significant role of business ties with suppliers and competitors as moderators in the relationship between international ambidexterity and international, innovative, and brand performance is not observed, in contradiction with previous research (Wu & Chen, 2020). Although the TMT maintains information exchanges with these links, enhancing social integration and raising awareness of potential resources, these exchanges have limited contribution to action and information integration. Furthermore, TMTs do not allocate resources to build strong business relationships and acquire international marketing resources. In addition, TMTs need to work on their relationships with clients, which prevents them from accessing valuable resources (Wu & Chen, 2020).

The validation of hypothesis 8a and rejecting hypotheses 8b and 8c confirms that TMTs' political ties only strengthen the relationship between international ambidexterity and international performance, supporting previous research (Lu et al., 2010). This result highlights the strategic importance of international companies in developing countries establishing government connections to access supports, subsidies, and exemptions, mitigate risks, and enrich international market knowledge. The non-significant results can be explained by the TMT's underutilization of government opportunities and additional factors such as the type of government or the turnover of officials (Sheng et al., 2011).

The confirmation of hypothesis 9b and the rejection of hypotheses 9a and 9c highlight that the TMT focuses its business ties on obtaining resources to innovate instead of seeking profits and

brand recognition. In this way, strong trade ties contribute to integrating more international trading partners. This facilitates the exchange of knowledge and technologies, crucial elements for developing new products, new marketing, and organizational methods (Agostini et al. (2017). In the case of political ties, by validating hypothesis 10a and rejecting hypotheses 10b and 10c, it is shown that TMT political ties can increase the benefits of international collaborations, improve profitability, and mitigate the risks associated with international collaboration (Sheng et al., 2011). On the contrary, according to Dai et al. (2018), these political ties can generate organizational inertia, affecting the motivation to improve innovation capacity and not support the company's reputation.

The results derived from the Country Control variable reveal that brand performance will be higher in developing country markets. According to Yang et al. (2015), unlike saturated markets in developed countries, environments in developing countries, characterized by lower competition, facilitate rapid brand positioning. Brands that succeed in these contexts tend to adapt better to local needs and preferences, showing a deep understanding of the culture. Descriptive data highlight the prevalence of Latin American markets as the main customers, characterized by cultural similarities that could contribute to a higher level of brand positioning (Azzari et al., 2023).

This study demonstrated that international ambidexterity and international open innovation, together with strong political and business ties in top management, emerge as a comprehensive and effective strategy for the sustained success of international companies in developing countries, especially in Latin American contexts.

4.5.1 Theoretical Implications

This study significantly enhances the existing literature in several necessary fields. Initially, it offers empirical evidence that supports the claim that international dynamic capabilities are crucial for improving the Performance of firms in emerging nations. Their abilities provide a permanent competitive advantage, applicable to immediate and extended deadlines. This finding significantly contributes to the current academic discussion regarding the fundamental principles of dynamic capability theory, especially concerning international firms from emerging markets such as Latin America (Teece, 2023; Peng & Lin, 2021).

Second, this study contributes to the field of international business by managing earlier deficiencies identified in the literature. This study expands on previous research that concentrated exclusively on a singular international dynamic capability, like international ambidexterity, by

integrating the concept of international open innovation. This integration offers a comprehensive perspective on the interactions among various dynamic capabilities that influence Performance.

Third, the study exceeds the typical tendency to evaluate a limited range of performance metrics and instead highlights various performance dimensions. This approach enhances our comprehension of the numerous elements that affect business success in global environments. The results indicate that international dynamic capabilities contribute to measurable results, such as higher sales and innovative products while improving intangible assets like corporate reputation and brand positioning in global markets.

The findings highlight the important roles of international ambidexterity and international open innovation in the achievements of global companies, especially within emerging markets. The findings indicate that balancing exploration and exploitation is relevant for capturing opportunities in international markets and promoting innovation. This challenges earlier claims (Venugopal et al., 2020) by demonstrating that an appropriate balance between exploratory and exploitative strategies is necessary for firms in this context. Moreover, the findings suggest that companies that participate in international open innovation by collaborating with external partners achieve improved Performance in multiple areas—international, innovative, and brand—thus alleviating resource limitations and demonstrating increased adaptability to the ever-changing global market.

Finally, our research adds to the existing body of work on micro foundations by demonstrating that top management teams (TMTs) having robust political connections are linked to enhanced advantages throughout the internationalization process. Interestingly, these political connections have a more pronounced impact on international ambidexterity than international open innovation. The beneficial influence of TMT's business networks on innovative Performance in collaborations with international partners was emphasized. The strategic connections that leaders cultivate within their business networks improve the management of collaborative innovation initiatives, finally improving the firm's competitive standing on a global level. Our primary contribution focuses on clarifying the contextual elements associated with different TMT characteristics that affect the degree to which international dynamic capabilities can improve Performance. This detailed comprehension contributes significantly to the theoretical frameworks related to dynamic capabilities and international business..

4.5.2 Managerial Implications

This study provides guidelines and practical suggestions for management practices and policy development within international business, especially for companies functioning in emerging

markets. We emphasize the role of developing dynamic international capabilities as key components for attaining success in the global marketplace. . The cultivation of international ambidexterity represents a critical strategic imperative for firms seeking to enhance performance throughout their internationalization process while simultaneously driving innovation. This dual-focused approach not only yields immediate competitive advantages but also fosters sustainable long-term differentiation in global markets. Furthermore, working with global partners to acquire new insights, create advanced technologies, and seek intellectual property overseas through efficient management of international open innovation can produce significant benefits. Companies have the potential to improve their profitability, promote innovation, and bolster their brand presence in global markets.

To maximize the benefits linked to international dynamic capabilities, it is important for international firms from emerging markets to closely consider the influence of top management teams (TMTs). TMT members should build strong relationships with governments in their intended international markets. Establishing these relationships is important for obtaining the required support and resources to successfully execute strategies associated with international ambidexterity and open innovation, ultimately enhancing profitability throughout internationalization. Furthermore, TMTs must develop robust commercial relationships with suppliers and competitors, utilizing the synergies that emerge from international open innovation partnerships to improve overall innovative Performance.

The results highlight the influence of policymakers in both advanced and developing nations in supporting international companies from emerging markets. To promote growth and sustainability, it is recommended that these policymakers adopt supportive measures, including government financial assistance programs, export subsidies, tax exemptions, and methods for engaging in collaborative innovation initiatives. Providing the transfer of information, knowledge, and resources among global enterprises and local stakeholders is essential for strengthening these economies and advancing sustainable development.

Establishing an institutional framework that facilitates the entry and exit of international companies while protecting the interests of foreign investors is necessary for developing a favorable business environment. These initiatives will foster reciprocal investment and knowledge transfer, leading to strong economic growth and beneficial international cooperation.

4.5.3 Limitations and future research

The research presents certain limitations, highlighting the exclusive focus on Colombian international companies, which could restrict the applicability of the conclusions to other Latin

American economies. To improve external validity, the inclusion of multilatinas in future studies is suggested, thus allowing a broader exploration of the relationship between international dynamic capabilities and regional business performance. Furthermore, the influence of the geographical context is highlighted, where the strength of the clusters in Colombia could positively impact the relational capital of companies. Future research could compare results between firms within and outside clusters, contributing to the generalization of findings and a deeper understanding of contextual factors that affect the relationship between international dynamic capabilities and firm Performance.

Furthermore, it is noted that the subjective measurement of performance with the seven-point Likert scale could introduce biases, suggesting incorporating more objective indicators in future research for a more precise evaluation of performance. It is also proposed to examine the mediating role of international ambidexterity between open innovation and business performance, including other capabilities such as international dynamic marketing and international cultural ambidexterity, thus enriching the theoretical framework and offering companies from emerging countries with limited resources and the possibility of developing comprehensive capabilities to prosper in the international environment.

CHARTER 5

5 Does belonging to clusters enhance firm performance through their international dynamic Capabilities and International Entrepreneurial Culture?

Abstract:

The research examines how International Entrepreneurial Culture (IEC) impacts two international dynamic capabilities, ambidexterity and international open innovation, and how these capabilities influence the Performance of international companies in developing countries, considering whether or not they belong to clusters. A multigroup analysis found that IEC drives international open innovation but limits ambidexterity, although no significant differences were found between groups. Likewise, ambidexterity improved international Performance in both groups but did not impact innovative or brand performance. International open innovation impacts international Performance, being more notable in innovative Performance for cluster-affiliated companies and brand performance for those outside clusters, although these differences were not significant. Although the mediating role of absorptive capacity and the moderating role of environmental dynamism in the relationship between IEC and dynamic capabilities are not confirmed, it is demonstrated that the political ties of Top Management Teams positively moderate the relationship between ambidexterity and international Performance in cluster-affiliated companies, while in companies outside clusters, these ties negatively moderate the relationship between open innovation and innovative Performance. There was a significant difference in the mediating role of TMT political ties in the relationship between open innovation and brand performance, being more pronounced for cluster-affiliated companies.

5.1 Introduction

The agglomeration theory posits that companies tend to cluster in specific areas due to benefits from geographic proximity (Porter, 1998). These benefits include access to shared resources, a specialized labor force, shared infrastructure, shared technological knowledge, positive knowledge externalities, increased specialization, reduced transaction costs, and enhanced reputation. Additionally, clusters enable companies to continuously adapt their resources in response to uncertainty in international markets, thus promoting more effective dynamic capabilities (Wang & Ahmed, 2007).

Studies indicate better Performance in cluster firms, and regions with clusters provide a more conducive environment for international markets (Kim et al., 2022). Over the last three decades, clusters have become an economic policy tool and business model (Kowalski & Mackiewicz, 2021). However, more research is needed on the performance differences between cluster and non-cluster firms in international business. According to Cheah et al. (2023), comparisons have primarily focused on gender (Lim et al., 2021), countries (Ahmad et al., 2021), novices and experts (Carranza et al., 2020), family and non-family firms (Yáñez-Araque et al., 2021), thus further exploration in this field is needed.

Similarly, there needs to be more understanding of the capabilities that emerging market firms develop internationally to address their resource scarcity. According to Prange & Verdier (2011) and Zahoor et al. (2022), these firms can successfully internationalize by acquiring dynamic international capabilities, such as international ambidexterity (IAMB) and international open innovation (IOI). Ambidexterity was first discussed at the cluster level in 2011 by Michel Ferrary (Wolf et al., 2019). International ambidexterity was raised by Luo & Rui (2009) as a response to multinational enterprises from emerging markets to challenges posed by international markets (Prange & Verdier, 2011), involving the ability to balance exploration and exploitation at the international level (Prange & Verdier, 2011). This study seeks to understand how the characteristics of international ambidexterity vary between cluster and non-cluster firms.

Jacob et al. (2022) warn that excessive cluster integration may limit companies' ability to seek innovative knowledge. Zahoor et al. (2022) indicated that knowledge sources within clusters may need to be increased to seek international opportunities, as advanced knowledge resides in global networks. Therefore, international open innovation is imperative to diversify knowledge sources and share ideas with international alliance partners (Kapetaniou & Lee, 2019). Although presumed to benefit international firms (Naqshbandi & Jasimuddin, 2018), the variation between cluster and non-cluster firms has yet to be adequately explored (Zahoor et al., 2022).

Furthermore, Teece (2023) asserted that international dynamic capabilities are embedded in organizational routines rooted in culture, and some studies (Buccieri et al., 2019; Bilichenko et al., 2022) have confirmed that organizational culture is a key antecedent for innovation processes and international opportunity seeking. One type of organizational culture is the International Entrepreneurial Culture (IEC). IEC promotes and embraces a company's international business activities, providing a comprehensive conceptualization based on the company's opportunities (Dimitratos & Jones, 2005). IEC is only beginning to receive attention in established international companies and still needs conceptual clarity and a model for measuring its impact on the international dynamic capabilities of cluster-aggregated firms.

The academic discourse remains divided regarding the performance implications of clusters and international dynamic capabilities (Teece, 2023; Zhou et al., 2020). While Marco-Lajara et al. (2022) empirically validate superior outcomes for clustered firms, emerging market research reveals divergent performance effects between international open innovation and ambidexterity strategies (Peng & Chan, 2023). Furthermore, extant literature inadequately examines these capabilities across multiple performance dimensions - including international, innovative, and brand performance - leaving critical gaps in our understanding of their holistic impact (Peng & Lin, 2021).

Moreover, previous research has highlighted the moderating role of absorptive capacity in facilitating international firms' assimilation and internalization of knowledge from external sources (Peng & Chan, 2023). However, there is a knowledge gap regarding the mediating role of absorptive capacity in the relationship between IEC and international dynamic capabilities in clusters (Son et al., 2023). Likewise, in clusters with high levels of IEC, firms are more likely to adapt and reconfigure their international dynamic capabilities to cope with changing environments and enhance their Performance (Huang et al., 2014). Therefore, it is necessary to understand if these links will strengthen firms in clusters because they face greater environmental dynamism.

Similarly, researchers (Wu & Chen, 2020; Xiao et al., 2022) suggest considering contingencies that allow international firms belonging to a cluster to translate international dynamic capabilities into superior Performance. In this regard, some researchers proposed that in clusters, the business and political ties of the top management team (TMT) are essential because they provide significant resources to international firms from developing countries, strengthening the positive effect of international dynamic capabilities on Performance.

This study is particularly valuable because finding different effects of international dynamic capabilities for firms belonging to and not belonging to a cluster helps determine the importance of clusters in the Performance of international firms and raises practical and theoretical

implications. Additionally, it identifies IEC as a precursor to international dynamic capabilities and evaluates contingent factors such as absorptive capacity, environmental dynamism, and the business and political ties of TMTs. The research analyzed 158 firms not belonging to a cluster and 242 that do, employing partial least squares multigroup analysis (PLS-MGA) to consider group differences.

The manuscript is organized as follows: The first section presents the theoretical foundations and research hypotheses. Next, the methodology, sample, variable measurement, and analysis techniques are detailed. Then, the results are discussed. Finally, the study's contributions are evaluated, along with its limitations and suggestions for future research.

5.2 Theoretical foundations and hypothesis development

5.2.1 International entrepreneurial culture (IEC) and international dynamic capabilities in cluster and non-cluster companies

According to Dimitratos and Plakoyiannaki (2003), internationalization is an entrepreneurial process rooted in the organizational culture of companies, seeking opportunities beyond borders. The IEC is a type of organizational culture that aims to create value and capitalize on opportunities in the global market (Dimitratos & Plakoyiannaki, 2003). Research on IEC has been mainly associated with entrepreneurs and Born Globals (Buccieri et al., 2021). However, Dimitratos & Jones (2005) present a framework interpreting it as an intra-entrepreneurial approach applicable to any international company at any stage of its internationalization. According to Dimitratos & Jones (2005), the IEC drives organizations to actively identify and pursue international opportunities, which is key to developing dynamic capabilities. Firms with a strong IEC are likelier to engage in international innovation projects and capitalize on global opportunities. The IEC framework encompasses dimensions such as international business orientation, international market orientation, international learning orientation, international networking orientation, and international motivation (Dimitratos et al., 2012).

According to Bilichenko et al. (2022), IEC enables companies to be ambidextrous at the international level, combining exploration and exploitation of opportunities abroad to build efficient businesses and generate short- and long-term benefits (Wang & Rafiq, 2009). International exploration involves scanning and seeking information in foreign markets to identify new opportunities, while international exploitation leverages existing resources to enhance products and penetrate current international markets (Nguyen et al., 2016). According to Mendes et al. (2023), companies clustered together are more ambidextrous because they can balance activities exploiting existing competencies, are open to new approaches through exploration, and are better equipped with resources than other international companies (Avioutskii & Tensaout,

2022). Relationships developed within clusters improve the knowledge base and provide new impetus for the search for international resources and markets (Mendes et al., 2023).

Proximity in clusters allows companies to share experiences, knowledge, and values, fostering a similar culture (Jacob et al., 2022), which facilitates the diffusion of IEC and shapes behaviors toward international ambidexterity by encouraging individuals to shift their attention, time, and resources between alignment and adaptability spontaneously (Gibson & Birkinshaw, 2004). Avioutskii and Tensaout (2022) found that cluster affiliation is crucial for a multinational company from emerging countries to adopt an international ambidextrous strategy. Geographic proximity and cultural affinity facilitate the establishment of cooperative relationships that, in turn, support companies in balancing international exploration and exploitation. Therefore, we can propose the following hypothesis:

> *H1: There is a significant difference in the relationship between IEC and IAMB between international companies that belong to a cluster and those that do not belong.*

For international firms in clusters, knowledge accumulation is more accessible due to constant interactions with various actors (Marco-Lajara et al., 2022). It has been argued that access to knowledge is one of the main externalities of belonging to a cluster (Marco-Lajara et al., 2022). However, this accumulation of knowledge can lead to cognitive lock-in, where established ideas are preferred (Jacob et al., 2022). Therefore, accessing international knowledge becomes crucial. Although acquiring international knowledge is costly for international firms, international open innovation can counteract local cognitive lock-in (Jacob et al., 2022). International open innovation involves global collaboration, facilitating the exchange of ideas and knowledge, efficiently integrating international knowledge, and fostering innovative solutions (Zahoor et al., 2021; Kapetaniou & Lee, 2019).

Cultural proximity in clusters facilitates interactive learning and collaboration at both national and international levels, promoting shared values and preventing opportunistic behaviors (Marco-Lajara et al., 2022). However, Zahoor et al. (2022) point out that international open innovation can generate complexities due to cultural differences, limiting the potential value generation of external relationships. Therefore, international firms must foster an IEC that promotes knowledge creation and exchange, facilitating international collaboration. IEC drives international open innovation in cluster firms more than in non-cluster ones. Since international firms cannot mobilize all innovation assets alone (Nestle et al., 2019), they join clusters to connect with various actors in the innovation process. Cluster firms with a strong IEC adopt more aggressive strategies in seeking open innovation and exploring ideas and knowledge internationally (Basco & Calabrò, 2016). Therefore, we argue that:

H2. The relationship between IEC and IOI is significantly different for international firms belonging to clusters compared to those that do not belong.

