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Pathways to open innovation and performance: The role of entrepreneurial orientation and organizational culture

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1. Introduction

Social research has observed similarities in the systemic nature and behavior of the actors of social systems and the species of natural ecosystems, suggesting that companies in a business ecosystem may act as organisms in natural ecosystems, in the way they interact with other components, resulting in the joint development of capabilities (Pilelienė & Jucevičius, 2023). Innovation ecosystems are dynamic, collaborative networks integrating firms, knowledge, and resources to foster innovation and value creation (Pellikka & Ali-Vehmas, 2016; Sotirofski, 2024). Notable examples include the Helix frameworks – Triple, Quadruple, or Quintuple – which describe the interactions among academia, industry, government, society, and the natural environment, with universities as orchestrators (Carayannis & Campbell, 2010; Gastaldi & Corso, 2016), to promote economic and social development. In essence, while innovation ecosystems are the structures that support collaboration, capabilities building, technological developments, and knowledge sharing (Sotirofski, 2024) and often include competitors (Granstrand & Holgersson, 2020), Open Innovation (OI) is the strategic driver that generates innovation outputs (Asad et al., 2023; Benz & Seebacher, 2018).

Open innovation enables companies to strategically and purposefully leverage both internal and external knowledge flows, thereby strengthening innovation processes and identifying new market opportunities (Costa & Matias, 2020). Effective management of knowledge exchange among ecosystem partners plays an important role in the success of open innovation. The OI model was first proposed in 2003, assessing knowledge flows and innovation strategies to boost collaboration among firms and other actors inside and around the value chain. According to Chesbrough (2003), firms can use internal and external ideas and paths to the market while looking to advance their technologies, because, in this paradigm, internal innovation is not the only way to generate value.

Chesbrough and Bogers (2014) define OI as a process of distributed innovation based on managing knowledge flows across organizational boundaries. Yildirim et al. (2022) describe three open innovation types: inbound, outbound, and coupled approaches. The inbound OI process includes all the activities surrounding obtaining innovation, such as innovation projects, ideas, technologies, and knowledge from outside to inside an organization. It is the most widely used of all OI models. Conversely, outbound OI refers to the flow of innovation-related elements, such as projects, technologies, licenses, intellectual property rights, and knowledge, moving from within the organization to external entities. Common practices within this approach include outsourcing, out-licensing, and disseminating technologies to third parties (H. Chesbrough & Crowther, 2006). The coupled OI process integrates both inbound and outbound approaches, creating a bidirectional flow of innovation. This model combines outside-in and inside-out processes, enabling complementary resources exchange, intellectual property rights, and knowledge assets among collaborators (Enkel et al., 2009).

Indeed, there is a close and complex relationship between the OI strategy and a firm's culture, and its success requires a careful analysis of cultural dynamics and organizational structure. While there is a consensus in the literature that open-cultured organizations nurture the positive effects of outbound OI, firm growth (Li et al., 2022), and stakeholder engagement (Osobajo et al., 2023), OI approaches can also expose businesses to risks, such as disclosing sensitive and strategic information (Camilleri et al., 2023). Also, the organizational culture (OC) type plays a relevant role in the culture-OI relationship. While market-oriented and adhocracy cultures positively influence inbound and outbound OI, hierarchical cultures negatively impact both. Clan culture tends to hinder outbound innovation (Parveen et al., 2023).

Along with OI, entrepreneurial orientation (EO) enhances firm performance and innovation outputs (Asad et al., 2023; Kraus, Vonmetz, et al., 2023). EO can be defined as a

strategic managerial posture that reflects a set of beliefs and values that influences actions towards proactive, innovative, risk-taking activities, autonomy, and competitive aggressiveness (Lumpkin & Dess, 2001; Miller & Friesen, 1983; Wiklund & Shepherd, 2003). Recent research points to a strong link between EO and product innovation performance (Ta'Amnha et al., 2023), with a stronger effect on SMEs, startups, and firms in emergent economies, especially at initial and growth stages (Daradkeh & Mansoor, 2023).

