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Absorptive capacity in strategic management: evidence from digital technology-based SMEs

Capacidade absortiva na gestão estratégica: evidências de PMEs de base tecnológica

Capacidad de absorción en la gestión estratégica: evidencia de PYMEs basadas en tecnología digital

Autorship

Marcio Augusto Lassance Cunha Filho

Grenoble Alpes University (GAU)
mlassance@terra.com.br
https://orcid.org/0000-0003-4290-3147

Cristiane Drebes Pedron

Universidade Nove de Julho (UNJ)
cdpedron@gmail.com
https://orcid.org/0000-0002-2901-6378

Roberto Lima Ruas

Universidade Nove de Julho (UNJ)
roberuas@gmail.com
https://orcid.org/0000-0003-3821-3397

ABSTRACT

Goal: This study aims to determine how organisational absorptive capacity (ACAP) component elements are embedded in the strategic management processes of digital technology-based small and medium-sized enterprises (digital SMEs). **Methodology/approach:** Underpinned by the theoretical realms of strategic management and ACAP, we employed qualitative inquiry to extract the potential links between these two concepts from interviews and observations in the field. **Originality/relevance:** Our findings highlight evidence of planning and resource allocation aimed at leveraging external knowledge absorption as a strategic initiative in digital SMEs. **Main findings:** Our findings revealed the following ACAP component elements integrated into the strategic management processes of the selected digital SMEs: knowledge absorption from 'inter-organisational partnerships'; innovation through knowledge absorption in 'customer relationships'; 'social capital' as a knowledge absorption enabler; and leveraging 'previous knowledge' to seize new opportunities. **Theoretical contributions:** This study contributes to the operationalisation of ACAP by linking its component elements to strategic management imperatives for digital SMEs. **Management contributions:** For practitioners, the implementation of processes related to the proposed links may support management in their strategic management endeavours.

Keywords: Absorptive Capacity. Strategic Management. SMEs. Small and Medium-sized Enterprises. Digital Technology.

RESUMO

Objetivo: Este estudo tem como objetivo determinar como os elementos da capacidade absortiva organizacional (ACAP) estão integrados nos processos de gestão estratégica de pequenas e médias empresas (PMEs) de base tecnológica. **Metodologia/abordagem:** Com base nos fundamentos teóricos da gestão estratégica e da ACAP, utilizamos uma pesquisa de abordagem qualitativa para extrair os potenciais vínculos entre esses dois conceitos a partir de entrevistas e observações em campo. **Originalidade/relevância:** Nossas descobertas destacam evidências de planejamento e alocação de recursos voltados para alavancar a absorção de conhecimento externo como uma iniciativa estratégica em PMEs digitais. **Principais resultados:** Nossas descobertas revelaram os seguintes componentes da ACAP integrados nos processos de gestão estratégica das PMEs digitais selecionadas: absorção de conhecimento, a partir de parcerias interorganizacionais; inovação, através da absorção de conhecimento em relacionamentos com cliente; capital social, como um facilitador da absorção de conhecimento; e aproveitamento do conhecimento prévio, para capturar novas oportunidades. **Contribuições teóricas:** Este estudo contribui para a operacionalização da ACAP ao vincular seus elementos componentes às imperativas de gestão estratégica para PMEs digitais. **Contribuições para a gestão:** Para os profissionais, a implementação de processos relacionados aos vínculos propostos pode apoiar a gestão em seus esforços de gestão estratégica.

Palavras-chave: Capacidade Absortiva. Gestão Estratégica. PMEs. Pequenas e Médias Empresas. Tecnologia Digital.

RESUMEN

Objetivo del estudio: Este estudio tiene como objetivo determinar cómo los elementos componentes de la capacidad de absorción organizacional (ACAP) están integrados en los procesos de gestión estratégica de pequeñas y medianas empresas (PYMEs) basadas en tecnología digital. **Metodología:** Basándonos en los fundamentos teóricos de la gestión estratégica y la ACAP, utilizamos una investigación cualitativa para extraer los posibles vínculos entre estos dos conceptos a partir de entrevistas y observaciones en el campo. **Originalidad/relevancia:** Nuestros hallazgos destacan evidencias de planificación y asignación de recursos dirigidos a aprovechar la absorción de conocimiento externo como una iniciativa estratégica en las PYMEs digitales. **Principales resultados:** Nuestros hallazgos revelaron los siguientes elementos componentes de la ACAP integrados en los procesos de gestión estratégica de las PYMEs digitales seleccionadas: absorción de conocimiento a partir de 'socios interorganizacionales'; innovación mediante la absorción de conocimiento en 'relaciones con clientes'; 'capital social' como facilitador de la absorción de conocimiento; y aprovechamiento del 'conocimiento previo' para capturar nuevas oportunidades. **Contribuciones teóricas/metodológicas:** Este estudio contribuye a la operacionalización de la ACAP al vincular sus elementos componentes con los imperativos de gestión estratégica para las PYMEs digitales. **Contribuciones sociales/contribución a la gestión:** Para los profesionales, la implementación de procesos relacionados con los vínculos propuestos puede apoyar la gestión en sus esfuerzos de gestión estratégica.

Palabras clave: Capacidad de Absorción. Gestión Estratégica. PYMEs. Pequeñas y Medianas Empresas. Tecnología Digital.

INTRODUCTION

The development of competitive advantages and the generation of above-average returns in an industry are at the heart of strategic formulation in many organisations (Porter, 1985; Grant, 1991; D'Aveni, Dagnino & Smith, 2010; Rumelt, 2011). In pursuing above- average returns as a strategic endeavour, it is common sense that knowledge asset management is essential (Nonaka & Takeuchi, 1995; Conner & Prahalad, 1996; Alavi & Leidner, 2001), particularly when it pertains to the ability to innovate and foster performance (Carrillo & Gaimon, 2004; Nickerson & Zenger, 2004). Actively seeking knowledge from markets, competitors, customers, and other sources may explain performance heterogeneity (Sinkula, Baker & Noordewier, 1997; Harrison & Leitch, 2005). Thus, it is crucial to develop absorptive capacity (ACAP) to recognise the value of external knowledge, assimilate it at the organisational level, and apply it for commercial purposes to leverage innovation and performance (Cohen & Levinthal, 1990). ACAP is a prominent and resilient construct among scholars and appears as a constant theme in strategic management and innovation research (Fabrizio, 2009; Song, Gnyawali, Srivastava & Asgari, 2018; Cunha Filho, Pedron & Ruas, 2021; Ferreira, Gonçalves & Messias, 2024; Kastelli, Dimas, Stamopoulos & Tsakankas, 2024). In this study, we propose an integrative framework that bridges ACAP and strategic management.

