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INSIGHTS INTO THE RELATIONSHIP BETWEEN OPEN INNOVATION AND EXTERNAL KNOWLEDGE ACQUISITION IN TECHNOLOGY-BASED SOUTH KOREAN SMEs

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Abstract

Objective: To analyze evidence of the logic of open innovation in South Korean SMEs operating in the information technology segment, considering as a reference the main elements used by them in the processes of acquiring external knowledge (CE).
Methodology: The method used is qualitative, exploratory and interpretative, employing a systematic literature review to develop the research instruments. The fieldwork was supported by 9 semi-structured interviews with managers/professionals from the 7 SMEs investigated, and was carried out in the Seoul region, South Korea. Content analysis and the Atlas TI program were used to analyze the data. To discuss the results, the Snowball search method was used, supported by Google Scholar and Chatgpt 4.0 to organize the relationship between the results.
Results: The analysis of CE acquisition processes used in South Korean SMEs required the construction of analytical references based on the theories used. The analysis revealed evidence of the logic of open innovation in the EC acquisition processes of SMEs. Relevant aspects were also identified regarding the management and processes of EC acquisition among SMEs, which can be recovered as contributions to the academic debate and management practices .
Originality/value: Studies dealing with the relationship between open innovation and absorptive capacity, especially in a technologically advanced environment such as the ICT segment in South Korea, are not very common. In addition to these particular empirical conditions, the theoretical field provided relevant connections between open innovation and ACAP, which constitute opportunities for future studies.

Keywords: Open innovation, acquisition of external knowledge, SMEs, technology-based companies, and South Korea.

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INSIGHTS SOBRE A RELAÇÃO ENTRE INOVAÇÃO ABERTA E AQUISIÇÃO DE CONHECIMENTO EXTERNO EM PMES SUL- COREANAS DE BASE TECNOLÓGICA

Resumo

Objetivo: Analisar evidências da lógica da inovação aberta em PMEs sul-coreanas atuando no segmento de tecnologia da informação, considerando como referência os principais elementos empregados por elas nos processos de aquisição de conhecimento externo (CE).
Metodologia: O método empregado é qualitativo, exploratório e interpretativo, emprega revisão sistemática da literatura para elaborar os instrumentos de pesquisa. O campo foi sustentado em 9 entrevistas semiestruturadas com dirigentes/profissionais das 7 PMEs investigadas, e foi realizado na região de Seul, na Coréia do Sul. Na análise dos dados foi empregada a análise de conteúdos e o programa Atlas TI. Para a discussão dos resultados foi usado o método de busca Snowball, apoiado no Google Scholar e no Chatgpt 4.0 para a organização da relação entre os resultados.
Resultados: A análise dos processos de aquisição de CE usados nas PMES sul-coreanas exigiu a construção de referenciais analíticos baseados nas teorias empregadas. A análise revelou evidências da lógica da inovação aberta nos processos de aquisição de CE das PMEs. Ainda foram identificados aspectos relevantes acerca da gestão e dos processos de aquisição de CE entre as PMEs, que podem ser recuperados como contribuições ao debate acadêmico e à práticas gerencias.
Originalidade/valor: Estudos tratando da relação entre inovação aberta e capacidade absortiva, especialmente em ambiente tecnologicamente avançado como é o caso do segmento TIC na Coreia do Sul, não são muito comuns. Além dessas condições empíricas particulares, o campo teórico oportunizou conexões relevantes entre inovação aberta e ACAP o que constitui oportunidades de estudos futuro.

Palavras-Chave: Inovação aberta, aquisição de conhecimento externo, PMEs , empresas de base tecnológica, e Coréia do Sul.

INSIGHTS SOBRE LA RELACIÓN ENTRE LA INNOVACIÓN ABIERTA Y LA ADQUISICIÓN DE CONOCIMIENTOS EXTERNOS EN LAS PYMES SURCOREANAS DE BASE TECNOLÓGICA

Resumen

Objetivo: Analizar evidencias de la lógica de la innovación abierta en las PYMES surcoreanas que operan en el segmento de tecnologías de la información, considerando como referencia los principales elementos utilizados por ellas en los procesos de adquisición de conocimiento externo (CE).
Metodología: El método utilizado es cualitativo, exploratorio e interpretativo, empleando una revisión sistemática de la literatura para desarrollar los instrumentos de investigación. El trabajo de campo se apoyó en 9 entrevistas semiestructuradas a directivos/profesionales de las 7 Pymes investigadas, y se realizó en la región de Seúl, Corea del Sur, para el análisis de los datos se utilizó el análisis de contenido y el programa Atlas TI. Para discutir los resultados se utilizó el método de búsqueda Snowball, apoyado en Google Scholar y Chatgpt 4.0 para organizar la relación entre los resultados.
Resultados: El análisis de los procesos de adquisición de CE utilizados en las PYMES surcoreanas requirió la construcción de referentes analíticos basados en las teorías utilizadas. El análisis reveló evidencias de la lógica de la innovación abierta en los procesos de adquisición de CE de las PYMES. También se identificaron aspectos relevantes en cuanto a la gestión y los procesos de adquisición de CE entre las PYMES, que pueden ser recuperados como aportes al debate académico y a las prácticas de gestión.
Originalidad/valor: Los estudios que abordan la relación entre la innovación abierta y la capacidad de absorción, especialmente en un entorno tecnológicamente avanzado como el segmento de las TIC en Corea del Sur, no son muy comunes. Además de estas condiciones empíricas particulares, el campo teórico proporcionó conexiones relevantes entre la innovación abierta y ACAP, que constituyen oportunidades para futuros estudios.

Palabras clave: Innovación abierta, adquisición de conocimiento externo, PYMES, empresas de base tecnológica y Corea del Sur.

1 INTRODUCTION

In the contemporary business environment, innovation is revealed as a driving force behind organizational performance and the development of competitiveness among organizations (Chen, Chen, Liu & Xu, 2021; Kim & Shim, 2018; Zaefarian, Forkmann, Mitręga & Henneberg, 2017). Built upon the principle of open innovation (Bogers, Chesbrough & Moedas, 2018; Chesbrough, 2003, 2010; Vrande, Jong, Vanhaverbeke & Rochemontd, 2009), grounded in the formation and operation of cooperation networks, inter-organizational relationships (Jang, Lee & Yoon, 2017; Sabando-Vera, Yonfa-Medranda, Montalván-Burbano, Albors-Garrigos & Parrales-Guerrero, 2022), and the exchange of knowledge (Ali & Ali, 2018; Hye, Jeon, Degravel, 2019), open innovation has become a production logic for innovations considered crucial for the competitiveness of companies (Jang et al., 2017). In this context, new factors promoting innovation have emerged, such as the absorption by organizations of external knowledge and information capable of enabling adaptations to the demands of this unstable and uncertain environment (Kumar, Rose & Muien, 2009).