5.2.2 International dynamic capabilities and performance in companies that do and do not belong to Clusters

Clusters generate superior Performance, which stems from the development of specialized and proximate workforce and suppliers, enabling the creation of positive externalities from technological advancement and innovation (Marco-Lajara et al., 2022). These elements positively impact companies' cost structures, making them more efficient. Various studies demonstrate that the externalities generated by clusters positively affect profitability (Marco-Lajara et al., 2022). According to Mendes et al. (2023), through inter-organizational relationships developed among different actors, clustered firms can easily acquire new resources (exploration) and adapt existing ones (exploitation) to succeed in their international operations.

Grounded in dynamic capabilities theory, international ambidexterity proves essential for balancing exploitation of current markets with exploration of new opportunities (Peng & Lin, 2021). This dual focus aligns with core internationalization objectives of performance growth through sales, market presence, and knowledge development (Falahat et al., 2020). According to Sharma et al. (2019), international ambidexterity relies on the network of international relationships, and to achieve success, a company must be part of a relevant network such as clusters; otherwise, it will bear the burden of being foreign. Therefore, when companies belong to conglomerates, they achieve superior Performance because the network enables the exploitation of existing advantages and the development of new ones that can be leveraged in the future. These findings support the assumption that:

H3. the relationship between IAMB and international performance is significantly different for international firms belonging to clusters compared to those that do not belong.

Companies within a cluster leverage inter-organizational relationships to enhance products and processes and explore new forms of differentiation (Mendes et al., 2023). Physical proximity within the cluster increases exposure to external knowledge, stimulating learning and innovation (Jacob et al., 2022). These links provide managers with a wide range of experiences and information, facilitating both exploration and exploitation within the cluster (March 1991). Both strategies drive innovation in products, processes, marketing, and organization (Mendes et al., 2023). International exploration enhances innovative Performance by opening up new opportunities in international markets, while exploitation can also improve innovative

Performance by refining products and penetrating further into existing markets (Mendes et al., 2023). Consequently, we believe that:

> *H4. the relationship between IAMB and innovative performance is significantly different for international firms belonging to clusters compared to those that do not belong.*

In the current global competitive environment, competition has shifted from individual companies to regions, highlighting the importance of clusters as locational advocates. Many clusters are adopting a more strategic branding strategy (Pongsakornrungsilp et al., 2021). Companies within clusters can leverage internal and external networks to develop a collective identity, an advantage that companies outside clusters need to possess. Precisely the recognition that international companies belonging to a cluster can obtain can enhance their brand performance, meaning that through international ambidexterity, they will improve their image, reputation, and market position and adapt their brand to diverse international environments (Eisingerich et al., 2010). Therefore, it is proposed that:

> *H5: the relationship between IAMB and brand performance is significantly different for international companies belonging to clusters compared to those that do not belong.*

companies (Kapetaniou & Lee, 2019). Companies in emerging countries face challenges in resources and capabilities, affecting their local and international success; therefore, they need to cluster and establish networks with international partners not only to innovate but also to achieve superior international Performance (Zahoor et al., 2022). Clusters offer additional benefits by reducing transaction costs due to geographical proximity and stable relationships between companies along the value chain (Kapetaniou & Lee, 2019). Specifically, the increase in sales, expansion, and knowledge of the international market is not explained by the internal efficiency of each company but by the interactions inherent in clusters and their ability to articulate different organizations at the national and international levels, which contribute to Performance (Pineda-Ospina et al., 2020). Therefore, we posit that:

> *H6: the relationship between IOI and international performance is significantly different for international companies belonging to clusters compared to those that do not belong.*

Collaboration within clusters drives innovation and knowledge transfer, accelerating the commercialization of new products and technologies (Mendes et al., 2023). However, this collaboration can displace internal R&D activities with open innovation within the cluster (Laursen & Salter, 2006). Although companies in clusters exhibit greater innovative capacity due to agglomeration economies, they need help accessing advanced knowledge, which may restrict the originality of innovations (Lyu et al., 2019; Kapetaniou & Lee, 2019). By collaborating with foreign partners, companies enrich their knowledge base and leverage resources for innovation

(Fu et al., 2022). Interorganizational interactions within local and international clusters drive innovation and innovative performance of companies (Son et al., 2023). Activities in international networks allow access to new knowledge and compensate for deficiencies in innovation and resources (Son et al., 2023).

H7. the relationship between IOI and innovative performance is significantly different for international companies belonging to clusters compared to those that do not belong.

Maintaining a solid reputation is a fundamental aspect for companies internationally. In this regard, the image that clusters generate at the local and regional levels is critical in attracting international customers and establishing strong business relationships. Additionally, it facilitates hiring R&D talent from abroad (Huber, 2012). Firms embedded in clusters benefit from dual knowledge advantages: (1) access to localized expertise and (2) diffusion of global network intelligence - strategic assets typically unavailable to non-clustered competitors. This geographical and relational embeddedness fosters unique competitive capabilities in international markets.. Consequently, companies in clusters are better positioned to adopt open innovation and collaborate with international partners to enhance their image and reputation, increase market share, strengthen their competitive position, and improve their brand's overall Performance (Agostini et al., 2017). In this context, we consider that:

H8. the relationship between international open innovation and brand performance is significantly different for international companies belonging to clusters compared to those that do not belong.

5.2.3 The mediating role of absorptive capacity between international dynamic capabilities and IEC in cluster and non-cluster companies

According to Mendes et al. (2023), companies in clusters share a common knowledge base, which expands their ability to absorb new knowledge, meaning they have the ability to acquire, assimilate, transform, and leverage new knowledge (Zahra & George, 2002). For Crescenzi and Gagliardi (2018), this capacity is essential for balancing the exploitation of existing markets and the exploration of new markets. Knowledge acquisition and assimilation facilitate international exploration, while its transformation and leverage reinforce international exploitation. Additionally, cluster companies share an IEC and have greater absorptive capacity than other international companies (Crescenzi & Gagliardi, 2018). They detect and exploit opportunities in foreign markets with greater adaptability and speed (Peng & Lin, 2021). Therefore, absorptive capacity enables an international cluster company to simultaneously conduct international exploitation and exploration to ensure its future viability (March 1991). Based on these observations, we suggest that:

H9: The mediating role played by absorptive capacity in the relationship between IEC and IAMB will be significantly different for international companies belonging to clusters compared to those that do not.

Son et al. (2023) note that companies cluster to take advantage of knowledge spillovers, linking their effectiveness to the absorptive capacity of the receiving company (Kohlbacher et al., 2013). This capacity is crucial for the success of open innovation, especially in an international environment where obtaining advanced knowledge and technologies involves leveraging internal and external resources (Son et al., 2023). Therefore, a strong absorptive capacity enables companies to identify, understand, and assimilate external knowledge (Radziwon & Bogers, 2019). In cluster companies, international open innovation is more likely to develop due to their openness to knowledge and an IEC that encourages pursuing external opportunities and strengthens internal systems. The IEC helps acquire, assimilate, and transform knowledge, supporting open innovation in international markets (Naqshbandi & Kamel, 2017). Given the higher absorptive capacity of cluster companies, they are expected to facilitate the acquisition of new knowledge from foreign markets through the IEC. Therefore, we propose that:

H10: The positive mediating role of absorptive capacity on the relationship between IEC and IOI will be significantly different among international companies that are part of clusters and those that are not.

5.2.4 The moderating role of environmental dynamism in clusters

IEC plays a crucial role in achieving international ambidexterity and open innovation. However, it is important to consider that environmental factors can influence this relationship (Khan & Mir, 2019). For example, according to Buccieri et al. (2020), the connection between IEC and ambidexterity is strengthened when companies operate in markets characterized by a high degree of environmental dynamism. Environmental dynamism encompasses a variety of factors, including the speed of change in the industry, modifications in operational practices, the pace of innovation in products and processes, and the intensity of research and development (Frank et al., 2017).

International companies in clusters are immersed in a significantly more dynamic environment due to the proximity between companies, intensive competition, concentration of resources, and rapid dissemination of knowledge (Kohlbacher et al., 2013). These elements can catalyze the development of dynamic capabilities at the international level. The high instability makes the IEC stronger in seeking external knowledge and opportunities abroad. In contrast, dynamic

capabilities are likely to be limited in stable environments like those faced by companies outside of clusters (Teece, 2007). Therefore, we argue that:

H11: Environmental dynamism plays a significantly different positive moderating role in the connection between IEC and IAM in international companies belonging to clusters compared to those that do not.

H12: Environmental dynamism plays a significantly different positive moderating role in the connection between IEC and IOI in international companies belonging to clusters compared to those that do not.

5.2.5 Business and political ties of the Top Management Team (TMT) as moderators in the relationship between international dynamic capacity and performance

According to Wu and Chen (2020), the positive influence of top management teams (TMT) on the Performance of international companies lies in their ability to establish and maintain business and political connections. The involvement of top executives in these companies plays a decisive role in facilitating the building of external connections that contribute to the integration and accumulation of resources. The business ties of the TMT refer to the relationships established by its members with external partners, such as customers, suppliers, and competitors, who possess valuable resources beneficial to the company (Peng & Luo, 2000). Previous research on emerging market multinationals has emphasized the importance of TMT's business ties in companies' international success (Wu & Chen, 2020).

The political ties of the TMT encompass relationships with government officials, regulators, and support entities, valued as significant assets in emerging economies (Prange & Verdier, 2011). The top executives of multinationals dedicate efforts to nurturing these relationships, which are key to resource allocation in international operations (Wu & Chen, 2020). Belonging to a cluster offers access to regionally integrated and institutionally supported networks, where companies can leverage local innovation ecosystems (Crescenzi & Gagliardi, 2018). Clusters generate positive externalities due to proximity to suppliers, customers, competitors, and market labor concentration (Crescenzi & Gagliardi, 2018).

In contrast to companies that are not part of a cluster, the active cooperation of the TMT of cluster companies with suppliers, customers, and competitors enhances their ability to negotiate resource allocation between existing exploitation activities and new exploration activities (Wu & Chen, 2020), contributing to international ambidexterity (Venugopal et al., 2020). In the context of cluster companies, TMTs can maintain strong domestic and international business relationships

to improve productivity, increase international sales, facilitate entry into new markets, and reduce costs, resulting in higher international Performance. Therefore, we argue that:

H13a: The positive moderating influence of TMT business ties on the relationship between IAMB and international performance will vary significantly depending on whether firms are part of a cluster or not.

The connection between international ambidexterity and innovative Performance is strengthened by the TMT's ability to establish strong relationships with business partners (Wu & Chen, 2020). business collaboration within conglomerates and the TMT's international networks provide the necessary resources to achieve that international ambidexterity. As a result, TMTs of clustered companies ensure greater availability of resources to implement and capitalize on the benefits of innovation in products, processes, marketing, and organization through international ambidexterity (Wu & Chen, 2020). Within these conglomerates, companies benefit from acquiring new knowledge and relationships established with competitors, suppliers, and customers, both locally and internationally. This enables them to exchange high-level knowledge to drive their innovative capacity (Son et al., 2023). Therefore, we believe that:

H13b: The positive moderating influence of TMT's business ties on the relationship between IAM and innovative performance will vary significantly depending on whether companies are part of a cluster or not.

Brands play a fundamental role in organizations, influencing sales, customer and employee loyalty, and risk mitigation when expanding into international markets (Iyer et al., 2021). This requires TMTs to develop strong relationships with suppliers, customers, and competitors to maintain brand coherence and adaptation to international markets. Business ties can provide companies with key resources to effectively implement international ambidexterity and achieve high brand performance (Iyer et al., 2021). Both companies and TMTs immersed in clusters enjoy a strong reputation (Pongsakornrungsilp et al., 2021), facilitating brand adaptation in new and established markets through international ambidexterity, resulting in superior brand performance. Consequently, we assume that:

H13c: The positive moderating influence of TMT's business ties on the relationship between IAM and brand performance will vary significantly depending on whether companies are part of a cluster or not.

In recent years, governments of emerging countries have implemented various programs to benefit and promote business clusters (Son et al., 2023). In this context, the political ties of TMTs in clustered companies grant access to government programs that offer financial support, such as loans, subsidies, and tax exemptions. These measures can significantly alleviate financial pressure and enhance the ability to take risks in international operations (Wu & Chen, 2020). This support is beneficial both for exploring strategic assets and exploiting competitive advantages. Consequently, this situation facilitates clustered companies to develop international ambidexterity, allowing them to improve their international Performance more easily than non-clustered companies (Lu et al., 2010). Therefore, we can assume that:

H14a: The positive moderating influence of TMT's political ties on the relationship between IAM and international performance will vary significantly depending on whether companies are part of a cluster or not.

Cluster initiatives are fundamental in the economic development policy of developing countries, which seek to improve innovation (Zhou et al., 2020). Given the scarcity of resources in international companies from these countries, innovative practices in clusters often replace R&D activities (Kapetaniou & Lee, 2019). TMTs always establish a realistic understanding of conflicting strategic agendas and think rationally about exchanging and combining resources. This benefits the pursuit of innovative gains while simultaneously implementing exploration and exploitation activities abroad (Kapetaniou & Lee, 2019). Therefore, TMTs of companies in clusters often dedicate significant time and effort to establishing ties with government officials, as they control and allocate the necessary resources (Wu & Chen, 2020). These connections are crucial for achieving innovative Performance and facilitating the smooth implementation of international ambidexterity. Therefore, we believe that:

H14b: The positive moderating influence of TMT's political ties on the relationship between IAM and innovative performance will vary significantly depending on whether companies are part of a cluster or not.

Governments of developing countries show greater support for the participation of companies in international fairs than those that do not belong to clusters. This governmental preference facilitates the adoption of new marketing strategies (Pongsakornrungsilp et al., 2021; Iyer et al., 2021). This governmental support is crucial for improving the reputation, image, and positioning of companies and TMTs in international markets (Wu & Chen, 2020), contributing to a more effective execution of international ambidextrous activities in brand performance. Therefore, we believe that:

H14c: The positive moderating influence of TMT's political ties on the relationship between IAM and brand performance will vary significantly depending on whether companies are part of a cluster or not.

Clusters represent open innovation systems at the national level, where international open innovation is integrated into the network of partners to enhance Performance (Kapetaniou & Lee, 2019). The decision to involve international partners lies with the TMT (Röd, 2019); thanks to their extensive connections, TMTs have a superior ability to seek solutions internationally, allowing them to establish various alliances (Röd, 2019). In clusters, social capital facilitates the exchange of valuable information between companies and institutions (Marco-Lajara et al., 2022). In contrast to companies outside of clusters, the connection between the actors in these clusters promotes interpersonal bonds and a closer relationship (Marco-Lajara et al., 2022), facilitating the exchange of knowledge and information and improving the international Performance of companies (Son et al., 2023).

H15a: The positive moderating influence of TMT's business ties on the relationship between IOI and international performance will vary significantly depending on whether companies are part of a cluster or not.

Zhou et al. (2020) argued that companies within clusters have access to a vast pool of knowledge and resources for innovation, surpassing those outside these groups. Additionally, TMTs of cluster companies have a deeper understanding of R&D and can exchange information with their business partners. They are more aware of the technological resources available within the conglomerates, giving them greater ability to manage innovation with international partners. The presence of an extensive network of national and international business links strengthens the knowledge base and enhances the innovative Performance of the cluster (Kapetaniou & Lee, 2019). Therefore, it is suggested that:

Hypothesis 15b: The positive moderating influence of TMT's business ties on the relationship between IOI and innovative performance will vary significantly depending on whether companies are part of a cluster or not.

For TMTs, it is more feasible to establish links with business partners within clusters than in non-cluster environments. This environment facilitates the development of greater business awareness regarding user needs and market trends, as well as quality improvement and cost reduction (Brunswicker & Vanhaverbeke, 2015). International open innovation strengthens TMTs' ties with competitors, customers, and suppliers globally, allowing companies to meet international market consumer demands and contribute to brand strengthening (Jiao et al., 2023).

H15c: The positive moderating influence of TMT's business ties on the relationship between IOI and brand performance will vary significantly depending on whether companies are part of a cluster or not.

Dai et al. (2018) indicate that political ties can provide companies with institutional resources, such as reputation, information, subsidy opportunities, and participation in formal standardization and research activities. Companies in clusters have stronger political ties, both locally and internationally, allowing them to obtain preferential benefits and enhance their international Performance through subsidies and tax exemptions (Sheng et al., 2011). Legal protection can favor companies in gaining profits from international open innovation projects (Peng, 2003), while public procurement can positively impact gains (Tellis et al., 2009). Public financial support, obtained through TMT links, reduces financial constraints (Kapetaniou & Lee, 2019), and financial backing and resource sharing contribute to profitability. Therefore, it is postulated that

H16a: The positive moderating influence of TMT's political ties on the relationship between IOI and international performance will vary significantly depending on whether companies are part of a cluster or not.

Political ties are crucial in protecting intellectual property rights and facilitating knowledge transfer among international partners to drive innovation (Zhou, 2013; Li, 2012). However, according to Dai et al. (2018), the top management team's political ties have limitations in enhancing innovation and may exert a negative influence when resources are under government control (Sheng et al., 2011). Nonetheless, cluster companies receive government subsidies for R&D, stimulating private investment in this area and positively impacting innovative Performance. Knowledge transfer from international partners fosters investment in R&D and enables companies to assimilate global knowledge (Kapetaniou & Lee, 2019). Therefore, the solid political ties of TMTs in cluster companies enable them to efficiently obtain resources for innovation through international open innovation. Consequently, it is presumed that:

H16b: The positive moderating influence of TMT's political ties on the relationship between IOI and innovative performance will vary significantly depending on whether companies are part of a cluster or not.