The ability to develop and sustain a competitive advantage in line with the technological dynamics of the global environment remains a major challenge for managers and organizational strategists (Faulkner & Campbell, 2006). These dynamics particularly influence digital SMEs (Alshahrani & Salam, 2024), as they rely on technological knowledge to provide market value through proprietary digital products and services (Giones & Brem, 2017). Despite facing challenges and resource constraints compared to larger companies (Tolstoy, 2009), knowledge is recognized as a key resource for SMEs to achieve a competitive advantage (Bojica & Fuentes, 2012).

This study focuses on digital SMEs. For the purposes of this study, digital SMEs are defined as companies that commercialize products, services, or solutions based on proprietary digital technology—either hardware or software. In this sense, these organizations are a specific subset of technology-based SMEs. Thus, we aim to shed light on their integrated processes and mechanisms of Absorptive Capacity (ACAP) and strategic management to achieve superior performance in dynamic markets.

Although SMEs are more dependent on external knowledge than larger companies in the same sector (Zahra, Matherne & Carleton, 2003; Tolstoy, 2009), knowledge management research usually centres on large companies, and the overall results are not always applicable to SMEs (Cerchione, Esposito & Spadaro, 2016). Their limited capacity to access specific resources poses an additional challenge in structuring the processes and mechanisms of external knowledge absorption (Langley & Truax, 1994; Liao, Welsch & Stoica, 2003). Despite the importance of knowledge absorption for SMEs, few studies have addressed ACAP in the context of these companies

(Zahra, Ucbasaran & Newey, 2009; Flatten, Greve & Brettel, 2011; Kim, Akbar, Tzokas & Al-Dajani, 2014; Alshahrani & Salam, 2024). Furthermore, empirical studies on strategic management that deal with competitive advantages to generate above- average returns generally focus on leading companies in their sectors or even publicly traded companies, with few studies specifically targeting SMEs (Katila, Chen & Piezunka, 2012; Cerchione et al., 2016).

In spite of the evolution of organizational learning techniques, including those utilizing artificial intelligence and augmented reality, absorptive capabilities remain a critical area of interest in both academic and practitioner circles (Abou-Foul, Ruiz-Alba & López-Tenorio, 2023; Makhloufi, Laghouag & Sahli, 2024). This relevance is particularly pronounced in emerging countries and among SMEs, where the ability to leverage external knowledge effectively is crucial for enhancing innovation capacity and entrepreneurship (Andrade, Lenzi, Rossetto & Teston, 2021; Cassol, Marietto & Martins, 2022). The dynamic interplay between technological advancements and absorptive capacity underscores the persistent challenges faced by SMEs in navigating rapidly changing market environments, making this subject an omnipresent concern in contemporary strategic management discourse (Cunha Filho, 2022).

Therefore, given the relevance of employment indicators and supply chain complementarity (OECD, 2019), the small number of studies integrating ACAP with strategic management in SMEs is a pivotal motivation for this study. Considering the above, we aim to answer the following research question: "How are organisational absorptive capacity (ACAP) component elements embedded in the strategic management processes of digital SMEs?" The main research objective is to shed light on the potential coalescence of attributes within strategic management practices, routines, mechanisms, enablers, and other facilitators with ACAP component elements through an integrative framework in the context of digital SMEs. To answer this research question, we review the extant literature to identify relevant strategic management process imperatives for SMEs. Next, leveraged by the findings of the inductive field inquiry on the selected digital SMEs, we combined these imperatives with the observed ACAP component elements. Ultimately, this study aims to develop an integrative framework that bridges absorptive capacity (ACAP) and strategic management in digital SMEs, specifically examining how ACAP component elements are embedded within their strategic processes and thereby contributing to a deeper understanding of enhanced performance in dynamic markets. In addition to the theoretical contributions to the ACAP and strategic management fields, there are benefits for practitioners, as process implementation related to the proposed links might support management in their strategic endeavours.

Following the introduction, this study presents a theoretical background of ACAP and SMEs' strategic management. Next, we present the methodological procedures employed to assess organisations in the field. The results and discussion sections, followed by conclusions and final considerations, complete the article.

THEORETICAL BACKGROUND

Absorptive Capacities

Although the term "absorptive capacity" has been used previously (Kedia & Bhagat, 1988), Cohen and Levinthal's (1990) contribution is widely accepted as seminal work on the subject. They define ACAP as the organisational ability to recognise the value of new external information, assimilate it, and exploit it for commercial purposes. Cohen and Levinthal (1990) emphasised the relevance of prior knowledge and investments in research and development (R&D) as crucial for developing ACAP. The authors also reinforce the importance of individual absorptive capacity in building organisational ACAP.

In a complementary proposal, Zahra and George (2002) defined ACAP as an organisational dynamic capability (Teece, Pisano & Shuen, 1997) comprising four dimensions. According to the authors, ACAP is a set of strategic processes and organisational routines that produce organisational dynamic capability through new knowledge acquisition, assimilation, transformation, and exploitation. In an attempt at reconceptualisation, Todorova and Durisin (2007) suggested a model with some important changes to Zahra and George's (2002) proposal. The authors refocused on the first ability proposed by Cohen and Levinthal (1990): the recognition of the value of external information for an organisation. They understood this phase to be a crucial step in the acquisition of new external knowledge. They also complemented their understanding of the transformation phase by proposing it as an alternative rather than a subsequent process to assimilation. Transformation processes apply only to newly acquired knowledge if there are few commonalities with the organisation's current knowledge stock (Todorova & Durisin, 2007).

Despite several attempts to propose a configuration model for ACAP in the extant literature, the sense and recognition of external knowledge value, along with the acquisition, assimilation, and exploitation of this new knowledge, are the predominant ACAP dimensions or sub-capacities (e.g., Lane, Koka & Pathak, 2006; Volberda, Foss & Lyles, 2010; Gebauer, Worch & Truffer, 2012; Patterson & Ambrosini, 2015; Makhloufi, Laghouag & Sahli, 2024). For the purpose of this research, in addition to the sub-capacities already mentioned, the ACAP 'component elements' comprise the multilevel organisational antecedents, i.e., the prior level of specific resources and capabilities underpinning the appropriate development of ACAP in organisations (Jansen, Van Den Bosch & Volberda, 2005). Moreover, the 'component elements' set also encompasses the organisational mechanisms enabling (or restricting) appropriate interaction between the ACAP sub-capacities, their antecedents, and the expected outcomes. Internal and external social linkages, knowledge coordination through cross-functional interfaces, and participation in decision-making processes are among these mechanisms (Van Den Bosch, Volberda & De Boer, 1999; Zollo & Winter, 2002; Gebauer et al., 2012).

