

INNOVATION AT THE CORE OF COMPETITIVE ADVANTAGE: A THEMATIC EXPLORATION OF EMERGING ORGANIZATIONAL PATHWAYS

A INOVAÇÃO NO CERNE DA VANTAGEM COMPETITIVA: UMA EXPLORAÇÃO TEMÁTICA DE NOVOS CAMINHOS ORGANIZACIONAIS

Article received on: 12/10/2025

Article accepted on: 2/9/2026

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The authors declare that there is no conflict of interest

Abstract

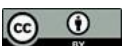
Now more than ever, organizations need to innovate in order to face uncertainty, become sustainable, and exploit digital opportunities. Despite significant research into the phenomenon, the literature is fragmented across a range of disciplines and perspectives. This article conducts a thematic analysis of 234 references to map the field of study and synthesize key findings. The findings reveal that innovation has become a core strategic imperative for organizations. Innovation is crucial for organizations to exploit opportunities and integrate sustainability into their operations. The findings also reveal that organizations need to transform their business models to adapt to changes in their environments and the technologies they use. The study contributes to the growing body of research into innovation. The article links the bibliometric findings to themes that emerge on organizational resilience and competitive advantage. Implications for theory, practice, and future research are discussed.

Keywords: Innovation. Business Models. Sustainability. Dynamic Capabilities. Organizational Ambidexterity.

Resumo

Agora, mais do que nunca, as organizações precisam inovar para enfrentar a incerteza, tornar-se sustentáveis e aproveitar as oportunidades digitais. Apesar das pesquisas significativas sobre o fenômeno, a literatura está fragmentada entre diversas disciplinas e perspectivas. Este artigo realiza uma análise temática de 234 referências para mapear o campo de estudo e sintetizar as principais conclusões. Os resultados revelam que a inovação se tornou um imperativo estratégico fundamental para as organizações. A inovação é crucial para que as organizações explorem oportunidades e integrem a sustentabilidade em suas operações. As conclusões também revelam que as organizações precisam transformar seus modelos de negócios para se adaptarem às mudanças em seus ambientes e nas tecnologias que utilizam. O estudo contribui para o crescente corpo de pesquisas sobre inovação. O artigo relaciona os resultados bibliométricos a temas que emergem sobre resiliência organizacional e vantagem competitiva. São discutidas as implicações para a teoria, a prática e pesquisas futuras.

Palavras-chave: Inovação. Modelos de Negócios. Sustentabilidade. Capacidades Dinâmicas. Ambidextridade Organizacional.



1 INTRODUCTION

Innovation is a prerequisite for organizational change and development in the 21st century. Many studies underscore the importance of innovation in addressing sustainability, digitalization, and socio-political challenges. In this special issue, attention is especially given to sustainable business model innovation that organizations apply to achieve their objectives (Pan, Xu, & Skare, 2023). Moreover, innovation can be triggered by the disruptive character of artificial intelligence for which companies develop corresponding strategies (Jorzik et al., 2024; Kanbach et al., 2023). In "ESG and innovation: the linkage of long-term stakeholder value", Xu & Zhu (2024) investigate the relationship between ESG performance and innovation, and explain why innovation is vital to shareholders' returns and social welfare. With changing circumstances, innovation is no longer an optional extra but a necessity for companies to survive in an increasingly competitive business environment.

In addition to these articles on innovation (also known as R&D or new venture creation), the period saw the appearance of some fundamental works, e.g., on disruptive innovation (Christensen, 1997), on architectural innovation (Henderson & Clark, 1990), or on dynamic capabilities (Teece, Pisano & Shuen, 1997). Simultaneously, works appeared on ambidextrous organizations (Tushman & O'Reilly, 1996, 2004) or on critical success factors for continuous renewal (Rothwell, 1992), as well as on the so-called "innovation journey" (Van de Ven, 1999).

The issue of innovation has long been studied, yet recent discussions are predominantly focused on innovation development. Scholars explore how companies and countries develop their innovative capacity based on the perspective of dynamic capabilities (Teece, 2007, 2010, 2012, 2018), combine multiple strategies to create innovative business models by achieving organizational ambidexterity (Gibson & Birkinshaw, 2004; Raisch & Birkinshaw, 2008; Zimmermann et al., 2018), or pursue sustainability-oriented innovation (Rennings, 2000; Klewitz & Hansen, 2014; Geissdoerfer et al., 2018). There is also a lively discussion about the effects of digital transformation (Khin & Ho, 2018; Soluk et al., 2021; Vaska et al., 2021). However, these approaches still lack integration into a general theory of innovative development, which remains stuck in separate "conceptual silos". The tasks assigned to managers following

an innovation strategy are often contradictory. Therefore, research results on the subject should be used to build on existing findings in order to provide a complete, cumulative view. Others address the trade-offs between innovation exploration and exploitation (Simsek et al. 2009; Junni et al. 2013). Still, there is a growing body of research on sustainability-oriented innovation (Reyes-Santiago et al. 2017; Shahzad et al. 2021), as well as on digital transformation, particularly from a technological perspective (Guo et al. 2022). A comprehensive synthesis of approaches to fully exploit innovation in organizations, however, is missing. The article has both theoretical and practical justification. From a theoretical perspective, the article contributes to consolidating ongoing research on innovation. From a practical point of view, the article provides managers and policymakers in innovative organizations and networks with useful insights into how to survive and succeed in a challenging business environment characterized by rapid change and strong innovation pressures. Organizations face an overwhelming array of challenges today, including climate change, rapid digitalization, and socio-political instability, which force them to become more innovative to survive. But what do we actually mean by innovation? This study investigates the complexities of what can be seen as a strategic priority and explains why organizations' innovative efforts so often fail to deliver on their promises.

