Transforming B2B service innovation – the path toward new digital-intensive business through entrepreneurship

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Abstract

Purpose – This study aims to explain the areas of opportunity for entrepreneurship offered by digitalization and proposes strategic recommendations for entrepreneurs and firms offering B2B services in the digital economy.

Design/methodology/approach – Exploratory research is used to analyze how digitalization is affecting B2B services entrepreneurship in the mobility industry. A mixed methodology combining 4 in-depth interviews and a Q-survey with 30 participants was used. The information obtained was processed using qualitative and quantitative analysis tools to identify areas of opportunity and suggest actions to improve the possibilities of entrepreneurship.

Findings – This study identifies artificial intelligence (AI)-driven business models, data and resource management and selective investment filtering as the most promising paths in B2B services, while suggesting that sustainability is not as critical as previously assumed. The findings also indicate that servitization and personalization have varying levels of impact, with personalization being less effective in B2B than previously expected. Moreover, the role of individual entrepreneurial alertness is diminishing, giving way to collective learning, technological alternation and strong networking effects as key drivers of success in digital-intensive B2B environments, providing a new perspective on entrepreneurial alertness.

Research limitations/implications – The findings emphasize that B2B firms should adopt a modular transition approach to digitalization, enabling step-by-step implementation rather than radical transformation. The research also suggests that not all digital investments are equally viable, with AI-powered logistics, smart supply chains and data-driven platforms outperforming traditional models such as vehicle hire and taxi booking services. The shift from individual to collective learning and strategic networking is essential for capturing and leveraging entrepreneurial opportunities in a rapidly evolving digital landscape. Entrepreneurs and business leaders should prioritize building robust ecosystems, leveraging industry collaborations and integrating emerging technologies into their business models.

Originality/value – This study makes several novel contributions. First, it introduces new theoretical insights on entrepreneurial alertness, emphasizing its transition from an individual-driven process to a collective and technology-enabled phenomenon. Second, it provides a comprehensive synthesis and valuation of digital-intensive business models, ranking them according to their strategic viability in B2B contexts. Finally, this study identifies the key characteristics shaping entrepreneurial success in digital B2B markets, emphasizing the importance of network-based learning, adaptive ecosystems and the integration of AI-driven decision-making.

Keywords B2B marketing, Entrepreneurship, Mobility, New business models, Entrepreneurial alertness, Industry 5.0

Paper type Research paper

1. Introduction

Greater digitalization is leading companies toward a new industrial revolution (Pérez-Moure *et al.*, 2024a; Liu *et al.*, 2024; Loureiro, 2018), and data generation and management appear critical for value creation (Pérez-Moure *et al.*, 2024b). Alongside this data, multiple tools have emerged such as artificial intelligence (AI), Big Data or machine learning. These tools provide new alternatives for managing companies and developing business (Venturini, 2022; Obschonka and Audretsch, 2020). This digital dynamism demands significant effort from managers to adapt or, at least, to ensure organizational survival through continuous innovation (Liu *et al.*, 2024; Singh *et al.*, 2020). Thus, digital-intensive businesses emerge, a new kind of business whose core activities, value creation and competitive advantage rely heavily on the integration of digital technologies, data-driven

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processes and servitization models (Kowalkowski *et al.*, 2024; Liu *et al.*, 2024).

This context is the breeding ground for entrepreneurship and the emergence of new business models with strong innovative components (Lampón *et al.*, 2024b); that is, new ways for creating value for customers and improving organizational competitiveness (Pérez-Moure *et al.*, 2024b; Kim and Oh, 2022; Sánchez-Gutiérrez *et al.*, 2019). To this end, the entrepreneurial process must focus on identifying business opportunities over time (Dencker *et al.*, 2021; Kim and Kim, 2021). Business leaders or entrepreneurs need to develop an organizational culture favoring environmental observation, resource identification and idea evaluation through a process called entrepreneurial alertness (Casanova *et al.*, 2023; Jelinek and Litterer, 1995; Kaish and Gilad, 1991). This process, characterized by a constant search for opportunities associated with environmental evolution, must be internalized in both established and newly created companies (Lanivich *et al.*, 2022), and extended through collaborative business ecosystems encompassing public and private institutions (Cabanelas *et al.*, 2023), and a strong digital component (Dinh *et al.*, 2018).

In B2B domains, where there are strong customer–supplier interaction and long-term relationships, the challenges are especially complex due to the increased propensity for servitization (Kramer *et al.*, 2024; Dotzel and Shankar, 2019). This propensity is reflected in recent literature on innovation in B2B services, which is still a promising field of development (De Jong *et al.*, 2021). For instance, some promising areas for B2B services are gamification, personalization, mixed reality or visualization of information (Wieland *et al.*, 2024; Ndubisi *et al.*, 2020; De Jong *et al.*, 2021).

Therefore, connecting innovation in B2B services with entrepreneurship is an important issue to address in literature, but also a complex issue due to its scope (single or multiple companies) or its focus (technology or people) (Hermawati *et al.*, 2024; Dotzel and Shankar, 2019). This complexity is intensified in highly uncertain environments associated with new digital technologies, characterized by high levels of competition (Dayan and Ndubisi, 2020). All these elements complicate the full development of entrepreneurial alertness, as new scenarios can be disruptive, making prior experience insufficient (Lanivich *et al.*, 2022). Thus, it is necessary to study mechanisms allowing the exploitation of opportunities in the digital economy for entrepreneurship in B2B services; an area requiring greater development given its novelty and the ongoing high level of transformation (Casidy *et al.*, 2020).

This paper aims, first, to explore areas of entrepreneurial opportunity offered by digitalization to foster innovation in B2B services. Second, it proposes lines of action to enhance entrepreneurial possibilities in B2B services within the digital economy, updating the concept of entrepreneurial alertness. Why, then, focus on a specific industry such as mobility? First, mobility is a strategic industry for many countries, offering significant potential for growth and innovation (Pérez-Moure *et al.*, 2023; Lampón *et al.*, 2024a; Athanasopoulou *et al.*, 2019). Second, digitalization, entrepreneurship and innovation in B2B services are complex and require slightly different approaches depending on the industry. Third, the emergence of connected and autonomous vehicles (CAVs) opens new areas to explore (Lampón *et al.*, 2024a). Consequently, the first research question is limited to the mobility industry. Given the rise of Industry 4.0, Industry 5.0 and Society 5.0, key factors influencing entrepreneurs' ability to seize opportunities are largely similar across industries. Hence, the second research question is not restricted to a single sector. Two research questions (RQ) arise:

RQ1. Which B2B business models offer the greatest opportunities in the mobility industry for companies, entrepreneurs and governments?

RQ2. What are the key factors that influence the ability of entrepreneurs to seize entrepreneurial opportunities across industries?

To address these questions, an exploratory approach using a blended methodology has been chosen. First, a qualitative methodology based on focus groups and in-depth interviews will be adopted. Second, a Q-methodology survey will introduce a quantitative perspective to the research. Qualitative methodologies are appropriate for investigating and identifying concepts and areas due to their flexibility and adaptability, along with their ability to capture diverse social perspectives (Kirschbaum *et al.*, 2024; Lenger, 2019). The quantitative Q-methodology survey is effective for identifying common perspectives and is particularly useful in technological innovation, information systems or transportation fields (Dieteren *et al.*, 2023; Athanasopoulou *et al.*, 2019).

Despite the growing research on digitalization and B2B services, little attention has been given to entrepreneurship and new business models development in digitally intensive industries. This study addresses this gap by integrating entrepreneurial alertness theory with emerging business models and examining their impact on B2B companies. Moreover, the research expands existing studies on B2B services, business models and entrepreneurship by providing an eclectic theoretical framework and a contextualized research focus, using the mobility industry as a framework. Unlike previous studies, this research uses a mixed-methods approach, combining a Q-methodology survey (applied to two distinct research questions) with in-depth interviews. This methodological combination is novel within B2B literature. The findings of this study have significant implications for both academics and practitioners. We aim to identify the most promising business models in B2B services and determine the key characteristics entrepreneurs need to successfully establish new companies in the B2B context. Therefore, this study contributes to three distinct but interconnected fields: B2B service innovation, new business models and entrepreneurial alertness, within the broader discussion of Industry 4.0, Industry 5.0 and Society 5.0. Beyond theoretical contributions, this study provides practical recommendations for investors and entrepreneurs by identifying business models with the greatest potential and factors critical to the entrepreneurial process. These insights can help countries and entrepreneurs better prepare for a rapidly evolving business landscape shaped by technological disruption and innovation.

2. Literature review

2.1 From 4.0. to 5.0

New technologies and digitalization are driving a new industrial revolution, bringing about drastic changes (Liu *et al.*, 2024; Xu *et al.*, 2021). In this context, Industry 4.0 gradually transitioning to Industry 5.0 (Golovianko *et al.*, 2023; Xu *et al.*, 2021), enabled by the concept of Society 5.0 (Huang *et al.*, 2022; Deguchi *et al.*, 2020). These transformations not only impact business models but also influence entrepreneurship and B2B markets.

On the one hand, Industry 4.0 is characterized by high flexibility within production systems, enabling greater product customization (Bonamigo and Frech, 2021; Ibarra *et al.*, 2018). It is primarily based on digitalization, automation and data-driven decision-making (Leng *et al.*, 2022). Key enabling technologies such as Internet of Things (IoT), Big Data, Cloud Computing and AI play a crucial role in its development. However, Industry 4.0 focuses predominantly on efficiency, productivity and automation, often sidelining the human factor. This shift has facilitated the emergence of new technology-driven business models, particularly in the B2B domain (Bortoluzzi *et al.*, 2022).

Despite these advancements, Industry 4.0 has introduced new trends and business models. It has played a crucial role in driving servitization at a technical level (Ibarra *et al.*, 2018) and has fostered network-oriented business models, where new actors emerge and collaboration increases (Golovianko *et al.*, 2023; Xu *et al.*, 2021). Moreover, Industry 4.0 has enabled remote maintenance and product installation, as well as service-based updates (Bettiol *et al.*, 2017). In addition, it has facilitated the integration of warehouses, production and sales into a unified digital ecosystem (Ibarra *et al.*, 2018). As a result, Industry 4.0 has improved industrial service performance, strengthened trust and fostered collaboration between stakeholders, thereby promoting long-term business relationships (Bonamigo and Frech, 2021).

Yet, the evolving business context has become complex. While Industry 4.0 encourages automation and product customization, it also presents challenges in terms of entrepreneurial competencies (Kumar *et al.*, 2023). Entrepreneurship has been significantly transformed by Industry 4.0, accelerating industrialization processes and enabling the emergence of fully digital entrepreneurs (Ben Youssef *et al.*, 2021; Kraus *et al.*, 2018). Furthermore, Industry 4.0 has fostered the creation of technology hubs and accelerators, facilitating the rapid and continuous emergence of startups (Kumar *et al.*, 2023; Kraus *et al.*, 2018).

Currently, this paradigm is evolving with the emergence of Industry 5.0 (Huang *et al.*, 2022; Murtaza *et al.*, 2024). Unlike Industry 4.0, Industry 5.0 redefines the relationship between people and technology (Leng *et al.*, 2022). This new paradigm focuses on the industry's ability to achieve social objectives while fostering resilience, job creation and sustainable development, where people cooperate and are reintegrated into automated processes (Magni *et al.*, 2023). These changes hold significant implications for business models, B2B environments and entrepreneurship (Koroglu, 2023; Leng *et al.*, 2024).

Although Industry 4.0 has promoted interconnectivity and collaboration, some authors argue that such cooperation remains limited to operational efficiency and supply chain optimization (Murtaza *et al.*, 2024; Golovianko *et al.*, 2023). In contrast, Industry 5.0 introduces multisectoral cooperation as a more strategic pillar, integrating companies not only from the same sector but also from different industries with shared objectives, such as sustainability and social innovation (Leng *et al.*, 2024; Xu *et al.*, 2021). This shift involves a multitechnological restructuring, requiring firms to operate in highly diverse and dynamic environments (Leng *et al.*, 2024; Leng *et al.*, 2022).