In this interaction between external knowledge flows (CE) and open innovation, the concept of absorptive capacity (ACAP) (Cohen & Levinthal, 1990; Gebauer, Worch & Truffer, 2012; Lane, Koka & Pathak, 2006; Lewin, Massini & Peeters, 2011; Todorova & Durisin, 2007; Volberda, Foss & Lyles, 2010; Zahra & George, 2002) has gained prominence in organizations and in academic discourse (Apriliyanti & Alon, 2017). According to Zahra and George (2002), ACAP is structured around four sets of organizational routines - routines of acquisition, internalization, assimilation, and application of external knowledge - which enable the company to reconfigure its resource base for innovation by integrating new knowledge and recycling existing ones (Bocquet, Brion & Mothe, 2016).

For small and medium-sized enterprises (SMEs), the development of innovations as an alternative for their survival and competitiveness is a strategy with significant challenges due to their limited availability of resources (Deitos, 2003; Hutter, Hautz, Repke & Matzler, 2013; Müller, Buliga & Voigt, 2021). Therefore, one of the possible paths for SMEs has been to seek, internalize, and use information and knowledge that has already been developed in other external sources (Egbu, Hari & Renukappa, 2005; Kim & Kim, 2014). Hence, for SMEs, the logic of open innovation and the employment of the innovation strategy based on ACAP can result in a more suitable knowledge appropriation process under conditions of lower cost, time, and risk (Müller et al., 2021). However, the relationship between open innovation, ACAP, and SMEs still lacks empirical research addressing the practices and routines that would structure

these relationships, especially the capacity for absorbing external knowledge in small businesses (Mishra, 2019), particularly when operating in technology-based sectors (Cunha Filho, Pedron & Ruas, 2021).

Thus, the first motivating factor of this study was to contribute to reducing the lack of empirical knowledge about ACAP in SMEs, especially SMEs operating in technology-based segments. This opportunity arose from the involvement of a researcher who is of South Korean nationality and resides in South Korea, capable of accessing SMEs engaged in the production of semiconductors and memory displays in that country. This segment places South Korea among the world leaders in innovation (Hasan, Klaiber, & Sheldon, 2018; Romildo, 2019;).

On the other hand, due to the Covid-19 pandemic, the field research had to be adapted to the availability limitations presented by South Korean SMEs. Even after the most challenging phase of the epidemic, access restrictions persisted. Faced with this limitation, the research was reduced in its original scope, focusing on the stage of External Knowledge Acquisition (CE), which is the first stage of ACAP structuring (Gebauer et al., 2012; Zahra & George, 2002). However, the decision to focus the research on this stage of ACAP was not limited to the casuistic reasons associated with Covid-19.

According to the seminal literature on ACAP, the Acquisition stage deals with processes recognized as fundamental in the absorption of external knowledge, such as recognizing the value of external knowledge, identifying the most effective external sources, activation triggers, the role of gatekeepers, and other relevant processes (Cohen & Levinthal, 1990; Gebauer et al., 2012; Patterson & Ambrosini, 2015; Todorova & Durisin, 2007; Zahra & George, 2002). Furthermore, its processes and practices exhibit a significant level of complexity and play a fundamental role in the success of the subsequent stages of ACAP - assimilation, transformation, and application (Kim & Yoo, 2018; Laursen & Salter, 2006; Limaj & Bernroider, 2019).

In addition to these justifications, there was a methodological reason related to the data collection phase: the nature of the phenomena that characterize the stage of External Knowledge Acquisition (CE) involves interorganizational dimensions, and as a result, its practices and procedures tend to be more tangible and supported by more evidence, unlike the stages of assimilation, transformation, and application of external knowledge (Gebauer et al., 2012; Zahra & George, 2002). This condition, in theory, makes the task of identifying and characterizing the processes associated with the Acquisition stage less complex.

Finally, all arguments regarding the opportunity to collect information and opinions about the subcapacity to acquire CE in South Korean SMEs, contextualized by the research

gaps in technology-based SMEs (Cunha Filho et al., 2021; Mishra, 2019), led to the formulation of the problematic, research question, and objective that follow.

Considering that South Korea is one of the world leaders in the ICT (Information and Communication Technology) segment and that there is a large participation of small and medium enterprises in the business environment of that country (almost 99%) (Park, 2023), it is assumed that an important part of these SMEs reflect the country's advancement in its innovation production practices, currently incorporated into the logic of open innovation. In this sense, the expectation is that SMEs operating in the ICT segment may be adopting some of the practices associated with the logic of open innovation, which would be perceived in their processes of acquiring external knowledge. Based on these assumptions, the research question that guides this work is: which important elements of the CE acquisition processes of 7 South Korean SMEs operating in the ICT segment can be considered engaged with the main requirements of the logic of open innovation? The answer to this question refers to the following objective: to analyze evidence of the logic of open innovation in South Korean SMEs operating in the information and communication technology segment, considering as a reference the main elements employed by them in the processes of acquiring external knowledge.

The method employed in the research was essentially qualitative, exploratory, and interpretative. It begins with a systematic literature review relating open innovation, the capacity to absorb external knowledge, and small and medium-sized enterprises - from which the factors that constituted the collection instruments and the analysis categories of a field research in 7 South Korean IT SMEs are derived, based on semi-structured interviews with 9 managers and professionals from these companies. The specifics of the investigation, as well as general aspects of the South Korean SMEs investigated, are presented in detail in the section dedicated to the method.

The construction and experimentation of analytical references to analyze the subcapacity of CE Acquisition in its relationship with open innovation can be qualified as the theoretical-empirical contribution of this study. Considering that the process of absorbing external knowledge is treated as the capacity to absorb CE (ACAP), one of its parts, the Acquisition of CE, will be addressed next as a subcapacity.

2 LITERATURE REVIEW

2.1 Brief information about South Korea, the ICT segment, and the environment where the investigated SMEs operate

South Korea is a country located in East Asia with a total area of 100,339 km² and a population of 51,628,000 inhabitants. This makes South Korea one of the most densely populated countries in the world (515 inhabitants per km²). A very high proportion of the population (81%) is considered urban, with 20% of them living in the Seoul region. Its economy is one of the most developed in the world, with a strong focus on technology and industrial production, especially in the electronic, automotive, heavy machinery, petrochemical, and manufacturing sectors in general. The advancements in technology are notable: in recent years it has achieved the position of the world's largest producer of semiconductors and is one of the leaders in 5G communication technology. Its portfolio of large companies includes giants such as Samsung, Hyundai, and LG (Tripoli, 2023).

Since 2000, the growth rate of the Korean ICT (Information and Communication Technology) industry has been much higher compared to the global economic growth rate. (Seo, 2022). The ICT sector is the environment where the SMEs investigated in this research operate.