2 BACKGROUND

For more than three decades, there has been an incredible momentum in innovation research. New empirical studies and theoretical approaches are continually emerging. Different disciplines contribute to understanding competitive advantages. The field of innovation itself is meanwhile in need of new applications on sustainability, digitalization, and entrepreneurial resilience. This issue of WSI focuses on sustainable business model innovation, on the effects of Artificial Intelligence, and on innovations in market-like environments. While much research focuses on the entrepreneurial and individual aspects of business model innovation, an increasing number of studies address its organizational and managerial aspects. In addition to studies like Furtwänglinger et al. (2022) analyzing entrepreneurial teams, more recent studies have appeared in this field, e.g., Wang, Yi & Wei (2023), who investigate the role of top management team social

capital in business model design. Further studies examine the relation between family firms and socioemotional wealth (Weimann et al. 2020) or the family influence in digital innovation (Soluk et al. 2021). Works such as Christensen (1997) on disruptive innovation, Henderson & Clark (1990) on architectural innovation, and Rothwell (1992) on the critical success factors for industrial innovation have a very strong legacy. In contrast, the legacy of Tushman & O'Reilly (1996, 2004) on ambidextrous organizations and Teece et al. (1997) on the dynamic capabilities framework has been very much elaborated by Teece (2007, 2010, 2012, 2018) on managerial processes and organizational routines. While the number of studies on knowledge transfer and innovation is increasing, a growing body of research is emerging on sustainability topics. Rennings (2000) started the research stream on sustainability with the first work on eco-innovation. Later, sustainability-oriented innovation was addressed. For instance, Carrillo-Hermosilla et al. (2010) provided a first classification of eco-innovations, while Klewitz & Hansen (2014) delivered a first review on sustainability-oriented innovation in SMEs. Geissdoerfer, Vladimirova & Evans (2018) provided a comprehensive review of sustainable business model innovation.

Khin & Ho (2018): Positive relationship between digital capability and firm performance. Matarazzo, M., Mistretta, M., & Salvia, G. (2021): Digital transformation practices among SMEs: perspectives and challenges (the Italian context case study). Guo et al. (2022): Research on digital innovation-driven capability of enterprise in the AI era. Vaska et al. (2021): Digital transformation of business models—review of current trends. Stryja & Satzger (2019): Digital nudging to enable digital transformation – A research agenda. In addition to scientific papers and articles, among the basic references we have to mention Utterback (1994), Von Stamm (2003), and Jones, Womack & Rawson (1991) - to understand the dynamics of innovation and of production based on lean principles. Van de Ven (1999) presents the stages of the so-called innovation journey, while the OECD/Eurostat Oslo Manuals provide methodological guidelines for measuring innovation (2005, 2018).

3 METHODOLOGY

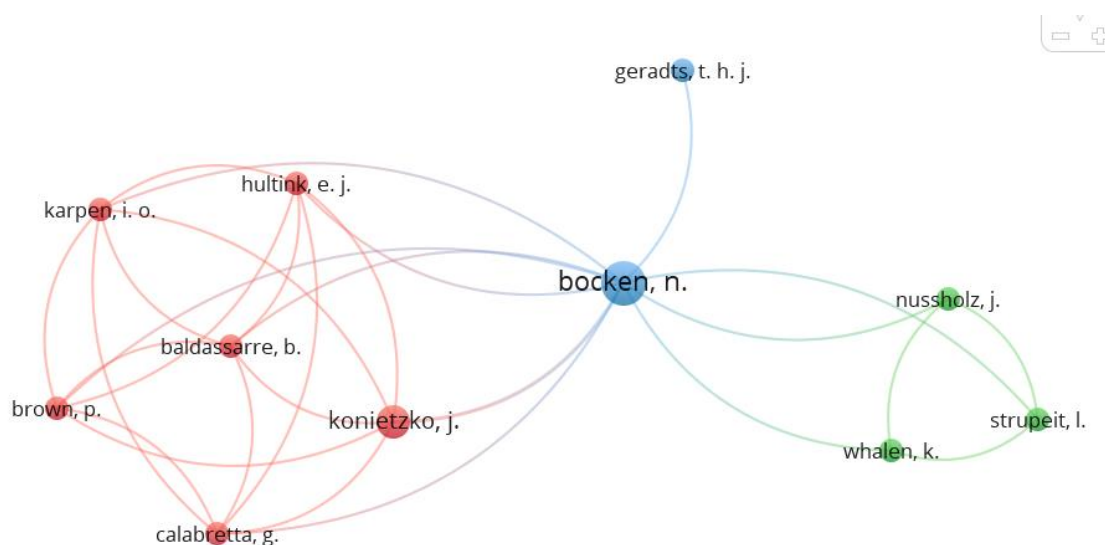
This study adopted a qualitative approach and used bibliometric methods to examine research publications on innovation and management practices. The study was structured according to the ‘research onion’ proposed by Saunders et al. (2009). An interpretivist paradigm was utilized in the study, as innovation is a socially constructed phenomenon influenced by factors such as management practices and organizational (including institutional) factors. A systematic search of online databases Web of Science, Scopus, and SpringerLink was conducted to select relevant research papers. The search included all accessible peer-reviewed articles over a 30-year period, from 1990 to 2024. A bibliometric analysis was subsequently conducted using VOSviewer, version 1.6.20 (Eck and Waltman, 2010), to analyze co-authorship and co-citation networks and identify clusters of influential authors and thematic concentrations. Software that maps the metadata of articles and publications was used. The study used metadata, including authors, publication year, keyword co-occurrences, and citations, to map clusters of relevant publications and identify trends within the themes. This study applies thematic analysis in conjunction with bibliometric mapping in order to provide both a macro-level view of the distribution of documents within the field of work organization and a micro-level view of the concepts addressed within it. Thematic analysis offers a framework for generating a detailed, theoretical account of concepts evident within a corpus of texts, revealing their constituent parts or themes. The grounded theory methodology developed by Strauss and Corbin (1998) served as the basis for the coding process, which was undertaken in three stages: open, axial, and selective. In addition, the thematic analysis was guided by several broader principles developed by Braun and Clarke (2006). Recognition of the limitations that the practice of citation and the qualitative tradition of thematic analysis places on analysis has also been addressed. The systematic use of multiple databases and an extremely systematic analysis process were two key safeguards used in this study. The study was conducted in an ethically sound manner, using publicly available academic sources and properly citing the authors and works accessed during the analysis.