Key enabling technologies within this paradigm include AI, collaborative robots, blockchain and edge computing (Leng *et al.*, 2022). Nonetheless, due to the dynamic context, it remains challenging to determine which innovations will have a lasting impact and which will become obsolete (Leng *et al.*, 2024). Alongside these technological changes, competencies such as flexibility, resilience, agility, adaptability and sustainability are emerging as essential principles for entrepreneurs, business models and B2B relationships (Koroglu, 2023). Within this context, the transition toward Society 5.0 becomes increasingly relevant, reshaping how businesses and society interact (Huang *et al.*, 2022).

Beyond digitalization, Society 5.0 redefines the way firms operate and create value, emphasizing the role of digitalization in improving quality of life and addressing social challenges (Huang *et al.*, 2022; Deguchi *et al.*, 2020). This shift implies that sustainability, extreme personalization and XaaS (X as a Service) will become more prominent within new business models (Mourtzis and Angelopoulos, 2024). Consequently, Industry 5.0 promotes a "lean" approach in which society can access necessary products and services individually, whenever, wherever and however they are needed (Leng *et al.*, 2022). This transformation is driving servitization and subscription-based business models (Murtaza *et al.*, 2024). Although Society 5.0 may create new opportunities for digital business solutions, it also introduces new challenges for entrepreneurs, who must adapt to a more multidisciplinary and dynamic environment (Del Giudice *et al.*, 2023). Thus, success will depend not only on technical competencies but also on the ability to integrate technology, social impact and sustainability (Lew *et al.*, 2023).

2.2 The evolutionary nature of business models

The definition of business model has changed over the years, and several different definitions currently exist. For instance, Minerbo and Brito (2022) and Ruiz de la Torre and Sanchez (2022) have focused on how value is created, captured and delivered to firms and customers. In contrast, others present the business model as a highly strategic element that shapes the fate of the business (Leppänen *et al.*, 2023; Wirtz *et al.*, 2016; Casadesus-Masanell and Ricart, 2010). In addition, it has been understood as the integration of a firm's technical aspects, economic value and market opportunities (Åström *et al.*, 2022). Consequently, a business model could be understood as an element that defines and conditions the set of activities, processes and strategies developed by a firm to generate value – not only aimed at the market but at all stakeholders – seeking to unite technical potential with creative capacity (Pérez-Moure *et al.*, 2024b; Athanasopoulou *et al.*, 2019).

Therefore, the business model must establish the basis for creating new value propositions (Teece and Linden, 2017),

identifying new actors (Pérez-Moure *et al.*, 2024b) and clearly defining the target population as preliminary steps to identifying opportunities (Medina *et al.*, 2022). However, it has a dynamic, evolutionary nature linked to economic and social changes (Taipale-Erävala *et al.*, 2020); for example, the digital and industrial revolution (Liu *et al.*, 2024; Loureiro, 2018; Teece and Linden, 2017). This context of change offers new ways of understanding the business world, potentially transforming it into new opportunities (Liu *et al.*, 2024; Loureiro, 2018; Minerbo and Brito, 2022).

Recently, the literature referring to digital-intensive businesses has emerged as one of the new ways to define digitally driven firms. Conceptually, the literature defines digital-intensive businesses by their distinctive economic structure and origins. In a theoretical analysis, Nambisan (2017) characterized them as companies where "digital technologies form an inherent part of the value creation process" (p. 4), while Teece and Linden (2017) highlighted that these are "born-digital companies, which, once the software has been built, often have low or zero marginal costs associated with providing a service" (p. 1), contrasting sharply with traditional business models. Expanding on this distinction, Ritter and Pedersen (2020) noted that "firms can be born digitalized" (p. 188), implying that their business model is digital from inception, unlike traditional B2B firms that must transform established models. Furthermore, Kowalkowski *et al.* (2024) refined this through a techno-demarcation perspective, describing digital firms as "specialized rather than diversified" (p. 293) entrants driven by "hyperscale and hyperspecialization" (p. 293), enabling them to disrupt traditional markets efficiently.

Empirically, recent studies have operationalized this concept to measure its impact on organizational performance using robust methodologies. For instance, Nasiri *et al.* (2022), using regression analysis on a sample of 284 firms, defined digital intensity as a metric "proportional to the number of digital activities" (p. 276) and concluded that successful digital-intensive business models depend directly on digital maturity. Liu *et al.* (2024) conducted a longitudinal study (2007–2020) involving 1,875 manufacturing firms. Using text analytic techniques, they operationalized digital orientation as a "strategic guiding principle that encourages and supports the broad application" (p. 271) of connectivity technologies, finding that firms with higher digital intensity achieved superior organizational resilience over time. Similarly, Bican and Brem (2020) used a multimethod approach to characterize these businesses by their "enhanced resource optimization characterized by intangibility" (p. 2), while Lazić and Jović (2019) confirmed through comparative case studies that these digital-intensive businesses enable firms to redefine customer relationships and optimize processes.

Therefore, drawing on both conceptual and empirical contributions, digital-intensive businesses can be understood as organizations whose value creation, operations and competitive advantage are deeply embedded in digital technologies, characterized by high digital maturity, resource intangibility and the strategic integration of connectivity and data across all business processes.

Currently, new business models are highly conditioned by increasing servitization and digitalization. Servitization – understood as the transition from a product-centered business model to one centered around services, or a complex combination of both (Kowalkowski *et al.*, 2024; Ruiz de la Torre and Sanchez, 2022; Kowalkowski *et al.*, 2017) – is a logical evolution that most firms eventually undergo, even though many still face difficulties during this transition (Kowalkowski *et al.*, 2024; Rabetino *et al.*, 2017). Digitalization, for its part, is a transformation process occurring when digital technologies are adopted across all organizational areas (Kowalkowski *et al.*, 2024; Rachinger *et al.*, 2019). This transformation includes process automation, cloud-based technologies, implementation of Big Data and data analysis solutions and real-time connectivity between devices and systems, significantly enhancing firm flexibility (Wieland *et al.*, 2024; Bouwman *et al.*, 2018). Digitalization thus affects how firms interact with their customers and competitors, and how both B2B and B2C customers access and use products and services (Hermawati *et al.*, 2024; Kowalkowski *et al.*, 2024; Ritter and Pedersen, 2020). Consequently, the challenges, opportunities and threats associated with digitalization and servitization demand substantial innovation, as they may not be adequately addressed through existing business models (Pérez-Moure *et al.*, 2024b; Rachinger *et al.*, 2019).

B2B firms are particularly exposed to these challenges given their complex long-term relationships, heightened competition and the trend toward servitization (Wirtz and Kowalkowski, 2022; Dotzel and Shankar, 2019). In today's highly competitive market, innovation in services can influence overall business performance (Lampón *et al.*, 2024a; Casidy *et al.*, 2020) and reshape the configuration of the value chain (Lampón *et al.*, 2024b; Bouwman *et al.*, 2018; Rachinger *et al.*, 2019), while clearly defining how value will be added or how processes will be improved remains critical (Pérez-Moure *et al.*, 2024a). This innovation may take various forms, including gamification, personalization, mixed reality or information visualization (De Jong *et al.*, 2021), strongly supported by digital technologies (Venturini, 2022).

2.3 Entrepreneurship and digitalization

Entrepreneurship has been widely studied academically due to its significant relevance for the economy (Ben Youssef *et al.*, 2021); this has been explored in terms of economic growth and job creation (Ancillo and Gavrila, 2023; Shane, 2009), innovation, talent deployment and competitiveness improvements (Thurik *et al.*, 2023; Audretsch and Keilbach, 2007) or through providing solutions to complex problems (Ancillo and Gavrila, 2023; Ben Youssef *et al.*, 2021). Entrepreneurship is essential for renewing the economy of any country (Berman *et al.*, 2024) and should be sustainable over time (Kim and Kim, 2021). Furthermore, public actors frequently attempt to foster entrepreneurship through substantial investments, hoping to obtain revolutionary enterprises. Unfortunately, such efforts do not always yield positive outcomes (Thurik *et al.*, 2023; Shane, 2009), as entrepreneurship sometimes arises more from necessity than from an intention to create innovative businesses. Indeed, entrepreneurship driven by innovation typically has lower survival rates (Dencker *et al.*, 2021). Despite this, there is increasing interest in understanding the value of the relationship between digitalization and entrepreneurship

(Ancillo and Gavrila, 2023; Ojala, 2016), giving rise to the term "digital entrepreneurship" (Ancillo and Gavrila, 2023; Bogoslov and Lungu, 2020; Kraus *et al.*, 2018; Sahut *et al.*, 2021). Entrepreneurs should be mindful of digitalization's effects and its associated relationships, as these can lead to substantial changes and create new business opportunities (Berman *et al.*, 2024; Kraus *et al.*, 2018). Digitalization of services and products, along with a solid digital strategy, is essential for ensuring new businesses are profitable and sustainable over time (Leipziger *et al.*, 2024; Venkatesh *et al.*, 2019).

Digitalization provides entrepreneurs with new tools for launching businesses and fundamentally changes the entrepreneurship process itself (Ben Youssef *et al.*, 2021). Indeed, there is a positive relationship between entrepreneurship, digitalization and productivity (Ghazy *et al.*, 2022). Digitalization enables entry into industries traditionally characterized by significant entry barriers (e.g. mobility, banking or retail) and facilitates access to new opportunities (Ben Youssef *et al.*, 2021; Nambisan, 2017). Furthermore, digitalization facilitates the acquisition, production, distribution and consumption of data, which translates into value creation closely linked to digital information (e.g. through tracking systems). It also promotes the development of multifaceted markets where consumer and producer roles become interchangeable (Sahut *et al.*, 2021). Currently, significant value is attributed not only to the link between digitalization and entrepreneurship but also to enabling technologies such as Blockchain (Chalmers *et al.*, 2021b), AI (Chalmers *et al.*, 2021a; Obschonka and Audretsch, 2020; Shepherd and Majchrzak, 2022), Big Data (Obschonka and Audretsch, 2020) and Virtual Reality (VR) (Ben Saad and Choura, 2022). In summary, digitalization has profoundly transformed entrepreneurship, allowing entrepreneurs to design and offer products more agilely and efficiently, fully leverage data, identify business opportunities more effectively, access broader and more diverse markets and innovate new business models and value forms.

The digital entrepreneurship process is highly complex and differs from the traditional one (Berman *et al.*, 2024; Ojala, 2016). Typically, digital entrepreneurship does not follow a predefined business plan; rather, an entrepreneur's behavior and decisions evolve dynamically throughout the business process (Sahut *et al.*, 2021). Constant technological evolution and elevated uncertainty frequently reshape the entrepreneurship process (Kraus *et al.*, 2018). Consequently, entrepreneurs face increasingly dynamic environments, uncertain timelines, extensive data management responsibilities and early-stage access to networking opportunities and partnerships (Spiegel *et al.*, 2016), requiring continuous vigilance and adaptability.

2.4 Entrepreneurial alertness

Entrepreneurial alertness is a widely studied concept in literature, following two distinct approaches. The first focuses on the process of value creation and differentiation of the entrepreneur, while the second focuses on opportunity identification (Chavoushi *et al.*, 2020). Entrepreneurial alertness can thus be defined as the state and capability that enables entrepreneurs to recognize previously unnoticed opportunities (Pidduck and Clark, 2024). Specifically, it has been conceptualized both as a component of the opportunity identification process (Daniel *et al.*, 2021) and as a cognitive process triggered by responses to various environmental stimulus (Pidduck and Clark, 2024; Valliere, 2013). This ability involves connecting seemingly unrelated elements, storing information effectively and maintaining high sensitivity to environmental changes (Daniel *et al.*, 2021; Baron, 2007).