SMEs represent more than 90% of the total number of companies in the country, and by 2023 SMEs are expected to reach a total of 7.71 million small and medium-sized enterprises, which represents 99.9% of the total number of companies. Among these SMEs, 4,652 operate in the IT sector (Park, 2023). In 2022, the Korean government allocated 92.8% of the projected budget to encourage new investments directly to SMEs operating in innovative segments (Kosme, 2022). The volume of SME exports in 2022 was $117.5 billion. A positive characteristic of the exports from small and medium-sized enterprises is that they are not concentrated on specific items and diversify into a variety of items, which generates less risk for the survival of this type of companies (Choi, 2023).

According to Korea IDC, the domestic artificial intelligence market is expected to register an average annual growth rate of 14.9% over the next five years. Although the adoption of AI is already being accelerated in various industrial segments, the incentive policies for the AI ecosystem, which combines digital and industrial technology, have been strengthened through innovations in service business, which has been observed to give a new impetus to the growth of the AI market. (IDC, 2023).

2.2 Open innovation, ACAP, and the stage of External Knowledge Acquisition (CE)

Knowledge is a fundamental asset for organizational outcomes and for strengthening the competitive position of each company (Pereira & Bamel, 2021; Teece & Al-Aali, 2011). The diffusion of the open innovation paradigm at the end of the 20th century (Chesbrough, 2003) values the proposal of Cohen and Levinthal (1990) dedicated to the construction of a multifunctional capacity comprising the following activities related to external knowledge (CE): exploration, recognition of value, acquisition, adaptation, transformation, and application of CE. It is necessary to consider that in the open innovation paradigm (IA), CE becomes essential to maintain innovation operations in companies (Camisón & Forés, 2010), therefore the capacity to manage CE becomes a central component for innovation strategies (Cohen & Levinthal, 1990) and a source of competitive advantage for companies (Jansen, Van Den Bosch & Volberda, 2005; Volberda et al., 2010). In summary, ACAP is the capacity that enables access to and assimilation of CE, and therefore of new ideas (Lim & Kim, 2018), elements that mobilize innovation and competitiveness in the long term (Chung, 2011).

The proposal of Cohen and Levinthal (1990) is subsequently recognized and developed in various studies, and despite some differences among seminal works on ACAP, it is possible to arrive at a certain homogeneity about its composition (i) exploration, recognition of value and acquisition of CE; (ii) assimilation/internalization of CE to the existing knowledge in the company; (iii) transformation/adaptation/recycling of CE; (iv) application of the recycled knowledge in various innovations (Cohen & Levinthal, 1990; Gebauer et al, 2012; Lane et al., 2006; Todorova & Durisin, 2007; Volberda et al., 2010; Zahara & George, 2002).

The focus of the research scope on the stage of CE acquisition and its relation with the logic of open innovation defined the first stage of this path: to investigate the main elements and dynamics that compose the sub-capacity of CE acquisition, in order to identify reference elements capable of sustaining the analysis of South Korean SMEs and their relationship with the logic of open innovation. From the review of seminal articles on ACAP, it is worth preliminarily highlighting the following aspects: Cohen and Levinthal (1990) emphasize the importance (i) of recognizing the value of CE; (ii) of information about external sources; (iii) of mechanisms of social integration, which would involve aspects of organizational learning and (iv) the relevance of gatekeepers. Zahra and George (2002) highlight: (i) the external sources of CE and (ii) the need for prior knowledge to evaluate and acquire CE, an approach that is also highlighted in Patterson and Ambrosini (2015). Lane et al. (2006) value the

importance of learning based on antecedent knowledge in order to support decisions on the management of CE. In this sense, Lichtenthaler (2009) argues that learning processes help companies to convert external knowledge into innovations, while Gebauer et al. (2012) establish a relationship between sharing and collaboration at work with organizational learning as a basis for recycled knowledge. For Eisenhardt and Martin (2000) and Todorova and Durisin (2007), the Acquisition stage is essential because it is the moment of recognizing the value of CE, an aspect that will direct the entire ACAP process and therefore should be preceded by mobilizing elements, such as the identification of appropriate sources of CE and the construction of a prior repository of previous knowledge originated from recent projects. The construction of antecedents evolves through learning processes (Todorova & Durisin,2007). For Escribano, Fosfuri and Tribó (2009), the Acquisition stage is the moment to define relationships and seek new knowledge. Finally, Lewin et al. (2011) adds to the ACAP the perspective of internal and external routines, which will affect the understanding of the Acquisition phase.

Figure 1 is the result of the selection and systematization of elements raised in the preliminary analysis of topics extracted from the literature, presented above. The selection criteria were: (i) references highlighted as relevant to the performance of the sub-capacity of CE acquisition in at least 3 articles considered seminal on ACAP; (ii) references recognized by professionals from technology-based SMEs that operate in innovation-related activities; (iii) references capable of producing empirical evidence about their presence and performance in the sub-capacity of CE acquisition. The result of this selection was called 'structuring elements'. In figure 1, they are presented and characterized, along with the works where they are referenced.