3.1 Findings and analysis

The obtained results have been analyzed using VosViewer (Eck and Waltman, 2010). Information about the analysis can be found in the previous entry. In the following, the network map on co-authorship is presented in Figure 1.

Figure 1

Network map



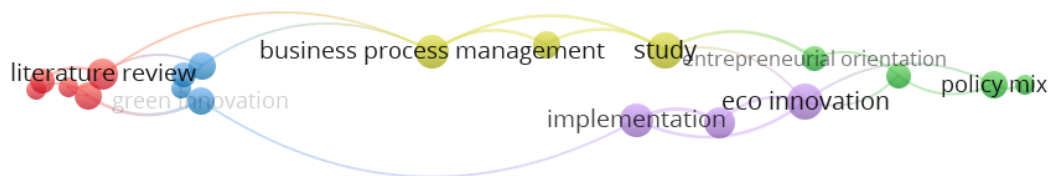
Source: VOSviewer (version 1.6.20). Adapted from van Eck and Waltman (2010)

Figure 1 shows all co-authorship relations between the identified authors. “Bocken, N.” is clearly in a hub-like position, connecting several clusters of co-authors. The red bounded cluster consists of Karpen, Baldassarre, Calabretta, Brown, and Hultink. These authors co-author extensively in the area of sustainable innovation and business models. The green bounded cluster consists of Nussholz, Strupeit, and Whalen. These three authors co-author each other in the areas of sustainability, (circular) economy, industry & innovation, but have very little co-authoring activity with others. The small blue cluster consists of Geradts, who co-authored with Bocken in the area of sustainable innovation. The visualization shows Bocken's connections to other research areas and strengthens her connections to sustainability-oriented innovation research.

Figure 2 gives an overview of the authors who are most frequently cited together. Again, we find several dense clusters of nodes representing different theoretical traditions. Besides the dynamic capabilities school (Teece, Pisano, Shuen), we also find organizational ambidexterity (Tushman, O'Reilly). The third cluster comprises authors dealing with sustainability and eco-innovation (Bocken, Geissdoerfer). The size of the nodes reflects the citation frequency of the individual authors. They serve as “anchoring points” for reading the map.

Figure 2

Co-citation network



Source: VOSviewer (version 1.6.20). Adapted from van Eck and Waltman (2010)

Figure 3

Density visualization map on Keyword Co-occurrence



Source: VOSviewer (version 1.6.20). Adapted from van Eck and Waltman (2010)

Figure 3 presents the keyword co-occurrence network generated by VOSviewer (van Eck and Waltman, 2010). This conceptual map presents the relationships among the topics addressed in existing innovation research. The network of keywords from the literature consists of nodes representing keywords and connections representing co-occurrence frequencies. The most prominent terms in the results are eco-innovation,

green innovation, entrepreneurial orientation, and business process management. The three central anchors are all of considerable size and very bright. They represent prevailing concepts in innovation research and relate to themes of sustainability, organizational processes, and entrepreneurship.