By formulating specific policies and regulations on cluster initiatives, the government supports constructing a business network platform for international open innovation (Jiao et al., 2023; Pongsakornrungsilp et al., 2021). A cluster company can acquire marketing resources more quickly through its connections with the government. Strong political ties are also useful for building trust and reciprocity between companies and other actors (Dai et al., 2018). As opposed to those that are not, companies in clusters establish relationships with government authorities,

allowing them to be better received by international partners and enhance their reputation (Jiao et al., 2023). This, in turn, contributes to brand positioning. Considering these assumptions, we contend that:

H16c: The positive moderating influence of TMT's political ties on the relationship between IOI and brand performance will vary significantly depending on whether companies are part of a cluster or not.

5.3 Methodology

This study relied on survey data collected from international Colombian companies. The population framework was initially defined by the 11,700 companies registered in the National Association of Foreign Trade (ANALDEX, 2023) and the 360,000 companies that are part of the 161 Cluster initiatives in Colombia (Red Cluster Colombia, 2024). To achieve a representative sample size with a 5% margin of error and a 95% confidence level, 400 companies were selected, of which 158 do not belong to the Red Cluster Colombia network, while 242 do. Of the 242 companies, 115 are in the food sector within the cocoa (24), coffee (12), meat (16), fruits (17), dairy (11), macro snacks (13), and white protein (22) clusters. The remaining 127 companies belong to other clusters such as beauty (21), aerospace (19), digital economy (19), smart energy (15), experiences (15), fashion (16), health and clinical excellence (13), and tourism (13). 72.8% are large, 22.5% are medium-sized, and 4.8% are small enterprises.

The information was provided by those responsible for international activities and research, usually a senior executive. A self-administered questionnaire was used, which was pre-tested with five executives for adjustments. Data collection was conducted during the third quarter by an independent research firm, thus ensuring confidentiality

5.3.1 Measures

The IEC scale is a second-order construct consisting of 23 items, which was reduced to 21 after the pretest, eliminating two items related to international entrepreneurial orientation. Following the principles of Hair et al. (2019), items with loadings below 0.5 were discarded. In this first stage, the IEC scale remained with 7 items; the elimination of 16 items suggests that this scale may not be the most suitable for measuring IEC due to the context and type of companies studied, which is one of the study's limitations. International motivation and international learning orientation were excluded because only one item showed significant loading values. The International Entrepreneurial Orientation (IEO) scale was reduced to 3 items, focusing on proactivity, new operational technologies, and marketing new product or service lines. Three items were removed from the International Market Orientation (IMO), leaving 2 items centered

on developing products and services based on international market information and understanding how international customers value their products. Finally, the International Network Orientation (INO) was limited to 2 items, indicating that these companies do not collaborate with competitors but establish networks with non-competitors for joint research and marketing and advertising activities.

Additionally, although item loadings for other constructs exceeded 0.7, some items presented correlation and collinearity issues during model fitting. As a result, 6 items of international open innovation (IOI) were retained, addressing the active search for international partnerships to acquire knowledge and technology, incorporation of technology and knowledge from foreign partners in R&D, as well as buying and selling intellectual property. Three items of international exploration were retained, involving hiring R&D talents, searching for technological and marketing resources, and acquiring global managerial knowledge and business data. On the other hand, international exploitation was reduced to 3 items, focused on leveraging technological advantages, understanding foreign customer requirements, and strengthening contacts in current international markets.

The absorptive capacity initially consisted of 6 items, of which 3 remained. These addressed the search, analysis, interpretation, identification, acquisition, and understanding of external knowledge necessary for the company. Regarding environmental dynamism, 3 items were retained, evaluating how production methods and new business models evolve frequently and rapidly in the industry or sector.

Dependent variables were assessed with subjective measures; following the Falahat et al. (2020) scale, 7 items were used, of which 3 remained, including benefits from international sales, market coverage, and market knowledge enhancement. Mendes et al. (2023) scale was utilized to assess innovative Performance in the past 3 years, with 5 items, of which 3 remained related to innovations in goods and services, organizational forms, and new marketing methods. To evaluate brand performance, Iyer et al. (2021) scale with 5 items was used, of which 3 remained related to image and reputation, brand positioning, and overall brand performance.

The moderating variables were the Top Management Teams' (TMT) business and political ties in their primary international market, using the scale from Wu & Chen (2020). Business ties consisted of 4 items, with 2 remaining: cooperation with suppliers and competitors. Political ties comprised 4 items, with 2 remaining: close relationships with government officials and government and agency resource contributions to support international operations.

5.4 Results

To calculate the proposed research model, SmartPLS software was employed, which is an appropriate option for conducting structural equation modeling analyses in studies requiring a flexible, robust, and user-friendly approach, especially when working with small samples or complex models (Henseler et al., 2016). The model contains IEC as a second-order construct and international ambidexterity as a formative construct. PLS model analysis involves two steps: (1) measurement model evaluation and (2) structural model evaluation. Subsequently, multigroup analysis is examined using MICOM to study invariance and PLS-MGA to analyze group differences.

First, all reflective first-order constructs' reliability and convergent validity were assessed. As shown in Table 5-1, all factor loading values exceed the threshold of 0.5. For the first-order constructs OEI, IP, BP, BT, and PT, Cronbach's alpha is below 0.6, recommended in exploratory studies (Hair et al., 2017); the other constructs exceeded reliability and convergent validity.

Table 5-2 shows IEC as a second-order construct. The INO had collinearity problems with the model, so the construct was eliminated. The AVE, composite reliability, and Cronbach's alpha exceeded the values suggested by Hair et al. (2019). Furthermore, the constructs met the HTMT (Heterotrait-Monotrait) criterion, and all HTMT values were less than 1, as shown in Tables 5 and 3.

Table 5-1. Reliability and convergent validity of the first-order reflective construct.

Items	Outer loadings			Cronbach's Alpha			Composite reliability			AVE		
	Comp	Y/ Cluster	N/Cluster	Comp	Y/ Cluster	N/Cluster	Comp	Y/ Cluster	N/Cluster	Comp	Y/ Cluster	N/Cluster
International Entrepreneurial Orientation (IEO)				0.660	0.685	0.623	0.806	0.817	0.792	0.584	0.600	0.562
OEI1	0.815	0.809	0.828									
OEI4	0.817	0.836	0.782									
OEI6	0.648	0.667	0.623									
International Market Orientation (IMO)				0.718	0.772	0.597	0.875	0.897	0.831	0.779	0.814	0.711
IMO 2	0.859	0.884	0.811									
IMO 3	0.905	0.919	0.875									
International Network Orientation (INO)				0.784	0.812	0.737	0.898	0.910	0.878	0.816	0.836	0.783
INO4	0.860	0.877	0.828									
INO5	0.945	0.950	0.938									
International Exploration (IEX)				0.809	0.817	0.793	0.886	0.891	0.876	0.723	0.732	0.703
IEX1	-0.902	-0.911	-0.884									
IEX2	-0.815	-0.816	-0.818									
IEX7	-0.83	-0.837	-0.812									
International Exploitation (IEXP)				0.867	0.867	0.866	0.919	0.919	0.918	0.791	0.791	0.790
IEXP1	0.851	0.841	0.862									
IEXP7	0.943	0.947	0.936									

IEXP8	0.873	0.877	0.866									
International Open Innovation (IOI)				0.872	0.867	0.879	0.913	0.910	0.917	0.724	0.716	0.735
IOI1	0.845	0.860	0.823									
IOI3	0.789	0.756	0.831									
IOI5	0.914	0.904	0.928									
IOI6	0.851	0.858	0.842									
International Performance (IP)				0.617	0.610	0.633	0.785	0.778	0.799	0.550	0.541	0.570
IP1	0.761	0.757	0.743									
IP3	0.769	0.788	0.774									
1P6	0.703	0.653	0.748									
Innovation Performace (INP)				0.718	0.739	0.683	0.831	0.842	0.812	0.622	0.642	0.593
INP1	0.748	0.773	0.702									
INP4	0.885	0.888	0.882									
INP5	0.724	0.735	0.713									
Brand Performance (BP)				0.663	0.640	0.695	0.814	0.804	0.829	0.594	0.579	0.618
BP3	0.760	0.767	0.758									
BP4	0.719	0.679	0.773									
BP5	0.830	0.829	0.826									
Absorptive Capacity (AC)				0.881	0.885	0.878	0.927	0.929	0.924	0.808	0.813	0.803
AC1	0.905	0.908	0.906									
AC5	0.865	0.869	0.859									
AC6	0.925	0.926	0.923									
Business Ties (BT)				0.641	0.659	0.613	0.843	0.850	0.832	0.730	0.740	0.714
BT2	0.794	0.805	0.777									

BT3	0.911	0.912	0.908									
Political Ties (PT)				0.678	0.674	0.685	0.850	0.843	0.860	0.741	0.731	0.755
PT1	0.794	0.743	0.815									
PT4	0.911	0.954	0.919									
Environment Dynamism (ED)				0.871	0.882	0.848	0.938	0.943	0.928	0.883	0.892	0.865
ED1	0.920	0.926	0.906									
ED2	0.959	0.962	0.953									

Table 5-2. Reliability and convergent validity of the second-order reflective construct.

Items	**Outer loadings**			**Cronbach's Alpha**			**Composite reliability**			**AVE**		
	Comp	Y/ Cluster	N/Cluster	Comp	Y/ Cluster	N/Cluster	Comp	Y/ Cluster	N/Cluster	Comp	Y/ Cluster	N/Cluster
International Entrepreneurial Culture (IEC)												
IEO	0.888	0.859	0.916	0.749	0.757	0.741	0.888	0.889	0.884	0.799	0.801	0.792
IMO	0.900	0.929	0.863									

Table 5-3. Evaluation of discriminant validity (Fornell-Larcker criterion).

Dataset	**Construct**	**AC**	**BP**	**BT**	**ED**	**IEC**	**INP**	**IOI**	**IP**	**PT**
	AC									

Complete N=400 (All international company)	BP	0.478							
	BT	0.472	0.732						
	ED	0.446	0.344	0.303					
	IEC	0.087	0.617	0.863	0.184				
	INP	0.349	0.683	0.859	0.489	0.648			
	IOI	0.853	0.769	0.836	0.605	0.289	0.587		
	IP	0.235	0.568	0.834	0.552	0.233	0.548	0.574	
	PT	0.345	0.830	0.363	0.550	0.460	0.247	0.396	0.350
Yes cluster N=242	AC								
	BP	0.518							
	BT	0.507	0.752						
	ED	0.400	0.346	0.307					
	IEC	0.103	0.623	0.890	0.169				
	INP	0.368	0.713	0.857	0.503	0.630			
	IOI	0.877	0.738	0.873	0.588	0.347	0.621		
	IP	0.239	0.572	0.767	0.635	0.236	0.548	0.560	
	PT	0.327	0.784	0.368	0.635	0.470	0.240	0.346	0.334
Not cluster N=158	AC								
	BP	0.478							
	BT	0.472	0.732						
	ED	0.446	0.344	0.303					
	IEC	0.087	0.617	0.863	0.184				
	INP	0.349	0.683	0.859	0.489	0.648			
	IOI	0.853	0.769	0.836	0.605	0.289	0.587		
	IP	0.235	0.568	0.834	0.552	0.233	0.548	0.574	
	PT	0.345	0.830	0.363	0.550	0.460	0.247	0.396	0.350

Regarding the assessment of international ambidexterity as a formative construct, the evaluation and significance of the weights are appropriate, and the collinearity of the indicators, determined by the variance inflation factor (VIF), is below the critical value of five (Hair et al., 2019), confirming the absence of collinearity issues. Each dimension's relative and absolute importance was analyzed through its outer loadings, and the significance level was obtained using the bootstrapping procedure.

Table 5-4. Collinearity weights and loadings of the second order

Higher-order construct	Lower-order construct	Complete			Y/ Cluster			N/Cluster		
		VIF	Outer weight	Outer loading	VIF	Outer weight	Outer loading	VIF	Outer weight	Outer loading
IAMB	IEX	1.293	0.565***	0.850***	1.301	0.611***	0.876***	1.265	0.496***	0.803***
	IEXP	1.293	0.599***	0.868***	1.301	0.551***	0.844***	1.265	0.670***	0.897***

5.4.1 Structural Model Evaluation

Figure 5-1. Structural model of companies that do belong to a cluster

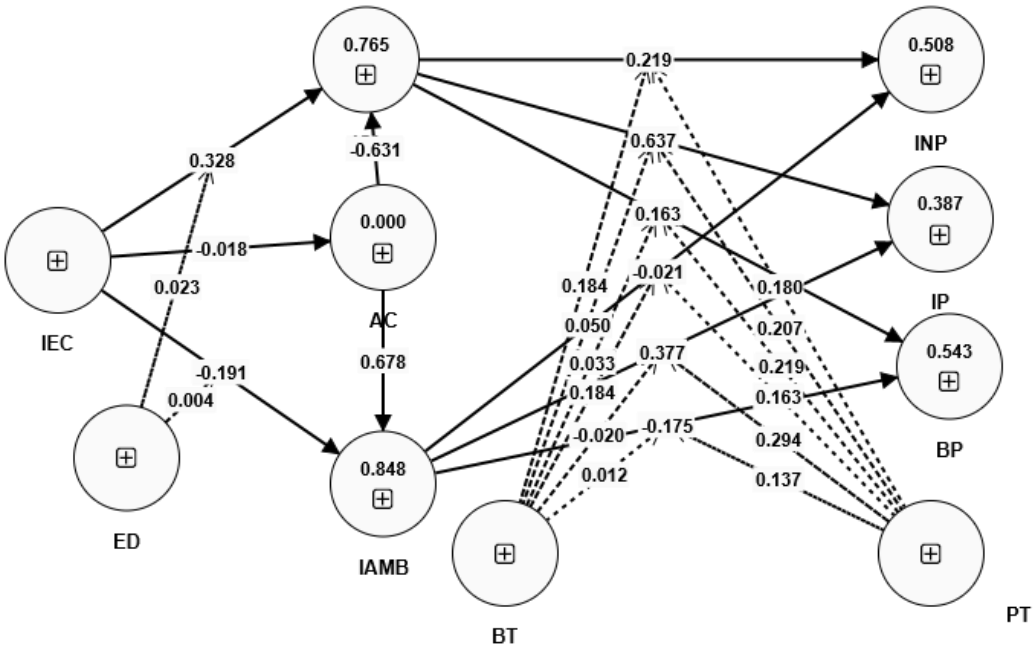


Figure 5-2. Structural model of companies that do not belong to a cluster

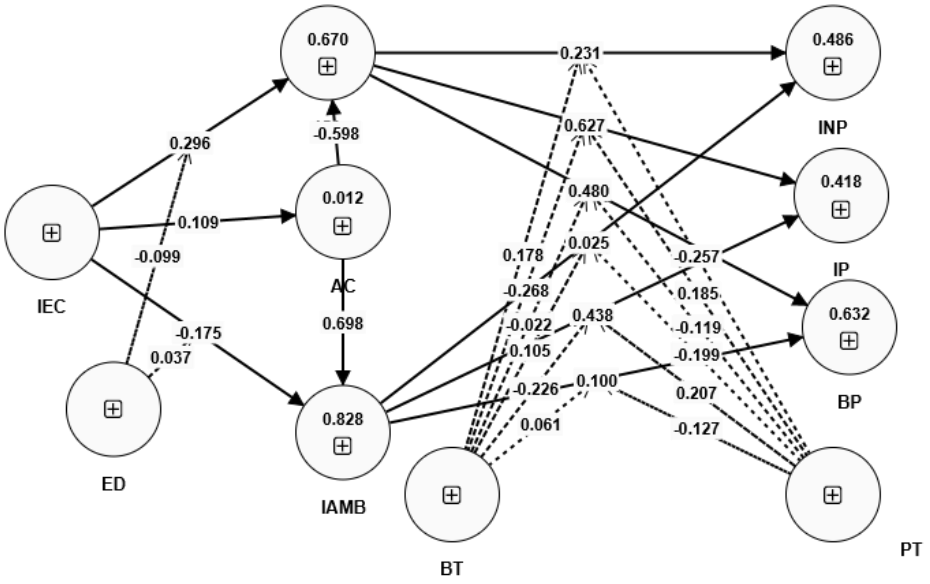


Table 5-5 shows that the R2 of absorptive capacity (AC) was below 0.2; however, the other constructs are above this suggested value both in the complete model and among the groups. According to Hair et al. (2017), values of 0.75, 0.50, and 0.25 can be considered strong, moderate, and weak, respectively. The model exhibits poor fit with a standardized root mean square residual (SRMR) indicator of approximately 0.13. According to Hair et al. (2019), these values may vary depending on the context and complexity of the model. To enhance the predictive power, the predictive relevance indicator Q2 was calculated. Hair et al. (2018) suggested that values above 0.35 indicate that, for an endogenous construct, an exogenous construct has significant predictive relevance. Absorptive capacity had the lowest value across all samples.

To evaluate the hypothetical model using PLS-SEM, 5000 iterations were considered. The results (Table 5-5, Figures 5-1 and 5- 2) show that the H1: IEC -> IAMB relationship is significant but negative. H2: IEC -> IOI and H3: IAMB -> IP have significant and positive relationships in the complete sample and in the groups that belong and do not belong to clusters. H4: IAMB -> INP and H5: IAMB -> BP relationships were insignificant in the overall sample or the two groups, demonstrating that international ambidexterity does not impact innovative performance or brand performance.

H6: IOI -> IP exhibits a significant positive relationship in the complete sample and both groups. H7: IOI -> INP was found to be insignificant in the non-cluster companies' sample, while it was significant in the cluster and overall samples. Conversely, H8: IOI -> BP was not significant for cluster companies but was significant in the non-cluster and overall samples.

Regarding the moderating effect of environmental dynamism, no effects were found in any sample for H11: ED x IEC -> IAMB or H12: ED x IEC -> IOI. Similarly, the moderating role of

TMT's business ties in the relationship between international ambidexterity and international innovation and brand performance could not be confirmed in any sample. H14a: PT x IAMB -> IP was insignificant for non-cluster companies but significant in cluster companies and the overall sample.