A three-component model has been proposed for entrepreneurial alertness, involving, first, the search for and analysis of hidden information; second, the capacity to associate unrelated elements; and third, the ability to evaluate and determine the most profitable connections (Daniel *et al.*, 2021; Tang *et al.*, 2012). Although initially considered a passive process where entrepreneurs did not actively engage (Li *et al.*, 2020; Baron, 2007), entrepreneurial alertness is now understood as a continual, proactive process requiring dedication, time and effort to identify or create highly valuable opportunities (Neneh, 2019; Tang *et al.*, 2012). This proactive view of alertness includes six key factors: entrepreneurial environment, social networks, personality traits, prior experience and knowledge, cognitive abilities and information-seeking behaviors (Sharma, 2019).

Although extensive literature exists regarding this concept, there remains considerable room for further development (Chavoushi *et al.*, 2020; Lanivich *et al.*, 2022). This is partly because entrepreneurial alertness has often been narrowly associated with opportunities, which limits its broader potential and practical usefulness (Lanivich *et al.*, 2022). Recent research has begun exploring new dimensions, such as the importance of entrepreneurial alertness from a young age (Obschonka *et al.*, 2017), how opportunities are created and discovered (Smith *et al.*, 2019; Tang *et al.*, 2021a) and the relationship between crises and entrepreneurial alertness (Tang *et al.*, 2021b). Research has also looked at the relationship between entrepreneurial alertness and innovation (Fellnhofer, 2022; Levasseur *et al.*, 2022; Lew *et al.*, 2023; Zhao *et al.*, 2021). Other studies have specifically examined how entrepreneurial alertness facilitates innovation in new business models, noting that this relationship is moderated by factors such as the type of learning and perception of risk (Zhao *et al.*, 2021) or market dynamism, being notably stronger in more dynamic environments (Lew *et al.*, 2023).

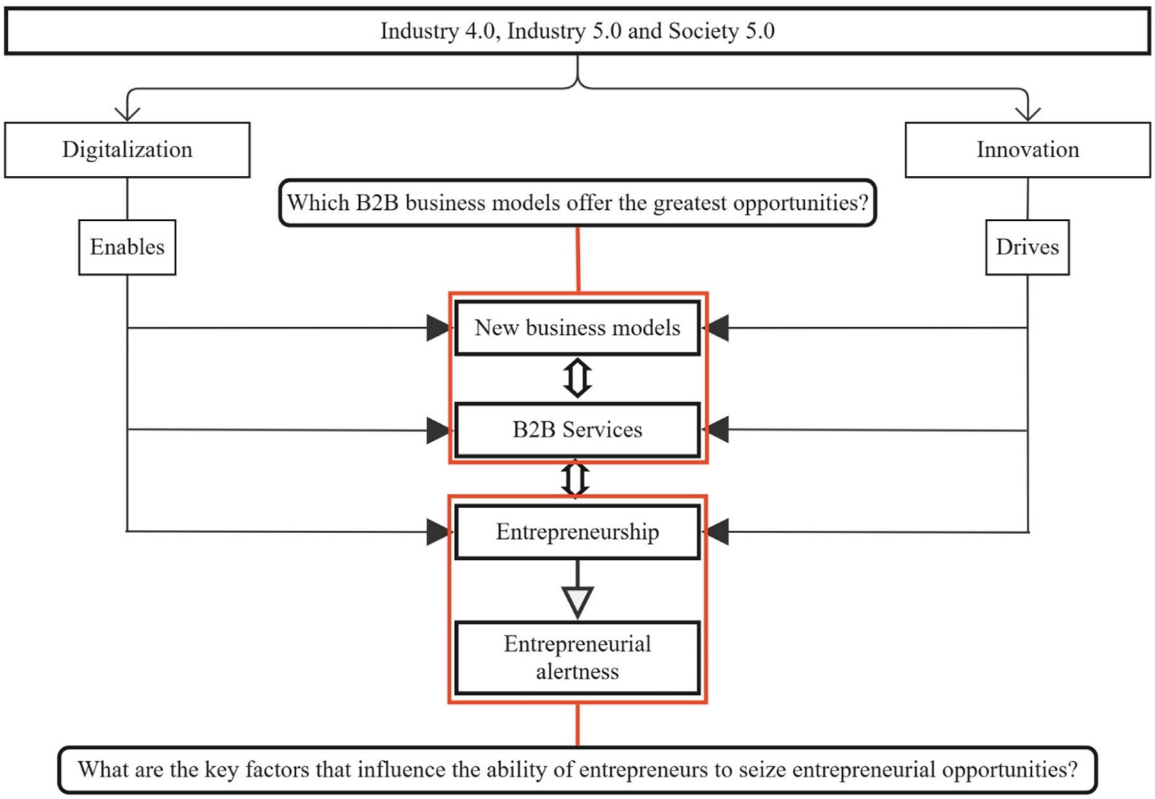
Thus, despite significant existing literature, entrepreneurial alertness remains open for exploration, particularly regarding the role of public institutions – rarely mentioned – and the impact and importance of emerging digital technologies. Moreover, analyses have rarely focused on specific industries (Lanivich *et al.*, 2022), even though innovation processes in digitally intensive industries differ substantially from those in traditional industries (Nambisan, 2017).

In summary, Figure 1 shows the key topics within the literature review section and RQs.

3. Methodology

The main methodological approach used in this research is Q-methodology. This technique is considered a mixed-method approach as it comprises both qualitative and quantitative perspectives. The qualitative perspective is used to identify key

Figure 1 Key topics of literature review and research questions



Source: Authors' own elaboration

topics, perspectives or statements about a theme that participants will later evaluate, while the quantitative one is used to objectify and get a valuation (Brown, 1993; Brown, 1980). In this method, participants (P-set) rank a series of predefined statements (Q-set) according to their individual perceptions, experience and judgment (McKeown and Thomas, 2013; Brown, 1993). Instead of correlating tests, Q-methodology correlates participants, identifying shared and differing viewpoints on the topic. This process is effective only when the statements are carefully selected to ensure representativeness (McKeown and Thomas, 2013; Watts and Stenner, 2005).

In addition, Q-methodology provides some advantages. It streamlines data collection and classification, requiring less time and fewer resources than other techniques (Dieteren *et al.*, 2023; Van Exel and de Graaf, 2005). By evaluating all statements simultaneously while focusing on a single research question, participants can make real-time adjustments, eliminate order effects and enhance accuracy and generalizability (Dieteren *et al.*, 2023; Van Exel and de Graaf, 2005; Watts and Stenner, 2005; McKeown and Thomas, 2013; Brown, 1993).

This research introduces a novel approach by not only applying Q-methodology but also incorporating in-depth interviews (Legard *et al.*, 2003). While this is not a common practice, integrating in-depth interviews increases the rigor, robustness and transparency of the study. In addition, in-depth interviews allow for nuanced insights that cannot always be fully captured or summarized through structured methodologies or predefined statements, thereby addressing one of the potential limitations of Q-methodology (Dieteren *et al.*, 2023; Dworkin, 2012). This methodological combination (known as mixed methodology) strengthens the study by enhancing robustness, confidence and analytical depth (Mingers, 2005), providing a more comprehensive perspective on the research problem (Mingers, 2011).

The justification for using these methods stems from the limitations of using a single approach. Quantitative techniques alone often lack the depth needed to explore complex phenomena comprehensively, potentially omitting critical variables or missing emergent variables during the research process (Pérez-Moure *et al.*, 2024a). These risks become particularly pronounced when studying new business models, B2B markets and entrepreneurship, as these areas are continuously evolving. Conversely, qualitative methods alone may lack objectivity or fail to accurately represent reality due to sampling limitations, time constraints and analytical subjectivity (Minichiello *et al.*, 2008). Thus, integrating qualitative and quantitative methods enables deeper exploration compared to purely quantitative techniques, while preserving greater objectivity and robustness than exclusively qualitative methods. In addition, Q-methodology is widely applied across various fields such as technological innovation, information systems and transportation (Dieteren *et al.*, 2023; Athanasopoulou *et al.*, 2019).

Furthermore, this research adopts both exploratory and descriptive approaches. While the primary objective is to

identify impactful business models in the B2B sector and analyze key factors influencing entrepreneurial opportunity exploitation, the study also aims to offer descriptive insights. Given the complexity and breadth of the topic, relying solely on one methodological technique would be inadequate.

The data collection process took place between September 2023 and July 2024, encompassing both the in-depth interviews and Q-methodology evaluations. To ensure methodological rigor and replicability, this study follows the best practices outlined by Cabanelas *et al.* (2023) and builds upon previous research that has successfully applied Q-methodology, such as Athanasopoulou *et al.* (2019), Cairns (2012) and O'Donovan and Smith (2020). Given that this study addresses entrepreneurship and innovation in B2B services within a digitally intensive industry such as mobility – a broad topic that can be analyzed from multiple perspectives – and the complexity of Q-methodology, particular attention has been paid to methodological design. The methodological procedure is shown in Figure 2 and was performed as follows.

3.1 Statements (Q-set)

A comprehensive literature review and in-depth interviews were conducted to define the Q-set. Thus, an extensive literature review was conducted to identify the main topics and issues related to B2B services, entrepreneurship, business models and mobility. The findings from this review were then used to design in-depth interviews aimed at extracting the key concepts, clarifying ideas and highlighting aspects that might have been overlooked (Legard *et al.*, 2003). This additional methodology step strengthens the reliability of the collected data and enhances its validity (Dworkin, 2012; Minichiello *et al.*, 2008; Legard *et al.*, 2003).

A total of four in-depth semistructured interviews were conducted with experts from the academic, business and public sectors (Table 1). It should be noted that the in-depth interviews are not the main methodology, but complementary. In addition, as this is considered a strategic industry, certain information and potential participants are subject to confidentiality constraints. The script, nonetheless, can be found in Appendix 1.

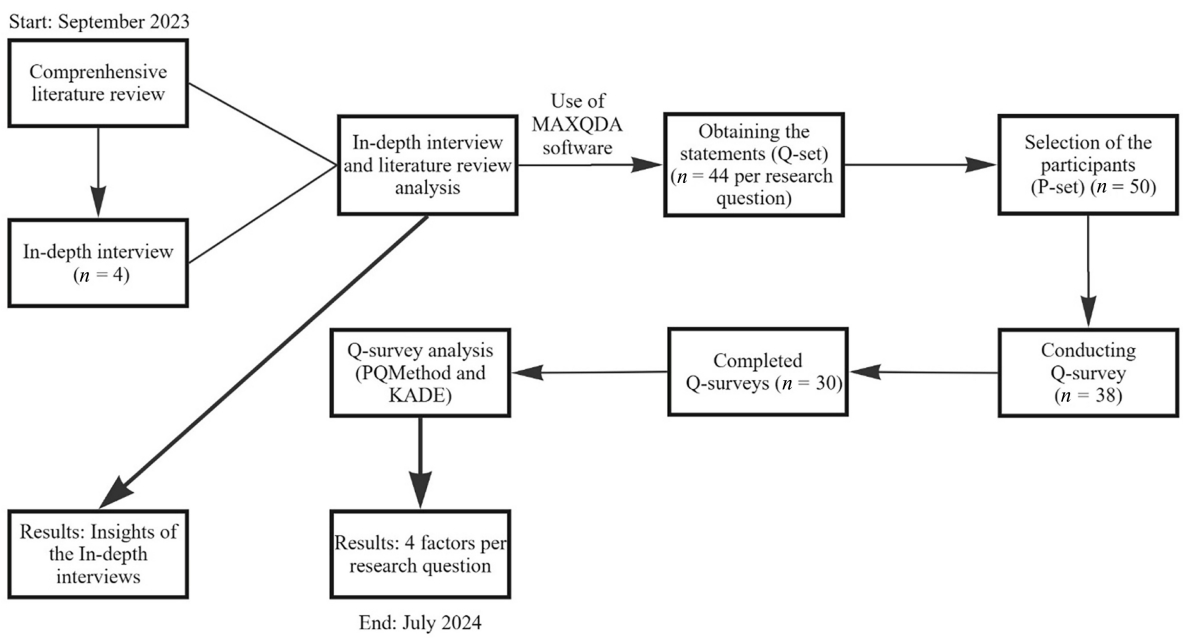
MAXQDA is specialized software designed for qualitative data analysis. It allows researchers to import, transcribe and analyze qualitative sources such as in-depth interviews and academic papers. Through this process, it enables the generation of word frequency charts and the identification of key statements. In addition, the research team has prior experience with this software, ensuring rigorous and efficient analysis. The result was a total of 44 statements for each Q-survey (Appendix 2). This number is considered suitable because, depending on the specificity of each one, the number can be higher or lower, but the recommendation for the Q-set is between 40 and 50 statements (Van Exel and de Graaf, 2005). Finally, the Q-set was assessed with various academics to refine its clarity and ensure that the statements aligned with the RQs. *RQ1* and *RQ2* are considered suitable because they are open, but they are also focused, brief, clear and related to the research topic and the context (McKeown and Thomas, 2013).