Strategic Management in Digital SMEs

As stated by Faulkner and Campbell (2006) in The Oxford Handbook of Strategy, "strategic management is about charting how to achieve a company's objectives, and adjusting the direction and methods to take advantage of changing circumstances" (Faulkner & Campbell, 2006, p. 3). Despite being an evergreen topic in both managerial and academic environments, publications on strategic management usually target large enterprises, whereas articles on strategic analysis in SMEs have received less attention from scholars (Zahra, Sapienza & Davidsson, 2006; Iborra, Safón & Dolz, 2020). SMEs differ from larger organisations in their structure, with limited human and financial capital resources, and their dependence on a smaller number of customers (Tallott & Hilliard, 2016). Consequently, it is arguable that SMEs engage in formal strategic management processes (Woods & Joyce, 2003). Some scholars argue that formal predictive planning processes are uncommon in small and medium-sized businesses, with an adaptive approach to strategic management as their way of operation (Jennings & Beaver, 1997; Kumar, Boesso, Favotto & Menini, 2012). Nonetheless, most of these companies also pursue competitive advantages and above-average financial returns and, in doing so, rely on strategic management processes, either explicitly or not (Jennings & Beaver, 1997; Woods & Joyce, 2003).

Overall, for companies supplying markets with proprietary products and solutions based on digital technology, value creation depends on agile and innovative responses in integrating up-to-date digital technologies and other knowledge resources (e.g., employees, organisational routines, prior businesses, and competitor information) to meet customer demands (Nambisan, 2017). As suggested by Giones and Brem (2017, p. 47), "they strategically combine technological product knowledge ('technology push') with consumer know-how ('market pull')" to provide hardware and software solutions. Considering the unique attributes of most of these demands, digital SMEs have a limited capacity to access specific resources to develop and commercialise proprietary products and solutions, which poses an additional challenge to the effectiveness of their strategic management processes (Liao et al., 2003; Rothaermel & Alexandre, 2009). Conversely, once agile and innovative responses are paramount for digital SMEs to keep pace with technological and market dynamics, a sense of adaptability is required to formulate and execute strategies that meet customer requirements (Arbussa, Bikfalvi & Marquès, 2017; Heikkilä, Bouwman & Heikkilä, 2017). In this sense, a precise and articulated strategic formulation, usually underpinned by comprehensive market research and competitive analysis, may not be the choice for digital SMEs, because the costs of developing a deliberate strategic plan might outweigh the benefits in a dynamic business environment (Brinckmann, Grichnik & Kapsa, 2010; Thietart, 2016). Viewed in this way, the digital SMEs strategy would be more of an emergent approach than formal deliberate strategic planning (Mintzberg & Waters, 1985).

With the continuous growth of a knowledge-based economy, knowledge assets are increasingly recognised as valuable resources (Grant, 1996; Spender, 1996). In this sense, it seems scholars and practitioners concur that knowledge asset management is a strategic imperative for organisations (Nonaka & Takeuchi, 1995; Alavi & Leidner, 2001; Fabrizio, 2009). From this perspective, SMEs should pursue new external knowledge acquisition and

application as a strategic approach to overcome their limited resources compared with large organisations (Rothaermel & Deeds, 2004; Durst & Edvardsson, 2012; Santoro, Ferraris & Winteler, 2019; Ferreira & Franco, 2020). In particular, considering market and technology dynamics, digital SMEs face even greater difficulties in setting flows and structuring the processes and mechanisms of external knowledge absorption (Tzokas, Kim, Akbar & Al- Dajani, 2015; Morgan-Thomas, 2016; Alshahrani & Salam, 2024).

Notwithstanding the option for a deliberate or emergent strategic planning approach (or a combination of both), digital SMEs are, in essence, technology-oriented organisations. This means that they most likely employ above-average qualified personnel and allocate resources to continuously search for innovative processes and ideas to develop proprietary hardware and software solutions that meet customer demands. Therefore, these organisations are likely to follow a technology-oriented strategy (Ritter & Gemünden, 2004), even though they have constraints in accessing resources compared with large organisations. Digital SMEs predominantly rely on external knowledge to create and configure customer value as a strategic imperative (Flatten et al., 2011; Tzokas et al., 2015).

METHODOLOGICAL PROCEDURES

The social reality involved in the knowledge absorption phenomenon is still complex and cannot be fully understood (Szulanski, 1996; Yli-Renko, Autio & Sapienza, 2001). Consistent with this, this research follows a constructivist epistemological approach, in which reality is dependent on the researcher's perspective (Von Glasersfeld, 2007). Considering the blurred boundary between the ACAP phenomenon and its context (Hawawini, Subramanian & Verdin, 2003; Argyres & Zenger, 2012), we employed a qualitative and exploratory methodology through a comparative multi-case study (Eisenhardt, 1989; Walsham, 1995). Although ACAP is acknowledged as a multilevel phenomenon, it ultimately resides in organisational units (Cohen & Levinthal, 1990). Therefore, in accordance with extant research on ACAP, the organisation is the primary level of analysis in this study (Jansen et al., 2005; Berghman, Matthyssens, Streukens & Vandenbempt, 2013).

Case Selection

The research setting comprises 2 (two) small and 1 (one) medium-sized companies. The selection followed Siggelkow's (2007) recommendation to choose exemplary cases in which the phenomenon was representative and could be investigated in depth. Therefore, we selected digital SMEs with proven exposure to business dynamics over time. Moreover, we selected cases from innovation clusters to limit our findings to firm-specific factors. Our intent is to control for potential geographical and institutional heterogeneity because companies belonging to these clusters most often access common sources of labour and capital, share supply chain options, leverage similar government tax benefits, and so on (Keeble, Lawson, Moore & Wilkinson, 1999). Although precise generalisations may not be possible, due to the contextual nature of the ACAP phenomenon, the interpretation of data collected within innovation

clusters may generate relevant implications for the external validity of this research (Walsham, 1995).