In contrast, both in the complete sample and in the groups H14b: PT x IAMB -> INP and H14c: PT x IAMB -> BP, TMT's political ties did not moderate the relationship between international ambidexterity and innovative and brand performance. Additionally, H15a: BT x IOI -> IP and H15c: BT x IOI -> BP, TMT's business ties did not moderate the relationship between international open innovation and international and brand performance. However, H15b: BT x IOI -> INP was significant for the overall sample but not for the groups.

It was demonstrated that TMT's political ties affect the relationship between international open innovation and international performance only for the complete sample (H16a: PT x IOI -> IP). While TMT's political ties affect the relationship between international open innovation and innovative performance only in non-cluster companies, this relationship is negative (H16b: PT x IOI -> INP). In the case of H16c: PT x IOI -> BP, it was only significant in cluster companies.

Regarding hypotheses 9 and 10, Table 5-5 shows that the relationship AC -> IAMB is positive, AC -> IOI is significant and negative, but IEC -> AC is not significant; therefore, there is no mediating role of absorptive capacity for the complete sample or the groups.

Table 5-5. Result of the structure model and Multi-group analysis.

		Complete			Yes Cluster			Not Cluster			Difference (YES CLUSTER - NOT CLUSTER)	p value	N/Y
Hyp	**Relationship**	**Path Coefficient**	**t-Value**	**P- values**	**Path Coefficient**	**t-Value**	**P- values**	**Path Coefficient**	**t-Value**	**P- values**			
H1	IEC -> IAMB	-0.177	6.780	**0.000*** **	-0.191	5.604	**0.000*** **	-0.175	4.061	**0.000*** **	-0.016	0.389	
H2	IEC -> IOI	0.304	10.916	**0.000*** **	0.328	9.219	**0.000*** **	0.296	5.971	**0.000*** **	0.032	0.300	
H3	IAMB -> IP	0.383	3.504	**0.001*** **	0.377	2.526	**0.012** **	0.438	2.507	**0.012** **	-0.061	0.394	
H4	IAMB -> INP	0.024	0.276	0.756	-0.021	0.179	0.858	0.025	0.179	0.858	-0.046	0.399	
H5	IAMB -> BP	-0.072	0.880	0.410	-0.175	1.502	0.133	0.100	0.872	0.383	-0.275	**0.047**	**N**
H6	IOI -> IP	0.632	5.120	**0.000*** **	0.637	3.773	**0.000*** **	0.627	3.019	**0.003** **	0.011	0.487	
H7	IOI -> INP	0.247	2.521	**0.012** **	0.219	1.692	**0.091***	0.231	1.473	0.141	-0.012	0.475	
H8	IOI -> BP	0.290	3.047	**0.002*** **	0.163	1.201	0.230	0.480	3.817	**0.000*** **	-0.317	**0.044**	**N**
H9,H10	IEC -> AC	0.037	0.768	0.443	-0.018	0.292	0.770	0.109	1.340	0.180	-0.128	0.108	
H9	AC -> IAMB	0.689	22.960	**0.000*** **	0.678	16.373	**0.000*** **	0.698	15.936	**0.000*** **	-0.020	0.371	
H10	AC -> IOI	-0.622	24.269	**0.000*** **	-0.631	20.453	**0.000*** **	-0.598	12.611	**0.000*** **	-0.034	0.275	
H11	ED -> IAMB	-0.386	10.999	**0.000*** **	-0.406	9.096	**0.000*** **	-0.357	5.959	**0.000*** **			
H11	ED x IEC -> IAMB	0.009	0.370	0.711	0.004	0.134	0.893	0.037	0.832	0.405	-0.034	0.260	
H12	ED -> IOI	0.339	12.190	**0.000*** **	0.350	10.720	**0.000*** **	0.338	6.271	**0.000*** **			
H12	ED x IEC -> IOI	-0.007	0.275	0.783	0.023	0.884	0.377	-0.099	1.613	0.107	0.122	**0.037**	**N**
H13a	BT x IAMB -> IP	-0.065	0.726	0.468	-0.020	0.174	0.862	-0.226	1.505	0.132	0.206	0.138	

H13b	BT x IAMB -> INP	0.122	1.368	0.171	0.184	1.578	0.115	0.105	0.772	0.440	0.079	0.328	
H13c	BT x IAMB -> BP	0.060	0.742	0.458	0.012	0.103	0.918	0.061	0.477	0.634	-0.049	0.388	
H14a	PT x IAMB -> IP	0.261	2.583	**0.010****	0.294	2.115	**0.034****	0.207	1.410	0.159	0.087	0.334	
H14b	PT x IAMB -> INP	-0.007	0.081	0.935	0.163	1.419	0.156	-0.199	1.395	0.163	0.362	**0.024**	**N**
H14c	PT x IAMB -> BP	0.019	0.217	0.828	0.137	1.247	0.213	-0.127	0.908	0.364	0.264	0.072	
H15a	BT x IOI -> IP	-0.037	0.395	0.693	0.050	0.435	0.664	-0.268	1.600	0.110	0.318	0.057	**N**
H15b	BT x IOI -> INP	0.154	1.713	**0.087***	0.184	1.617	0.106	0.178	1.197	0.231	0.005	0.492	
H15c	BT x IOI -> BP	0.038	0.394	0.694	0.033	0.258	0.796	-0.022	0.140	0.889	0.055	0.391	
H16a	PT x IOI -> IP	0.218	2.270	**0.023****	0.207	1.424	0.155	0.185	1.306	0.192	0.022	0.462	
H16b	PT x IOI -> INP	-0.034	0.407	0.684	0.180	1.559	0.119	-0.257	1.984	**0.047***	0.437	**0.007**	**N**
H16c	PT x IOI -> BP	0.075	0.834	0.404	0.219	1.820	**0.069***	-0.119	0.827	0.408	0.338	**0.037**	**Y**

	R-square	**Q²predict**	**R-square**	**Q²predict**	**R-square**	**Q²predict**
AC	0.001	-0.002	0.000	-0.008	0.012	-0.002
BP	0.569	0.472	0.543	0.454	0.632	0.497
IAMB	0.842	0.363	0.848	0.380	0.828	0.331
INP	0.488	0.481	0.508	0.496	0.486	0.441
IOI	0.721	0.329	0.765	0.359	0.670	0.293
IP	0.387	0.267	0.387	0.260	0.418	0.280
SRMR	**0.135**		**0.137**		**0.136**	

*Relationships are significant at P < 0.10

5.4.2 Multigroup Analysis

When addressing the study of comparison impact using PLS-SEM and aiming to verify its moderating nature, it is essential to follow a meticulous process to avoid potential errors. To achieve this, the calculation of measurement invariance through MICOM (Hair et al., 2018) should be conducted initially. This methodology ensures that potential variations observed are solely attributable to the moderating variable, ruling out any influence derived from potential differences in measurement models across different groups (Henseler et al., 2016). Once this phase is completed, the PLS-MGA analysis is performed, specifically designed to assess the moderating effect of belonging or not belonging to a particular cluster (Cheah et al., 2023).

The findings of the MICOM procedure are detailed in Table 5-6, broken down into three stages. In Step 1, the evaluation of configurational invariance is addressed, ensuring indicator uniformity across all measurement models (Henseler et al., 2016). In Step 2, compositional invariance is examined, where initial correlation values are compared with the 5% quantile and p-value (Cheah et al., 2023). Results in the table indicate that all permutation c-values (=1) fall within the 98.31% confidence interval, confirming compositional invariance (Cheah et al., 2023). In Step 3, the equality of composite means and variances is evaluated, a final requirement to establish complete invariance (Henseler et al., 2016). These results are crucial in determining partial or total invariance, supporting previous analyses. Confirming total invariance across all three steps lays the groundwork for MGA.

After completing the MICOM procedure, MGA was conducted using datasets from international companies belonging to and not belonging to clusters. Table 5-5 illustrates the results of path coefficients between different groups. Table 5-5 illustrates the results of path coefficients between different groups. The only hypothesis fulfilled was H16c, where the moderating impact of TMT political ties on the relationship between international open innovation and innovative brand performance is more substantial in companies belonging to a cluster than those that do not. The results indicate that in companies not belonging to a cluster, the impact of international ambidexterity on brand performance is more significant compared to companies belonging to a cluster. Similarly, international open innovation in companies not belonging to the cluster will be more strongly affected by brand performance than in cluster-affiliated companies.

On the other hand, the moderating effect of environmental dynamism on the IEC-IOI relationship is stronger in cluster companies than in non-cluster companies. The moderating impact of TMT's political ties on the relationship between international ambidexterity and innovative performance is stronger in cluster companies than in non-cluster companies. The moderating impact of TMT's business ties on the relationship between international open innovation and international performance is stronger in cluster companies than in non-cluster companies.

Table 5-6. Results of invariance measurement testing using permutation

					Step 3				
	Step 1	Step 2			Equal Mean Value		Equal variances		
Construct	Configural Invariance	c = 1	Confidence Interval	Compositional Invariance	Differences	Confidence Interval	Differences	Confidence Interval	Full Measurement Variance
AC	yes	1.000	[1.000; 1.000]	yes	-0.136	[-0.213 ; 0.196]	1.000	[-0.257 ; 0.304]	yes
BP	yes	0.998	[0.998; 0.994]	yes	0.069	[-0.213 ; 0.190]	0.998	[-0.272 ; 0.258]	yes
BT	yes	1.000	[0.999 ; 0.996]	yes	-0.031	[-0.207 ; 0.195]	1.000	[-0.244 ; 0.258]	yes
ED	yes	1.000	[1000 ; 0.999]	yes	0.185	[-0.199 ; 0.209]	1.000	[-0.263 ; 0.273]	yes
IAMB	yes	0.991	[0.995 ; 0.980]	no	-0.219	[-0.214 ; 0.203]	0.991	[-0.245 ; 0.258]	yes
IEC	yes	0.991	[0.994 ; 0.978]	yes	-0.132	[-0.208 ; 0.196]	0.991	[-0.319 ; 0.310]	yes
INP	yes	0.999	[0.997 ; 0.992]	yes	-0.003	[-0.214 ; 0.187]	0.999	[-0.266 ; 0.287]	yes
IOI	yes	1.000	[1000 ; 0.999]	yes	0.169	[-0.215 ; 0.191]	1.000	[-0.233 ; 0.255]	yes
IP	yes	0.996	[0.994 ; 0.980]	yes	0.036	[-0.210 ; 0.202]	0.996	[-0.227 ; 0.257]	yes
PT	yes	0.994	[0.998 ; 0.991]	yes	0.071	[-0.188 ; 0.192]	0.994	[-0.275 ; 0.268]	yes

5.5 Discussions

This study focuses on investigating the impact of international dynamic capabilities on the performance of international companies, analyzing the moderating role of cluster membership. Additionally, it examines the influence of IEC as a precursor to international dynamic capabilities. It evaluates the mediating effect of absorptive capacity and the moderating role of environmental dynamism in this relationship. Furthermore, it considers the political and business ties of TMTs as enhancers of international dynamic capabilities and performance.

A strong international orientation—characterized by market proactivity, tailored product development, and foreign customer understanding—appears to constrain firms' capacity for simultaneous exploration of new markets and exploitation of existing ones. This finding demonstrates consistent validity across diverse firm types (Mendes et al., 2023) and may reflect Ferrary's (2011) cluster specialization principle, which suggests optimal performance occurs when firms specialize in either exploration or exploitation activities, as few possess the cultural and organizational resources to effectively pursue both strategies concurrently.

On the other hand, despite the findings suggesting that international companies promote IEC to effectively acquire external innovative resources through international collaborations (Dimitratos et al., 2012), no significant difference was observed between international companies that belong and not to clusters. International companies promote an open culture like the IEC to promote knowledge exchange processes with international partners. These findings contradict Nestlé et al. (2019), who found that belonging to a cluster initiative enhances the positive effects of establishing an entrepreneurial culture for open innovation.

International ambidexterity positively impacts international performance, yet the difference between companies within and outside clusters is insignificant. These findings challenge previous research, such as those by Sharma et al. (2019), which suggested that belonging to conglomerates facilitated the exploitation and exploration of advantages, leading to high performance. International companies from economies without the need to belong to a cluster can enhance their sales and expand their international reach by hiring talent in R&D and international marketing and obtaining information about global business (international exploration) while leveraging their technological advantages and strengthening their connections in international markets (international exploitation).

The relationship between international ambidexterity and innovative performance lacked empirical support. No significant differences were observed between cluster and non-cluster companies, and the relationship was not statistically significant, consistent with Guo et al. (2020), contradicting Camisón et al. (2017) and Wu & Chen (2020). Companies struggle to integrate

knowledge from new and established markets to drive innovation in products, services, organizational forms, and marketing methods. The inability to efficiently reconfigure resources in international environments limits the exploitation of technological development.

It was demonstrated that although international ambidexterity does not significantly affect brand performance in both groups, multigroup analysis revealed a significant disparity between these groups. Specifically, a greater impact of international ambidexterity on brand performance is observed in companies not part of a cluster. These findings contradict the claims of other researchers (Scheer & von Zallinger, 2007; Pongsakornrungsilp et al., 2021), who argued that belonging to a cluster would confer a better international reputation to the company.

It was confirmed that international open innovation positively and significantly impacts international performance, aligning with previous research (Yoon et al., 2020; Zahoor et al., 2021). However, the difference between cluster and non-cluster companies is not significant. Active collaboration with international partners to acquire knowledge, innovations, and intellectual property drives sales and entry into new international markets. International performance is not linked to cluster membership, challenging those who argue otherwise (Pineda-Ospina et al., 2020).

The results suggest that the relationship between international open innovation and innovative performance is similar among companies inside and outside clusters. However, cluster companies experience a positive impact of international open innovation on innovating in products, organizational forms, and new marketing methods. These findings align with previous research (Fu et al., 2022; Ryu et al., 2021), indicating that international companies in developing countries leverage local connections and international networks to enhance their innovative performance.

The impact of international open innovation on brand performance differs between cluster and non-cluster companies. Contrary to the belief that cluster reputation and image would favor this relationship (Huber, 2012), a stronger influence was observed in non-cluster companies. Collaboration with international partners in these companies significantly contributes to positioning brands in international markets (Agostini et al., 2017). In contrast, in cluster companies, this relationship lacks relevance, suggesting that the cluster image in Colombia still needs to be stronger compared to international markets.

No significant difference was found in the mediating role of absorptive capacity between international ambidexterity and IEC in both companies. Additionally, this mediating role in international companies needed to be more relevant, contradicting previous studies (Peng & Lin, 2021; Peng et al., 2023). Although absorptive capacity enables companies to leverage existing competencies and develop new ones through assimilated knowledge (Cohen & Levinthal, 1990), improving international ambidexterity, there is no significant relationship between IEC and

absorptive capacity. This suggests that IEC is optional for acquiring and assimilating new knowledge.

No significant difference was found in the mediating role of absorptive capacity between IOI and IEC in both companies. IEC has a greater direct impact on international open innovation. Contrary to popular belief, a strong absorptive capacity may decrease knowledge exchange with international partners. Naqshbandi and Tabche (2018) attribute this finding to a scarcity of resources and highly specialized personnel to assimilate knowledge from international partners. This suggests that absorptive capacity may be less relevant at national and international levels (Kapetaniou & Lee, 2019).

It was demonstrated that there is no significant difference in the moderating role of environmental dynamism in the relationship between IEC and IAM in both companies, and its moderating impact was not statistically significant. This result contradicts previous research (Buccieri et al., 2020). Conversely, it was observed that the moderating effect of environmental dynamism on the IEC-IOI relationship is more pronounced in cluster companies than in non-cluster companies. However, this moderating effect did not reach statistical significance in either group of companies. In clusters characterized by intense competition and high instability, knowledge is available internally and shared with local and international partners.

The present study did not demonstrate a significant difference in the moderating role of TMT's business ties in the relationships between international ambidexterity and international, innovative, and brand performance, either for companies that are part of a cluster or those that are not. Likewise, no significant effect of these relationships was observed among different groups of companies. These results contradict previous research (Wu & Chen, 2020) and corroborate that for international companies from emerging countries, ties with suppliers and competitors have limited contributions to performance and resource integration through international exploitation and exploration.

The analysis of the moderating influence of TMT's political ties on the relationship between international ambidexterity and international performance revealed no significant variation among the different groups. However, it was observed that in cluster companies, TMT's political ties positively moderate this relationship. This finding underscores the importance of access to government programs offering financial support, subsidies, and tax exemptions, facilitating emerging market companies' development of international ambidexterity and improvement of their performance in areas such as sales and positioning in foreign markets (Lu et al., 2010).

It was found that the moderating impact of TMT's political ties on the relationship between international ambidexterity and innovative performance is stronger in cluster companies compared to non-cluster ones. However, the moderating effect was not significant for both

groups. The nonsignificant results may be explained by the TMT's underutilization of governmental opportunities and additional factors such as the type of government or the rotation of officials that do not allow for innovative development (Sheng et al., 2011). Additionally, no significant difference was found in the moderating impact of TMT's political ties on the relationship between ambidexterity and brand performance, and the effect was not significant for both groups. TMT's political ties do not contribute to improving the image and reputation of international companies through international ambidexterity.

On the other hand, it was confirmed that the moderating impact of TMT's business ties on the relationship between international open innovation and international performance is stronger in cluster companies compared to non-cluster ones. However, the relationships were not significant. It was evidenced that the ties of cluster companies with suppliers and competitors in their network, combined with ties with international partners, will be stronger; however, this does not generate higher performance in international markets. It was demonstrated that TMT's business ties need to strengthen cooperation with international partners, achieving better innovative performance and improving the image and reputation in the market. This result is characteristic of both cluster and non-cluster companies.

It was determined that TMT's political ties in both cluster and non-cluster companies show little variation in their moderating capacity between open innovation and international performance. However, the moderating impact of these ties on the relationship between international open innovation and innovative performance is more pronounced in cluster companies. Although this effect was negative for non-cluster companies, it was insignificant for cluster companies. These findings are consistent with previous research indicating that the influence of political actors does not improve innovation performance (Kapetaniou & Lee, 2019).