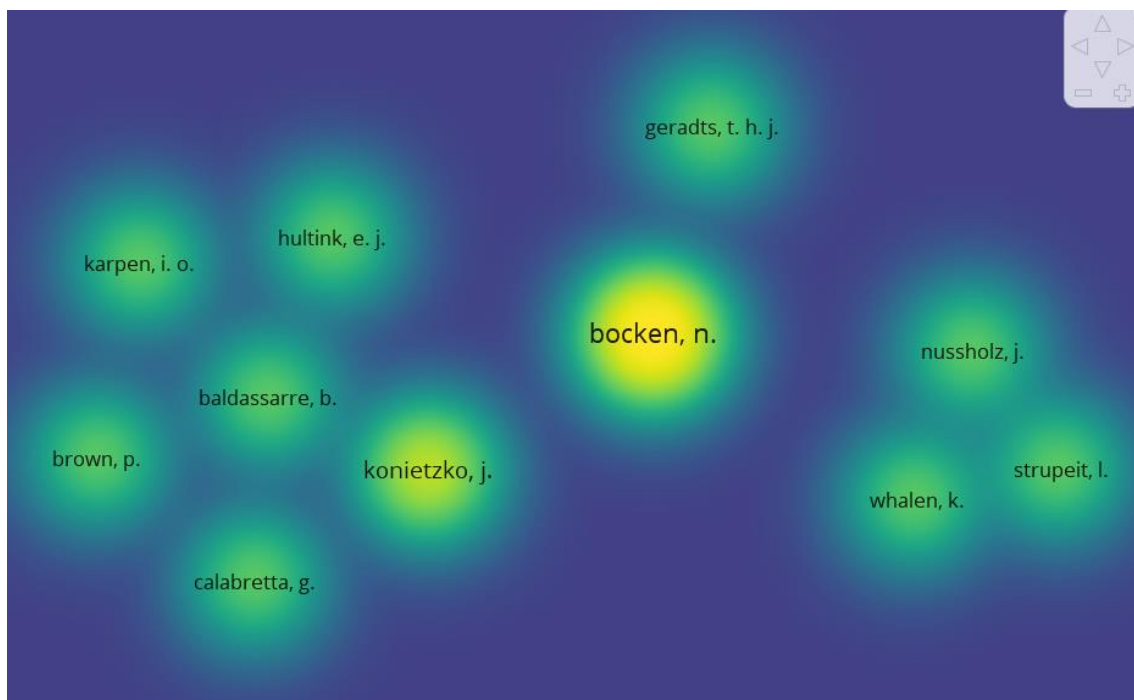
The high degree of connectivity between papers also gives a glimpse into the multi-disciplinary nature of the field of innovation studies. For example, the eco-innovation label not only references environmental themes but also the policy mix and implementation of environmental innovation. The highly connected label of entrepreneurial orientation bridges the strategic entrepreneurial perspective with the management of business processes, dealing with innovation at the firm level. Thirdly, terms such as 'literature review/study' serve as structural reference points for the methodological aspects in the corpus. This shows that research into innovation has reached a level where it is summarized in systematic reviews and studied empirically. Zooming in on the figure, we also observe clustering. Three groups of themes can be identified: one related to sustainability (eco-innovation, green innovation); the other two, to organizational/managerial processes and governance/policy, respectively (business process management, entrepreneurial orientation, policy mix, implementation). This reflects an important aspect of current literature on innovation: it is a multidimensional phenomenon influenced by ecological, managerial, and institutional factors. The conversation about innovation has become multi-dimensional. Figure 3 also shows that conversations about innovation have reached a critical mass, connecting with those around sustainability, organizational design, and policy. The pattern of conversation has become more complex and multi-dimensional.

Figure 4 shows the most visible scholar in the network, Bocken, N. Other scholars can be distinguished into several clusters. The first cluster consists of Karpen, J. O.; Baldassarre, G.; Calabretta, G.; Brown, S.; Hultink, E. J.; and Konietzko, S. This group is highly connected with each other, reflecting a long tradition of co-authoring on topics related to sustainable business models, sustainable design, and sustainable innovation. The second cluster consists of Nussholz, C., Strupeit, A., and Whalen, R. This group is closely connected to Bocken and has published articles on the circular economy, eco-innovation, and sustainability, with a specific focus on organizational practices. There are also a few more connections between Geradts and Bocken.

Studies of collaboration networks can reveal the diffusion of ideas within a field, as well as clusters of related papers and bridges between disciplines. The figure illustrates how Bocken bridges sustainability, design, and organizational innovation. The figure also shows the intellectual structure of the field of innovation research, comprising ‘tribes’ of theoretical contributions and ‘communities’ of collaborating researchers. It also points to a few ‘hubs’ that help to connect parts and pieces of the emerging knowledge base on innovation. This indicates a highly collaborative, networked knowledge-generation process among a small group of scholars.

Figure 4

Density visualization map - Co-authorship Network Analysis



Source: VOSviewer (version 1.6.20). Adapted from van Eck and Waltman (2010)

3.2 Thematic analysis

3.2.1 *Theme one: organizational ambidexterity*

Exploring new opportunities and exploiting existing ones is what organizations do every day. Most seem to manage to do both simultaneously. Exploration and exploitation are often treated as separate processes in the business innovation literature, but many studies assume that organizations are also ambidextrous, simultaneously maintaining a successful operating model whilst seeking new innovation opportunities. Starting from the seminal work of Tushman & O'Reilly (1996) on generating and managing major change, through Gibson & Birkinshaw (2004) on the role of center in managing and generating innovation, to the more recent study by Raisch & Birkinshaw (2008) on transitions, recent research has shown organizational ambidexterity to be crucial for adaptability. New managerial practices are needed to achieve organizational ambidexterity and succeed in this challenge.

3.2.2 *Theme two: product innovation*

Product innovation is the most traditional and well-researched dimension of innovation. It deals with the creation of new products and technologies and is perceived as one of the ways for firms to gain competitive advantages. Schumpeter's work (1934) is the starting point for research on product innovation. Since then, much research has examined the patterns of technological trajectories that follow the product innovation process (Utterback & Abernathy, 1975; Henderson & Clark, 1990). Much of this research has dealt with what Christensen (1997) refers to as 'disruptive innovation'. Research on innovation has increasingly shown that product innovation is important for competitiveness. Product innovation is the most visible form of innovation and has been linked to market performance. Moreover, there is growing evidence that new product and process developments are important drivers of economic growth. To be successful in existing or even new markets, companies have to be responsive to consumers' and users' needs and at the same time able to face technological innovations by other firms.