3.2 Participants (P-set)

In Q-methodology, the sample is not selected randomly but rather in a logical and deliberate manner. This is because the P-set should encompass diverse perspectives and expertise, ensuring that participants have substantial background knowledge in the subject (Van Exel and de Graaf, 2005).

Following this, we contacted 50 potential participants via email. Of these, 43 responded to the email and 38 initiated the Q-survey. 30 participants completed the process, forming the final P-set (the list of participants, their nationalities and areas

Figure 2 Methodology steps



Source: Authors' own elaboration

Table 1 Overview of in-depth interviews

Interview	Type	Position	Main activity	Length (min)
1	Entrepreneur	CEO	Technology	50
2	Academic	Full professor	Mobility	33
3	Academic	Full professor	Entrepreneurship and marketing	37
4	Public institution	Internationalization & business development manager	Mobility	41

Source(s): Authors' own elaboration

of knowledge are given in Appendix 3). This represents a response rate of 60%. While some studies recommended between 40 and 50 participants (Van Exel and de Graaf, 2005; Brown, 1980), 30 is considered sufficient, given the challenge of recruiting highly relevant participants due to the novelty of the field. Participants also had to respond to the two research questions instead of one, which could have affected the response rate. Nevertheless, our sample size is comparable to other previous studies, and the response rate is even higher (Athanasopoulou *et al.*, 2019; O'Donovan and Smith, 2020; McKeown and Thomas, 2013).

Half of the responses were collected in person (15 completed surveys), while the remaining half was collected online via Miro platform (the other remaining 15). In both cases, participants were required to rate, order and place the statements on a Likert scale ranging from −5/+5, where −5 indicated no opportunity/impact and +5 indicated major opportunity/impact. Participants were allowed to adjust their responses as many times as necessary. The purpose of the research and instruction were explained at the beginning of each individual session. In addition, participants were accompanied throughout the process in case they had any questions; but no direct intervention took place to avoid influencing their responses.

Due to the exploratory and multidisciplinary nature of this research, a group of academic experts was recruited from various fields, including entrepreneurship, B2B services and business models, all within the context of the digitally intensive and innovative mobility industry. Academics were selected instead of other actors because they possess a broader perspective and serve as a link between companies, government and society, granting them a comprehensive understanding of past, present and future dynamics. In addition, they do not have conflicts of interest and are not subject to external influences. Participants had to meet at least two of the following three criteria:

1 Have published more than five scientific works in one or more of the fields covered in this research, index in JCR (Q1 or Q2) or ABS.
2 Hold a position as a full professor or senior lecturer in a field related to this research.
3 Have participated in an international research project related to one or more aspects of our study.

In addition, to mitigate cultural bias, the sample includes academics from different nationalities, including Spain, China, Mexico, France, Italy, Portugal, Canada, the USA and Germany. This international approach aims to enhance the generalizability of the results. Although nationality was not a selection criterion, priority was given to participants from countries where the mobility industry plays a significant role, given that this research focuses on it. This ensures that the findings are contextually relevant and representative of industry trends. All those criteria were based on previous research (Dieteren *et al.*, 2023; O'Donovan and Smith, 2020; Athanasopoulou *et al.*, 2019; Cairns, 2012) and best practices outlined by Cabanelas *et al.* (2023).

4. Findings

4.1 In-depth interviews

Although the objective of conducting the in-depth interviews was to obtain information that could qualify or complement the literature review, it also provided interesting findings.

4.1.1 Concept of opportunity

First, respondents were asked about the concept of opportunity, as it provided a logical structure for the interview. There was consensus among them that an opportunity represents a gap in the market for which an innovative solution could be developed – one that adds value, is economically viable and effectively meets demand. It was described as a transformational response that bridges what society wants with what it needs.

Second, regarding entrepreneurial motivation and the introduction of new businesses in B2B, several perspectives emerged. On the one hand, it was seen as an intrinsic motivation, driven by the entrepreneur's desire for better working conditions, a source of income, personal challenges or dissatisfaction with the status quo. On the other hand, it was viewed as an extrinsic motivation, shaped by an environment in which public agents and businesses seek to generate returns – such as profits or patents – through entrepreneurial initiatives.

4.1.2 Business models and the role of servitization

Regarding business models and the impact of servitization, several key insights emerged. First, the trend toward servitization was seen as something that would "inevitably" continue to gain ground. Second, the most relevant business models were identified as those focused on the generation, processing and exchange of data and information, along with the services associated with that data. Disruptive or lesser-known business models were not mentioned (except for Edge computing), which was attributed to their still being at a very early stage of development. In the case of business models that are more relevant in the B2B sphere, respondents primarily referred to services linked to digital platforms, data and connectivity. In this context, they highlighted that technology-driven businesses are better positioned and are gaining relevance.

4.1.3 Digitalization and innovation in B2B firms

Regarding the state of digitalization in B2B firms, it is currently considered to be at a basic level, though it is recognized as an inescapable process of adaptation and innovation. For this transformation to occur, a comprehensive approach is required – one that involves continuous reinvention, linked to a shift in vision and even identity. Digitalization also presents certain drawbacks; it poses a threat to technologically backward firms, as distribution channels are evolving and it may initially lead to a loss of trust. Nevertheless, digitalization is a means rather than an end and accurately diagnosing its application will be fundamental. AI and computational technologies are particularly relevant in this context, yet respondents highlighted significant uncertainty in the market. Furthermore, technology serves as an enabler for entrepreneurship, as it facilitates the identification of new opportunities and allows services to achieve a broader reach.

4.1.4 Entrepreneurial alertness and entrepreneurship

Respondents were asked about entrepreneurial alertness, which was seen as an aspect that can be developed but is also partly linked to the inherent qualities of entrepreneurs. By nature, entrepreneurs must remain aware, continuously seeking new opportunities in the market and engaging in benchmarking. In other words, they must be able to develop competitive intelligence, though certain skills and predispositions may be innate and can be further enhanced through training. That said, respondents emphasized that these innate abilities are less important than the training itself. In addition to commonly recognized entrepreneurial traits, respondents highlighted aspects such as technological awareness, a sharp vision of their goals, future-oriented thinking and collective learning. Moreover, while entrepreneurial alertness was acknowledged as having a significant impact on the business world, some interviewees noted that it tends to be focused more on the present rather than on anticipating future needs and developments.

4.1.5 The role of cooperation and emerging challenges in B2B context

Regarding the importance of cooperation in entrepreneurship, there was consensus that, nowadays, there is no alternative. Most firms are compelled to collaborate to achieve their objectives, particularly in high-technology B2B settings. When asked about the role of public agents, opinions varied. Some viewed them as enablers, providing essential public funding, fiscal support and legislative frameworks. In contrast, entrepreneurs tend to see them as key players in fiscal and legislative matters but not in financial support.

Finally, the interviewees highlighted that entrepreneurs and companies are facing new challenges, such as an increasingly complex and intercultural business environment, along with heightened competition from highly skilled players. The intercultural and intersectoral environment was perceived as beneficial, as it helps identify new opportunities. In short, entrepreneurship or the introduction of new businesses is currently at an uncertain juncture due to the profound changes taking place.

4.2 Q-survey

4.2.1 Q-survey analysis

To analyze the responses, the PQMethod application was used as the primary tool for statistical analysis. In addition, KADE, a specialized Q-methodology software, was used to provide a more detailed and visually enhanced analysis of the data. The statements and responses were first processed in PQMethod, where a principal component analysis was conducted to identify patterns and perspectives. Then, KADE was used to further refine the interpretation and improve the visualization of the results. For both the first and second Q-surveys, all extracted factors had Eigenvalues greater than 1 (Figure 3). Out of the eight possible factors, only four were retained for each analysis. This decision was made because, beyond the fourth factor, the Eigenvalues drop below 2, meaning they account for less variance (Tefas and Pitas, 2011). Moreover, each factor represents a distinct perspective or pattern, resulting in a total of eight perspectives per research question. This would lead to a total of 16 perspectives, which would be impractical for result interpretation and analysis. Increasing the number of factors could also negatively impact the interpretability of the findings. Ultimately, considering the research objectives, retaining four factors is deemed appropriate for this study (Tefas and Pitas, 2011; Jolliffe, 2003).

After retaining the four factors, a varimax rotation was applied to enhance consistency and interpretability, ensuring that the extracted factors were distinct from one another and facilitating the identification of dominant patterns (Watts and Stenner, 2005). Once this step was completed, factor *loadings* were classified for a p-value < 0.05, achieving a reliability level of over 95% for all factors (Watts and Stenner, 2005). It should be noted that while the correlation between factors was not significant in the first question, it was significant for the second. As a result, each factor synthesizes perceptions and generates a new Q-sort summary for each perspective identified. Although the study included 30 participants, only 26 responses were incorporated into the perspectives of the first question. Given the high level of uncertainty in the field, the remaining four responses did not align with any of the extracted perspectives at the established significance level of p-value. Forcing their inclusion would have compromised the reliability of the findings. To classify the statements in the Q-sort summary per factor, the Z-scores were calculated. Z-scores are calculated using the formula $Z = (X - \mu)/\sigma$ where μ represents the mean and σ the standard deviation. Values between 1 and 2 are considered high impact, while values between −1 and −2 are considered low impact (Brown, 1980).

Subsection 4.2.2 presents the results for each question in a descriptive manner. The factors are identified with italicized titles. These results will be further analyzed and discussed in Section 5.

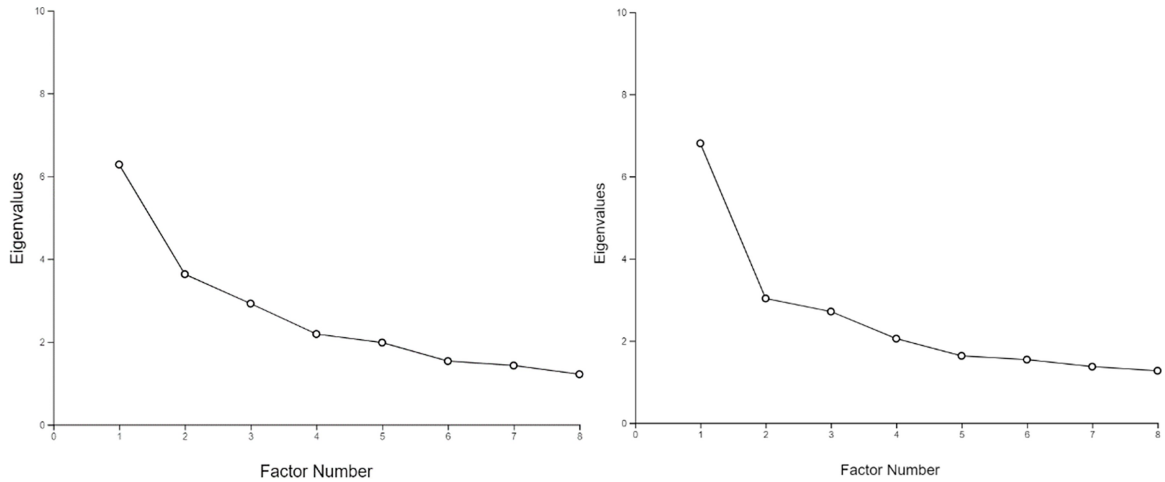
4.2.2 First question results: areas of opportunity

The first question deals with the areas that offer more opportunities in mobility. The resultant Q-sorts are reflected in Appendix 4 and synthetized in Table 2 by factor. These results will be further analyzed and discussed in Section 5.