Figure 1

Structuring Elements of the ACAP Acquisition Stage

Structuring Elements of the ACAP Acquisition Stage theoretical references for analyzing the Acquisition conditions of the investigated SMEs	
Structuring Elements of the ACAP Acquisition Stage	**Referenced Works**
1. **Recognition of the Value of CE in external knowledge sources to consolidate the environment and culture of open innovation:** this structuring element appropriates two theoretical-empirical strands associated with innovation: first, the reference that comes from the construction and dissemination of ACAP (Cohen & Levinthal, 1990; Apriliyanti & Alon, 2017) which deals with the capacity of company professionals to identify and evaluate relevant CE and identify those with the highest potential for application and most valuable; second, the reference to the recognition of the open innovation paradigm (IA) and its association with the acceptance and adoption of the principle that CE is an inevitable resource for innovation production in the current context (Chesbrough, 2003, 2010; Vrande et al., 2009). Therefore, the 'recognition of the value of CE' expresses two meanings: capability, in the form of an attribute to be developed, and validation, from the perspective of adopting a new paradigm.	(Apriliyanti &Alon, 2017 ; Bogers et al, 2018 ; Chen et al., 2021; Chesbrough, 2003; 2010 ; Cohen & Levinthal, 1990; Jang et al., 2017; Lewin et al., 2011; Todorova & Durisin, 2007 ; Vrande et al, 2009)
2. Existence of Prior Knowledge to support decisions about CE (or Antecedents) - are the result of experience and learning in previous processes of exploration, acquisition, and assimilation. This prior knowledge can have different configurations: explicit and tacit; formal and informal; centralized or sectoralized. Prior knowledge involves various fields of innovation production: identification of external sources, nature of the knowledge available in them, technological trends, suitable suppliers, potential customers, etc. Given the speed of innovation processes, it is necessary that these knowledges, generally appropriated in previous projects, are organized and available for immediate interventions. (Gebauer et al., 2012; Todorova & Durisin, 2007; Zhara & George, 2002).	(Algarni, Ali, Leal-Rodiguez & Albort-Morant ,2023; Dong; Guo; Chen. & Murong, 2023; Gebauer et al., 2012; Lane et al., 2006 ; Todorova & Durisin, 2007; Zahra & George, 2002)
3. Existence of Social Integration Mechanisms (or learning) efers to the formation of a culture of inter and intraorganizational relationships, whose basis is the disposition to collaboration, cooperation, sharing in formal and informal activities. The exchange of experiences and knowledge enhances the construction of collective and organizational learning, both internally and externally. (Gebauer et al, 2012; Hye et al., 2019). It also includes organizational learning strategies that encourage cooperation and sharing in activities and mobilization for the self-development of professionals. These mechanisms are important incentives for partnerships in the open innovation environment.	(Cohen & Levinthal, 1990; Eisenhrardt e Martin, 2000 ; Gebauer et al., 2012; Lane et al. 2006; Lichtenthaler, 2009 ; Todorova & Durisin, 2007; Zahra & George, 2002)
4. Employment of CE Acquisition Practices - refer to the organizational processes and regular activities in the form of routines and practices that a company uses to explore the environment and acquire CE. Examples: practices to identify external sources of knowledge and technologies, practices to assess the suitability and relevance of available CE; relationship practices with players in the production chain, practices for exploring websites and publications, etc. The development and consolidation of these practices is what structures the routines of the CE acquisition sub-capacity and, by extension, the meta-routines of the ACAP. (Lewin, 2011 and Zhara & George, 2002. However, these consolidations should not lose sight of the attributes of flexibility and agility, advantages of SMEs in an open innovation environment (Dubouloz, Bocquet, Balzli, Gardet, & Gandia, 2023).	(Camisón e Forés, 2010 ; Eisenhardt & Martin, 2000; Jiménez-Barrionuevo et al. 2011 ; Lewin et al, 2011; Todorova & Durisin, 2007; Volberda et al., 2010 ; Zahra & George, 2002)

5. Performance of Gatekeepers to speed up and increase the quality of the CE acquisition process in companies. Gatekeepers are individuals or groups that act as guardians of external knowledge flows, in their transition to the interior of the company where it will be assimilated and adapted. According to the literature, in medium and large companies, the gatekeeper would have the responsibility to 'bridge' between the company that provides the knowledge and the one that receives it and also organize the first phases of knowledge absorption. (Cohen & Levinthal, 1990). This means that, in addition to coordinating the decision about the most valuable CE, the gatekeeper must mediate and translate them into assimilation processes. Due to these relatively complex attributions, the gatekeeper is considered a key figure in the acquisition of CE.	(Cohen & Levinthal, 1990; Chesbrough, 2003)

Source: Organized by the authors.

3 METHOD

Phase 1 of the methodological path began with a literature review on seminal articles about ACAP, with a focus on the stage of external knowledge acquisition (CE), which resulted in 18 articles. Subsequently, a search was conducted in databases, Web of Science (WoS), Scopus, and ProQuest, selecting articles that dealt with ACAP in SMEs, resulting in 1,113 articles. Narrowing the filter to the field of SMEs in the area of IT, publications that referred in some way to the stage of knowledge acquisition of ACAP, and also selected publications classified in Qualis higher than B2 (4 in the current Qualis), resulted in 48 articles. The 2 sets of articles defined above were analyzed according to all eligibility criteria, in order to adequately synthesize the findings in a reproducible manner (Tranfield, Denyer, & Smart, 2003).

Based on this analysis, the collection instruments were developed - directives of information about the companies to be investigated (year of foundation, main product portfolio, segments of operation, number of collaborators, annual turnover, markets of operation, etc.) and instrument for semi-structured interview, which included questions about the company's relationship with the acquisition of CE, the company's motivation for this initiative; the most relevant and most frequent external sources of knowledge, along with the types of knowledge predominant in each of these sources; the knowledge of greatest value for each SME; practices of CE acquisition (including gatekeeper roles) and also open questions arising from the respondents' answers.

Phase 2 began with the selection and scheduling of the investigated SMEs. This selection was made based on the availability and convenience of the interviewees and their respective companies. The collection took place between the end of 2020 and the beginning of 2021, first, through prior access to documentary information and consultations to webpages,

which allowed the development of a broad profile of each company; second, through semi-structured interviews applied to 9 directors and professionals active in the 7 investigated SMEs. Among the interviewees, 6 are at the managerial level and 3 are professionals/technicians of the company and before starting the interview itself, the respondents filled out a form on personal data and company data. The data collection was made possible thanks to the network of relationships of one of the authors of the research, who lives in Seoul, has South Korean nationality, and led this stage of the research. The 9 interviews totaled 341 minutes.

The details of the Collection information appear in figure 2, and the reference to the interviewees, as well as the company to which they are linked, appears in the last line of this figure.

Figure 2

Profile of the investigated companies and respective interviewees

Tópics	**AD Solutions**	**MSTECH**		**ISNET**	**CIEL Systems**	**MetroSoft**	**Cloocus**		**Einz**
IT Segments	Wireless Security	Technical test inspection and analysis		Software system development	Communication Equipment	Software development and supply	Microsoft Azure Consulting and Solutions		System Integration
Foundation	2013	2012		1999	2011	2001	2018		2018
No. Employees	7	157		20	8	25	99		15
Main Product	Main Product Hacker attack blocking and unwanted access control	LG Mobile APP and radio communication		Next-generation medical information system (HIS)	Development of automatic system for air pollution prediction	Next-generation medical information system (HIS)	Development of infrastructure monitoring for Microsoft's cloud platform		arious solutions for server platforms
Interviewees	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**E9**

Source: Created by the authors

Furthermore, regarding the collection of information, it is worth noting that the interviews were conducted privately and individually, which discards any possibility of mutual influences on their responses to the semi-structured instrument. Although the companies investigated operate in the same productive segment, they are relatively diverse among themselves, in terms of size, age, main products, market performance, turnover, available resources, etc.

Two types of analyses were performed. First, the analysis of the interview results of the professionals from the investigated SMEs, in which the technique of content analysis was employed, a set of communication analysis techniques that aims to interpret the content of messages and indicators (Bardin, 2011); second, the analysis of the raised results and of the secondary data, such as websites and documents, from the analytical references called 'structuring elements' of the sub-capacity of CE acquisition, whose selection criteria were presented at the end of the theoretical review. The content analysis, construction, and integration of evidence followed the guidance of Creswell (2010) and were supported by Atlas TI. For the Discussion stage of the results, the Snowball search method was used, supported by Google Scholar and ChatGPT 4.0 for organizing the relationship between the results. Figure 3 consolidates the methodological path followed.