3.2.3 Theme three: service innovation

Innovating services is discussed in the context of the shift towards intangible goods and experience-based services. Gallouj & Weinstein (1997), den Hertog (2000), Miles (2008), and Djellal & Gallouj (2010) address service innovation and/or new forms of service delivery, including co-creation. The New Theme 4 focuses on innovation beyond the product's boundaries, addressing design, delivery, and the experience of services. Service innovation creates new value by appropriate customer interaction or by leveraging intangible assets.

3.2.4 Theme four: process innovation

Process innovation aims to improve current processes within a company and/or increase efficiency, both internally and across organizational boundaries, by refining existing routines and production processes. Process innovation has been extensively discussed by Davenport (1993) and Hammer & Champy (1993) in the context of business process reengineering. The topic is also related to organizational learning (Reichstein & Salter, 2006) and long-term performance (Bessant & Tidd, 2007). Innovating business processes can increase efficiency and eco-efficiency. Process innovation can be the same as digital transformation or go hand in hand with green innovation. Process innovation is crucial for companies seeking to boost competitiveness, maximize the use of available resources, and address environmental challenges.

3.2.5 Theme five: business model innovation

The innovation of business models and the reconfiguration of existing value chains is a topic as old as the business models that currently exist, because business model innovation is a strategic area of research as old as businesses themselves. Business model innovation has been around for decades, and it is therefore nothing new. Yet, Bocken et al. (2014) and Foss & Saebi (2017) found that the topic of sustainable business models is a growing field of research.

This theme of innovation looks at it from a broader perspective, including product/service and process innovation. Attention is also paid to the underlying logic for value creation. The theme also considers how business models need to evolve to create sustainable, long-term value.

3.2.6 Theme six: eco-innovation / green innovation

Innovation extends beyond environmental strategies. Integrating environmental responsibility into innovation can be highly valuable. Eco-innovation refers to innovations that reduce environmental impact (Rennings, 2000; Kemp & Pearson, 2007) and has links to the circular economy (Carrillo-Hermosilla et al., 2010; Bocken et al., 2016; Geissdoerfer et al., 2017).

A competition award issue that links aspects of competitiveness and sustainability. The issue will focus on eco-innovation, which is both a technological and strategic challenge. However, eco-innovation must also be integrated into a company's broader innovation process and its understanding of its social responsibility.

3.2.7 Theme seven: policy and institutional dimensions

Innovation is not an isolated process and is influenced by governance and institutions. Edquist (2005), Flanagan et al. (2011), Lundvall (1992), and Nelson (1993), amongst others, have examined the characteristics of innovation systems and the composition or mix of related policies that can either facilitate or obstruct innovation. Theme C addresses the question: how do institutions and the institutional environment of innovation trajectories look? It analyses the extent to which certain policies hinder or foster innovation, and studies mechanisms of innovation at the system level that need to be aligned by firms, governments, and other institutions.

3.2.8 *Entrepreneurial orientation*

Entrepreneurial orientation is perceived as a multi-dimensional concept that regards innovation as a fundamental component of entrepreneurship. The innovation dimension of entrepreneurial orientation is seen as encompassing risk-taking, proactiveness, and/or competitive aggressiveness. Three significant studies relating entrepreneurial orientation to innovation performance include those by Covin & Slevin (1991), Lumpkin & Dess (1996), and Wiklund & Shepherd (2005). Entrepreneurial behavior can foster innovation. In this book, we address how entrepreneurship can generate innovative ventures that go on to build successful firms. We investigate the role of entrepreneurial behavior within organizations and its contribution to their innovation capacity.

3.2.9 *Digital transformation*

Digital transformation refers to the impact of digital technologies on innovation. Yoo et al. (2012), Nambisan et al. (2017), and Bharadwaj et al. (2013) discuss this theme, which links with product, service, and process innovation, as well as business model innovation. It also explores how digital transformation fosters organizational ambidexterity and supports sustainability outcomes. Evidence shows the themes that emerge from the vast innovation literature. The thematic analysis employed in this study identified nine key themes that organize the innovation discourse.

These themes – ambidexterity, product innovation, service innovation, process innovation, business model innovation, eco-innovation, policy and institutional dimensions, entrepreneurial orientation, and digital transformation – collectively reveal the multi-dimensionality of innovation and highlight the relevance of organizational capabilities, sustainability, technology, and public policy, summarized in the following Table 1:

Table 1*Themes in Innovation Research: Focus, Representative References, and Key Insights*