Perspective 1: Artificial Intelligence (see Appendix 4– Factor 1)

- General overview and representation:
  - Includes perspectives from 12 participants, representing 40% of the total sample.
  - All elements related to AI received high scores.
- Areas of higher opportunity:

Figure 3 Eigenvalues result by factor for the first Q survey (left) and second (right)



Source: Authors' own elaboration

Table 2 Areas of greater or lesser opportunity in the mobility B2B field

Factor 1: Artificial intelligence	Factor 2: Transport-centered technologies	Factor 3: Mobility as a service	Factor 4: Green business models
Areas of higher opportunity			
Driver-centric artificial intelligence (1.94)	Smart logistics (2.10)	Vehicle maintenance and repair services (1.86)	Carbon removal solutions (1.93)
Vehicle-centric artificial intelligence (1.70)	Applications for efficient supply chain management in the transport sector (1.52)	Ridesharing applications (1.79)	Energy flexibility solutions (1.84)
Business intelligence and data mining (1.66)	Connected vehicle technologies (1.50)	Smart parking applications (1.61)	Mobility data tracking and analysis platforms (1.43)
Machine learning (1.41)	Autonomous vehicles (1.40)	Multimodal mobility service platforms (1.61)	Micro mobility platforms (1.41)
Areas of neutral opportunity			
Battery swapping (0.09)	Efficient route and travel planning (0.11)	Last mile transport services (0.09)	Vehicle maintenance and repair services (0.08)
Reverse logistics and returns management solutions (0.06)	Air quality tracking and monitoring apps (0.04)	Fleet management applications (0.02)	Traffic control systems and intelligent traffic lights (0.03)
Charging infrastructure for electric vehicles (−0.07)	Ridesharing applications (0.02)	Roadside assistance and emergency services (0.00)	Smart logistics (−0.02)
Fleet management applications (−0.10)	Reverse logistics and returns management solutions (−0.06)	Vehicle rental by hour (−0.01)	Smart parking applications (−0.03)
Areas of lower opportunity			
Taxi booking applications (−2.34)	Humanoid collaborative robots (−2.20)	Humanoid collaborative robots (−1.89)	Cloud computing (−2.07)
Vehicle rental by the hour (−1.65)	Personalization of services and limited editions of vehicles (−2.00)	Energy flexibility solutions (−1.64)	Autonomous vehicle (−2.06)
Transport services for people with reduced mobility (−1.26)	Cloud computing (−1.51)	Carbon removal solutions (−1.61)	Insurance companies (−1.99)
Ridesharing applications (−1.51)	Crowdfunding platforms for mobility projects (−1.42)	Internet of Things (−1.24)	3D printing (vehicles and customized parts) (−1.43)

Source(s): Authors' own elaboration

  - Statements linked directly to AI such as driver AI (1.94) and vehicle AI (1.70) received the highest scores. As well as technologies that incorporate AI such as machine learning (1.41)
  - Technologies that process and generate data such as business intelligence (1.66), also received a high score.
- Areas of neutral opportunity:
  - Sustainability-oriented business models and supply chain management-related business models were rated neutrally.
- Areas of lower opportunity:
  - Shared mobility services such as taxi booking applications (−2.34) or vehicle rental (−1.65) received the lowest scores.
  - Additional service-related business models such as roadside assistance, emergency services or vehicle maintenance also received low scores.

Factor 1 shows that participants associate the highest opportunities with AI-based solutions and data-driven applications, reflecting a preference for automation and technological efficiency. While these results are consistent with Industry 4.0 and 5.0 principles, the relatively lower relevance of sustainability-oriented business models suggests that technological innovation is prioritized over sustainability integration.

Perspective 2: Logistics-centered technologies (see Appendix 4*– Factor 2)*

- General overview and representation:
  - Includes perspectives from six participants, representing 20% of the total sample.
  - Areas related to logistics and supply chain management received the highest scores.
- Areas of higher opportunity:
  - Smart logistics (2.10) and applications for efficient supply chain management (1.52) received the highest scores.
  - Systems for vehicle fleet management and optimization as well as autonomous vehicles (1.40) and door-to-door logistics received high scores.
- Areas of neutral opportunity:
  - Sustainability-oriented business models were rated neutrally, like Factor 1.
- Areas of lower opportunity:
  - Humanoid collaborative robots (−2.20) and vehicle personalization, including limited editions (−2.00), received the lowest scores.
  - Alternative financing models, such as crowdfunding platforms for mobility projects (−1.42) and cloud-based solutions (−1.51), were also ranked lower.

Most of the high-scored statements align with key principles of Industry 4.0, mainly related to logistics optimization and supply chain efficiency. The low relevance assigned to humanoid robotics and vehicle personalization indicates that automation is perceived primarily as a driver of efficiency rather than for enhancing user experience or customization. Likewise, cloud computing and crowdfunding platforms were rated low, suggesting that participants perceive them as weak opportunities in logistics-related B2B services. Factor 2 represents a more traditional and infrastructure-based approach to innovation in the industry.

Perspective 3: Mobility as a service (see Appendix 4*– Factor 3)*

- General overview and representation:
  - Includes perspectives from five participants, representing 16.67% of the total sample.
  - Direct mobility-related services received the highest scores.
- Areas of higher opportunity:
  - Services directly linked to mobility such as vehicle maintenance (1.86) and ridesharing apps (1.79) received the highest scores.
  - Several other services also ranked close to the highest score, including Smart parking applications (1.61) and multimodal mobility platforms (1.61).
- Areas of neutral opportunity:
  - Logistics, resource management and personalization services were rated neutrally.
- Areas of lower opportunity:
  - Humanoid collaborative robots (−1.89), like factor 2, received the lowest score in this perspective.
  - Sustainability-oriented services and business models such as carbon removal solutions (−1.61) were also ranked low.

Participants in this factor identified the most promising opportunities within mobility servitization, particularly Mobility as a Service (MaaS). Collaboration and real-time information were considered essential enablers of these models. Battery swapping was viewed as a viable option, whereas energy flexibility solutions were rated lower, indicating a selective adoption of Industry 4.0 and 5.0 principles focused mainly on service-based innovation.

Perspective 4: "Green" business models (see Appendix 4*– Factor 4)*

- General overview and representation:
  - Includes perspectives from five participants, representing 16.67% of the total sample.
  - The highest-rated statements were those linked to sustainability in numerous ways.
- Areas of higher opportunity:
  - Carbon removal solutions (1.93) and energy flexibility solutions (1.84) received the highest scores.
  - In general terms, other services and business models related to a more sustainable resource management such as mobility data tracking (1.43) and electromobility were also ranked highly.
- Areas of neutral opportunity:
  - In this case, MaaS-related statements were rated neutrally.
- Areas of lower opportunity:
  - Cloud computing (−2.07) and autonomous vehicles (−2.06) received the lowest score in this perspective.
  - Edge computing was also ranked low, along with personalized services such as 3D printing (−1.43) and insurances (−1.99).

Participants in this factor prioritized sustainability-oriented business models, consistent with current Industry 5.0 and Society 5.0 trends. Lower scores for advanced computing, autonomous vehicles and personalized services indicate that efficiency and environmental considerations are valued over technology-driven differentiation in B2B contexts.

4.2.3 Second question results: entrepreneurship factors

Regarding the factors that condition the use of entrepreneurial opportunities, Table 3 reflects the results by factor, and Appendix 5 includes the Q-survey results. These results will be further analyzed and discussed in Section 5.

Perspective 1: Proactive entrepreneurship (see Appendix 5 – Factor 1)

- General overview and representation:
  - Includes perspectives from ten participants, representing 33.33% of the total sample.
  - Closely associated with Factor 1 (AI).
- Higher impact factors:
  - Statements related to *personal traits and entrepreneurial skills* received the highest scores.
  - Key personality traits and cognitive skills were prioritized, particularly *risk-taking ability* (1.81), *entrepreneurial knowledge and skills* (1.76) or *motivation and resilience* (1.48).
  - Some environmental factors such as *culture of innovation* also received high scores.
- Neutral impact factors:
  - Statements related to the *use of information* and collaborative inputs for *product or service development* were rated neutrally.
- Lower impact factors:
  - Factors related to resources received lower scores such as *transport and communication infrastructure* (−1.93) and *Availability of workspaces* (−1.25).
  - Information and analysis-related factors also ranked lower such as *search for hidden information* (−1.12) or analysis *of hidden information* (−1.25).

This factor highlights the importance of entrepreneurs' own skills and knowledge in identifying and exploiting opportunities. Motivation, risk-taking and resilience were rated highest, suggesting that personal attributes are perceived as more critical than external resources. The role of an innovative culture was also acknowledged, though to a lesser extent.

Perspective 2: Resources and business resilience (see Appendix 5– Factor 2)

- General overview and representation:
  - Includes perspectives from six participants, representing 20% of the total sample.
  - Focus on resource availability and external support as key enablers of entrepreneurship.
- Higher impact factors:
  - Contextual and sector-specific elements were also highly rated such as access to financial resources (1.94), availability of mentors and advisors (1.79) and access to technologies (1.37) received the highest scores.

Table 3 Factors of entrepreneurship, ordered for greatest to least impact

Factor 1: Proactive entrepreneurship	Factor 2: Resources and business resilience	Factor 3: Cooperation and organizational strength	Factor 4: Collaborative environment
Higher impact factors			
Ability to take risks (1.81)	Access to financial resources (1.94)	Networks and contacts (2.3)	Networks and contacts (1.72)
Entrepreneurial knowledge and skills (1.76)	Availability of mentors and advisors (1.79)	Entrepreneurial knowledge and skills (1.71)	Cooperation with other companies (1.59)
Personality traits (1.71)	Adaptability (1.52)	Access to financial resources (1.70)	Competition research (1.46)
Motivation and resilience (1.48)	Access to technology and digital tools (1.37)	Competition in the sector (1.32)	Entrepreneurial environment (1.34)
Neutral impact factors			
Access to information (0.09)	Cognitive ability (0.07)	Search for hidden information (0.08)	Access to information (0.04)
Adaptation of existing products or services to new demands (0.08)	Motivation and resilience (0.03)	Identify opportunities (0.04)	Access to financial resources (0.01)
Entrepreneur education level (−0.01)	Entrepreneurial knowledge and skills (0.00)	Need for entrepreneurship (−0.03)	Legal and fiscal regulations (−0.05)
Cooperation with other companies (−0.01)	Access to training programs (−0.04)	Connect unconnected dots (−0.07)	Search for hidden information (−0.09)
Lower impact factors			
Transport and communication infrastructure (−1.93)	Need for entrepreneurship (−2.04)	Transport and communication infrastructure (−1.62)	Interculturality and globalization (−2.09)
Availability of workspaces (−1.92)	Evaluate the options (−1.94)	Entrepreneurial environment (−1.47)	Personality traits (−2.00)
Analysis of hidden information (−1.25)	Facilitating tools (−1.82)	Sustainable entrepreneurship (−1.46)	Difficulty attracting human resources (−1.88)
Search for hidden information (−1.12)	Sustainable entrepreneurship (−1.49)	Access to business support programs (−1.42)	Motivation and resilience (−1.58)

Source(s): Authors' own elaboration

- Neutral impact factors:
  - Statements linked to personal development and training such as individual capabilities and resilience were rated neutrally.
- Lower impact factors:
  - Statements related to market analysis and information gathering such as evaluate the options (−1.94) received the lowest scores.

This factor emphasizes access to external resources, and particularly finance, training and technology as key enablers of entrepreneurship. Participants placed less emphasis on market analysis and information gathering, suggesting a reliance on tangible resources rather than individual capabilities for entrepreneurial success.