Figure 3

Methodological path followed 1Figure 3: Methodological path followed

Research Stages	**Phase 1**	**Phase 2**
Nature of research	Qualitative	Qualitative
Methodological Approach		Exploratory
Paradigm		Positivist
Method	Systematic Review	Semi-structured Interviews
Unit of analysis	Literature on ACAP in international SMEs	IT area South Korean SMEs in the IT area
Data collection procedures	- Planning: Search in the databases Scopus, WoS, ProQuest, Spell, and Scielo - Organization and systematization.	- Application of semi-structured interviews with professionals involved in the acquisition of CE; - Selection of business documents and webpages
Data collection instruments	Database resources	- Semi-structured interview guide - Online reports
Data analysis procedures	Content analysis - ATLAS.ti software.	Content analysis - ATLAS.ti software.
Discussion of Results		Snowball search method with Google Scholar and ChatGPT 4.0 for organizing the results.

Source: Created by the authors.

4- Results e Analysis

The presentation of the results selects important parts of the in-depth interviews conducted with the 9 professionals representing the 7 investigated companies. The analysis begins with the relationship of the SMEs with their sources of external knowledge with which

they share knowledge and constitute one of the main strongholds of evidence of the activities that make up the exercise of the sub-capacity of acquisition, one of the stages of ACAP.

4.1 Aggregated analysis of the SMEs' relationship with their external sources of knowledge: relevance and frequency;

Figure 4 indicates the positions of frequency and relevance of each of the external sources of knowledge, according to the opinion of the interviewees. The rankings below were structured based on direct questions using the Likert Scale divided into 5 levels, for each of the external sources below, and the results come from the sum of the scores obtained on the Likert scale.

Figure 4

The relevance and frequency of access to each of the External Sources of knowledge of the investigated SMEs, according to the interviewees

External Sources (ES)	Relevance of ES	Frequency of access to ES
Clients & Consumers - of the products and services of the SMEs	1st position	2nd position
Internet (Search Site/**Websites** – access predominantly in free exploration)	2nd position	1st position
Competitors - operating in the same market segment, with identical or similar products and services	3rd position	8th position
Suppliers - of equipment, software, and materials	4th position	5th position
Partnerships - in ongoing or completed projects	5th position	3rd position
Government/National System - governmental projects, technical advisory, support agency, etc.	6th position	6th position
Lectures, Workshops, Meetings	7th position	7th position
Networking - Networks of contacts formed by different types of actors related to the business	8th position	4th position
Publications, Databases	9th position	10th position
Long-term, stable, and permanent alliances	10th position	9th position
External Consulting	11th position	13th position
Fairs, Exhibitions	12th position	11th position
Universities and Institutes - Joint projects, consultancies, etc..	13th position	12th position
Social Network (Facebook, Instagram, Linkedin, etc.)	14th position	14th position

Source: Created by the authors.

Figure 4 reveals that the external sources Customers and Consumers, Internet, Suppliers, Partnerships, and Government show a certain homogeneity in terms of relevance and frequency, all positioned in the upper ranks, which means that they play a fundamental role in knowledge sharing with the investigated companies. This result indicates that among the main partners in knowledge sharing of the investigated SMEs, those that have business relations with them in the production chain stand out. The external source Competitors deviates from this condition as it is considered relevant but not accessed frequently, due to the confidentiality and complexity of this type of relationship. The source Networking goes in the opposite direction – it is frequent, but not as relevant.

The external sources classified as less relevant are also less frequent – Publications and Databases, Long-Term Alliances, External Consulting, Fairs and Exhibitions, and Universities and Research Institutes. Contrary to common sense, the condition of low relevance and low frequency of the external source Universities and Research Institutes is surprising, classified as not very relevant and infrequent, which goes against what the literature on the subject indicates, in which this source of knowledge is capable of enabling learning about technology, markets, and customers (Eerme & Nummela, 2019; Spithoven, Clarysse & Knockaert, 2011).

4.2 Analysis of the characteristics of the relationship of the investigated SMEs with each of the main external sources of knowledge;

Figure 5 is dedicated to the analysis of the nature of the CE from each of the knowledge sources (2nd column) and the relevance of the relationship of each of these external sources for the investigated companies, considering the nature of the shared knowledge (3rd column). In this sense, it refers to excerpts from the interviews conducted with the professionals from the companies.

Figure 5

Analysis of the nature of knowledge shared by each external source and the relevance of these for the companies where the interviewed professionals work

External Sources	Tipo	Nature of knowledge acquired in these relationships	Relevance of the relationship of the external sources used by the investigated SMEs
Clients	**Excerpts from the interview**	"Typically, customer feedback is along the lines of <I wish there was this feature>. This type of feedback is very important to update the next version of the product" <E1> "We receive feedback from customers on the status of product development, on new development methodologies and complaints regarding product defects" <E9>	When the customer is a company like LG, their developers teach many things about the specifications." <E2> When a local government, which is also a client, provides feedback on the functions it needs, a new system is developed according to its needs" <E5>
	Analysis	- Customers are the most frequent external source and are very relevant for SMEs due to their feedback. These are generally aimed at improvements and features for current products. This means that the majority of customer input goes towards incremental improvements.	- Technological knowledge related to new product cycles comes as feedback from large customers, e.g. LG. These insights, valuable for future products and MKT stocks, are rarer. - - According to the literature, the external source of customers has great strategic relevance in the open innovation environment, due to the CE. (Gazquez, Machado, & Urpia, 2020).
Internet and Website	**Excerpts from the interview**	"As a developer, I look a lot on the Internet for source code to develop the necessary technology." <E4> "From a developer's point of view, when there are development problems, the most referenced source is the Internet, 80-90% of the time." <E5>	"To keep up with changes in this sector or in technology, I obtain information quickly via the Internet, to instruct R&D and the technical department". <E6> "When I have a problem, I look at what similar problem solvers have posted on tech blogs or something." <E8>
	Analysis	- What predominates in this source is operational knowledge about everyday technical problems; - Information/news on new techniques and/or technologies in the IT environment;	- It is a fast, practical and economical source of information, widely used by professionals in the open innovation environment; - It can be a relevant source for daily operations, but of little value for the company's business strategy. (Winter & Chaves, 2017).
Competitors	**Excerpts from the interview**	"We can discover all the disadvantages and flaws of our competitors and then create equipment that complements them. And get ahead in the market" <E1> "When we develop products with several companies, we hold meetings together. We are not in the position of competitors, but of partners". <E1>	"Companies are coming together to share information with competitors during industry seminars." <E2>. "When I update or downgrade the product version and I can't resume, then I ask competitors for help." <E3>
	Analysis	- In general, knowledge is sought about the strengths and weaknesses of competitors, to have an advantage in new projects, technology and MKT; - Low frequency relationship, but very	- Recently, meetings to discuss the productive sector have been transformed into platforms to share trends about new technologies and new products with competitors; - There have