On the other hand, our findings confirmed that the moderating impact of TMT's political ties on the relationship between international open innovation and brand performance is more prominent in companies that are part of a cluster than those that are not. Solid political ties in the TMT are revealed as a relevant factor in cultivating trust and improving the reputation with international partners (Jiao et al., 2023). This political and social capital positions the cluster and the companies' brand in international markets. Consequently, in clusters, the high-level management team can create a more conducive environment for international open innovation to strengthen the company's brand internationally.

5.5.1 Theoretical Contribution

The main contribution of our work is that it helps narrow the gap in the academic literature on international dynamic capabilities that should be studied in the context of clusters. Although there are some works based on the cluster approach, the novelty of our work lies in that it not only aims to understand whether companies belonging to a cluster have higher international dynamic capabilities but also establishes a direct relationship with both international and innovative performance and branding.

The agglomeration theory posits that geographic proximity enables companies to leverage positive externalities (Porter, 1998) and that clusters enhance firms' performance through knowledge exchange (Tallman et al., 2004). Additionally, it is argued that international dynamic capabilities drive performance (Teece, 2023). Contrary to theoretical expectations, our analysis reveals that cluster participation significantly enhances two key mechanisms: (1) international ambidexterity's positive effect on foreign market performance, and (2) international open innovation's capacity to drive three strategic outcomes: (a) sales growth, (b) market expansion, and (c) innovation development. These findings suggest that geographical agglomeration creates unique ecosystem advantages that amplify dynamic capability effectiveness. However, it was demonstrated that these results are not attributable to firms' participation in clusters but to the international dynamic capabilities they have forged in international markets.

However, the results highlighted the importance of TMT's political ties in cluster companies to enhance the impact of international open innovation on brand performance and improve the company's positioning in international markets by constructing political and social capital. This underscores the relevance of clusters and political relations in brand management and the internationalization of companies in developing countries. Faced with these findings, it is evident that the success of clusters in Colombia is not characterized by the crucial role of learning and knowledge diffusion by actors.

The results challenge the traditional conception that a strong absorptive capacity facilitates knowledge exchange with international partners. The relevance of absorptive capacity may vary between national and international contexts, highlighting the complexity of innovation management in a globalized environment (Kapetaniou & Lee, 2019). Additionally, it was found that while an organizational culture like IEC may be effective in enhancing collaboration with international partners, more is needed to explore and exploit resources abroad simultaneously. Regarding moderating roles, environmental dynamism had no effect, suggesting that international companies adapt to dynamic markets. It was also evidenced that, in emerging countries, TMT's political ties are more effective than business ties in improving the performance of international dynamic capabilities.

5.5.2 Practical Contribution

Our findings offer relevant insights for companies operating in clusters. The importance of these companies having a TMT with strong political ties to effectively position their brands in international markets and collaborate with foreign partners is emphasized. Additionally, it is observed that high IEC facilitates innovation management, but not necessarily international ambidexterity. To collaborate with international partners, companies need to develop less absorptive capacity, while to benefit from international ambidexterity, they need to increase their absorptive capacity. Finally, in emerging countries, managers of international companies should focus on developing political rather than business ties to improve their performance through international dynamic capabilities.

The study's results confirm that belonging to a cluster is optional for companies to accumulate knowledge and develop ambidexterity. In some regions of Latin America, clusters still need to meet governmental expectations regarding innovation and economic development due to a lack of cooperation among involved actors. Therefore, it is suggested that governments rethink their policies, as their main contribution is reflected in the image and reputation of clusters, but not necessarily in companies' profitability and innovative capacity. For companies belonging to clusters in Colombia, it is crucial to establish trust relationships that foster knowledge exchange and creation. In summary, it is essential for these companies to develop their social capital to enhance their competitiveness and innovative capacity in the cluster context.

5.5.3 Limitations and Future Research

One of the highlighted limitations of this study lay in the structure of the scale used to evaluate IEC, which was simplified to two dimensions: IEO and IMO. This simplification suggests that the scale used is more suitable for emerging international companies than those already established in the market. Therefore, the recommendation is proposed to develop a new, more appropriate measurement scale that encompasses the complexities and nuances of IEC in both types of companies. The heterogeneity of the cluster sample could have been a limitation. Future research is recommended to segment the sample according to specific sectors to obtain more precise results. Relationships of interest for further research were identified, such as the direct effects of absorptive capacity and IEC on cluster company performance and the mediating role of international dynamic capabilities in the relationship between IEC and AC. Multigroup analysis

could reveal how the moderating effect of environmental dynamism varies in the relationship between IEC, IOI, BP, and IP in cluster and non-cluster companies. Additionally, exploring the mediating role of IAMB in the relationship between AC, BP, and IEC is suggested to understand the differences between groups.

Table 5-7. future lines of research

Relationship	Difference (YES CLUSTER - NOT CLUSTER)	1-tailed (YES CLUSTER vs NOT CLUSTER) p value	2-tailed (YES CLUSTER vs NOT CLUSTER) p value
ED x IEC -> IOI -> BP	0.051	0.044	0.044
ED x IEC -> IOI -> IP	0.077	0.038	0.038
AC -> IAMB -> BP	-0.188	0.952	0.048
IEC -> IAMB -> BP	0.051	0.048	0.048
Indirect effect			
Relationship	**Original sample (O)**	**T statistics (|O/STDEV|)**	**P values**
AC -> BP	-0.222	4.847	0.000
AC -> INP	-0.152	3.431	0.000
AC -> IP	-0.147	2.822	0.002
IEC -> BP	0.091	2.686	0.004
IEC -> INP	0.079	2.529	0.006
IEC -> IP	0.140	3.648	0.000
AC -> IOI -> IP	-0.401	3.683	0.000
IEC -> IOI -> IP	0.209	3.552	0.000
AC -> IAMB -> IP	0.256	2.419	0.008
IEC -> IAMB -> IP	-0.072	2.404	0.008
AC -> IOI -> INP	-0.138	1.687	0.046

CHAPTER 6

6 CONCLUSIONS

6.1 Discussions

The dynamic capabilities framework, originally proposed by Teece (1997), has become increasingly central to international business theory. As Teece (2023) emphasizes, these capabilities grow more critical as firms face rising environmental uncertainty and complexity, particularly in cross-border operations. A core tenet of this theory is its context-dependent nature (Teece et al., 1997); the capabilities that drive domestic success often differ markedly from those required in international contexts (Pinho & Prange, 2016). This imperative explains why firms from developing economies must cultivate specialized international dynamic capabilities to navigate diverse institutional and market environments effectively.

Indeed, in this dissertation, Chapter 2 mentions several international dynamic capabilities that firms have developed, such as global dynamic capabilities, international cultural ambidexterity, international marketing agility, international ambidexterity, and international open innovation, among others. However, after a comprehensive literature analysis, two capabilities emerged prominently: international ambidexterity and international open innovation. These capabilities encompass the managerial ability to innovate with international partners and coordinate resources and capabilities, which are essential factors for achieving better performance and maintaining international competitiveness (Teece, 2023).

This chapter identified several internal and external factors underlying these two dynamic capabilities, thus contributing to improved performance through various moderating effects. One prominent internal factor was culture, specifically International Entrepreneurial Culture (IEC), a second-order construct investigated primarily in firms with a global presence and rarely in established international firms. In addition, contingent effects emerged, such as absorptive capacity, business and political ties with the top management team (TMT), and environmental dynamism. Regarding control variables, traditional variables (such as firm age, size, international experience, industry, entry mode, and level of internationalization, etc.) were excluded after preliminary tests showed that they did not significantly influence the results. An exception is Chapter 4, where a comparison between developed and developing countries was included, at the suggestion of Yang et al. (2015). Following a comprehensive literature review, a model was

developed and tested using structural equation modeling in a sample of 400 Colombian international companies.

In the third chapter of this study, the model results were presented, demonstrating how International Entrepreneurial Culture (IEC) significantly contributes to international open innovation. This implies that the continuous pursuit of opportunities abroad enhances collaboration and facilitates knowledge exchange with international partners to foster innovation. However, the IEC hinders international ambidexterity as it is more geared towards international exploration and has no effect on international exploitation. These results may be biased due to the scale used to measure IEC potentially not being the most suitable for application in emerging markets, highlighting the need to develop a new scale for future research.

On the other hand, it was found that the International Entrepreneurial Culture (IEC), in its constant pursuit of opportunities abroad, needs to align adequately with absorptive capacity, thus preventing it from mediating dynamic capabilities. Furthermore, contrary to common belief, it was discovered that a strong absorptive capacity does not necessarily facilitate knowledge exchange with international partners and that environmental dynamism does not reinforce the relationships between international dynamic capabilities. However, environmental dynamism had a very strong positive effect on international open innovation, suggesting that international open innovation plays a more significant role in international dynamic capabilities.

Furthermore, both the second and fourth chapters address an influential academic debate focused on determining whether international dynamic capabilities actually improve the performance of firms in developing countries. This research contributes significantly to Teece's (2007) proposals by confirming that international ambidexterity not only improves sales and market expansion, but also facilitates new product development and optimizes marketing and organizational processes for international markets. On the other hand, international open innovation, being a more comprehensive dynamic capability, exerts a broader influence on performance in terms of innovation, international performance, and brand positioning.

Furthermore, it was observed that the impact of international ambidexterity and open innovation on performance is strengthened when top management teams (TMTs) establish strong political ties, contributing to enhancing firms' international performance. It is essential to highlight that these political ties were found to be particularly relevant for international ambidexterity, underscoring the significant role governments play in acquiring human resources in R&D, international marketing, and obtaining detailed information on global business (international exploration) while simultaneously leveraging technological advantages, understanding current customer needs, and strengthening contacts in international markets (international exploitation)

for firms in developing countries. The political ties of top management teams (TMTs) are strategic for the pursuit of tangible resources and assets and contribute to enhancing the image and reputation of the company in international markets through international open innovation.

By operationalizing the control variable to analyze the effect of markets in developing countries versus developed ones on performance, it was found that brand performance will be higher in developing country markets, especially in Latin American countries, because they are less competitive, allowing brands to stand out and adapt more quickly due to cultural similarity. The analysis further reveals that TMT connections with suppliers and competitors serve as significant enablers of international open innovation, which in turn drives measurable improvements in innovation performance. However, these network ties appear uniquely relevant to open innovation outcomes rather than other dimensions of international dynamic capabilities.

Previous studies have demonstrated that international firms operating in clusters experience higher growth as they continuously adapt and upgrade their resources to foster more effective dynamic capabilities (Wang & Ahmed, 2007), resulting in superior performance. This is why developing countries have implemented government policies to create business clusters to foster innovation and internationalization (Irawati & Charles, 2010). Despite the importance of clusters, only some studies have explored their relationship with international dynamic capabilities, and those that have done so are mainly qualitative in nature (Jacob et al., 2022).

Addressing this research gap, in Chapter 5, the complete model was integrated, and through a multigroup analysis, it was demonstrated that belonging to a cluster or not does not alter the results of the effect of international entrepreneurial culture on international dynamic capabilities, nor is there a significant difference observed in the impact of dynamic capabilities on performance. However, a significant difference was found in the moderating role of the top management team (TMT) political ties about international open innovation and brand performance. It was confirmed that for firms integrated into clusters, links with the government enable them to benefit from collaboration with international partners to enhance their image and reputation in the international market. These findings reveal that firms opting to be part of a cluster in developing countries do so to improve their position and image in the international market, and they will seek governmental support to achieve this.

This research provides empirical evidence that international dynamic capabilities play a crucial role in the performance of international firms in developing countries in Latin America. It is confirmed that an entrepreneurial culture oriented towards opportunities in international markets enhances the ability to collaborate with international partners. Additionally, it is highlighted that the political ties of top management teams are more influential than commercial links in

improving the outcomes of dynamic capabilities. Despite the widespread belief that clusters enhance firm performance in international markets, our findings show that belonging to a cluster is unnecessary to benefit from international dynamic capabilities. However, being part of a cluster allows the TMT to maintain strong political ties, facilitate brand positioning in the international market, and collaborate with international partners.

6.2 Academic implications

Due to globalization, many companies from developing countries are internationalizing. However, these companies need more resources to carry out this process, so they must rely on dynamic capabilities. The theory of dynamic capabilities interests researchers in international business, as the world is immersed in uncertainty and increasingly complex and turbulent environments (Teece, 2023). In light of this premise, international firms' capabilities in their home country may differ from those they need to develop internationally (Pinho & Prange, 2016), questioning the views of some scholars (Eisenhardt and Martin, 2000; Jafari-Sadeghi et al. 2021; Irawati and Charles, 2010) who claim that these capabilities are context-independent.

A significant theoretical contribution of this research is recognizing that dynamic capabilities acquire value from their inherent relationship with the context. This is because companies that internationalize adapt to changing dynamics and engage in a continuous cycle of resource development, consolidation, and reallocation (Pinho & Prange, 2016). Companies from developing countries face resource scarcity; therefore, they need international dynamic capabilities to enhance, create, implement, update, integrate, or reconfigure existing resources and capabilities to address challenges in dynamic global environments (Peng & Lin, 2021), generating returns and maintaining sustainable competitive advantages.

Another significant contribution involved identifying, within the literature, two international dynamic capabilities that are fundamentally important for firms in developing countries: international ambidexterity and international open innovation. Ambidexterity is essential for exploiting and exploring resources and assets in the international market. On the other hand, international open innovation emerges as a response to the inherent limitations of national open innovation in addressing international technological phenomena.

Furthermore, it was found that culture is a crucial antecedent of both international dynamic capabilities, particularly international entrepreneurial culture (IEC), grounded in international

entrepreneurship theory and studied in the context of Born Globals and New Ventures. However, according to Dimitratos et al. (2012), IEC can be analyzed in established international firms, as internationalization is considered a constant entrepreneurial act.

The theory of international entrepreneurship posited that a culture focused on continuously pursuing opportunities abroad would enable firms to be ambidextrous. However, it was found that this culture represents a barrier to achieving a balance between exploration and exploitation. Due to its entrepreneurial nature and focus on the international market, international entrepreneurial culture would be more oriented towards exploring resources and information in international markets rather than exploiting existing international advantages and markets. This implies that returns would not be realized in the short term but in the long term.

It is important to note that International Entrepreneurial Culture is vital for international firms to seek international alliances, incorporate technology and knowledge from international partners, and be willing to buy and sell intellectual property. In this way, exciting contributions have been made to established international firms from the theory of international entrepreneurship. However, the scale of International Entrepreneurial Culture needed to be more suitable for capturing all construct dimensions (international entrepreneurial orientation, international market orientation, international learning orientation, international networking orientation, and international motivation). Therefore, it is pertinent to create a new scale that can be applied to any international firm in developing countries, regardless of its age, size, or speed of internationalization.

Contrary to theoretical expectations in the literature, our empirical analysis failed to confirm absorptive capacity as a significant mediating mechanism between international entrepreneurial culture and dynamic capabilities. While prior research (e.g., Cohen & Levinthal, 1990; Zahra & George, 2002) positions absorptive capacity as a critical bridge connecting cultural antecedents to capability development, our findings suggest this relationship may be more context-dependent than previously theorized, particularly in emerging market contexts. It was evidenced that absorptive capacity is negatively related to international exploration, international entrepreneurial culture, and international open innovation. On the other hand, it is positively related to leveraging existing advantages to strengthen and expand current international markets and customers (international exploitation), as absorptive capacity is linked to control and deep learning.

These findings represent a significant theoretical contribution by demonstrating that the search for opportunities, resources, information, partners, and knowledge at the international level is not fully integrated into the firm's knowledge base, especially in international firms from developing countries, which often face scarce resources. Additionally, the importance of absorptive capacity

may not be reflected in international open innovation due to the complexity of managing innovation in a globalized environment.

Another variable that, according to the literature, could have a moderating effect by strengthening international dynamic capabilities with international entrepreneurial culture is environmental dynamism. However, it was demonstrated that environmental dynamism does not have a moderating effect. Nevertheless, it is positively related to exploration and open innovation and negatively related to exploitation. This demonstrates that international exploitation does not align with uncertainty, risk, and threats, while open innovation and international exploration face more changing and dynamic environments.

On the other hand, according to the theory, dynamic capabilities are directly related to performance, which helps achieve sustainable competitive advantage. This research confirms these expectations regarding the role of international ambidexterity and international open innovation in international and innovative performance, challenging the postulates of Eisenhardt & Martin (2000) who affirm that dynamic capabilities become difficult to maintain in high-speed markets. However, it was found that open innovation also impacts the image and reputation of companies in international markets, thus demonstrating that international dynamic capabilities generate both tangible and intangible outcomes. This finding is important for academic literature as it shows that open innovation is a stronger dynamic capability for reconfiguring existing resources and capabilities and addressing challenges in the international context, thereby enabling competitive advantage for firms in developing countries.

From the perspective of microfoundations theory, it is revealed that Top Management Teams (TMTs) with strong political connections strengthen the relationship between international dynamic capabilities and performance. These political ties are more relevant for international ambidexterity than for international open innovation, as the exploitation and exploration of resources and assets require support from host country governments. Additionally, the positive influence of TMT links with suppliers and competitors is highlighted in developing new products, marketing innovation, and organizational forms with other international partners. This opens the door to reassessing TMTs' commercial and political links and their importance for international dynamic capabilities.

Another significant contribution was the confrontation between dynamic capabilities theory and cluster theory. It was demonstrated that international companies do not necessarily have to be integrated into a cluster to benefit from international dynamic capabilities. The superior performance of international companies from developing countries is attributed to their dynamic capabilities in foreign markets. However, in clusters, the political ties of Top Management Teams (TMTs) play an important role in the brand's positioning in international markets through

international partners. This aligns with the tenets of cluster theory, highlighting clusters' role in a company's reputation.