Theme	Focus	Representative References	Key Insights
Organizational Ambidexterity	Balancing exploration and exploitation; managing paradoxes of novelty vs. efficiency	Tushman & O'Reilly (1996); Gibson & Birkinshaw (2004); Raisch & Birkinshaw (2008); Saleh, Durugbo & Almahamid (2023); Sartori & Carrido (2023)	Ambidexterity enables firms to pursue new opportunities while refining existing capabilities; it is a mechanism for adaptability and resilience in turbulent environments.
Product Innovation	Development of new goods and technologies; market differentiation	Schumpeter (1934); Utterback & Abernathy (1975); Hendersen & Clark (1990); Christensen (1997)	Product innovation remains central to competitiveness, allowing firms to differentiate and respond to technological disruption and consumer demand.
Service Innovation	New delivery models, customer experience, intangible value creation	Gallouj & Weinstein (1997); den Hertog (2000); Miles (2008); Djellal & Gallouj (2010)	Service innovation extends innovation beyond tangible products, reshaping industries through customer interaction, co-creation, and new service delivery mechanisms.
Process Innovation	Improvements in routines, production methods, eco-efficiency, digital transformation	Davenport (1993); Hammer & Champy (1993); Reichstein & Salter (2006); Bessant & Tidd (2007)	Process innovation enhances efficiency and sustainability, often linked to eco-innovation and digital technologies, driving operational excellence.
Business Model Innovation	Reconfiguring value creation and capture; sustainable models	Chesbrough (2007); Amit & Zott (2001); Bocken et al. (2014); Foss & Saebi (2017)	Business model innovation integrates product, service, and process changes, emphasizing sustainability and long-term viability.
Eco-innovation / Green Innovation	Environmental responsibility, circular economy, sustainability strategies	Rennings (2000); Kemp & Pearson (2007); Bocken et al. (2016); Carrillo-Hermosilla et al. (2010); Geissdoerfer et al. (2017)	Innovation increasingly tied to ecological imperatives, aligning competitiveness with responsibility, resource efficiency, and circular economy principles.
Policy and Institutional Dimensions	Governance, regulation, policy mixes shaping innovation	Edquist (2005); Flanagan, Uyerra & Laranja (2011); Lundvall (1992); Nelson (1993)	Innovation trajectories are influenced by institutional frameworks and policy instruments that support or constrain change, highlighting systemic perspectives.
Entrepreneurial Orientation	Linking innovation to entrepreneurship, risk-taking, proactiveness	Covin & Slevin (1991); Lumpkin & Dess (1996); Wiklund & Shepherd (2005)	Entrepreneurial orientation drives innovation by fostering risk-taking, proactivity, and competitive aggressiveness, linking entrepreneurship with innovation outcomes.
Digital Transformation	Impact of AI, data, and digital technologies on innovation pathways	Yoo, Henfridsson & Lyytinen (2012); Nambisan, Lyytinen, Majchrzak & Song (2017); Bharadwaj et al. (2013); Sebastian et al. (2017)	Digital technologies reshape business models and processes, accelerating innovation and disruption across industries, often intersecting with ambidexterity and sustainability.

Source: elaborated by the authors

3.3 Evolution by decades

From 1930s to 1970s centered on basic issues of innovation; the 1970s and 1980s increasingly dealt with technological trajectories and product innovation over time. A classic paper from the latter period is that of Utterback & Abernathy (1975) on technological discontinuities and their displacement by new product life cycles and innovation modes. The majority of the papers in this Special Issue are concerned with

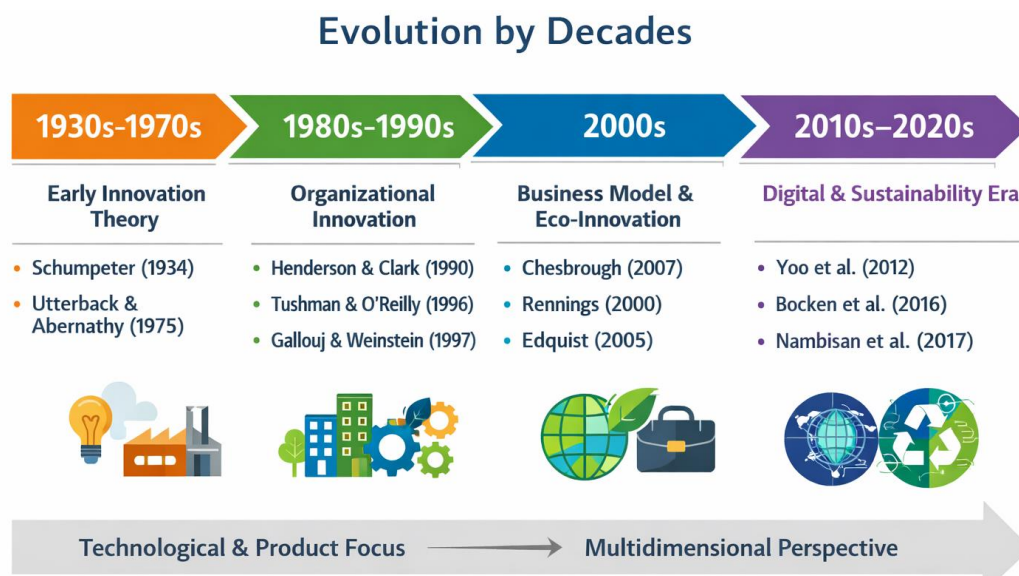
industrial innovation and attempts to explain and interpret experiences of ‘poor performance and deteriorating competitiveness’.