Regarding SME size, we followed the recommendations of the European Commission for normalisation purposes among the selected cases (European Commission, 2003). We held companies and participants anonymous, in compliance with the non-disclosure agreements signed by senior representatives.

Presentation of the Cases

Alpha is a medium-sized technology solution organisation based in Brazil with more than 25 years of operations. The company portfolio includes high-tech products, services, and solutions for the aerospace and defence industries, targeting worldwide markets. Gross revenue is roughly US$15M (15 million dollars) per year, with an average of 200 employees in the last five years, including shop-floor industrial workers. The company was founded in 1992 as a result of a large aerospace organisation spin-off.

Beta is a small technology product organisation with more than 20 years of operation. The company's portfolio includes digital broadcasting equipment with embedded proprietary software. Gross revenue is below US$500K (five hundred thousand dollars) per year, with an average of 40 employees in the last five years, including shop floor industrial workers. The company was founded in 1996 when two classmates, recent graduates from a local engineering university, decided to launch operations.

Gama is a small-sized engineering organisation that provides highly reliable electronic equipment for application-specific purposes, along with consulting services for different types of missions. The company was established in 1996 in Brazil with the aim of meeting the needs of the Latin American market through the quality of its services and high value-added products. The average number of employees is around 15, with an annual income of approximately US$400K (four hundred thousand dollars).

Data Collection

The data collection design was primarily based on interviews with multiple key participants selected from different functional areas of the organisation, such as business development, operations, sales, manufacturing, information systems, project management, and human resources (Miles & Huberman, 1994). Distinctive participants' perspectives on the knowledge absorption phenomenon may be a relevant source of variation in their views (Eisenhardt & Graebner, 2007). Following a four-month negotiation period with senior company representatives, 18 (eighteen) in-depth interviews were conducted (see Table 1 for details).

Table 1

Field Collection Information

Company	Job role	Duration	
		per interview	per case
ALPHA	Executive VP of Operations	2h05min	8h06min
	Director of Research, Development and Inovation	1h08min	
	Executive VP of Sales	1h03min	
	Manufacturing Manager	45min	
	Product Development and R&D Manager #1	42min	
	Product Development and R&D Manager #2	42min	
	Product Development and R&D Manager #3	1h41min	
BETA	Owner and Managing Partner	32min	3h16min
	Sales manager	35min	
	Finance and Administration Manager	32min	
	Engeneering, Development and research Manager	35min	
	Production Manager	32min	
	Custom Services Manager	30min	
GAMA	CEO – Founder	1h53min	5h08min
	Project Manager & Eletronic Engineer	35min	
	Product DevelopmentEletronic Engineer	42min	
	Project Manager & Mechanical Engineer	1h11min	
	Software Development Engineer	47min	
		TOTAL	**16h30min**

The interviews followed a semi-structured protocol (Brinkmann, 2018), comprising questions about strategic management imperatives along with ACAP dimensions, antecedents, social mechanisms, and organisational routines. An assessment of the research design and interview protocol conducted by two senior scholars validated the methodology. More than 16 hours of interviews were recorded with subsequent professional transcription. Notes were used to support the data analysis procedure.

A comprehensive set of information obtained from secondary sources also supported the data collection in this study (Miles & Huberman, 1994; Yin, 2003). These documents include sales reports, standard operating procedures, institutional presentations, engineering documents, and meeting notes. In addition, one researcher spent approximately 10 hours of non-participant observations (Creswell, 2007) in meetings related to project assessment (Alpha and Gama) and shop floor operations (Alpha and Beta) during visits to the companies. Combined with the interviews, these additional procedures integrated the elements of the internal validity of this study.

Data Analysis

We followed a recurrent iterative process between data collection and analysis. Immediately after the interviews, we double-checked our initial understanding of the notes. After transcribing the interviews, an iterative process was conducted to identify emerging patterns and establish a coding scheme. Initially, each transcript was individually read and analyzed by the two main researchers to identify preliminary categories related to strategic management imperatives and the components of absorptive capacity (ACAP). This preliminary scheme underwent continuous adjustments through successive readings and discussions among the researchers to ensure its robustness and alignment with the study's objectives. Emails and social media messages were occasionally employed to test our understanding. Additionally, follow-up interviews were conducted with senior representatives to validate the interpretation of collected information.

Following an inductive orientation, a coding scheme stemming from the links between strategic management imperatives and ACAP component elements was built from more than 500 pages of transcriptions. ATLAS.ti© and MAXQDA© software packages support this exercise. To ensure the validity of the process, an independent third researcher reviewed the entire set of codifications in a blinded manner, comparing their interpretations with those of the main researchers. Discrepancies were discussed in group meetings, leading to adjustments in the coding scheme until an intercoder reliability index above 80% was achieved. This process ensured greater methodological rigor and replicability of the study.

RESULTS

In this section, we describe our main findings from the exploratory inquiries conducted in Alpha, Beta, and Gamma. Although it is not an exhaustive list, the findings presented here are deemed the most representative of the selected cases. Among all the findings gathered during extensive interviews and other data sources, this list stands out as particularly significant for the purpose of this research. We present the ACAP component elements and strategic initiatives that were successively observed by each company. In doing so, we aim to facilitate case comparisons for each piece of evidence.

Alpha

Alpha's value proposition provides excellence as a technological integrator. According to the Operations Director, technology dynamics mean that project requirements and resource allocation are not stable. Alpha strongly denotes that experimentation and inter-organisational partnerships for risk and knowledge sharing are strategic priorities. Moreover, as an integrator of multidisciplinary projects, knowledge sharing between partners is crucial for delivering results. The following quote highlights this: "...there are five national and three international partners... the [large company] delivers the ultimate requirements of a solution. As an integrator, we manage the complementary

knowledge of the network participants to help them assimilate each other's knowledge and then build innovations..." (Director of Research, Development and Innovation, Alpha).

Alpha's strategic management explicitly leverages inter-organizational partnerships for knowledge acquisition and sharing. As stated by the Executive VP of Operations, "We develop networks with other companies, universities, and development agencies. That is the main role of our R&D Director. He is not responsible for pure internal research... instead, he develops relationships, partnerships, and external contacts." (Executive VP of Operations, Alpha). These networks facilitate the acquisition of complementary expertise and resources, mitigating risks inherent in complex, multidisciplinary projects. The intentional development of networks with other companies, universities, and development agencies allows for the effective assimilation and application of external knowledge, directly supporting innovation efforts. To summarise, Alpha's case highlights the pivotal role of 'inter-organizational partnerships' in knowledge acquisition and sharing as a core strategic initiative.