Perspective 3: Multidimensional entrepreneurship (see Appendix 5 *– Factor 3)*

- General overview and representation:
  - Includes perspectives from nine participants, representing 30% of the total sample.
  - This is the most multifaceted perspective, incorporating elements from other factors, such as information processing, networks, entrepreneurial knowledge and financial resources.
- Higher impact factors:
  - Analyzing and processing information was highly rated, including analysis of hidden information or competition research (1.32).
  - Entrepreneurial traits and skills (1.71) also received high scores.
  - Networks and contacts (2.30) were rated as highly relevant.
  - Access to financial resources (1.70) was also considered a key factor.
- Neutral impact factors:
  - Statements related to opportunity recognition and analytical thinking such as identifying, connecting or uncovering new opportunities were rated neutrally.
- Lower impact factors:
  - Environmental or institutional conditions received the lowest scores such as entrepreneurial environment (−1.47) or transport and communication infrastructure (−1.42).

This factor reflects a multidimensional view of entrepreneurship, combining elements such as networking, access to resources, information search and proactive behavior. No single aspect was dominant, indicating that entrepreneurial success is perceived as the result of multiple complementary factors rather than one prevailing determinant.

Perspective 4. Collaborative environment (see Appendix 5 *– Factor 4)*

- General overview and representation:
  - Includes perspectives from five participants, representing 16.67% of the total sample.
  - Collaboration-related elements received the highest scores.
- Higher impact factors:
  - Collaboration and networking were highly rated such as cooperation with other firms (1.72) or strong professional networks and contacts (1.59).
  - Contextual and sector-specific elements were also highly rated.
- Neutral impact factors:
  - Statements related to structural conditions such as access to resources, regulatory factors and information were rated neutrally.
- Lower impact factors:
  - Human and contextual aspects such as Interculturality and globalization (−2.09) or Difficulty attracting human resources (−1.88) received low scores.

This factor represents a collaborative entrepreneurial profile in which cooperation and strong networks are perceived as the main enablers of success. Rather than relying on personal traits or access to resources, participants emphasize the importance of ecosystem support and collective interaction within the business environment.

5. Discussion and conclusion

5.1 Academic contributions

Regarding Industry 5.0, several authors have described the transition from Industry 4.0 to 5.0 as a linear process, where companies evolve from an efficiency-driven model (Industry 4.0) toward collaborative and sustainable strategies (Industry 5.0) (Bonamigo and Frech, 2021; Huang *et al.*, 2022; Murtaza *et al.*, 2024; Leng *et al.*, 2022). Our findings suggest a coexistence of Industry 4.0 and 5.0, where companies adopt technologies from both models based on their strategic needs because automation- and efficiency-focused models continue to receive equally high relevance. This implies that companies remain in an early stage of this process, because business models aligned with Industry 5.0 principles such as sustainability, user-centric approaches and intersectoral cooperation are not predominant. In addition, Magni *et al.* (2023) and Deguchi *et al.* (2020) suggested that Industry 5.0 is expected to lead to a radical redesign of business models. In contrast, our findings indicate that this evolution may be more gradual, depending on market dynamics, industry and company characteristics.

Both paradigms coexist strategically rather than replacing one another. To explain this phenomenon, we propose the initial notion of "Modular Transition," suggesting that some firms may selectively adopt technologies from both paradigms based on their market conditions and competitive needs. This flexible adoption challenges the assumption of a universal transition timeline and suggests that firms prioritize automation, AI and efficiency while gradually incorporating collaboration and sustainability as strategic conditions allow.

One of the aims of this research was to identify the most relevant or promising business models in the B2B context. Our research emphasizes the predominance of data-driven and AI-based business models, particularly AI-based driving, machine learning or business intelligence which were highly rated, maybe due to their strategic role in optimizing operations and decision-making processes. These results are consistent with Kowalkowski *et al.* (2024) who argued that data-driven business models hold greater relevance in B2B than B2C markets and with Pérez-Moure *et al.* (2024a) who highlighted that new business models should generate value within

processes. This perspective may also explain why subscription-based business models were rated lower, contradicting Murtaza *et al.* (2024).

While AI or logistics optimization were identified as key areas, others such as cloud computing or blockchain were perceived as less relevant, as well as gamification, personalization, mixed reality or information visualization in contrast with De Jong *et al.* (2021), Venturini (2022) or Leng *et al.* (2022) who exposed that these technologies are essential enablers of digital transformation. Research has emphasized the significant role of digitalization in shaping business models and its impact on them (Pérez-Moure *et al.*, 2024b; Rachinger *et al.*, 2019; Bouwman *et al.*, 2018). While we agree that digitalization is a key driver of business models, our research pointed out that not all the technologies and business models exert the same impact in B2B. Yet, business models' adoption is driven not by their disruptive potential but by their immediate applicability and tangible impact. Despite this trend, our analysis revealed significant uncertainty in the development and adoption of new business models, as participant perspectives were misaligned, with four participants excluded from the final analysis.

Business models are continuously evolving, and our findings confirm their highly dynamic nature (Taipale-Erävala *et al.*, 2020; Loureiro, 2018; Teece and Linden, 2017) largely driven by the increasing role of servitization and digitalization (Ruiz de la Torre and Sanchez, 2022; Rachinger *et al.*, 2019; Kowalkowski *et al.*, 2017; Rabetino *et al.*, 2017). While servitization-driven business models (e.g. vehicle maintenance and repair services, applications for efficient supply chain management or multimodal mobility platforms) have been positively rated, others such as personalization-focused services [e.g. Personalization of services and limited editions of vehicles, Transport services for people with reduced mobility or 3D printing (vehicles and customized parts)] were perceived as limited relevance. These findings disagree with the assumption that servitization in B2B follows the same logic as in B2C, where customization is a key competitive differentiator (Kowalkowski *et al.*, 2024; Wirtz and Kowalkowski, 2022; Bettiol *et al.*, 2017) and the proposition that extreme personalization and XaaS will play an essential role in industrial contexts (Mourtzis and Angelopoulos, 2024). Instead, B2B firms prioritize efficiency- and reliability-oriented business models over hyperpersonalization. Decision-making in B2B contexts is largely rational and cost-driven, leading firms to favor scalable solutions that deliver measurable process improvements and operational efficiency. As a result, *process optimization, automation and AI-driven adaptability are expected to shape the evolution of B2B services, with firms investing primarily in technologies that offer tangible, short-term value rather than uncertain, long-term benefits.*

The growing importance of sustainability in new business models has been widely recognized (Mourtzis and Angelopoulos, 2024; Kowalkowski *et al.*, 2024; Pérez-Moure *et al.*, 2023), and different authors have positioned it as a core principle of Industry 5.0 (Murtaza *et al.*; Xu *et al.*, 2021). Conversely, our findings suggest that sustainability-driven business models in B2B currently do not represent a major market opportunity. Business models such as charging infrastructure for electric vehicles, efficient route and travel planning apps or battery swapping were rated as low or neutral. This challenges the assertions that business models should be primarily oriented toward social welfare (Deguchi *et al.*, 2020; Huang *et al.*, 2022). Instead, B2B firms appear to prioritize business models that enhance competitiveness through efficiency, cost and revenues. Resource management solutions such as fleet management applications were positively evaluated, suggesting that sustainability is not irrelevant in B2B but selectively integrated. These findings partially align with the findings of Lampón *et al.* (2024a), who argued that in the digital transformation of supply chains, sustainability is not a determinant criterion. This finding suggests a more nuanced perspective of sustainability in B2B, showing that it is not an independent driver of transformation but rather an efficiency enabler. This insight suggests a shift from sustainability concept to a pragmatic business strategy, reinforcing that firms adopt sustainability selectively, not universally.

Finally, entrepreneurial alertness has been traditionally conceptualized as an individual's capacity and process to identify opportunities, driven by a cognitive process that responds to environmental stimuli, connecting seemingly unrelated elements and processing relevant information (Baron, 2007; Valliere, 2013; Chavoushi *et al.*, 2020). While this perspective remains relevant, our findings suggest that social networks (Sharma, 2019) and technological foresight are not merely complementary factors but fundamental drivers of alertness in digitally intensive B2B environments, as well as strategic abilities, intersectoral collaboration or collective learning. This contrasts with studies that prioritized individual opportunity recognition (Valliere, 2013) or short-term opportunity scanning (Lanivich *et al.*, 2022). Based on our interviews, we argue for a systemic approach, incorporating short-, medium- and long-term analytical processes.

These findings align with the emergence of Society 5.0, where collaborative intelligence replaces isolated entrepreneurial action (Deguchi *et al.*, 2020). This transition is closely tied to the redefinition of opportunity as a gap in the market for which a solution can be developed, adding value and being economically viable (Pidduck and Clark, 2024; Daniel *et al.*, 2021; Ojala, 2016), but with a transformative nature that combines what society wants with what it needs. Furthermore, previous research has established a positive relationship between entrepreneurial alertness and innovation (Levasseur *et al.*, 2022; Zhao *et al.*, 2021), dynamic environment (Fellnhofer, 2022; Lew *et al.*, 2023) and learning's moderating effect on risk perception (Zhao *et al.*, 2021). Our four identified perspectives – Proactive Entrepreneurship, Resources and Business Resilience, Multidimensional Entrepreneurship and Collaborative Environment – reinforce these relationships, indicating that in the current competitive and dynamic environment, entrepreneurs must adopt a proactive, multidisciplinary, collaborative and adaptive approach to sustain innovation and competitiveness.

Another key insight is the diminishing role of financial resources as the primary enabler of entrepreneurship. While traditional studies emphasized access to financial resources or funding (Shane, 2009), our results suggest that entrepreneurial success in digitally intensive B2B context is more dependent on technology, collaboration, knowledge exchange or abilities. Furthermore, entrepreneurial traits such as assuming risks,

motivation or adaptability are now more relevant to entrepreneurial success instead of a sustainable long-term approach (Kim and Kim, 2021) or entrepreneurship through necessity (Dencker *et al.*, 2021).

Finally, while digital entrepreneurship (Bogoslov and Lungu, 2020; Kraus *et al.*, 2018) and service digitalization remain crucial for new business' sustainability and profitability (Venkatesh *et al.*, 2019; Sahut *et al.*, 2021), previous studies have positioned blockchain (Chalmers *et al.*, 2021b), AI (Chalmers *et al.*, 2021a; Shepherd and Majchrzak, 2022), Big Data (Obschonka and Audretsch, 2020) or VR (Ben Saad and Choura, 2022) as entrepreneurship-facilitating technologies. Our interviews indicate that there is no single dominant enabling technology, except for AI, which ranked highest, followed by Big Data at a secondary level. This suggests that entrepreneurs must develop continuous awareness of emerging digital capabilities, leveraging technological advancements not as isolated tools but as integral components of strategic decision-making.

Therefore, our results indicate that *network integration, collective intelligence and technological alertness are now equally critical in dynamic B2B environments*, making a disruptive shift in how entrepreneurial alertness should be understood. We propose a redefinition of entrepreneurial alertness that can be increasingly understood as a broader process of identifying conventional commercial patterns or anticipating future trends but also about leveraging intersectoral networks to access knowledge and opportunities; adapting to technological foresight rather than reacting to existing gaps; and integrating strategic partnerships as a core component of entrepreneurial decision-making. This shifts the focus from an individual-driven process to a collaborative, digital and network-driven one.

5.2 Managerial contributions

This research presents several practical implications. The findings suggest that *the most promising business models in B2B are those focus on AI, data management and resource optimization*, with logistics standing out as key area. This highlights the need for firms to adopt new technologies that enhance operational efficiency. *Companies should explore investments in AI, smart logistics, supply chain management applications, direct services, energy flexibility solutions and carbon removal solutions*. Conversely, they should limit investments in business models such as hourly vehicle rentals, taxi reservation apps, vehicle personalization and limited editions or humanoid collaborative robots. In other words, *firms should prioritize enhancing operational efficiency and value-chain integration over hyper-personalized services that may not align with B2B customer needs*.