In the 1980s and 1990s, works on organizational innovation emerged. Henderson & Clark (1990) drew on Carl Sauer's work on the development of agriculture to study architectural innovation, while Tushman & O'Reilly (1996) developed the concept of ambidexterity to address the challenge of simultaneously exploring and exploiting. Of particular note was the emergence of the theme of service innovation, as contributions from Gallouj & Weinstein (1997) and den Hertog (2000) tackled the creation of intangible value. In contrast, process innovation was increasingly identified with business process reengineering, a theme articulated by managers such as Davenport (1993) and Hammer & Champy (1993), focused on enhancing efficiency and organizational design.

In the 2000s, business model innovation became more relevant. By then, the new logics of value creation had been discussed for a decade, by people like Chesbrough (2007) and Amit & Zott (2001). In the same decade, eco-innovation received more attention due to sustainability challenges, as noted by Rennings (2000) and Carrillo-Hermosilla et al. (2010). Perspectives on policy and institutions to foster innovation were also pushed forward by Edquist (2005) and Flanagan et al. (2011).

The business environment is changing dramatically. Many studies have investigated the influence of digital transformation on various industries and how they can be innovative in this context (Yoo et al. 2012; Nambisan et al. 2017; Bharadwaj et al. 2013). In entrepreneurship, the orientation of entrepreneurs (entrepreneurial orientation) and its relationship to innovation performance have been studied for a long time (Covin & Slevin, 1991; Wiklund & Shepherd, 2005). More recently, sustainability (Bocken et al. 2016) and the circular economy (Geissdoerfer et al. 2017) became integral to innovation strategies.

In sum, over the decades, there has been a continuous shift from a technological/production orientation, via a combination of product- and company-oriented views of innovation, to a diverse set of themes, including sustainability, entrepreneurship, and digital transformation. Figure 5 illustrates the Evolution over the decades.

Figure 5*Evolution of Innovation Research by Decade*

Source: elaborated by the authors

4 DISCUSSION AND IMPLICATIONS

This report provides a thematic overview of the extensive literature on innovation, identifying themes at different levels (organizational, technological, and ecological) and over time. These themes span ambidexterity, product, service, and process innovation; business model innovation; eco-innovation; policy innovation; innovation from an entrepreneurial perspective; and digital transformation. For each theme, implications for theory and practice are outlined.

Organizational ambidexterity (pursued by Tushman & O'Reilly (1996), Gibson & Birkinshaw (2004), or Raisch & Birkinshaw (2008)) is an important strategic objective for many companies seeking to balance exploration and exploitation to enhance resilience and adaptability in a changing competitive environment. As evidenced by recent studies in diverse industries (Saleh et al. 2023; Sartori & Garrido 2023), more companies are pursuing an ambidextrous stance. As such, this is an important and timely area of inquiry for managers seeking best practices, as well as for business school researchers seeking to expand our understanding of firm dynamics and competitiveness. While the imperative to develop product innovation has long been a competitive driver of firm competitiveness (Schumpeter 1934), it has evolved dramatically since its inception.

To benefit from product innovation, different types and approaches have emerged and can be found in businesses at various stages, depending on market and organizational circumstances (Utterback & Abernathy, 1975; Christensen, 1997). Against this backdrop, managers face the challenge of formulating the right mix of in-house and outsourced solutions to achieve sustained competitive advantage. Many organizations, therefore, rely not only on the expertise of their employees, but increasingly on collaboration with technology and start-ups in order to complement the competencies available within their own firm (Mehmanpazir 2017), generate cross-value Propositions, and respond to ever more rapid changes in the business environment, fuelled by an exponentially increasing array of new entrants seeking to disrupt established incumbent positions

Innovation in services. Service innovation, according to Gallouj & Weinstein (1997) and den Hertog (2000), involves creating intangible value and adopting customer-oriented approaches. It includes co-production and new ways of delivering service, see Miles (2008) and Djellal & Gallouj (2010). Process innovation (Davenport, 1993; Hammer & Champy, 1993). Process innovation can make a company more efficient and sustainable in the long run and is linked to digital transformation and eco-innovation. Business model innovation (BMI), how firms create and capture value, can be rethought. Recent contributions to the business model concept have especially focused on model dimensions such as product, service, or process innovation. However, from a sustainable innovation perspective, such model changes are also seen as crucial for transitioning to a more sustainable society, driving sustainable innovation by adopting sustainable business models. Integrating environmental knowledge into the innovation process is a critical element. This special issue aims to advance the understanding of linkages between business model innovation and sustainable innovation. How do policy and institutional factors affect innovation? Edquist (2005), Flanagan et al. (2011), Lundvall (1992), etc., are all key authors in this field. These factors can influence governance and the rule of law, as well as the diffusion of certain technologies. This paper also explores the link between Entrepreneurial orientation, as studied by Covin & Slevin (1991), Lumpkin & Dess (1996), and Wiklund & Shepherd (2005), and innovative start-ups, and examines why some entrepreneurs are more successful than others at exploiting opportunities for innovative start-ups. Lastly, digital transformation, highlighted by Yoo et al. (2012), Nambisan et al. (2017), and Bharadwaj et al. (2013), affects how organizations develop

models and processes that incorporate the use of AI, data, and digital platforms to drive innovation and disruption, and how these elements are connected to ambidexterity and sustainability goals.