Alpha actively seeks knowledge from its customers to drive innovation. This close customer relationship is considered essential for success, as expressed by the Executive VP of Sales: "In this market, usually everything is confidential... you deal with many clients, all over the world... if you don't maintain a close relationship [with the client], you don't succeed in a two-to-six-year sales cycle, because the relationship is what keeps you connected..." (Executive VP of Sales, Alpha). This direct interaction enables the company to anticipate emerging needs and tailor its product offerings accordingly. The business development team is formally assigned to continuously assess the needs of existing and prospective clients to inform product development. This close collaboration ensures that Alpha's solutions precisely address customer requirements.

The importance of internal social capital is underscored by Alpha's strong emphasis on knowledge sharing and teamwork. The Operations Director highlights this culture by emphasizing that "...experimentation and inter-organizational partnerships for risk and knowledge sharing are strategic priorities." (Executive VP of Operations, Alpha). In addition to that, the shortened development cycles leveraged by technology in Alpha's operations have enabled overlapping project activities. The following quote highlights that: "...in reality... the [technology] advancement shortened the development cycles... not by doing things faster but rather by making activities overlapping a reality... but as a key condition to succeed in this overlapping, people must interact... they need to talk to each other...and learn from that..." (Executive VP of Operations, Alpha). Instead of managing projects using traditional departmental logic, project teams include virtually all stakeholders from external partners to final customers. Serial step-by-step project management is no longer applicable to Alpha's development programme. This means that social relationship attributes are at the core of both internal and external knowledge transfer. Indeed, there are formal incentive initiatives for participants to talk and interact, as a fundamental condition for effective knowledge absorption and successful project outcomes. This collaborative environment fosters a collective approach to problem-solving and innovation. The sense of mutual trust and understanding facilitates knowledge exchange among team members and facilitates effective knowledge absorption.

Alpha strategically leverages its existing knowledge base – particularly its deep expertise in aerospace engineering – to identify and pursue new opportunities. Even when temporarily shifting to other market segments during periods of economic downturn, the company swiftly reverted its focus back to its core aerospace competency. As stated by the Executive VP of Sales, "...they [founding partners] brought the aerospace knowledge from a [large company]... the [Operations VP] and most design engineers here are people who studied aerospace engineering..." (Executive VP of Sales). This ability to adapt and leverage prior knowledge provides Alpha with a sustainable competitive advantage, allowing the firm to efficiently capture new opportunities.

Beta

Beta, a small digital technology product organization, presents a distinct strategic approach rooted in its ACAP elements. The company, known for its embedded proprietary software in digital broadcasting equipment, displays integrated ACAP components in its strategic management processes. Findings below highlight the most relevant ACAP components in Beta case.

While Beta didn't engage in extensive formal inter-organizational partnerships as Alpha did, it strategically leveraged smaller, more targeted collaborations. As one respondent noted, "We have a partnership with [university] for three years... to develop a personalised computer for each TV relay in the country... we do this together with [university], because we may reduce the product price and sell it cheaper than the competition." (Engineering, Development and Research Manager, Beta). This collaboration highlights a focused approach to accessing complementary knowledge and resources to enhance competitiveness. The partnership wasn't solely for knowledge sharing but also for product development and cost reduction. This selective approach contrasts with Alpha's larger network strategy.

Beta's strategy heavily emphasizes customer relationship management. "Due to fierce competition, Beta's main strategic focus is on quick responses to market demand," explained an owner. "We listen a lot to what the market is asking for, what the customers want... based on that we must develop products ahead of the competitors or make adjustments to products whenever necessary." (Owner and Managing Partner, Beta). Customer interactions, therefore, served as direct inputs for product development and innovation, resulting in highly responsive and tailored solutions. This quick response mechanism is vital for competitiveness in Beta's dynamic market.

Within Beta, a strong sense of trust and collaboration fostered effective knowledge sharing. As an employee described it, "...it is like a family business,...there is seldom any problem... they are both [the owners] very open... they get there in the shop floor and talk to everyone..." (Engineering, Development and Research Manager, Beta). According to the participants, it minimises conflict, enhances the organisational climate, and generates an open environment that fosters new ideas and innovation. This strong internal social capital, despite the smaller size of the company, facilitated a dynamic and efficient work environment supportive of innovation. This collaborative culture enables quick response to customer needs and effective knowledge transfer within the team.

Beta effectively built upon its existing foundation of knowledge. With over 20 years of experience, the owners are deeply involved in product development and maintain a strong presence as 'bench engineers', consistently leveraging their established expertise. As noted by the Finance and Administration Manager: "...they [founders] got together and set up the company... they always pursued updated knowledge [on broadcast equipment]... and over time they brought in professionals who could enhance the knowledge they have developed..." (Finance and Administration Manager, Beta). This statement highlights their pride in identifying as 'bench engineers', illustrating how their historical expertise is integral to Beta's ongoing success. Furthermore, this internal knowledge, combined with a customer-centric approach, enables Beta to swiftly adapt to changing market demands.

Gama

Gama, a small-sized engineering organization providing highly reliable electronic equipment and consulting services, also demonstrates the integration of ACAP components into its strategic management processes. The results below illustrates the ACAP components found in Gama.

Similar to Beta, Gama's approach to 'inter-organizational partnerships' is more targeted than Alpha's expansive networking strategy. While partnerships with larger companies are considered, interviews revealed difficulties in overcoming natural asymmetries between companies. The following quote highlights this challenge: "It was very difficult to bring work from France over here...I spent three weeks presenting, under the guidance of the [large company] director general... At the end, the finance person was always someone appointed by [large company]" (CEO - Founder, Gama). Therefore, Gama prioritizes leveraging collaborations with regional universities and research institutes for the co-development of new customer-centric hardware and software products and solutions. As one respondent stated, "[Our] people work with the [university] staff...When a specific requirement emerges - or when the university itself needs someone to solve a particular problem—they contract Gama as a service provider. The development is then carried out in partnership with them" (CEO - Founder, Gama). This focused partnership allows Gama to access specialized knowledge, enhance product development, and increase its competitiveness.