		important for reviewing strategic aspects about products and innovation, inspired by the competition's actions;	been cases of competitors becoming partners, due to projects with large companies and/or mutual difficulties;
Suppliers	**Excerpts from the interview**	"Suppliers know more than anyone else about products and their advantages and disadvantages. Therefore, to understand a product and to develop it, we have to obtain knowledge from suppliers. (E1)	"If there is a type of technology that cannot be implemented or there is an error in the choice, you can contact the supplier center to find out about it." (E8); "Based on the guide document provided by the supplier, I analyze what I can take advantage of and use in the project. (.....)If there is an update, I can request it directly" (E3)
	Analysis	- In-depth knowledge about products: qualities, problems, advantages and disadvantages of using products; - Supplier knowledge is crucial to understand and improve product designs;	- Strategic vision of SMEs: attract suppliers to act as partners in projects; - The relevance of Suppliers as an external source of knowledge is shared in the literature - (Vargas, Gonçalo, Dos Santos, & De Souza, 2020)
Partnerships	**Excerpts from the interview**	"If we don't have the technology and a competitor does, we can work to compensate for the flaws and limitations through partnerships" <E4>.	"As we cannot offer all products, we work in partnership with other companies that offer items that we do not have." <E5> "In some cases I go to update and training platforms from other companies to look for new content. <E6>
	Analysis	- Information without technological flaws and limitations that is shared between partner SMEs, in a system of productive complementarity; - Exchange of knowledge in joint projects for product development;	Partnerships are vital for innovation between SMEs and are part of Korean business culture, being one of the sources that mobilize open innovation; - Partnerships between SMEs is an important strategy to stimulate productive complementarity.
Government	**Excerpts from the interview**	"Through the government, we get information about the types of businesses that will develop in the future', what type of system will be needed and about climate problems in the near future." <E5> "It is necessary to follow government information systems and guidelines, because if we make a mistake in a bid proposal or in a contract, it could cause harm for everyone." <E2>	"Security is an issue that has a lot of secrecy on the government side, so you will never know what kind of security system is being run and what kind of information the government has, even if you try to research it. And this information is very important for companies operating in the communications segment" <E1> "Local governments are great customers, as they demand projects and services. (E6)
	Analysis	- Strategic and updated information on security and national events, which can directly affect SMEs and their projects; - Information without government guidelines: essential to avoid errors in tenders and contracts, in which SMEs participate;	The Government and its systems are important customers for SMEs in the technology area., - Therefore, SMEs need to monitor government information about services and tenders and, by extension, its rules and standards;,
Networking	**Excerpts from the interview**	"When we meet people from companies that also supply the same customers as our company, we can exchange ideas on how to improve this process" <E2> "Companies need to be part of associations that enable	"If there's something that doesn't work or if I have any questions, I can go to a developer site to find out what I need or if there's a better way to develop. I usually talk to colleagues who do

		advertisements on the website or manage bids. At meetings of these associations, companies debate and negotiate among themselves." <E5>	similar work to get the information I need." <E3>
	Analysis	- Above all, to seek information on how to resolve doubts, share knowledge and stay up to date with changes in the sector; - Offers opportunities for collaborations and inter-company negotiations;	- Registration in an association of companies forming networking in order to collect information about technological trends, service offerings and tenders and changes in the sector;
University & Research Institute	**Excerpts from the interview**	"There does not appear to be a case where a technology was developed at a university and it ended up being effectively used in the company's systems. As companies have achieved a high-level technological base, there are not many motivations to carry out research at universities and engage in industry-academia cooperation". <E7>	"There are companies that want to link to universities because the government supports them financially. However, the performance of this partnership is not good." <E5> "Research institutes and universities are not relevant to our company, because we work with wireless security between IT lines and with information leaks". <E1>
	Analysis	- Information and technologies developed in these institutions (according to those interviewed, the available information would not be aligned with the companies' needs) - Joint projects with SMEs, - at the time of the research there were not many interested parties, for the same reason as above;	- Less relevant source for some of the SMEs investigated. The reasons are due to a) the need for information security and b) the technological standard dominated by SMEs, according to those interviewed, at least as advanced as those in force in university research;

Source: Created by the authors

The analyses that make up Figure 5 prompt some additional reflections. Customers, Suppliers, Internet/Website, and Networking constitute relevant external sources for feedback related to everyday activities, such as adjustments to the functionality of products and processes, improvements and problem solving in operations, projects for the development of incremental innovations, etc.

On the other hand, Customers of large companies, Hardware and Software Suppliers, Strategic Partners, and Government can, according to evidence presented in the same figure, make valuable contributions to the medium-term strategies of SMEs, such as: information and knowledge about technological trends, projects for new products/services for the sector, and to participate in new government strategies. A preliminary conclusion is that SMEs have been benefited by this flow of external knowledge, capable of stimulating incremental improvements in their operational and everyday activities, as well as encouraging new strategic projects, based on new technological trends, new products, and markets.

Moreover, the same Figure 5 points to alternatives for future improvements. The relationship with competitors and suppliers, for example, show in the rankings of Figure 5, a

position of relevance higher than the position of frequency of access. How to increase the frequency of access to the Competitors source? The alternative of using meetings dedicated to the debate on industry trends is very stimulating, but according to the findings, they are still in reduced quantity – one per semester. To transform this culture, it would be necessary to value the centripetal force of cooperation and reduce the centrifugal force of competition. The desire to improve the relationship in this environment also involves the relationship with the Suppliers source, in the form of joint project development.

In the same perspective, it is necessary to examine the sources Networking and Partnerships, placed in interviews in positions of relevance, but which in their content do not present the same importance. Indeed, when analyzing the nature of the knowledge acquired from the Networking source, the respondents highlighted mainly contents of an operational nature. The Partnerships source, however, shows few incidences of enduring projects, mainly reporting situations of partnerships for short-term opportunities.