6.3 Managerial Implications

It is essential for managers of companies in developing countries to cultivate international dynamic capabilities as critical elements for success in global markets. These companies must foster an international entrepreneurial culture to develop the capacity to explore international markets and operate in dynamic environments. On the other hand, if their focus is on exploitation in more stable environments, they should prioritize absorptive capacity. Companies with an international entrepreneurial culture are better positioned to leverage the benefits of knowledge transfer and exchange with international partners. They may need less absorptive capacity, as collaborating with international partners requires less capacity development. Managers of international companies in developing countries, such as Latin America, are now more aware of the need to develop international dynamic capabilities to succeed in global markets.

By focusing on international ambidexterity, i.e., actively seeking resources and information in foreign markets while leveraging existing advantages to strengthen and expand current international markets and customers, companies can achieve better results in the internationalization process and innovations that can manifest in both the short and long term. Similarly, suppose companies seek international partnerships and collaborations to integrate technology and knowledge from foreign partners into research and development (R&D) activities, in addition to being willing to buy and sell intellectual property. In that case, they can obtain returns from internationalization and innovation and position themselves in the international market.

Furthermore, to maximize the benefits of international dynamic capabilities, international companies from emerging markets must have top management teams that maintain active connections with governments in international markets. This will enable the development of international dynamic capabilities, greater profitability in internationalization processes, and advancing innovation. They should also cultivate relationships with suppliers and competitors to develop innovations, leveraging the synergies of international open innovation.

It emphasizes the importance of developing countries actively supporting and implementing government programs of financial support, subsidies, and tax exemptions to incentivize international ambidexterity. It is crucial to create an institutional environment that facilitates international open innovation and, at the same time, ensures the protection of intellectual property. Furthermore, public policies focused on clusters should be rethought, as international companies in Colombia are not collaborating to share knowledge and improve innovative processes but rather

seeking to benefit from government support to gain visibility in international markets. The government should promote clusters to have their brand and disseminate it internationally.

6.4 Limitations and future research lines

Throughout this research, it was pointed out that one of the main limitations of this study was the use of the international entrepreneurial culture scale, composed of five dimensions, of which only international entrepreneurial orientation and international marketing orientation could be considered.

Due to these results, it was necessary to validate the scale with Colombian executives from international companies using the Delphi method. This qualitative tool allows obtaining a consensus among a group of people who are part of a panel of experts.

During March, April, and May 2024, several executives from international companies in Cali were contacted to participate in a focus group. However, most stated they needed more time to attend. Finally, only five executives agreed to participate in the interview: two in person, two through Meet, and one by phone. In order to reach a minimum of ten participating executives, it was necessary to attend the postgraduate courses at the Universidad Javeriana Cali during August 2024. A selection process was carried out among the groups, identifying high-level executives in one of the courses, who expressed their willingness to collaborate with the research.

The interviews sought to compare the executives' individual opinions regarding the items on the scale until reaching a consensus (Nasa et al., 2021). The executives had to give their opinions on the items that made up the International Entrepreneurial Culture measurement scale, considering aspects such as clarity and coherence.

The interviewees were asked to highlight in red the items that did not meet the criteria of clarity and coherence. The elements that would require some modifications were highlighted in yellow, and in green, the elements were clear and coherent. To carry out the qualitative analysis, it was necessary to designate a scale ranging from 1 ("criteria not met") to 3 ("high level") (see Table 6-1).

Table 6-1. Measurement of the items of the International Entrepreneurial Culture scale

Ítems	**International Entrepreneurial Orientation**													
	Our company typically ……	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**M**	**SD**	**Aiken's V**
1	Initiates actions that competitors then respond to	1	3	3	3	1	3	1	3	1	1	2,0	1,054	0.5
2	Is the first to introduce new products or services	1	3	3	3	3	3	1	2	3	2	2,4	0,843	0.7

3	Is the first to introduce new administrative techniques	1	3	1	3	1	1	1	2	2	2	1,7	0,823	0.35
4	Is the first to introduce new operational technologies	3	3	1	3	3	1	1	2	3	2	2,2	0,919	0.6
5	Typically adopts a highly competitive "beat the competition" stance	3	1	3	3	3	3	1	3	3	2	2,5	0,850	0.75
6	Over the past five years, our company has marketed new lines of products or services.	3	3	1	3	3	3	2	3	3	3	2,7	0,675	0.85
	International Market Orientation													
7	We have routine or regular customer service activities foreign	3	3	3	1	3	3	3	3	3	3	2,8	0,632	0.9
8	Our product or service development is based on good information from the international market.	3	3	3	3	3	3	3	3	3	3	3	0	1
9	We know very well how our foreign customers value our products and services.	3	3	3	3	3	3	3	3	3	3	3	0	1
10	The company always collects information about its foreign customers through any means	3	3	3	3	3	3	1	3	2	3	2,7	0,675	0.85
11	Our company always collects information about its foreign competitors through any means	3	3	3	3	3	3	1	3	2	3	2,7	0,675	0.85
	International Motivation													
	With reference to the management philosophy of my company's activities in this foreign country….													
12	The development of employees' own ideas for the improvement of the company is especially encouraged.	3	1	1	1	3	3	1	2	3	3	2,1	0,994	0.55
13	Senior management is aware of and very receptive to employee ideas and suggestions	3	3	3	1	3	3	2	3	3	3	2,7	0,675	0.85
	Orientation to international learning													
14	We have many formal information links established between departments involved in overseas activities	3	1	3	3	3	3	3	3	3	2	2,7	0,675	0.85
15	The company has many formal processes that provide clear direction on the implementation of overseas activities	3	3	3	3	3	3	3	3	2	2	2,8	0,422	0.9
16	The company has many formal processes that evaluate the effectiveness of its overseas activities	3	3	3	1	3	3	3	3	2	2	2,6	0,699	0.8
	International network orientation													
	Foreign, the company cooperates……													
17	With competitors in joint manufacturing agreements	3	1	1	3	3	3	3	3	1	3	2,4	0,966	0.65
18	With competitors in joint research	1	3	1	3	3	3	3	3	3	3	2,6	0,843	0.8
19	With competitors in advertising and marketing	3	1	1	1	1	3	1	3	1	3	1,8	1,033	0.4
20	With non-competitors (partners, distributors, suppliers, customers, companies in other sectors, government) in joint manufacturing agreements	1	3	1	1	3	3	3	3	3	3	2,4	0,966	0.7
21	With non-competitors in joint research	1	3	3	3	3	1	3	3	3	3	2,6	0,843	0.8
22	With non-competitors in advertising and marketing.	1	3	3	1	1	1	1	3	3	3	2	1,054	0.5

The table 6-1 shows the results of the central tendency measures and Aiken V scores for the clarity criterion for each item of the International Entrepreneurial Culture Scale assessed by the expert managers. The means indicate that the experts considered that, in general, the items should be

modified to have greater clarity and coherence. The Aiken V coefficient allows for quantifying the relevance of the items concerning a content domain based on the assessments of N judges. This coefficient presents values between 0 and 1, with values close to unity indicating greater agreement between judges, translating into greater content validity evidence (Rozo-García et al., 2024). An item is coherent if the calculated value is greater than or equal to 0.75.

The values of the Aiken V coefficient to calculate content validity ranged between 0.35 and 1.0 points. In the case of international entrepreneurial orientation, only 2 items out of the 6 remained. These were related to the competitive attitude and innovation in products and services. Regarding the first item, they stated that it is very difficult to get to know international competitors closely; regarding items 2, 3, and 4, they suggested removing the word "the first in…" because they did not have exact knowledge of the international market. They also pointed out that it is very complex to innovate in administrative techniques because each country has its own dynamics, and companies must adapt to each culture.

In the international market orientation scale, all items exceeded the 0.75 threshold. Managers suggested modifying items 10 and 11 to indicate that information is collected through different channels. Regarding international motivation, item 12 could have been more relevant because management initiates the internationalization strategy; therefore, it must be attentive to the information it receives from employees in the destination country who have the most experience in the international market.

The items on international learning orientation were maintained because they are above 0.75. However, they asked to remove "many" from the statement because it sounds redundant. Regarding the construct of international network orientation, they only validated 2 items, 18 and 21, which are related to the cooperation of companies with competitors and non-competitors to carry out joint research. The other items would be removed because these companies' cooperation in other areas with competitors and non-competitors is dangerous in the countries where they have a presence because they can keep knowledge and information that is very valuable for the company.

Of the 22 items that comprise the International Entrepreneurial Culture scale, thirteen are considered explicit in their wording and relevant for measuring the construct. This suggests that the scale, in its current form, is not suitable for assessing established international companies, especially in developing countries, contrary to the assertions of Dimitratos and Plakoyiannaki (2003). Therefore, it is recommended that future research delve into possible modifications to the items and develop an international entrepreneurial culture scale specifically designed for international companies other than Born Global and New Ventures. This revision will mainly benefit researchers by confirming that the current scale is not suitable

Furthermore, this thesis opens the door for researchers to reconsider existing research and collaborate with entrepreneurs, managers, or senior executives to develop new scales. It is pertinent to share the research results to consider new lines of research based on different international dynamic capabilities (such as global dynamic capabilities, international cultural ambidexterity, and international marketing agility) that affect the performance of international firms in developing countries.

Another recommendation for future researchers is to include antecedents such as strategic orientations, social networks, country culture, strategic human resource management capabilities, operational human resource management capabilities, knowledge management, and the degree of internationalization. Other types of performance measures are also suggested, such as firm survival, competitive advantage, eco-innovation, market performance, and speed of internationalization.

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7 APPENDIX

1. Descriptive Statistics Chapter 3, 4 y 5

	CHAPTER 3									
	IEO	*IMO*	*IM*	*ILO*	*INO*	*IOI*	*IEX*	*IEXP*	*AC*	*ED*
Mean	6	6	6	6	4	6	6	5	4	5
Median	6	6	7	6	4	6	6	5	4	5
Mode	6	7	7	6	4	7	6	5	4	5
Std. Dev.	0,506	0,431	0,554	0,636	0,667	0,673	0,493	0,697	0,927	0,630
Sample variance	0,256	0,186	0,307	0,405	0,444	0,452	0,243	0,486	0,860	0,397
Range	3	2,6	2,5	3,7	4,2	3,0	2,9	4,0	5,5	3,5
coefficient of variation	0,088	0,069	0,088	0,108	0,168	0,113	0,088	0,152	0,229	0,139
Min	4	4,4	5	3	2	4	4	3	1	3
Max	7	7	7	7	6	7	7	7	7	6
Obs	400	400	400	400	400	400	400	400	400	400

	CHAPTER 4							
	IOI	***IEX***	***IEXP***	***INP***	***IP***	***BP***	***BT***	***PT***
Mean	6	6	5	6	6	6	6	2
Median	6	6	5	6	6	6	6	2
Mode	7	6	5	7	6	6	7	2
Std. Dev.	0,673	0,493	0,697	0,656	0,542	0,573	0,558	0,667
Sample variance	0,452	0,243	0,486	0,430	0,293	0,328	0,311	0,444
Range	3,0	2,9	4,0	3,0	2,6	2,6	3,0	3,3
coefficient of variation	0,113	0,088	0,152	0,108	0,093	0,093	0,092	0,315
Min	4	4	3	4	4	4	4	1
Max	7	7	7	7	7	7	7	4
Obs	400	400	400	400	400	400	400	400

	CHAPTER 5														
	IEO	***IMO***	***IM***	***ILO***	***INO***	***IOI***	***IEX***	***IEXP***	***AC***	***ED***	***INP***	***IP***	***BP***	***BT***	***PT***
Mean	6	6	6	6	4	6	6	5	4	5	6	6	6	6	2
Median	6	6	7	6	4	6	6	5	4	5	6	6	6	6	2
Mode	6	7	7	6	4	7	6	5	4	5	7	6	6	7	2
Std. Dev.	0,506	0,431	0,554	0,636	0,667	0,673	0,493	0,697	0,927	0,630	0,656	0,542	0,573	0,558	0,667
Sample variance	0,256	0,186	0,307	0,405	0,444	0,452	0,243	0,486	0,860	0,397	0,430	0,293	0,328	0,311	0,444
Range	3,0	2,6	2,5	3,7	4,2	3,0	2,9	4,0	5,5	3,5	3,0	2,6	2,6	3,0	3,3
coefficient of variation	0,088	0,069	0,088	0,108	0,168	0,113	0,088	0,152	0,229	0,139	0,108	0,093	0,093	0,092	0,315
Min	4	4	5	3	2	4	4	3	1	3	4	4	4	4	1
Max	7	7	7	7	6	7	7	7	7	6	7	7	7	7	4
Obs	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400

2. **Correlation Matrix Chapter 3**

	ieo1	ieo2	ieo3	ieo4	ieo5	ieo6	imo1	imo2	imo3	imo4	imo5	im1	im2	ilo1
ieo1	1.0000													
ieo2	0.1935	1.0000												
ieo3	0.1029	-0.0080	1.0000											
ieo4	0.4135	0.2921	0.2031	1.0000										
ieo5	-0.0548	0.2322	-0.2273	0.1161	1.0000									
ieo6	0.5135	0.2345	0.2023	0.2524	-0.1560	1.0000								
imo1	0.1828	0.3660	0.4440	0.4183	-0.0003	0.0835	1.0000							
imo2	0.3520	0.0692	0.1052	0.5637	0.1070	0.1189	0.2912	1.0000						
imo3	0.5301	0.1436	0.3747	0.4945	0.1607	0.1314	0.4197	0.5596	1.0000					
imo4	0.4245	0.4696	0.1353	0.3985	0.0364	0.2616	0.4340	0.1907	0.2505	1.0000				
imo5	-0.3738	-0.0713	-0.0541	-0.3445	-0.2716	0.0205	-0.2581	-0.1274	-0.4746	-0.1639	1.0000			
im1	0.3015	0.3648	0.4226	0.3862	-0.1363	0.1481	0.6042	0.3398	0.5932	0.2757	-0.2687	1.0000		
im2	-0.1389	-0.3694	0.1723	-0.0918	0.0015	-0.4547	-0.0993	0.0023	0.2114	-0.2223	-0.2745	-0.0407	1.0000	
ilo1	-0.2014	0.0499	-0.0555	-0.1558	0.0608	-0.3010	0.1718	-0.0981	-0.1712	-0.0715	0.0348	-0.2357	-0.0063	1.0000

ilo2	0.0270	0.0021	-0.3600	0.1089	0.1939	-0.1169	0.0656	0.0650	-0.0297	0.2002	-0.1039	0.0669	-0.1993	0.0395
ilo3	0.2298	0.0133	0.0909	0.4061	-0.1566	0.0667	0.2754	0.1040	0.0418	0.4931	-0.1401	-0.0750	-0.1112	0.3543
ino1	0.1715	0.1294	0.1568	0.3768	0.1336	0.3867	0.0041	0.2784	0.0987	0.0116	0.0346	-0.0196	-0.2080	-0.4501
ino2	-0.1607	0.2854	0.0880	0.1248	0.3713	0.0440	0.0041	-0.0040	-0.1522	0.2101	0.2725	-0.1203	-0.1926	-0.2878
ino3	-0.2513	0.0492	0.1610	0.0624	0.2761	-0.0045	-0.0662	-0.1206	-0.1708	-0.2252	0.1485	-0.1801	-0.0506	-0.2003
ino4	0.0897	0.1337	0.1095	0.0598	-0.1274	0.1323	-0.0769	-0.2185	-0.0666	0.1457	0.0451	0.0863	-0.0448	-0.6258
ino5	0.1074	0.1452	0.2160	0.4583	-0.0079	0.0609	0.1563	0.0415	0.1169	0.0532	-0.1222	0.2072	0.0434	-0.4407
ino6	-0.0753	-0.0716	0.0997	0.0860	-0.3952	-0.0331	0.2416	-0.1224	-0.0441	0.2414	0.0381	0.1237	-0.0339	0.1854
ioi1	0.0403	0.1443	0.3807	0.4674	0.2747	0.1250	0.3788	0.1963	0.3046	0.0618	-0.3055	0.2695	-0.0226	-0.2346
ioi2	0.5303	0.4114	0.2151	0.5370	0.0625	0.3704	0.4028	0.3059	0.5353	0.2573	-0.4095	0.5609	-0.2365	-0.0923
ioi3	-0.1752	0.2115	0.2775	0.1271	0.1581	-0.0687	0.3251	-0.1976	0.1341	0.0892	-0.1855	0.3975	0.0384	-0.2816
ioi4	0.1212	0.3525	0.2260	0.2638	0.3137	-0.0256	0.6777	0.1786	0.4774	0.2477	-0.4336	0.5967	0.0081	0.0209
ioi5	-0.0817	0.2024	0.2961	0.2613	0.3227	-0.1201	0.3347	0.0059	0.2856	0.0191	-0.2817	0.4212	0.0373	-0.2687
ioi6	0.0337	0.2487	0.3560	0.3909	0.3671	0.1041	0.2486	0.2025	0.2350	0.1995	-0.0652	0.2381	-0.0659	-0.3846
ioi7	-0.0406	0.3140	0.3526	0.3511	0.3894	-0.0009	0.2957	0.1295	0.2761	0.1184	-0.1810	0.3180	-0.0231	-0.2983
ioi8	0.4346	0.2230	0.1657	0.3434	0.3607	0.1143	0.3368	0.6561	0.6229	0.2443	-0.2068	0.2815	-0.0221	-0.0042
iex1	0.0167	0.2255	0.1903	0.2935	0.2542	0.3253	0.0064	0.0071	-0.0396	0.1145	0.2092	-0.0491	-0.3565	-0.3640
iex2	-0.0186	0.2343	0.1645	0.2971	0.3187	-0.0393	0.2036	0.1027	0.0738	0.0569	-0.1446	0.1134	-0.1245	-0.2028
iex3	0.2749	0.0366	0.1635	0.3839	-0.1544	0.5179	0.1846	0.1811	0.2038	0.0937	-0.0963	0.2046	-0.3155	0.0187
iex4	0.1999	0.0817	0.1143	-0.0376	0.3463	0.0070	0.3034	0.0258	0.2369	0.2229	-0.2897	0.0265	-0.0340	0.2750
iex5	-0.1431	0.1787	0.2355	0.1716	0.3036	-0.1050	0.2035	0.2581	0.3190	0.0246	0.0094	0.3173	0.1634	-0.1470
iex6	0.1151	0.2846	0.1816	0.2534	0.2687	0.1715	0.5349	0.2835	0.2731	0.3531	-0.2060	0.3767	-0.2726	0.0956