Close customer relationships are deeply embedded within Gama's strategic management processes. The company's customer-centric approach emphasizes a collaborative relationship during product development: "...they [clients] have always something to teach us anyway from the initial requirements until solution commissioning... for instance, most tests are done there at the customer site together with the customer... we learn together..." (CEO - Founder, Gama). This illustrates how customer feedback and interaction are instrumental in guiding product development, resulting in highly customized and effective hardware and software solutions.

The strong sense of trust and shared vision within Gama - particularly related to the owner - plays a critical role in its operations. This internal social capital fosters collaboration, open communication, and generates a positive work environment: "...there are different technical levels but everyone 'confesses' [as a sign of trust] with [the owner] all together. By the way, I think this is very cool in him... it seems everything each individual does has

the same importance..." (Project Manager & Mechanical Engineer, Gama). This trust-based culture supports effective knowledge sharing and facilitates efficient decision-making.

Gama effectively leverages its existing knowledge base for opportunities in new sectors. The company faced several cycles of business ups and downs: "...the fierce reality for small businesses in this sector forced them to leverage their previous knowledge as high- technology consultancy and engineering solution providers to fulfill clients' demands from other sectors." (CEO - Owner, Gama). This adaptation showcases the ability to successfully translate existing expertise into new market opportunities, highlighting the strategic value of previous organizational knowledge.

DISCUSSION

Based on evidence acquired from interviews and secondary data sources, the following four practices or mechanisms illustrate the most relevant links between Absorptive Capacity (ACAP) and strategic management in the selected cases: knowledge absorption from inter- organizational partnerships; innovation through knowledge absorption in customer relationships; social capital as a knowledge absorption enabler; and leveraging previous knowledge to seize new opportunities. In this sense, the resulting framework is an emergent product of the research, evolving from the inductive analysis of interview data and observations in the three case studies. Therefore, the proposed integrative framework is not solely derived from existing literature. Instead, it emerged inductively from the qualitative analysis of 16.5 hours of interview data collected from three digital SMEs, combined with observations within their operational contexts. This inductive approach allowed for a more nuanced understanding of the interplay between ACAP elements and strategic management practices in the studied organizations.

Knowledge absorption from inter-organizational partnerships

The data highlight Alpha's strategic reliance on inter-organizational partnerships for knowledge acquisition and innovation. This is evidenced in the company's purposeful development and maintenance of extensive networks with various organisations. As the Executive VP of Operations noted, this approach plays a key role in their innovation efforts. The R&D Director's assertion that "...today [even] large companies may fail to innovate by themselves" (R&D Director, Alpha), reveals the strategic rationale behind Alpha's approach, showcasing a deeper understanding of leveraging external knowledge and the benefits derived from integrating that knowledge within their internal processes. The detailed case study analysis further supports the notion of inter-organizational partnerships as a crucial component of ACAP in digital SMEs.

Knowledge flow dynamics between organizations in partnerships, such as formal networks, strategic alliances, and other network structures, can be a mechanism that enables innovation and above-average performance (Tsai, 2001; Reagans & McEvily, 2003; Kastelli et al., 2024). SMEs benefit from inter-organizational partnerships, including both formal and informal networks, by sharing organizational knowledge, accessing complementary assets, and

leveraging synergies among involved parties (Lu & Beamish, 2001; Rezazadeh & Nobari, 2018). Mellor's (2015) findings regarding knowledge-intensive SMEs confirm that "a non- innovator with a good network is as valuable as a multi-skilled innovator lacking an effective network, and that a reasonable mix may be innovators together with well-connected non- innovators" (Mellor, 2015, p. 9). Specifically, in international markets, as exemplified by Alpha and Gama, firms can benefit significantly from strategic alliances (Colombo, Grilli, Murtinu, Piscitello & Piva, 2009; Fernhaber, McDougall-Covin & Shepherd, 2009). Nakos, Brouthers, and Dimitratos (2014) argue that through foreign market alliance participation, SMEs can access and utilize the knowledge provided by partner companies to thrive in these new geographical and institutional environments.

Beta's strategic approach stands in contrast to Alpha's, demonstrating how firms of different scales can successfully integrate ACAP components into their strategic management. While Alpha emphasizes broad networking, Beta focuses on targeted collaborations, direct customer engagement, and internal knowledge transfer. This adaptive approach is well-suited to its smaller scale and specific market needs. Beta's approach to inter-organizational partnerships highlights a selective strategy focused on maximizing impact while minimizing resource commitment. The university partnership, for instance, demonstrates a precise selection aimed at achieving specific strategic goals (product development and cost reduction). This targeted approach contrasts sharply with Alpha's wider network, showcasing the flexibility of ACAP operationalization across different organizational contexts.

Furthermore, research institutions and universities are considered valuable partners for knowledge absorption as part of SME strategic management initiatives. According to Ur Rehman (2016), SMEs networked with research institutions are more likely to introduce product and process innovations and apply for patents. Similarly, the study by Dada and Fogg (2016) on SME organizational learning indicates that, despite resource constraints, these firms can achieve higher levels of knowledge acquisition by developing links with universities. In summary, inter-organizational partnerships are a valuable source of knowledge transfer between organizations. Supported by the findings of this study, the following proposition applies:

(1) ***Learning practices, routines, and enabling mechanisms for valuable knowledge absorption through inter-organizational partnerships are likely essential for the strategic management endeavors of digital SMEs.***

Innovation through knowledge absorption in customer relationships

Alpha's emphasis on close customer relationships is directly reflected in its strategic management practices. The Executive VP of Sales explicitly highlights the importance of strong relationships, emphasizing the need for a close connection with customers throughout a long sales cycle. The knowledge inflow from these relationships is embedded in Alpha's learning mechanisms, underscoring the strategic integration of customer relationships into Alpha's innovation process. This indicates that knowledge exchange with clients is

not merely transactional but serves as a crucial catalyst for product development and market success.

Beta showcases a remarkable illustration of customer-centric innovation. Direct interaction with customers forms the cornerstone of their product development. An owner emphasized the importance of actively listening to customers. The next following quotes confirm that: (1) "I talk to my clients every day...When there's a gap, I have to close it...I explain to engineering what the client wants, and we make changes." (Sales Manager, Beta); and (2) "The sales team brings customer requests to our meetings. We discuss those requests and prioritize them." (Engineering, Development and Research Manager, Beta). This close engagement allows Beta to quickly respond to market demands, leading to rapid product adjustments and innovation based directly on customer feedback. This customer-driven approach significantly enhances agility and competitiveness.