5 SIGNIFICANCE OF THE STUDY

Innovation as a business phenomenon attracts many stakeholders: entrepreneurs, managers, politicians, and the public. The various approaches to studying innovation need to be systematized to improve understanding. This article reviews current research on the dimensions of innovation. The works of many scientists and experts are grouped into nine major themes: ambidexterity, product innovation, service innovation, process innovation, business model innovation, eco-innovation, policy and institutional dimensions, entrepreneurial orientation, and digital transformation. In conclusion, the article shows innovation is multidimensional, not linear. It has evolved from Schumpeter's (1934) product innovation to also cover sustainability (Bocken et al., 2016; Geissdoerfer et al., 2017) and digital transformation (Yoo et al., 2012; Nambisan et al., 2017).

6 CONTRIBUTIONS

The study makes contributions along three dimensions. Theoretically, the paper provides a structured mapping of key contributions to innovation research over time, and it thereby illustrates how innovation research has moved from an emphasis on the development of new products, via shifting perspectives to include ambidexterity, business models, and the fostering of eco-innovation, to the importance of digital innovation for firms' survival. Managerially, the paper develops insights into how to manage sustained innovation and competitiveness in today's changing global business context through ambidexterity, eco-innovation, and digital transformation. Finally, the paper explores the significance of institutions in facilitating innovation, change, and systemic transformation from a policy perspective. Incorporating these additional viewpoints offers new insights and perspectives to academic theory as well as practical application for managers, entrepreneurs, and decision-makers. Innovation is, by nature, a more complex and

integrated process than has traditionally been viewed in management practice and scholarly research.

7 CONCLUSION

Innovation is a multi-dimensional phenomenon, influenced by organization, technology, ecology, and institutions. This paper synthesizes nine key themes representing major perspectives on innovation: ambidexterity, product innovation, service innovation, process innovation, business model innovation, eco-innovation, policy and institutional dimensions, entrepreneurial orientation, and digital transformation, and explores their multiple dynamics that shape innovation and competitiveness. Abstract: A path of progress of innovation research is sketched out. Starting from the early focus on product innovation (Schumpeter 1934; Utterback & Abernathy 1975), it shifts over time to an increasingly systemic view of innovation, incorporating the role of organizational capabilities (Tushman & O'Reilly 1996; Raisch & Birkinshaw 2008), sustainability (Rennings 2000; Bocken et al. 2016), and digital innovation (Yoo et al. 2012; Nambisan et al. 2017). Anticipating the articles in this special issue, this short reflection also highlights the need to balance exploration and exploitation, to embed eco-responsibility into the business model, and to address digital challenges. The study has practical relevance for managers. It underlines the importance of ambidexterity, business model innovation, and eco-innovation. Also, policymakers and institutions are important in the development of innovation systems. Entrepreneurial activity and digital technology are drivers of change. The results of this study contribute both theoretically and practically to the understanding of innovation and provide valuable insights for managers, entrepreneurs, and policymakers. Innovation is shown to be an ongoing, integrated process vital to addressing today's problems and sustaining long-term competitiveness in a rapidly changing world.

7.1 Future research

Further research is needed to investigate additional dimensions of innovation and their relationships with firm capabilities, sustainability, and digital transformation.

Although ambidexterity is a well-studied phenomenon (Tushman & O'Reilly, 1996; Raisch & Birkinshaw, 2008), there remains a need for more concrete "how-tos" on implementing ambidexterity in digital settings, including practical examples of balancing efficiency through data analytics with exploratory innovation. Longitudinal and cross-sectional industry studies, with respective benchmark companies, may complement such research. There is also potential in combining eco-innovation and business model innovation. While scholars such as Rennings (2000, 2009, 2013) and Bocken et al. (2016) have addressed sustainability, there is little research on combining circular economy principles with new digital platforms and start-ups. Comparative studies (Edquist, 2005; Flanagan et al., 2011) on the impact of different policy mixes across regions and institutional contexts are likewise needed.

Future studies on entrepreneurship, small business, and startup growth from an innovative entrepreneurship perspective might examine how SMEs use digital technologies to rapidly scale eco-innovation. Another promising area of research is the intersection of entrepreneurial orientation and digital transformation. While there is substantial research on the impact of entrepreneurial orientation and innovation (Covin & Slevin, 1991; Wiklund & Shepherd, 2005), the growing presence of AI, big data, and digital innovation ecosystems (Yoo et al., 2012; Nambisan et al., 2017) requires the development of new theories and models that combine an entrepreneurial posture with digital transformation. Future research could benefit from a more integrated perspective, drawing on organizational theory, sustainability, entrepreneurship, and digital transformation in order to better understand innovation. Taking such a perspective is likely to enhance our understanding of innovation. Importantly, it will also equip managers and policymakers with a more holistic and nuanced perspective to address the more complex forms of innovation currently emerging.

COMPETING INTERESTS

We declare that we have no competing interests.

FUNDING

This research has received no funding.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE MANUSCRIPT PREPARATION PROCESS

During the preparation of this work the authors used Grammarly, in order to in order to improve grammar accuracy, ensure clarity of expression, and refine sentence flow and enhance readability. Microsoft Copilot was used to support idea organization, provide suggestions for strengthening academic style, and to compose the cover letter. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA)

Dias, M. de O., & Lopes, R. de O. A. (2026). INNOVATION AT THE CORE OF COMPETITIVE ADVANTAGE: A THEMATIC EXPLORATION OF EMERGING ORGANIZATIONAL PATHWAYS. *Veredas Do Direito*, 23(6), e235771. <https://doi.org/10.18623/rvd.v23.5771>