iex7	0.0554	0.0981	-0.0267	0.3264	0.2502	0.2408	-0.0654	0.1594	0.0079	0.0212	0.1511	-0.0870	-0.2074	-0.4438
iexp1	0.3885	0.0418	0.0220	0.1640	-0.1226	0.2849	0.0335	0.2843	0.1058	0.3375	0.0571	-0.1082	-0.1290	0.2629
iexp2	0.0965	-0.1724	-0.3757	-0.1711	-0.0690	0.0681	-0.2958	0.0987	-0.1528	-0.0344	0.1602	-0.3559	-0.0524	0.3103
iexp3	-0.1987	-0.2441	-0.1205	-0.2468	-0.0117	-0.0365	-0.5508	-0.4380	-0.4915	-0.3192	0.3642	-0.5197	-0.0854	-0.1040
iexp4	-0.0093	0.2807	-0.1302	0.1007	0.1186	0.1143	-0.2668	-0.1314	-0.2431	-0.0221	0.2186	-0.2536	-0.1368	-0.2451
iexp5	0.0248	-0.1285	-0.3643	-0.2054	-0.0449	0.0322	-0.3079	0.1530	-0.1579	0.1173	0.2159	-0.3617	-0.0308	0.2328
iexp6	0.0419	-0.0472	-0.3794	-0.1002	-0.1202	0.1685	-0.4832	-0.2229	-0.3837	-0.2377	0.1338	-0.5186	-0.1279	0.1010
iexp7	0.2392	-0.1232	-0.3996	-0.2002	-0.1823	0.1185	-0.2230	0.0682	-0.1367	0.0479	0.1041	-0.3209	-0.1140	0.2819
iexp8	0.0496	-0.1644	-0.5019	-0.2279	-0.2049	0.0687	-0.4351	-0.0823	-0.4255	-0.0922	0.2943	-0.5168	-0.2295	0.3028
iexp9	0.3187	-0.1775	-0.1849	-0.0793	-0.2209	0.2022	-0.1842	0.2219	0.0073	0.1459	0.1254	-0.2463	-0.0949	0.3178
ac1	0.0870	0.0833	-0.1762	-0.1762	-0.1352	0.1273	-0.1101	0.0710	-0.1139	0.2593	0.2363	-0.2368	-0.1216	0.4117
ac2	0.1444	-0.0379	-0.2720	-0.0992	-0.0739	0.1362	-0.2208	0.1102	-0.1459	0.0821	0.2370	-0.3315	-0.1665	0.3859
ac3	0.3050	-0.0024	-0.3443	-0.0487	-0.0894	0.1945	-0.2055	0.2062	0.0184	0.1262	0.1436	-0.1470	-0.1495	0.1600
ac4	0.1585	-0.0547	-0.2810	-0.2177	-0.1640	0.1370	-0.1990	-0.0661	-0.1742	0.1258	0.1057	-0.3414	-0.1084	0.3547
ac5	0.0247	0.0306	-0.3137	-0.0157	-0.0963	-0.1124	0.0293	0.2638	-0.0780	0.2182	0.1984	-0.0601	-0.1541	0.3925
ac6	0.2408	0.0014	-0.2519	-0.0511	-0.1218	0.1933	-0.2323	0.1001	-0.0318	0.1557	0.1114	-0.2165	-0.0746	0.2939
ed1	-0.1088	0.2867	0.1216	0.0614	0.5531	0.0547	-0.1026	-0.1835	-0.1392	0.0869	0.1022	-0.2495	-0.1557	-0.0315
ed2	-0.2916	0.1063	0.1444	0.0129	0.4386	-0.1750	-0.1685	-0.1476	-0.1190	-0.1530	0.2039	-0.1580	0.0121	-0.1825
ed3	-0.0587	0.1519	-0.0924	0.1812	-0.3358	-0.1789	0.0455	0.1357	-0.0177	0.1977	0.0653	0.1181	0.1553	-0.0046
ed4	-0.0179	0.0928	0.1713	-0.1088	0.5583	0.0876	-0.0391	-0.1220	0.0456	0.2286	-0.0274	-0.2241	-0.0490	0.0385

	ilo2	ilo3	ino1	ino2	ino3	ino4	ino5	ino6	ioi1	ioi2	ioi3	ioi4	ioi5	ioi6

ilo2	1.0000													
ilo3	0.2716	1.0000												
ino1	-0.2669	-0.1081	1.0000											
ino2	-0.0414	-0.0885	0.5600	1.0000										
ino3	-0.2838	-0.2072	0.5800	0.5760	1.0000									
ino4	-0.1914	-0.1747	0.4665	0.5106	0.5215	1.0000								
ino5	-0.1353	-0.0535	0.4966	0.4995	0.4983	0.6451	1.0000							
ino6	0.3292	0.5377	-0.2363	-0.1449	-0.4397	-0.1570	-0.0847	1.0000						
ioi1	-0.0934	0.0287	0.6094	0.4419	0.4442	0.2656	0.5352	0.0540	1.0000					
ioi2	0.1505	0.2111	0.2156	-0.0692	-0.0504	0.0019	0.2412	0.1615	0.4726	1.0000				
ioi3	-0.0070	-0.1920	0.1284	0.3680	0.2686	0.4146	0.5291	0.1613	0.5245	0.2074	1.0000			
ioi4	0.2534	-0.0752	-0.0758	0.0365	-0.1130	-0.0989	0.1495	0.1167	0.4215	0.4410	0.5400	1.0000		
ioi5	0.1076	-0.1551	0.2583	0.3733	0.4914	0.4082	0.5668	-0.0581	0.6623	0.4091	0.7415	0.5451	1.0000	
ioi6	-0.0776	-0.0733	0.5873	0.6874	0.6770	0.5272	0.5936	-0.2424	0.6786	0.2861	0.4742	0.2566	0.7032	1.0000
ioi7	-0.1956	-0.1634	0.5274	0.6115	0.5933	0.4446	0.6068	-0.1810	0.7865	0.3719	0.6295	0.3845	0.7657	0.8450
ioi8	-0.0750	-0.0170	0.1996	0.1215	-0.0430	-0.1497	0.0415	-0.2670	0.2255	0.3192	-0.0196	0.3637	0.1237	0.3008
iex1	-0.1675	-0.0429	0.6914	0.7067	0.6827	0.5395	0.5533	-0.1951	0.4829	0.1418	0.3242	-0.0646	0.3970	0.6754
iex2	-0.1489	-0.0528	0.5285	0.5457	0.6858	0.4686	0.5769	-0.3610	0.6402	0.2441	0.3953	0.1740	0.6290	0.7486
iex3	0.1156	0.3555	0.0479	-0.2619	-0.0593	-0.1670	-0.0035	0.2652	0.1473	0.5268	-0.0039	0.0878	0.0713	0.0552
iex4	0.0960	0.1187	-0.0893	0.1263	-0.1282	-0.1888	-0.0399	0.0709	0.2473	0.2049	0.2103	0.4737	0.1915	0.1502
iex5	-0.1060	-0.3163	0.0006	0.1301	0.1271	-0.0146	0.0301	-0.3102	-0.0146	-0.1287	0.1916	0.2761	0.1832	0.2141

iex6	0.3814	0.1759	0.0175	0.1421	-0.0248	-0.1490	-0.0480	0.1454	0.3721	0.4414	0.2377	0.6298	0.3790	0.3737
iex7	-0.0262	-0.0927	0.7376	0.6264	0.6084	0.5311	0.5537	-0.1491	0.4359	0.1171	0.2296	-0.0648	0.3572	0.5962
iexp1	0.1114	0.4522	-0.0853	-0.2325	-0.4551	-0.4170	-0.4469	0.1205	-0.3693	-0.0174	-0.6366	-0.2527	-0.6266	-0.3957
iexp2	0.1548	0.1467	-0.2741	-0.3805	-0.5641	-0.5931	-0.6334	0.0761	-0.5822	-0.2918	-0.6792	-0.3559	-0.7874	-0.6991
iexp3	-0.1270	-0.0573	0.1802	0.2625	0.5043	0.3317	0.1893	-0.2244	-0.1353	-0.3125	-0.0974	-0.6176	-0.0315	0.0672
iexp4	-0.1932	-0.1071	0.5451	0.6510	0.5210	0.5166	0.5668	-0.1731	0.2847	0.0753	0.1198	-0.2578	0.1644	0.4118
iexp5	0.1439	0.1905	-0.2235	-0.2584	-0.5114	-0.4802	-0.7006	0.0827	-0.5602	-0.3456	-0.6934	-0.4172	-0.7818	-0.5478
iexp6	-0.1131	0.1366	0.2251	-0.0565	0.1905	0.0362	-0.0559	-0.0580	-0.1261	0.0043	-0.4500	-0.5754	-0.3380	-0.2011
iexp7	0.1117	0.1927	-0.2094	-0.4207	-0.4952	-0.4052	-0.5915	0.0402	-0.6009	-0.2456	-0.7195	-0.3586	-0.7704	-0.6859
iexp8	0.0737	0.1861	-0.2023	-0.2964	-0.3657	-0.3716	-0.4531	0.0087	-0.5900	-0.3220	-0.6793	-0.5858	-0.7842	-0.6495
iexp9	0.1523	0.3670	-0.2726	-0.4372	-0.5872	-0.5423	-0.6163	0.1520	-0.5632	-0.0965	-0.7586	-0.3691	-0.7609	-0.5912
ac1	0.1439	0.3672	-0.2884	-0.2245	-0.5096	-0.4801	-0.6592	0.2794	-0.4928	-0.1236	-0.6246	-0.2801	-0.6752	-0.4701
ac2	0.1110	0.2731	-0.2241	-0.2926	-0.4548	-0.5412	-0.5972	0.0456	-0.5934	-0.2301	-0.7265	-0.4048	-0.7698	-0.5917
ac3	0.1074	0.0761	-0.2500	-0.3648	-0.5892	-0.4350	-0.5189	-0.0411	-0.6362	-0.2057	-0.6314	-0.2810	-0.7393	-0.6183
ac4	-0.0059	0.2280	-0.3160	-0.3766	-0.5765	-0.4545	-0.5966	0.1219	-0.5899	-0.2842	-0.6039	-0.3549	-0.8113	-0.7178
ac5	0.4095	0.3065	-0.3962	-0.2566	-0.6832	-0.6249	-0.5587	0.3184	-0.4595	-0.1296	-0.4859	-0.0697	-0.5879	-0.5341
ac6	0.1638	0.2830	-0.3197	-0.3733	-0.6307	-0.5396	-0.5752	0.1839	-0.5379	-0.0775	-0.6453	-0.3240	-0.7349	-0.6126
ed1	-0.1257	-0.0427	0.4033	0.7256	0.5941	0.2656	0.3042	-0.2929	0.3512	0.0051	0.2203	-0.0619	0.3188	0.5432
ed2	-0.1059	-0.2120	0.4326	0.7237	0.7261	0.4048	0.4565	-0.2482	0.4190	-0.0339	0.3615	-0.0696	0.5174	0.6454
ed3	-0.1657	0.1959	-0.1423	-0.2201	-0.0793	0.1218	-0.0292	0.0148	-0.2956	-0.1386	-0.2202	-0.2670	-0.2496	-0.1462
ed4	-0.1274	0.0071	0.1090	0.4085	0.2195	0.0019	-0.1730	-0.2596	0.1075	-0.1834	0.0854	0.0142	0.0557	0.2884

	ioi7	ioi8	iex1	iex2	iex3	iex4	iex5	iex6	iex7	iexp1	iexp2	iexp3	iexp4	iexp5
ioi7	1.0000													
ioi8	0.2935	1.0000												
iex1	0.5898	0.1042	1.0000											
iex2	0.7664	0.1963	0.5664	1.0000										
iex3	0.0067	0.0511	0.0863	-0.0713	1.0000									
iex4	0.2421	0.4513	-0.0831	0.1600	0.0499	1.0000								
iex5	0.1870	0.2550	0.1282	-0.0084	-0.1420	-0.2123	1.0000							
iex6	0.3229	0.3345	-0.0029	0.2308	0.3736	0.5211	0.0313	1.0000						
iex7	0.4756	0.1515	0.7671	0.4246	0.0953	-0.0970	0.1170	0.0062	1.0000					
iexp1	-0.5298	0.1594	-0.1943	-0.4706	0.0399	-0.1085	-0.0148	-0.1095	-0.2209	1.0000				
iexp2	-0.7503	-0.0184	-0.3937	-0.6903	-0.1064	-0.1514	-0.0807	-0.3087	-0.3055	0.7491	1.0000			
iexp3	-0.0271	-0.4055	0.4535	0.1610	-0.1540	-0.3768	-0.1740	-0.5903	0.3095	-0.0734	0.0059	1.0000		
iexp4	0.3992	-0.0748	0.5610	0.3909	-0.1375	-0.0984	-0.2134	-0.2113	0.5733	-0.2124	-0.2543	0.4384	1.0000	
iexp5	-0.6569	-0.0064	-0.3909	-0.5959	-0.1189	-0.1518	-0.0565	-0.1819	-0.3015	0.7126	0.8387	-0.0881	-0.2387	1.0000
iexp6	-0.2454	-0.3345	0.0770	-0.0838	0.1369	-0.3147	-0.5117	-0.3604	0.1749	0.1689	0.2566	0.4611	0.4968	0.2292
iexp7	-0.7702	-0.0330	-0.3934	-0.5919	-0.1090	-0.1643	-0.1825	-0.2935	-0.2786	0.7326	0.8454	0.0043	-0.2367	0.7637
iexp8	-0.7003	-0.2176	-0.2356	-0.4475	-0.1017	-0.2480	-0.3576	-0.4510	-0.2555	0.5615	0.7745	0.3037	-0.0118	0.6832
iexp9	-0.7207	0.0885	-0.4255	-0.6399	0.1421	-0.0168	-0.2294	-0.1053	-0.3435	0.8022	0.8103	-0.0911	-0.2835	0.7960
ac1	-0.5716	0.0169	-0.3806	-0.5752	0.0706	0.0347	-0.1863	0.0581	-0.3337	0.6925	0.6734	-0.1874	-0.1525	0.7918
ac2	-0.6909	0.0225	-0.2577	-0.6031	-0.0400	-0.1683	-0.0558	-0.2703	-0.2675	0.8315	0.8855	0.0792	-0.1655	0.8103

ac3	-0.6899	0.1208	-0.3086	-0.6307	-0.0646	-0.1743	0.0692	-0.3029	-0.2545	0.7466	0.8535	-0.0524	-0.2557	0.7548
ac4	-0.7143	-0.0640	-0.3480	-0.6192	-0.1494	-0.0777	-0.1535	-0.3669	-0.3987	0.7362	0.8432	0.0241	-0.2547	0.7582
ac5	-0.5677	0.0741	-0.4543	-0.5184	-0.0824	0.0082	-0.0605	0.0626	-0.4012	0.6211	0.7205	-0.3013	-0.3376	0.7199
ac6	-0.6717	-0.0198	-0.3947	-0.6988	0.0687	-0.1265	-0.1365	-0.1940	-0.3832	0.7750	0.8354	-0.0744	-0.1546	0.7996
ed1	0.5234	0.0794	0.6793	0.4997	-0.2020	0.1320	0.0936	-0.0250	0.4371	-0.0948	-0.2402	0.4938	0.5724	-0.2320
ed2	0.6266	0.0249	0.6603	0.5264	-0.1766	-0.0106	0.1623	-0.0557	0.5910	-0.3897	-0.4567	0.5025	0.6099	-0.4148
ed3	-0.1991	-0.1690	-0.2139	-0.0949	-0.0329	-0.5359	0.1776	-0.2494	-0.1541	0.1660	0.0577	-0.0977	-0.0662	0.2295
ed4	0.2537	0.2286	0.3402	0.2186	-0.1970	0.3529	0.2255	0.0823	0.0830	0.1318	0.0077	0.1733	-0.0063	0.1077

	iexp6	iexp7	iexp8	iexp9	ac1	ac2	ac3	ac4	ac5	ac6	ed1	ed2	ed3	ed4
iexp6	1.0000													
iexp7	0.3537	1.0000												
iexp8	0.4810	0.7621	1.0000											
iexp9	0.2854	0.7904	0.6821	1.0000										
ac1	0.2736	0.6543	0.5218	0.7954	1.0000									
ac2	0.3176	0.8202	0.7691	0.8357	0.7417	1.0000								
ac3	0.1241	0.8175	0.7103	0.7636	0.5861	0.8418	1.0000							
ac4	0.2212	0.8351	0.7846	0.7392	0.6428	0.8303	0.8114	1.0000						
ac5	-0.0632	0.6076	0.5868	0.6692	0.6664	0.6934	0.6755	0.6251	1.0000					
ac6	0.3126	0.7241	0.6872	0.8434	0.7789	0.8410	0.7880	0.7742	0.6895	1.0000				
ed1	0.1329	-0.3205	-0.1435	-0.3257	-0.1662	-0.0969	-0.2742	-0.1936	-0.3224	-0.2003	1.0000			

ed2	0.0959	-0.5402	-0.3738	-0.5270	-0.3654	-0.3579	-0.4993	-0.5324	-0.4780	-0.4524	0.7719	1.0000	
ed3	0.0997	0.1548	0.1214	0.1109	0.1975	0.1092	0.1634	0.1172	0.1406	0.1348	-0.3302	-0.2606	1.0000
ed4	-0.2100	-0.0765	-0.0841	-0.0447	0.0625	0.0841	0.0036	0.1333	-0.0948	-0.0119	0.6287	0.3466	-0.3190	1.0000