Gama's customer-centric approach strongly emphasizes collaboration and co-creation during the product development process. The focus on close customer relationships throughout the development phases results in customized solutions and enhanced innovation. A request from a farm owner to provide continuous remote tracking of cattle weight illustrates Gama's approach to knowledge absorption from customer relationships: "we needed to remotely monitor each cow's weight... by measuring the perimeter of the thoracic cavity... using sensors and cloud transmission... so we sought out a cloud processing and software specialist for agriculture... the development was done directly with the client..." (CEO – Founder, Gama). This close customer engagement underscores the importance of leveraging customer feedback to improve product design and enhance market responsiveness.

Learning through customer relationships enables firms to target market needs more precisely (Levitt & March, 1988). Building upon the extensive literature on strategic management underpinned by resource-based theory (Grant, 1991; Peteraf, 1993), Rangone (1999) shows that SMEs' innovation capability highlights customer relationships as having a high strategic value. Hervas-Oliver, Boronat-Moll, and Sempere-Ripoll's (2016) study and, more recently, Gupta, Niranjan, and Markin's (2020) work with high-tech SMEs reached analogous results, showing that SME technological process innovation activities evolve through various factors, including a high dependency on customers as external sources of information. By contrast, Eggers, Kraus, Hughes, Laraway, and Snycerski's (2013) research reveals that customer orientation, interpreted as a purely responsive and reactive construct, shows a negative association with growth. The authors did not imply that customer relationships are unimportant in SME strategic initiatives, but rather that an exclusive and myopic focus on customer orientation might restrain growth in the long term (Eggers et al., 2013). Nonetheless, scholars and practitioners mostly concur that this practice is particularly important in SME strategic management processes, either as a new knowledge source or as a trigger for searching for valuable knowledge applied to new product development (Rangone, 1999; Fletcher & Polychronakis, 2007; Grimsdottir, Edvardsson & Durst, 2019). Stemming from the above and grounded in our findings, the following proposition is suggested:

(2) ***close customer relationships are paramount for innovation initiatives through valuable knowledge absorption, and in this regard, they presumably integrate strategic management processes in digital SMEs.***

Social capital as a knowledge absorption enabler

Alpha's success is partially attributed to the high levels of trust and collaboration within its organizational structure. The following quote highlights this: "I don't like the idea of departments...having a bunch of people in a corner...the geniuses thinking over there. We created an ecosystem to bring people into the same environment so they can feel the same pain together." (Executive VP of Operations, Alpha). The Executive VP of Operations describes this approach as a key element in their risk management and knowledge-sharing strategies, illustrating that collaboration and effective communication among team members are essential for the successful implementation of inter-organizational partnerships and efficient knowledge absorption processes.

Beta's smaller size and family-like atmosphere foster a strong internal social capital. The trust, open communication, and shared commitment within the team, as evidenced by the quote, "...it is nice to work here... they [owners] love to exchange ideas..." (Engineering, Development, and Research Manager, Beta), facilitate efficient knowledge sharing and rapid decision-making. The owner further emphasized how this openness leverages innovation: "the members of this innovation group... do not bring innovation every day, but when they do, we listen... we have regular meetings scheduled...and this is discussed" (Owner and Managing Partner, Beta). This internal social capital enables Beta to swiftly address customer needs and drive innovation, highlighting the importance of fostering trust and collaborative team dynamics.

Gama's organizational culture is characterized by trust and open communication. As one respondent noted, "...everyone 'confesses' [as a sign of trust] with [the owner] all together..." (Project Manager & Mechanical Engineer, Gama). This sentiment is echoed by employees, as another respondent mentioned, "The great thing here is that if I have any questions about mechanics or if I have a suggestion for the mechanics area, I send it to the person in charge; everyone is quite open to suggestions" (Product Development Electronic Engineer, Gama). This highlights an environment where open dialogue is encouraged, fostering effective problem- solving and innovation. Further, the acknowledgment that "[Owner] has a very good mindset, he's experienced in this, and he agrees. So, you end up having the freedom to do things the way you think they should be done" (Software Development Engineer, Gama), illustrates an empowering leadership style that supports employee autonomy and decision-making. This internal social capital fosters collaboration, reduces conflict, and creates a dynamic and productive work environment, demonstrating how a strong organizational culture can compensate for resource limitations and enhance the company's strategic capabilities. In this sense, it serves as a powerful enabler for knowledge absorption and strategic management.

Hernández-Carrión, Camarero-Izquierdo, and Gutiérrez-Cillán (2017) evaluate the impact of social capital, defined as the value embedded in the social relationships of individuals or groups (Gedajlovic, Honig, Moore, Payne & Wright, 2013), on the economic performance of SMEs. In a non-exhaustive proposal, these social relationships encompass at least four categories: personal, professional, associative, and institutional relationships (Stone & Hughes, 2002; Johannisson, 2008). For instance, professional relationship networks relate to the entrepreneur's past and present professional activities and may include partners, workers, suppliers, customers, and colleagues

(Davidsson & Honig, 2003; Sharma, 2008). Personal and professional interrelations within the organisation are also significant. Indeed, the ability to foster internal social networks is a critical resource for SMEs (Campbell & Park, 2017; Komodromos, Halkias & Harkiolakis, 2019). Campbell and Park (2017) proposed trust and a shared vision as attributes of internal social networks as relevant mechanisms for achieving business goals. Szulanski's (1996) findings reinforce this proposition by showing that a difficultrelationship between the source and recipient of information is a major barrier to internal knowledge transfer and assimilation. Indeed, in our empirical set, we find evidence that social capital is a relevant mechanism for companies' knowledge absorption and strategic management. In light of the above:

(3) ***social capital is likely to be an important enabling mechanism of knowledge absorption, which is deeply rooted in the strategic management processes of digital SMEs.***

Leveraging previous knowledge to seize new opportunities

Alpha's long-standing expertise in aerospace engineering serves as a critical resource for ongoing innovation. The Executive VP of Operations articulates the firm's consistent reliance on this existing knowledge base: "When we defined these three [growth] pillars, some of them experienced organic growth; that is, we took people who already had foundational knowledge and sought to add and acquire knowledge from the surrounding environment..." (Executive VP of Operations, Alpha). The Executive VP of Sales confirms, "...this industry has unique management and technology absorption practices that we have followed since our foundation..." (Executive VP of Sales, Alpha). This approach reflects a deliberate strategy to leverage existing capabilities in response to market demands and pursue new opportunities, demonstrating a strategic approach to knowledge management.