B2B firms may benefit from adopting a flexible approach aligned with the ideas of "Modular Transition" as a flexible business strategy, complemented by "Strategic Filtering," to selectively integrate technologies from Industry 4.0 and 5.0 according to market conditions and strategic priorities. In practice, this means prioritizing technologies that optimize processes, logistics, efficiency and decision-making such as AI and data management over those with limited operational impact, such as blockchain, VR, gamification or cloud computing.

Digitalization should therefore be treated as a strategic resource rather than an end goal, adapted to each industry's contingencies and emerging competences. In addition, authors have warned of the "hidden side" of digitalization (Gligor *et al.*, 2021; Bamel *et al.*, 2022), which may generate unrealistic expectations regarding its immediate benefits (Gligor *et al.*, 2021; Bamel *et al.*, 2022). Our findings reinforce the need to approach digital transformation pragmatically, as an enabler of strategic value rather than a universal solution.

Finally, managers should prepare their organizations to adapt continuously to evolving market and regulatory conditions, particularly regarding sustainability and AI. Developing compliance and intersectoral cooperation strategies can enhance flexibility and strengthen firms' capacity to anticipate change and maintain competitiveness.

The results also indicate that entrepreneurs should internalize entrepreneurial alertness, adopting a mindset of a continuous innovation process, fostering creativity, collective learning and adaptability to respond efficiently to the evolving market demands. This means *entrepreneurs should not only focus on identifying market gaps but also on building strategic partnerships and leveraging collective intelligence* through digital platforms and professional networks. To this end, *cooperation constitutes a cornerstone* in an increasingly interconnected and complex environment. *Firms and entrepreneurs should seek alliances to reach new markets and access services that they cannot provide independently.*

Entrepreneurs should improve skills such as *risk-taking, resilience, adaptability and competitive intelligence, which should be central elements of training programs*. To enhance entrepreneurship and improve resources management, the findings suggest focus on risk management capabilities, entrepreneurial knowledge and skills development, access to mentors, participation in professional networks and collaboration within business ecosystems. Meanwhile, less emphasis should be placed on factors such as workspace availability, transport infrastructure or the level of internationalization of the market, as these are less influential in the success of B2B entrepreneurship. Finally, *public institutions should play an indirect* role *in supporting entrepreneurship, primarily by facilitating legal and fiscal regulations rather than direct financial investment.*

These transformations reshape the role of entrepreneurs and managers, demanding greater flexibility, adaptability and interdisciplinary expertise while maintaining the rational, efficiency-driven nature of B2B markets, which demands specialized skills. In addition, AI is set to influence new business models development, management and automation, posing a risk of overautomation if digitalization is misapplied as an end in itself. It may negatively impact B2B markets, particularly when user-centric technology adoption is overlooked.

6. Limitations and future research

6.1 Research limitations

Given the exploratory nature, this research presents some limitations. While the number of participants in the methodologies was sufficient for exploratory research, a larger sample size could enhance robustness. In addition, despite efforts to mitigate cultural bias, generalizability remains limited due to both the sample size and sector-specific focus (mobility).

The study reflects the perspective of experienced academics with an international scope, but incorporating other actors would enrich future findings. Furthermore, digitally intensive B2B industries were the primary focus, meaning that results could vary in less digitalized industry. Finally, the research shares the inherent constraints of Q methodologies, requiring a manageable number of statements and posing potential comprehension challenges among participants.

6.2 Future research

Future research should further explore the coexistence of Industry 4.0 and Industry 5.0 as an evolving framework, analyzing how firms integrate both paradigms across different industries and organizational levels. Because the conceptual boundaries of Industry 5.0 are still being defined, future studies could investigate how enabling technologies, human–machine collaboration and value co-creation operate simultaneously under both paradigms. In addition, while this research identified *Strategic Filtering* as a process primarily focused on operational efficiency, subsequent studies could examine its strategic dimension and long-term implications for competitive advantage. The role of sustainability should also receive deeper attention, particularly in understanding how it can move beyond an efficiency enabler toward a source of innovation and differentiation in B2B contexts. Finally, the concept of *Modular Transition* introduced here offers a promising foundation for future empirical and conceptual research, enabling the analysis of how firms selectively adopt technologies and business models in response to shifting market and institutional dynamics.

Future research could also investigate the ethical and regulatory implications of AI-driven decision-making in B2B contexts. Extending this research beyond the mobility industry would provide broader insights into how digital entrepreneurship unfolds across diverse industries with different technological intensities. Moreover, incorporating quantitative and mixed-methods approaches could help validate and contrast the patterns identified here, strengthening the generalizability of the findings. Finally, further examination of AI's influence on entrepreneurial behavior and strategic decision-making would contribute to a deeper understanding of how digital capabilities shape competitiveness and innovation in B2B markets.

6.3 Final remarks

Overall, this study highlights the evolving interplay between digitalization, entrepreneurship and business models in B2B environments. By introducing the concepts of 'Modular Transition' and 'Strategic Filtering,' it advances the understanding of how firms manage technological and organizational complexity during the transition from Industry 4.0 to Industry 5.0. These findings underline that digital transformation in B2B contexts is neither linear nor universal, but rather adaptive, selective and context dependent. The study contributes to bridging theory and practice by offering a comprehensive perspective on how firms can combine efficiency, collaboration and sustainability to build more resilient and competitive business models in the new industrial era. The most promising business models will be those capable of combining technological innovation with strategic flexibility, translating efficiency and sustainability into measurable competitive advantages such as AI and Big Data. Likewise, entrepreneurship in this new era will depend on cultivating technological alertness, collective intelligence and collaborative capabilities that enable firms to anticipate change and co-create value within increasingly dynamic ecosystems.

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Appendix 1. Questions posed in the interviews

1 How would you define opportunity from an entrepreneurial point of view?
2 In recent years, services have gained weight in the economy, even in areas traditionally centered on the product. Do you believe this trend will continue?
3 Among B2B services, which ones will have more potential in the mobility area in the future?
4 What are the main development areas on which these services are based?
5 Would you classify yourself as a creator of new services? And as a user?
6 From your experience, what are the most promising areas for developing new business models?
7 Which buttons need pressing to foster innovation and the creation of new services in the mobility area?
8 How would you describe the current state of digitalization in B2B firms?
9 From your experience, how is digitalization impacting B2B environments?
10 What are the benefits of digitalization?
11 What are the negative consequences?
12 Which technologies do you believe are going to have most impact on business models in B2B service innovation?
13 What are the motivations for entrepreneurship?
14 How does technology influence innovative entrepreneurship?
15 Do you have a competition monitoring system incorporated into your environment, or other strategies to monitor how the environment is evolving?
16 Do you know the term "entrepreneurial alertness"? If not known, it is defined.
17 Do you think entrepreneurial alertness is a process inherent to entrepreneurial spirit or can it be developed?
18 There are six fundamental factors in entrepreneurial alertness: entrepreneurial atmosphere, social networks, personality traits, previous experience and knowledge, cognitive ability and information seeking. Can you think of any others?
19 How can entrepreneurial alertness contribute to the innovation process in the increasingly digital B2B world?
20 What importance do you think cooperation with other firms has in developing entrepreneurial alertness?
21 Do you believe that entrepreneurial alertness influences all sectors equally?
22 What importance do you think public agents have? What role do they play?
23 What are the greatest challenges for entrepreneurs?
24 How do you perceive training to develop entrepreneurial spirit and to provide professionals with the tools that can be used by them?
25 Does the interculturality that characterizes the globalized world have a negative or positive effect within the concept of entrepreneurial alertness?
26 Any final reflections on the challenges currently facing entrepreneurs.

Appendix 2. Which are the areas that offer more entrepreneurial opportunities in mobility?

1 Cloud computing
2 Edge computing
3 Blockchain
4 Internet of Things
5 3D printing (vehicles and customized parts)
6 Smart logistics
7 Vehicle rental by hour
8 Transport services for people with reduced mobility
9 Door-to-door logistics
10 Last-mile transport services
11 Micro mobility platforms
12 Charging infrastructure for electric vehicles
13 Battery swapping
14 Autonomous vehicles
15 Connected vehicle technologies
16 Roadside assistance and emergency services
17 Road safety solutions
18 Real-time navigation and mapping systems
19 Traffic control systems and intelligent traffic lights
20 Augmented, virtual and mixed reality technologies
21 Fleet management applications
22 Smart parking applications
23 Carsharing applications
24 Taxi booking applications
25 Air quality tracking and monitoring apps

26 Efficient route and travel planning apps
27 Crowdfunding platforms for mobility projects
28 Carbon removal solutions
29 Energy flexibility solutions
30 Mobility data tracking and analysis platforms
31 Data generation, processing and collection
32 Business intelligence and data mining
33 Reverse logistics and returns management solutions
34 Vehicle maintenance and repair services
35 Applications for efficient supply chain management in transport sector
36 Vehicle fleet management and optimization systems
37 Vehicle-centric artificial intelligence
38 Driver-centric artificial intelligence
39 Machine learning
40 Insurance companies
41 Advanced connectivity (5G and 6G)
42 Humanoid collaborative robots
43 Personalization of services and limited editions of vehicles
44 Multimodal mobility service platforms

Which are the factors that condition the use of entrepreneurial opportunities?

1 Search for hidden information
2 Access to information
3 Analysis of hidden information
4 Competition research
5 Connecting unconnected dots
6 Evaluate options
7 Identifying opportunities
8 Create value
9 Sustainable entrepreneurship
10 Innovation and technological alerts
11 Adaptation of existing products or services to new demands
12 Business mission
13 Facilitating tools
14 Personality traits
15 Experience and previous knowledge
16 Cognitive ability
17 Motivation and resilience
18 Need for entrepreneurship
19 Entrepreneurial knowledge and skills
20 Adaptability
21 Ability to take risks
22 Access to business support programs
23 Entrepreneur education level
24 Access to financial resources
25 Legal and fiscal regulations
26 Availability of workspaces
27 Availability of mentors and advisors
28 Access to technology and digital tools
29 Difficulty of attracting human resources
30 Access to international markets
31 Access to training programs
32 Access to subsidies and public funding
33 Transport and communication infrastructure
34 Interculturality and globalization
35 Having a good ecosystem
36 The sector in which you are doing business
37 Culture of innovation
38 Cooperation with other companies
39 Entrepreneurial environment
40 Networks and contacts
41 Demographic changes
42 Market trends (servitization)
43 Competition in the sector
44 Changes in the industry and in business models

Appendix 3

Table A1 P-set characteristics

Participant	Nationality	Expertise
1	Spanish	Mobility industry, global value chain
2	Spanish	B2B marketing, mobility industry, global value chain
3	Spanish	Family business, entrepreneurship
4	Spanish	Family business, entrepreneurship
5	Spanish	Mobility industry, global value chain
6	Mexican	Small and medium enterprise global integration
7	Spanish	Mobility industry, global value chain
8	Spanish	Mobility industry, global value chain
9	Spanish	Mobility industry, global value chain
10	Spanish	Customer marketing, legitimacy, social responsibility
11	Spanish	Mobility industry, entrepreneurship, tourism
12	Spanish	Mobility industry, entrepreneurship, innovation
13	Spanish	Emerging competitiveness, organization theory
14	Spanish	Costumer marketing, strategic management
15	French	Mobility industry, decarbonization
16	German	B2B Marketing, Entrepreneurship
17	German	Mobility industry
18	Chinese	Innovation management, business model innovation, mobility industry
19	North American	Mobility industry, entrepreneurship, economics
20	Canadian	Mobility industry, decarbonization
21	Spanish	Human resources, strategic management
22	Spanish	Logistics, strategic management
23	Portuguese	Innovation management, industrial relations, technology
24	Italian	Mobility industry, sustainability
25	Spanish	Marketing, tourism, entrepreneurship
26	Polish	Manufacturing transformation, mobility industry, research and development, politics
27	French	Industrial dynamics, economic geography, global value chains, global production networks
28	Italian	Innovation policies, mobility industry, digital transition
29	Mexican	Productive development, competitivity, technological development, SMEs, entrepreneurship
30	Spanish	Mobility industry, marketing B2B, entrepreneurship