3. Correlation Matrix Chapter 4

	ioi1	ioi2	ioi3	ioi4	ioi5	ioi6	ioi7	ioi8	iex1	iex2	iex3	iex4	iex5	iex6
ioi1	1.0000													
ioi2	0.4726	1.0000												
ioi3	0.5245	0.2074	1.0000											
ioi4	0.4215	0.4410	0.5400	1.0000										
ioi5	0.6623	0.4091	0.7415	0.5451	1.0000									
ioi6	0.6786	0.2861	0.4742	0.2566	0.7032	1.0000								
ioi7	0.7865	0.3719	0.6295	0.3845	0.7657	0.8450	1.0000							
ioi8	0.2255	0.3192	-0.0196	0.3637	0.1237	0.3008	0.2935	1.0000						
iex1	0.4829	0.1418	0.3242	-0.0646	0.3970	0.6754	0.5898	0.1042	1.0000					
iex2	0.6402	0.2441	0.3953	0.1740	0.6290	0.7486	0.7664	0.1963	0.5664	1.0000				
iex3	0.1473	0.5268	-0.0039	0.0878	0.0713	0.0552	0.0067	0.0511	0.0863	-0.0713	1.0000			
iex4	0.2473	0.2049	0.2103	0.4737	0.1915	0.1502	0.2421	0.4513	-0.0831	0.1600	0.0499	1.0000		
iex5	-0.0146	-0.1287	0.1916	0.2761	0.1832	0.2141	0.1870	0.2550	0.1282	-0.0084	-0.1420	-0.2123	1.0000	

iex6	0.3721	0.4414	0.2377	0.6298	0.3790	0.3737	0.3229	0.3345	-0.0029	0.2308	0.3736	0.5211	0.0313	1.0000
iex7	0.4359	0.1171	0.2296	-0.0648	0.3572	0.5962	0.4756	0.1515	0.7671	0.4246	0.0953	-0.0970	0.1170	0.0062
iexp1	-0.3693	-0.0174	-0.6366	-0.2527	-0.6266	-0.3957	-0.5298	0.1594	-0.1943	-0.4706	0.0399	-0.1085	-0.0148	-0.1095
iexp2	-0.5822	-0.2918	-0.6792	-0.3559	-0.7874	-0.6991	-0.7503	-0.0184	-0.3937	-0.6903	-0.1064	-0.1514	-0.0807	-0.3087
iexp3	-0.1353	-0.3125	-0.0974	-0.6176	-0.0315	0.0672	-0.0271	-0.4055	0.4535	0.1610	-0.1540	-0.3768	-0.1740	-0.5903
iexp4	0.2847	0.0753	0.1198	-0.2578	0.1644	0.4118	0.3992	-0.0748	0.5610	0.3909	-0.1375	-0.0984	-0.2134	-0.2113
iexp5	-0.5602	-0.3456	-0.6934	-0.4172	-0.7818	-0.5478	-0.6569	-0.0064	-0.3909	-0.5959	-0.1189	-0.1518	-0.0565	-0.1819
iexp6	-0.1261	0.0043	-0.4500	-0.5754	-0.3380	-0.2011	-0.2454	-0.3345	0.0770	-0.0838	0.1369	-0.3147	-0.5117	-0.3604
iexp7	-0.6009	-0.2456	-0.7195	-0.3586	-0.7704	-0.6859	-0.7702	-0.0330	-0.3934	-0.5919	-0.1090	-0.1643	-0.1825	-0.2935
iexp8	-0.5900	-0.3220	-0.6793	-0.5858	-0.7842	-0.6495	-0.7003	-0.2176	-0.2356	-0.4475	-0.1017	-0.2480	-0.3576	-0.4510
iexp9	-0.5632	-0.0965	-0.7586	-0.3691	-0.7609	-0.5912	-0.7207	0.0885	-0.4255	-0.6399	0.1421	-0.0168	-0.2294	-0.1053
inp1	0.2668	0.2871	0.0936	0.3097	0.2558	0.3000	0.3773	0.6315	0.3055	0.3282	-0.0769	0.3577	0.2039	0.1364
inp2	0.7351	0.3920	0.6597	0.6497	0.6880	0.6462	0.7873	0.3826	0.2712	0.5477	0.0591	0.4241	0.2219	0.5438
inp3	0.5365	0.3679	0.4725	0.3877	0.5306	0.6260	0.6857	0.5438	0.4986	0.4665	0.0403	0.3128	0.3090	0.2484
inp4	0.5010	0.4189	0.5515	0.5813	0.6400	0.6445	0.6989	0.5250	0.3502	0.5030	-0.0259	0.4413	0.2992	0.3965
inp5	0.1317	0.1817	-0.0093	0.2542	0.1074	0.2862	0.2510	0.4917	0.2337	0.3673	-0.1626	0.1764	0.3190	0.1408
ip1	0.4030	0.0443	0.3018	0.2283	0.1971	0.2992	0.3680	0.2200	0.2996	0.3040	0.0270	0.6037	-0.2116	0.3219
ip2	0.2764	0.1643	0.0984	0.0696	0.2391	0.5169	0.3823	0.2883	0.5577	0.3390	-0.2291	0.0665	0.2044	0.0615
ip3	0.5428	0.2510	0.2388	0.1954	0.3155	0.3465	0.3849	0.1750	0.2994	0.1504	-0.1886	0.1954	-0.0470	0.0315
ip4	0.5078	0.2856	0.2281	0.4821	0.2911	0.1935	0.3682	0.1344	0.0234	0.2478	-0.0409	0.0197	0.2947	0.2525
ip5	-0.1542	0.0752	-0.0325	0.2469	0.0224	-0.0050	-0.0628	0.3028	0.0747	-0.1802	0.0487	0.2144	0.3127	0.1447
ip6	0.1877	-0.0267	0.1303	0.2542	0.0726	0.1931	0.2862	0.3820	0.0595	0.2320	-0.4015	0.4355	-0.0535	0.1470

ip7	0.2403	0.2436	0.1393	0.3378	0.1363	0.0687	0.1002	0.3534	0.1424	0.1349	0.1044	0.0756	0.1809	0.0674
bp1	0.4525	0.3259	0.1560	0.1428	0.2516	0.5719	0.5631	0.5288	0.4420	0.4517	0.2010	0.3880	0.1081	0.2891
bp2	0.6033	0.2468	0.3201	0.2589	0.4396	0.6165	0.6217	0.3854	0.4923	0.5577	0.3054	0.1147	0.2804	0.3401
bp3	0.1801	0.3689	0.3202	0.5086	0.2620	0.1449	0.2378	0.2561	-0.2124	0.0922	0.1072	0.1651	0.1962	0.2541
bp4	0.3492	0.3298	0.4159	0.4178	0.3716	0.3510	0.4566	0.3973	0.2290	0.3154	-0.1102	0.3719	-0.0317	0.2136
bp5	0.5020	0.4792	0.5300	0.5907	0.6824	0.5051	0.5889	0.1869	0.1378	0.4601	0.1468	0.0639	0.2624	0.4874
bt1	-0.1645	0.1433	-0.2066	0.1129	-0.1460	0.1099	0.0235	0.4939	-0.0708	0.0305	-0.0336	0.0946	0.2722	0.2699
bt2	0.5078	0.2857	0.2658	0.2634	0.2793	0.4034	0.4044	0.4681	0.2777	0.3390	0.1299	0.3370	-0.0140	0.3115
bt3	0.5888	0.3614	0.4567	0.5155	0.5229	0.6237	0.6358	0.5005	0.5011	0.5027	0.0205	0.3555	0.3368	0.3330
bt4	0.3716	0.1377	-0.1551	-0.1327	-0.0736	0.2929	0.2145	0.2033	0.3063	0.1912	0.3969	0.1592	-0.0535	0.1970
pt1	-0.1285	-0.2490	-0.2113	-0.3409	-0.1103	0.0948	-0.0107	-0.1475	0.3148	-0.0550	-0.2126	-0.4109	0.2789	-0.2791
pt2	-0.0967	-0.0945	-0.3257	-0.4865	-0.2136	-0.1914	-0.2094	-0.3011	0.1371	-0.1698	0.1044	-0.2521	-0.2437	-0.3552
pt3	-0.1918	-0.0811	-0.1723	-0.4385	-0.2337	-0.2947	-0.2779	-0.4190	0.0591	-0.1801	0.2176	-0.2783	-0.4120	-0.3524
pt4	-0.2730	-0.4748	-0.4863	-0.5406	-0.4350	-0.0654	-0.2605	-0.0695	0.2118	-0.0577	-0.2641	-0.0310	-0.2102	-0.2001

	iex7	iexp1	iexp2	iexp3	iexp4	iexp5	iexp6	iexp7	iexp8	iexp9	inp1	inp2	inp3	inp4
iex7	1.0000													
iexp1	-0.2209	1.0000												
iexp2	-0.3055	0.7491	1.0000											
iexp3	0.3095	-0.0734	0.0059	1.0000										
iexp4	0.5733	-0.2124	-0.2543	0.4384	1.0000									

iexp5	-0.3015	0.7126	0.8387	-0.0881	-0.2387	1.0000						
iexp6	0.1749	0.1689	0.2566	0.4611	0.4968	0.2292	1.0000					
iexp7	-0.2786	0.7326	0.8454	0.0043	-0.2367	0.7637	0.3537	1.0000				
iexp8	-0.2555	0.5615	0.7745	0.3037	-0.0118	0.6832	0.4810	0.7621	1.0000			
iexp9	-0.3435	0.8022	0.8103	-0.0911	-0.2835	0.7960	0.2854	0.7904	0.6821	1.0000		
inp1	0.2727	-0.0054	-0.1573	-0.0931	0.1317	-0.2326	-0.1829	-0.1092	-0.2279	-0.1275	1.0000	
inp2	0.2209	-0.4674	-0.6419	-0.4312	0.0799	-0.5247	-0.4635	-0.6776	-0.7532	-0.6015	0.3444	1.0000
inp3	0.4944	-0.2064	-0.4797	-0.1944	0.2216	-0.4119	-0.3679	-0.4673	-0.5748	-0.3970	0.5769	0.6445	1.0000
inp4	0.2171	-0.2799	-0.5322	-0.2195	0.1044	-0.4773	-0.5126	-0.5469	-0.6201	-0.4553	0.4410	0.6877	0.6660	1.0000
inp5	0.0443	0.2525	-0.0548	-0.0670	0.0316	-0.1164	-0.2488	0.0098	-0.0764	-0.0495	0.4930	0.1687	0.2832	0.4420
ip1	0.3271	-0.2031	-0.1750	-0.0854	0.2847	-0.1663	-0.1062	-0.2489	-0.1210	-0.1895	0.1636	0.3477	0.3393	0.2607
ip2	0.4593	0.2383	-0.0560	0.2065	0.4273	-0.0135	-0.0272	-0.0780	-0.1239	-0.0828	0.2743	0.1640	0.4219	0.4940
ip3	0.3862	0.0166	-0.1359	0.0044	0.3435	-0.1660	0.0216	-0.1677	-0.3110	-0.1636	0.2546	0.3305	0.3683	0.3400
ip4	0.0332	-0.0993	-0.1402	-0.3569	0.0502	-0.1878	-0.1044	-0.2325	-0.3041	-0.3124	0.1883	0.4799	0.2109	0.1924
ip5	0.2466	0.2059	0.1886	-0.1268	0.0044	0.1083	-0.0001	0.2547	-0.0463	0.1358	0.2833	-0.0343	0.2761	0.1408
ip6	0.1640	-0.1150	-0.0780	-0.2563	0.3907	-0.0682	-0.1452	-0.1089	-0.0714	-0.1387	0.4039	0.3184	0.3405	0.2839
ip7	0.2924	0.0484	0.0344	-0.2384	-0.1445	-0.1287	-0.2538	0.0682	-0.0297	-0.0769	0.1969	0.1321	0.3054	0.1968
bp1	0.2771	0.0462	-0.3350	-0.1169	0.2370	-0.2068	-0.1358	-0.3174	-0.3468	-0.1283	0.4219	0.4885	0.6213	0.5807
bp2	0.5415	-0.3283	-0.4618	-0.1685	0.1350	-0.3838	-0.2167	-0.5024	-0.4529	-0.4328	0.3101	0.5851	0.5571	0.3665
bp3	-0.1336	-0.2248	-0.3501	-0.5765	-0.0939	-0.3306	-0.3249	-0.2754	-0.4421	-0.2573	0.0535	0.4207	0.2576	0.3837
bp4	0.2826	-0.2478	-0.3405	-0.2641	0.3682	-0.3679	-0.2555	-0.3370	-0.3077	-0.3091	0.4215	0.4785	0.5947	0.4952
bp5	0.1096	-0.3719	-0.6181	-0.3637	-0.0255	-0.5294	-0.3946	-0.5727	-0.6462	-0.5247	0.2591	0.6598	0.4959	0.4739

bt1	-0.1505	0.3516	0.1602	-0.3388	-0.0650	0.2967	-0.2905	0.0993	0.0509	0.2821	0.2450	0.0886	0.1874	0.2856
bt2	0.3811	-0.0450	-0.2157	-0.3130	-0.0090	-0.1086	-0.3048	-0.2024	-0.2796	-0.1232	0.2263	0.4644	0.6103	0.3951
bt3	0.4571	-0.1405	-0.4053	-0.1849	0.1416	-0.4192	-0.3495	-0.3577	-0.5277	-0.4099	0.4610	0.6207	0.6432	0.7309
bt4	0.1660	0.2194	0.0029	0.0475	0.0572	0.0450	0.1301	-0.0998	-0.0162	0.1364	0.0301	0.1461	0.0649	0.0801
pt1	0.3122	0.1587	0.1577	0.4325	0.3520	0.1982	0.3834	0.1685	0.0962	0.0425	0.1147	-0.2096	-0.0519	-0.1734
pt2	0.1772	0.1206	0.3523	0.5544	0.2512	0.2714	0.6564	0.2430	0.4033	0.2156	-0.1571	-0.4043	-0.2965	-0.4017
pt3	0.1376	-0.0913	0.1275	0.4203	0.3587	-0.0286	0.5772	0.1073	0.4056	0.1014	-0.1765	-0.4317	-0.2978	-0.5716
pt4	0.2649	0.3033	0.3858	0.4310	0.3475	0.4668	0.4670	0.4511	0.4861	0.3623	0.0042	-0.4290	-0.2277	-0.3482

	inp5	ip1	ip2	ip3	ip4	ip5	ip6	ip7	bp1	bp2	bp3	bp4	bp5	bt1
inp5	1.0000													
ip1	-0.0015	1.0000												
ip2	0.4657	0.2435	1.0000											
ip3	0.0247	0.2618	0.4864	1.0000										
ip4	0.2059	0.1252	0.0864	0.2547	1.0000									
ip5	0.2010	0.1500	0.3420	0.0542	0.0442	1.0000								
ip6	0.2393	0.5143	0.2370	0.2708	0.2276	0.0930	1.0000							
ip7	0.2548	0.2412	0.1515	0.1164	0.2357	0.2990	0.1571	1.0000						
bp1	0.4245	0.3015	0.4391	0.2131	0.0799	0.0990	0.1957	0.0065	1.0000					
bp2	0.1603	0.3734	0.0965	0.0689	0.3513	0.0099	0.1375	0.3747	0.4545	1.0000				
bp3	0.1844	-0.0558	-0.0886	-0.0188	0.2508	0.0699	0.1959	0.2511	0.1469	0.1464	1.0000			

bp4	0.1965	0.4338	0.2645	0.3226	0.1525	0.1202	0.6958	0.2935	0.2831	0.2647	0.3834	1.0000
bp5	0.1513	0.0161	0.0655	0.0691	0.4445	-0.0062	0.0914	0.1205	0.2273	0.4411	0.4118	0.3930	1.0000
bt1	0.4359	-0.0683	0.2759	-0.1855	0.0336	0.0885	0.3011	-0.0152	0.3111	0.0477	0.2082	0.2648	0.1765	1.0000
bt2	0.0570	0.4728	0.2568	0.3282	0.0975	0.0560	0.2693	0.5337	0.4000	0.5170	0.1364	0.4460	0.2654	0.1163
bt3	0.5285	0.3090	0.5341	0.4056	0.3095	0.2999	0.2448	0.4470	0.5613	0.4899	0.3446	0.3820	0.3238	0.1026
bt4	0.1839	0.2020	0.1303	0.1432	0.1056	-0.1901	-0.1600	-0.0571	0.5425	0.3841	-0.1613	-0.2342	-0.1604	0.0248
pt1	0.0642	-0.2970	0.2799	0.1493	0.0340	0.2044	-0.1341	-0.3941	0.0011	-0.0930	-0.4115	-0.2855	-0.1639	-0.0602
pt2	-0.3560	-0.0127	0.0612	0.1040	-0.0463	0.1038	-0.3282	-0.1742	-0.2019	-0.1636	-0.5945	-0.4075	-0.4106	-0.3747
pt3	-0.4191	0.0622	-0.3303	-0.1796	-0.1641	-0.1174	-0.0373	-0.1232	-0.3518	-0.0977	-0.2884	-0.0145	-0.2470	-0.3339
pt4	0.0138	0.1427	0.2461	0.0331	-0.3425	0.1535	0.1336	-0.2311	-0.0162	-0.1762	-0.5713	-0.2270	-0.5878	-0.0120

	bt2	bt3	bt4	pt1	pt2	pt3	pt4
bt2	1.0000						
bt3	0.4718	1.0000					
bt4	0.1811	0.2478	1.0000				
pt1	-0.4008	-0.0442	0.0691	1.0000			
pt2	-0.2538	-0.3197	0.1526	0.4138	1.0000		
pt3	-0.2912	-0.5264	-0.0879	0.0865	0.4446	1.0000	
pt4	-0.1285	-0.1415	0.1622	0.5134	0.3796	0.1807	1.0000