5 Discussion

5.1 The 'structuring elements' of the ACAP's CE Acquisition sub-capacity and the CE acquisition conditions of the investigated SMEs

The issues that drive the topic dedicated to the Discussion of the analysis revolve around the problem that mobilized this article and constitute the entry point into the research question: which structuring elements of the CE acquisition processes of Seven South Korean SMEs operating in the ICT segment can be considered engaged with the main requirements of the open innovation logic? This research question is addressed in figure 6, in which the results of the field research and the 'structuring elements of CE acquisition', presented in figure 1, are confronted, presented in figure 1

Figure 6

Analysis and discussion of the CE acquisition conditions of the investigated SMEs, based on the "structuring elements" of the CE Acquisition subcapacity

Structuring Characteristic	Analysis of 'Structuring Elements' of Acquisition in SMEs
Recognition of the Value of CE in external sources of knowledge to consolidate the environment and culture of open innovation	Firstly, the analysis of interviews about the relationship of SMEs with external sources of knowledge revealed an undeniable capacity to identify and evaluate relevant external knowledge and distinguish among them the most valuable for their companies, especially in the more recurrent external knowledge sources.
Existence of prior knowledge to support decisions about CE (or Antecedents)	The testimonials presented in figure 5, some of which are reproduced in this same topic, revealed the possibilities of organizing very important prior knowledge for the CE acquisition stage, from the portfolio of external sources.
Existence of Social Integration Mechanisms (or learning)	Several pieces of evidence were found among the investigated SMEs of initiatives for sharing, cooperation, and learning with other external players (clients, suppliers, government, and even competitors).
Employment of CE Acquisition Practices	The analysis of the testimonials identifies various acquisition practices related to the exploration and selection of CE in the environment of the investigated SMEs.
Performance of Gatekeepers to speed up and enhance the quality of the CE acquisition process	In the investigated SMEs, the gatekeeper's function is unfolded between (i) the general or commercial director, who focuses on the opportunity and value of the CE and therefore is able to evaluate its potentials – although sometimes he/she does not deeply know the technological aspects of the CE and (ii) a non-managerial IT professional, called a developer, whose function is to coordinate/implement the absorption of the CE and transform it into innovation/development.

Source: Prepared by the authors.

The observations of figure 6, which include parts of the narratives of the professionals already presented in figure 5, brought rich evidence about the dynamics of the CE acquisition sub-capacity and its relationship with the open innovation logic. The 'structuring element' - recognition of the value of CE – used as an analytical reference in field evidence, was able to detect the presence, among the investigated SMEs, of the two theoretical-empirical trends associated with innovation (Müller et al., 2021). First, the reference to the company professionals' capacity to identify and evaluate CE (Cohen & Levinthal, 1990; Todorova &

Durisin, 2007) and, second, the reference to the legitimization of the open innovation paradigm (IA) (Chesbrough, 2010; Vrande et al., 2009). The convergence of testimonies, although based on different perspectives, confirms that the capacity to recognize value in knowledge from external sources is the result of collective constructions and efforts, involving the different players operating in this environment. This condition is expressed in partnership relations between the SMEs themselves (Hye et al., 2019), between large companies and SMEs (Chesbrough, 2010; Jang et al., 2017) and between local governments and SMEs (Lee, Park, Yoon & Park, 2009). Therefore, it is evident that not only have the investigated SMEs legitimized and adopted the open innovation paradigm, but also the players who share the environment in which they operate, despite the endogenous (scarcity of financial and human resources, for example) and exogenous (limited relationships and access to third-party technologies) difficulties that this new paradigm presents (Dubouloz et al., 2023).

The second structuring element of external knowledge acquisition refers to the existence of prior knowledge capable of supporting decisions about CE. These knowledges are the result of previous experiences in processes of exploration, acquisition, and assimilation of CE (Lane et al., 2006; Zhara & George, 2002). The importance of prior knowledge in the CE absorption process is highlighted in the research of Algarni et al. (2023) and Dong et al., (2023), which include prior knowledge among the causal factors that strongly impact the course of external knowledge in assimilation processes and, by extension, its performance as innovation. The conclusions of figure 6 reveal that the investigated SMEs hold portfolios of prior knowledge sufficiently diverse and broad to meet the demands of CE, both for operational activities and for future projects. They also include relevant information about where to search for each type of CE. The presence of prior knowledge among the investigated SMEs reinforces the evidence that these companies are already operating from the perspective of open innovation.

The mechanisms of social integration, which enhance processes of learning and construction of collective competencies (Broman, Ruas & Rocha Pinto, 2019), through processes of cooperation, relationship, and sharing, constitute the third 'structuring element' used as an analytical reference of the CE acquisition sub-capacity and its relations with open innovation (Gebauer et al, 2012; Hye et al., 2019). In the context of learning with external partners, there were several pieces of evidence of sharing, cooperation, and learning connecting the investigated SMEs with external players (clients, suppliers, government, and even competitors), which reveals an engagement of their external relations with the logic of open innovation. However, regarding the internal social integration mechanisms, little was addressed by the interviewees. Paradoxically, in CE adaptation processes, developers are directed to use

as much internal knowledge as possible, which in theory, should require learning and recycling initiatives. And possibly what Chen, Lin e Chang (2009) understand as learning potential in the very modalities of work in companies operating with more advanced technologies may occur. In any case, in this research, no evidence of deliberate social integration mechanisms in the internal relations of the investigated SMEs was identified. What appeared very clearly was the strong emphasis that professionals dedicate to self-development. In summary, it is paradoxical that in external relations the potential for learning is very large, while in internal relations its evidence is limited.

The use of CE acquisition practices is another 'structuring element' of the sub-capacity under analysis. Testimonies presented in figures 5 and 6 identify various acquisition practices related to the sub-capacity analyzed, which reinforces the logic that suitable practices sustain desired strategies. In the case investigated here, the most frequent practices are concentrated on the exploration of new projects and the search for compatible external knowledge, which guarantees the focus and performance of the CE acquisition sub-capacity and its engagement in the open innovation logic. In this sense, Zynga, Diener, Ihl, Lüttgens, Piller & Scherb (2018) conclude in research about the implementation of IA in 756 companies, that the success of this project comes from the choice and adoption of practices suitable to the conditions of the companies. For an SME lacking resources, a normal situation among them, nothing is more appropriate than to concentrate efforts on external relations and the logic of open innovation. Vrande et al. (2009) justify this option through a similar and even more realistic logic: the selection of practices in SMEs obey above all the volume of investments to put them into action. Therefore, the most common practices in the SME environment are those that deal with customer feedback, involvement in external networkings, relationships with suppliers, as they are informal practices and not necessarily structured and that require little or no investment (Vrande et al., 2009). Finally, the practices raised and analyzed in the environment of the investigated SMEs ensure evidence of external activities related to the acquisition of CE, both from the perspective of ACAP (Cohen & Levinthal,1990), and the IA environment (Müller et al.,2021).