Appendix 4

Composite Q sort for Factor 1

−5	−4	−3	−2	−1	0	1	2	3	4	5
** ◄ Vehicle rental by the hour	** ◄ Transport services for people with reduced mobility	* ◄ Door-to-door logistics	Last mile transport services	Traffic control systems and intelligent traffic lights	Battery swapping	3D printing (vehicles and customized parts)	Advanced connectivity (5G and 6G)	** ► Edge computing	* ► Business intelligence and data mining	* ► Driver-centric artificial intelligence
** ◄ Taxi booking applications	Insurance companies	* ◄ Smart parking applications	Road safety solutions	* ◄ Efficient route and travel planning apps	Reverse logistics and returns management solutions	Applications for efficient supply chain management in the transport	** ► Cloud computing	** ► Blockchain	* ► Machine learning	Vehicle-centric artificial intelligence
	** ◄ Ridesharing applications	Roadside assistance and emergency services	Vehicle maintenance and repair services	* ◄ Vehicle fleet management and optimization systems	Charging infrastructure for electric vehicles	Mobility data tracking and analysis platforms	** Connected vehicle technologies	** Smart logistics	Data generation, processing and collection	
		** Personalization of services and limited editions of vehicles	* ◄ Real-time navigation and mapping systems	Micro mobility platforms	Fleet management applications	Carbon removal solutions	Augmented reality, virtual reality and mixed reality	* Autonomous vehicles		
			Air quality tracking and monitoring apps	Crowdfunding platforms for mobility projects	Multimodal mobility service platforms	Internet of Things (monitoring)	** Energy flexibility solutions			
					** ► Humanoid collaborative robots					

Legend

* Distinguishing statement at $P < 0.05$
** Distinguishing statement at $P < 0.01$
► z-Score for the statement is higher than in all other factors
◄ z-Score for the statement is lower than in all other factors

Composite Q sort for Factor 2

−5	−4	−3	−2	−1	0	1	2	3	4	5
** ◄ Personalization of services and limited editions of vehicles	Cloud computing	* ◄ Business intelligence and data mining	Smart parking applications	Carbon removal solutions	* Efficient route and travel planning apps	* Multimodal mobility service platforms	Charging infrastructure for electric vehicles	* ► Real-time navigation and mapping systems	* ► Connected vehicle technologies	* ► Smart logistics
Humanoid collaborative robots	Edge computing	Vehicle maintenance and repair services	** Energy flexibility solutions	Machine learning	Air quality tracking and monitoring apps	Mobility data tracking and analysis platforms	Fleet management applications	* ► Vehicle rental by the hour	** ► Transport services for people with reduced mobility	* ► Applications for efficient supply chain management in the transport
	Crowdfunding platforms for mobility projects	Insurance companies	Driver-centric artificial intelligence	* Data generation, processing and collection	* Ridesharing applications	Advanced connectivity (5G and 6G)	3D printing (vehicles and customized parts)	** ► Door-to-door logistics	* Autonomous vehicles	
		** ◄ Blockchain	** ◄ Battery swapping	Taxi booking applications	Reverse logistics and returns management solutions	* Micro mobility platforms	Internet of Things (monitoring)	Vehicle fleet management and optimization systems		
			Augmented reality, virtual reality and mixed reality	Last mile transport services	Road safety solutions	Traffic control systems and intelligent traffic lights	Roadside assistance and emergency services			
					** Vehicle-centric artificial intelligence					

Composite Q sort for Factor 3

−5	−4	−3	−2	−1	0	1	2	3	4	5
** ◄ Energy flexibility solutions	* ◄ Internet of Things (monitoring)	Road safety solutions	** Autonomous vehicles	Real-time navigation and mapping systems	Last mile transport services	** ► Crowdfunding platforms for mobility projects	Vehicle fleet management and optimization systems	Driver-centric artificial intelligence	Vehicle-centric artificial intelligence	* ► Vehicle maintenance and repair services
Humanoid collaborative robots	** ◄ Advanced connectivity (5G and 6G)	Edge computing	Reverse logistics and returns management solutions	Personalization of services and limited editions of vehicles	Roadside assistance and emergency services	Transport services for people with reduced mobility	** ► Taxi booking applications	Efficient route and travel planning apps	** ► Smart parking applications	** ► Ridesharing applications
	** ◄ Carbon removal solutions	3D printing (vehicles and customized parts)	Micro mobility platforms	Traffic control systems and intelligent traffic lights	Fleet management applications	Augmented reality, virtual reality and mixed reality	Charging infrastructure for electric vehicles	Applications for efficient supply chain management in the transport	Multimodal mobility service platforms	
		Air quality tracking and monitoring apps	Cloud computing	Smart logistics	Connected vehicle technologies	Machine learning	Business intelligence and data mining	** ► Insurance companies		
			* ◄ Data generation, processing and collection	Blockchain	Vehicle rental by the hour	Door-to-door logistics	Battery swapping			
					Mobility data tracking and analysis platforms					

Composite Q sort for Factor 4

−5	−4	−3	−2	−1	0	1	2	3	4	5
** ◄ Autonomous vehicles	3D printing (vehicles and customized parts)	Augmented reality, virtual reality and mixed reality	Driver-centric artificial intelligence	Real-time navigation and mapping systems	** Vehicle maintenance and repair services	Road safety solutions	Applications for efficient supply chain management in the transport	** ► Last mile transport services	** ► Mobility data tracking and analysis platforms	** ► Carbon removal solutions
* ◄ Cloud computing	Edge computing	** Humanoid collaborative robots	Connected vehicle technologies	Taxi booking applications	Traffic control systems and intelligent traffic lights	Advanced connectivity (5G and 6G)	* Ridesharing applications	Efficient route and travel planning apps	Multimodal mobility service platforms	** ► Energy flexibility solutions
	* ◄ Insurance companies	** ◄ Vehicle-centric artificial intelligence	Machine learning	Door-to-door logistics	Business intelligence and data mining	Transport services for people with reduced mobility	Fleet management applications	Charging infrastructure for electric vehicles	** ► Micro mobility platforms	
		Crowdfunding platforms for mobility projects	* Internet of Things (monitoring)	Vehicle rental by the hour	Smart logistics	Vehicle fleet management and optimization systems	Reverse logistics and returns management solutions	Data generation, processing and collection		
			Roadside assistance and emergency services	Blockchain	Smart parking applications	Personalization of services and limited editions of vehicles	Battery swapping			
					Air quality tracking and monitoring apps					

Appendix 5

Composite Q sort for Factor 1

−5	−4	−3	−2	−1	0	1	2	3	4	5
** ◄ Availability of work spaces.	Search for hidden information.	Access to technology and digital tools.	Access to international markets.	Market trends (Servitization).	Cognitive ability.	** ◄ Interculturality and globalization.	** ► Create value.	** ► Identify opportunities.	* ► Personality traits.	* ► Ability to take risks.
Transport and communication infrastructure.	* ◄ Analysis of hidden information.	** Evaluate the options.	** Access to business support programs.	* Availability of mentors and advisors.	Sustainable entrepreneurship.	Experience and previous knowledge.	Have a good ecosystem.	Culture of innovation.	Networks and contacts.	Entrepreneurial knowledge and skills.
	Competition research.	Facilitating tools.	Access to training programs.	Access to subsidies and public financing.	* ◄ Cooperation with other companies.	* ► Connect unconnected dots.	Business mission.	Entrepreneurial environment.	* ► Motivation and resilience.	
		** ◄ Competition in the sector.	** Difficulty attracting human resources.	Innovation and technological alert.	Access to information.	Changes in the industry and business models.	* Adaptability.	** ► Need for entrepreneurship.		
			** ◄ The sector in which it is undertaken.	* Legal and fiscal regulations.	Entrepreneur education level.	** Demographic changes.	Access to financial resources.			
					Adaptation of existing products or services to new demands.					

Composite Q sort for Factor 2

−5	−4	−3	−2	−1	0	1	2	3	4	5
** ◄ Evaluate the options.	Sustainable entrepreneurship.	Market trends (Servitization).	Business mission.	Create value.	Competition in the sector.	Access to information.	Have a good ecosystem.	Ability to take risks.	Adaptability.	Access to financial resources.
** ◄ Need for entrepreneurship.	Competition research.	Demographic changes.	** ◄ Experience and previous knowledge.	** Personality traits.	Cognitive ability.	** ► Transport and communication infrastructure.	* ► Legal and fiscal regulations.	Cooperation with other companies.	Access to technology and digital tools.	** ► Availability of mentors and advisors.
	** ◄ Facilitating tools.	Connect unconnected dots.	* Analysis of hidden information.	Availability of work spaces.	** Motivation and resilience.	Access to business support programs.	Entrepreneur education level.	Entrepreneurial environment.	Networks and contacts.	
		Search for hidden information.	Adaptation of existing products or services to new demands.	Innovation and technological alert.	** ► Access to training programs.	Changes in the industry and business models.	The sector in which it is undertaken.	Difficulty attracting human resources.		
			** ◄ Identify opportunities.	** Interculturality and globalization.	Entrepreneurial knowledge and skills.	** Culture of innovation.	* ► Access to international markets.			
					Access to subsidies and public financing.					

Composite Q sort for Factor 3

−5	−4	−3	−2	−1	0	1	2	3	4	5
** ◄ Entrepreneurial environment.	** ◄ Access to subsidies and public financing.	* ◄ Legal and fiscal regulations.	** ◄ Culture of innovation.	Entrepreneur education level.	* Adaptation of existing products or services to new demands.	Cognitive ability.	** Personality traits.	Adaptability.	Access to financial resources.	* ► Networks and contacts.
Transport and communication infrastructure.	** ◄ Access to business support programs.	** ◄ Have a good ecosystem.	Business mission.	Access to international markets.	Search for hidden information.	Difficulty attracting human resources.	The sector in which it is undertaken.	* Motivation and resilience.	** ► Competition in the sector.	Entrepreneurial knowledge and skills.
	Sustainable entrepreneurship.	Demographic changes.	Availability of work spaces.	Create value.	Identify opportunities.	Changes in the industry and business models.	Innovation and technological alert.	* Competition research.	** ► Analysis of hidden information.	
		Access to training programs.	* ◄ Availability of mentors and advisors.	* ► Facilitating tools.	Market trends (Servitization).	* Cooperation with other companies.	* ► Evaluate the options.	Ability to take risks.		
			** Interculturality and globalization.	Access to technology and digital tools.	* Connect unconnected dots.	Experience and previous knowledge.	Access to information.			
					** Need for entrepreneurship.					

Composite Q sort for Factor 4

−5	−4	−3	−2	−1	0	1	2	3	4	5
** ◄ Personality traits.	Demographic changes.	Facilitating tools.	Access to subsidies and public financing.	Entrepreneurial knowledge and skills.	Access to information.	Identify opportunities.	The sector in which it is undertaken.	Access to technology and digital tools.	* ► Competition research.	Networks and contacts.
** ◄ Interculturality and globalization.	** ◄ Motivation and resilience.	* Transport and communication infrastructure.	Availability of work spaces.	Competition in the sector.	Changes in the industry and business models.	Access to business support programs.	Experience and previous knowledge.	Innovation and technological alert.	Entrepreneurial environment.	Cooperation with other companies.
	** ◄ Difficulty attracting human resources.	** Need for entrepreneurship.	** ◄ Ability to take risks.	Create value.	* Evaluate the options.	Cognitive ability.	** Availability of mentors and advisors.	Have a good ecosystem.	Culture of innovation.	
		Access to training programs.	Market trends (Servitization).	Access to international markets.	Access to financial resources.	** Analysis of hidden information.	Business mission.	* ► Adaptation of existing products or services...		
			Connect unconnected dots.	** ◄ Adaptability.	Search for hidden information.	Entrepreneur education level.	Sustainable entrepreneurship.			
					* Legal and fiscal regulations.					

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