Beta's strategic success is significantly bolstered by the continued involvement of its founding engineers in product design and development. One respondent acknowledged the importance of the founders' prior knowledge: "I believe that the knowledge they brought greatly improved the company... [the owner], in particular, is a keen reader. Over time, he incorporated professionals with specific skills to implement their established initiatives effectively" (Finance and Administration Manager, Beta). Their long-standing expertise enables a deep understanding of customer needs and swift adaptation of products. Regarding these strategic movements in the product portfolio, the owner stated: "The company started by manufacturing radio equipment and stabilised around that. About seven years ago, we brought in an expert in television to develop our digital and analogue TV product lines, marking a significant turning point" (Owner and Managing Partner, Beta). This direct involvement of experienced personnel is a crucial element in Beta's strategy, highlighting the essential role of internal knowledge and experience in driving innovation and maintaining competitiveness.

Gama's strategic response to market fluctuations by leveraging previous knowledge illustrates an effective adaptive strategy. As per one respondent about the evolution of Gama story: "We all came from the [a research and development institute]. We started strongly, equipped with information

and training. As public employees, we pursued specialisation, applying our engineering skills. We transferred this know-how outside the industry and began implementing projects" (Project Manager and Electronic Engineer, Gama). The ability to successfully translate existing competencies into new market opportunities highlights the strategic importance of maintaining and utilizing previous organizational knowledge effectively, demonstrating the resilience and adaptability of Gama.

In a study of manufacturing SMEs, Mamun's (2018) findings showed significant effects of firm antecedents (e.g., prior business imperatives, knowledge, and risk orientation) on product, process, and service innovation and performance. Drawing on the knowledge-based view (Grant, 1996; Spender, 1996), Kallmuenzer and Scholl-Grissemann (2017) developed a conceptual framework of antecedents that includes internal and external resources in technological and management innovation, and their effects on current SMEs' financial performance. The authors argue that prior knowledge (Lee, Lee & Kang, 2005; Zahra, Neubaum & Larrañeta, 2007) has a positive impact on seizing new external technological opportunities. Similarly, Schwens, Zapkau, Brouthers, and Hollender's (2018) study on the operation modes of SMEs engaged in internationalisation endeavours suggested that experiential learning from past operation modes encompasses the acquisition of knowledge about foreign locations where these modes have been established and enhances the propensity of SMEs to opt for the same mode in a new foreign location. The evidence extracted from our field inquiries indicates that companies rely strongly on their previous knowledge throughout their strategic management processes. The importance of previous knowledge as an antecedent for effective knowledge absorption is at the core of seminal publications on ACAP (Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Zahra & George, 2002; Todorova & Durisin, 2007). Considering the above, we suggest the following proposition:

(4) ***organisational previous knowledge is an antecedent consistently leveraged by senior management to seize new business opportunities and thus, it may be included as one of the relevant component elements that integrate ACAP and strategic management for digital SMEs.***

Notwithstanding the emergence of other component elements bridging ACAP and strategic management (e.g., entrepreneurial orientation and dynamic capabilities), the propositions above best encapsulate what we have learnt from our field inquiries in the selected digital SMEs. The framework in Figure 1 summarises the propositions of this study.

Figure 1
ACAP and Strategic Management in digital SMEs

FINAL REMARKS

The focus of this article is on the relevance of valuable knowledge absorption for strategic management processes in digital-technology-based SMEs. The intent is to understand how absorptive capacities are embedded in digital SMEs' strategic formulation. Our findings revealed the following ACAP component elements integrated into the strategic management processes of the selected digital SMEs: knowledge absorption from 'inter-organisational partnerships'; innovation through knowledge absorption in 'customer relationships'; 'social capital' as a knowledge absorption enabler; and leveraging 'previous knowledge' to seize new opportunities.

During this journey, important theoretical contributions were identified. First, it adds to the ACAP literature by addressing the operationalisation of external knowledge absorption activities in digital technology-based small and medium organisations. Although digital SMEs have an overall limited capacity to access specific resources and greater difficulties in settingflows involving ACAP (Tzokas et al., 2015), few studies have dealt with the operationalisation of ACAP for these organisations (Flatten et al., 2011). Second, it contributes to the broad field of strategic management by focusing on SMEs. Despite the relevance of employment levels and the complementarity of the value chain (OECD, 2019), few comprehensive studies have been conducted on SMEs' strategic management (Iborra et al., 2020). As knowledge absorption capacities are paramount for achieving competitive advantages and above-average results (Cohen & Levinthal, 1990), the third implication relies on the proposed framework with linking blocks that combine strategic management imperatives and ACAP component elements.

By adapting to the nature and context of the business environment, management can benefit from these results. The proposed framework offers valuable insights for practitioners, helping them understand how to leverage

these elements within their strategic management processes. By prioritizing the development of robust inter-organizational networks, fostering close customer relationships, cultivating a strong social capital environment, and effectively utilizing past experiences, digital SMEs can enhance their knowledge absorption capabilities, drive innovation, and achieve superior performance in dynamic markets. The emergent framework provides a practical roadmap for improving strategic decision-making in resource- constrained environments.

Despite these contributions, this study has some limitations, which provide opportunities for future research. First, despite the rigorous steps in the methodological procedures, researcher interpretation plays an important role in the results of qualitative research (Creswell, 2007). The suggested propositions may be biased towards researchers' interpretations. In this sense, it would be worthwhile to focus on future studies on testing a specific linking block (e.g., innovation through knowledge absorption in 'customer relationships') on another set of digital SMEs. Second, because ACAP is firm-specific and contextual (Hawawini et al., 2003), case selection may not be comprehensive enough to raise areasonable level of generalisation. Hence, it would be interesting for future research to focus on a larger sample of digital SMEs selected from different business contexts to enhance insights about ACAP in companies' strategic management processes.

As digital SMEs struggle to survive and thrive in a dynamic global world, the more we investigate the strategic management processes applied to their reality, the better we can comprehend their importance in value chain complementarity. We chose ACAP embedded in strategic management processes for this study. However, many fields of study may also support such debate. Entrepreneurship, open innovation, and organisational learning, among others, may underpin the foundations of further investigation.

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