The last of the structuring elements deals with the role of gatekeepers, this key figure which, according to the literature on ACAP, would be responsible in medium and large companies, for the 'bridge' between the company that provides the knowledge and the one that receives it (Cohen & Levinthal, 1990). Figure 6 reveals that in the investigated SMEs there is no central figure of the gatekeeper, as their functions are shared between 2 or more

professionals. In the analyzed testimonies, there are no favorable or unfavorable observations to this adaptation. However, the choice of the investigated SMEs to carry out these functions should not cause surprise. In their seminal work, Cohen and Levinthal (1990) already anticipated that the implementation of a new model implemented by external knowledge, the logic of open innovation would require the adaptation of processes or the creation of additional processes to deal with issues of scale and scope generated by the absorption of CE. In the same perspective, Lewin et al., (2011) understand that organizations must develop and adopt processes that allow them to select the most valuable ideas and integrate them into their existing knowledge in the form of routines. Lazzarotti, Manzini, and Pellegrini (2015) introduce a change of perspective in this debate, arguing that the figure of the gatekeeper forged by Cohen and Levintahl (1990) comprises two different, but equally complex functions. The first is defined by the authors as a scout, as it should identify advances in science and technology that can be useful for the company, through a directed search in a specific technological area or not directed, in fields of new technological opportunities. The second is defined as gatekeeper, (the guardian of the bridge) that is, the appropriation of CE in the receiving company (Lazzarotti et al., 2015). Finally, what is important to consider in the analysis is that the traditional functions of the gatekeeper are being performed, through configurations adapted to the needs of SMEs and the open innovation environment.

5.2 Conclusions about the discussions triggered in figure 6

The most significant conclusion from the analysis results about the investigated SMEs is dedicated to the research question: it reveals that the CE acquisition processes meet some of the main requirements of the open innovation paradigm: (i) adherence to the recognition of the central role of CE (Cohen & Levinthal, 1990; Chesbrough, 2010); (ii) building relationships and exchanges with the main players in the productive segment (Gebauer et al., 2012; Hye et al., 2019), a relationship that includes knowledge sharing, exchange, and openness to partnerships and joint projects with other players (Vrande et al., 2009); (iii) building bases of prior knowledge that allow SMEs to identify external sources suitable for their demand (Algarni et al., 2023; Todorova & Durisin, 2007; Zahara & George, 2002). The results also showed that the investigated SMEs were generally benefited by external knowledge flows, which stimulated incremental improvements, adherence to strategic projects, based on new technological trends and new products.

Based on this same approach, it was concluded that adherence to the open innovation regime granted to the investigated SMEs, based on the presentation above, could be extended to the environment where they operate, including their main players, following the principle of reciprocity. In other words, the continuity and stability of an environment where open innovation prevails, requires sharing and exchange among the involved players. One of the strong indications of the players' adherence to the open innovation regime, according to the interviewees' testimonies, were cases of transformation of competing SMEs into partner SMEs, with the purpose of developing projects for new products.

Among the conclusions closest to the empirical field, but also relevant, and that can be put forward as suggestions for SMEs acting or intending to act in an IA environment, we can highlight:

a- As observed among the analyzed SMEs, privileging external relationships built in their production chain can accelerate important partnerships. Even if initiated as commercial transactions, these relationships can in the future open space for cooperation through feedback, suggestions, information on industry and technology trends, etc. Following the examples observed in the research, the preferential actors for these relationships would be clients, suppliers, and business partners, including competitors.

b- Value and encourage self-development as a more flexible way to keep up with the rapid changes in the technological environment - websites, online forums, online libraries of large companies, etc. But unlike what was observed among the analyzed companies, develop ways to encourage

c- Openness to global networks and knowledge - it is necessary to follow spaces of information, challenges, and globalized solutions, adopting search procedures similar to those observed among the professionals of the investigated SMEs. d- Adaptation of the organizational culture to the conditions of the IA logic: flexibility and openness are vital to adhere to the logic of open innovation.

6 Final Considerations

At the end of this stage, it is pertinent to question whether the methodological approach adopted to analyze the engagement of the elements that structure the CE acquisition processes in the investigated SMEs has fulfilled this purpose. In the authors' understanding, the approach based on 'structuring elements' adequately fulfilled the function of an analytical reference. It

not only met the need to provide tools for the analysis and evaluation of the CE acquisition processes of the investigated SMEs always in light of the requirements of the open innovation logic, but it also allowed extending this same situation of adherence to the requirements of open innovation to the other players who shared the same environment with the SMEs. In its trajectory, the adopted approach also opened space for various debates, directly or indirectly relevant to the understanding of the themes addressed in the research. Finally, it can be projected that the experience of this research would not have the same result if, instead of focusing on only one stage of the ACAP framework, it had taken the whole as the object of the analysis of the relationship with the logic of open innovation – certainly, it would have been an excessively long experiment to allow advances in the external relations of the SMEs. Therefore, from the experiment with this approach, the motivation is carried over to analyze another sub-capacity of the ACAP, understanding that each one of them carries its own specificities and complexities that are relevant to the treatment of the open innovation environment.

Naturally, the application of the 'structuring elements' approach also presented some limitations. The first one, which ended up influencing several reflections on its results, is related to the restricted access to the investigated SMEs, added to the impossibility of accessing the other players that made up the relationship networks of these SMEs, in the position of clients, suppliers, or partners. The adequate analysis of bilateral or multilateral relationship processes, dominant situations in an open innovation environment, should not be restricted to the vision and opinion of just one of the parties, in this case, the analyzed SMEs. Certainly, the homogeneity dominant in South Korean business thinking and culture, a factor highlighted in the literature, may have partially reduced the negative impacts of this limitation. A second limitation identified was the absence of an a priori investigation about the impacts of the interrelation between the 'structuring elements'. This measure could resize the research instruments, including projections of other evidence that could expand both the results and their analytical possibilities. Possibly, this measure would avoid some of the gaps observed in the analysis, such as the absence of evidence on internal practices within companies, on elements related to social integration in work processes, or even on training and learning initiatives adopted to deal with the open innovation environment.

Among the suggestions for future studies, the suggestion to replicate in other environments the approach adopted here could result in new perspectives and constructive perspectives about the processes of absorbing external knowledge in open innovation environments. Another possibility, still a little explored in the theoretical-empirical space, is the investigations about the relationship between ACAP and open innovation, from which this

study presented relevant connections. The relationship between these two 'theories' projects intriguing perspectives, as they are complementary dimensions – management and environment. Finally, the suggestion to analyze other stages of the ACAP, considering that assimilation, transformation, and application of CE, each present their own complexities and specificities. Is it possible to better understand the whole (the ACAP) from the investigation of each of its parts?

AUTHOR'S CONTRIBUTION

Contribution	Park, S.	Ruas, R.L.	Ouros, L.O.
Contextualisation	X	X	-
Methodology	X	X	-
Software	X	X	X
Validation	X	X	-
Formal Analysis	X	X	-
Investigation	X	X	X
Resources	X	X	X
Data Curation	X	-	X
Original	X	X	-
Revison and editing	X	X	X
Viewing	X	X	X
Supervision	-	X	-
Project Management	X	X	-
Obtaining funding	-	-	- -

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