This study attends to the call for identifying the effects of OI on performance, a topic still considered ambivalent and understudied (Ahn et al., 2013; Rumanti et al., 2021). Also, the relationship between OI and EO has been explored in literature, but important gaps still remain, with most studies focusing on the effectiveness of inbound open innovation, while the impact of outbound OI and the combined effects of both approaches with limited attention (Wadood et al., 2022). This limitation highlights an opportunity to investigate how open innovation strategies connect with the EO and the organizational performance link.

Furthermore, the literature indicates that an effective integration of EO and OC can foster the development of an entrepreneurial culture that is attuned to market demands while also promoting innovation and performance (Gupta et al., 2014). Finally, the COVID-19 pandemic accelerated the adoption of digital technologies and reshaped work dynamics, emphasizing the importance of an OC that fosters adaptability and continuous innovation (Homburg et al., 2017; Saad et al., 2022). This perspective offers practical insights for companies aiming to strengthen their performance in the post-pandemic landscape.

Following these arguments, this study aims to analyze the academic landscape published on the relationship between OI, EO, and OC, as well as identify trends and opportunities for future research in this field, seeking to understand how these factors interact to enhance innovation and firm performance. The key questions guiding this research are:

1. What is the published academic landscape on the relationship between OI, EO, and OC concerning innovation and firm performance?
2. What are the main trends and opportunities for future research on the relationship between OI, EO, and OC, about innovation and performance?

Given the growing yet fragmented body of literature on the intersections among open innovation, entrepreneurial orientation, and organizational culture (Rumanti et al., 2021), a systematic review of literature would be useful to map the academic landscape, synthesize key findings, and identify gaps and future directions (Kraus, Mahto, et al., 2023; Tranfield et al., 2003). By integrating bibliometric and qualitative analyses, the SRL method supports the development of a more structured research agenda in this field.

Hence, this study offers a comprehensive bibliometric and systematic review of the literature on OI, EO, and OC, analyzing 330 articles published between 2010 and 2025 in relevant international databases. It presents an analysis of OI, highlighting how cultural, strategic, and knowledge-based capabilities interact to shape innovative performance, identifying research gaps, especially on the relationships between organizational resources (human and intellectual capital), strategic and entrepreneurial orientations, innovation strategies (such as OI and product/service innovation), dynamic capabilities, and organizational performance. These contributions advance theoretical and practical understanding of how the combination of OI, EO, and OC impacts innovative and organizational performance, guiding future research agendas and management practices.

2. Literature review

2.2. Open innovation and entrepreneurial orientation

OI represents a paradigm shift and complement from closed to open models of innovation, emphasizing the importance of external knowledge and collaboration (H. Chesbrough, 2006). This approach involves three core processes: outside-in - integrating

external knowledge -, inside-out - exploiting internal ideas externally -, and coupled in the form of collaborative alliances, and has gained significance due to shorter innovation cycles, to defend firms from rising R&D costs and resource constraints (Gassmann & Enkel, 2004).

Some challenges emerge for firms from this approach: leveraging internal innovation, incorporating external ideas, and motivating outsiders to contribute. To address these challenges, companies employ strategies, such as pooled R&D, spinouts, and selling complements in open-source software development (West & Gallagher, 2006). The concept has evolved to encompass a distributed innovation process based on managed knowledge flows across organizational boundaries, utilizing pecuniary and non-pecuniary mechanisms aligned with a company's business model (H. Chesbrough & Bogers, 2014).

OI offers significant opportunities to enhance the innovation of firms but also entails various risks. Research identified five main risk categories: data-related, people-related, firm-level, outcome, and other risks (Madanaguli et al., 2023). Intra-organizational risks, such as misaligned managerial motives and stakeholder asymmetries, can be mitigated through corporate governance practices and stakeholder-centric approaches (Shaikh & Randhawa, 2022). While OI can enhance competitive advantage and support corporate sustainability objectives, it may expose businesses to risks like revealing sensitive information to outsiders (Camilleri et al., 2023). However, these risks may be treated as trade-offs to maximize OI benefits while minimizing potential drawbacks for businesses and stakeholders.

Concerning the relationship between OI and EO, OI inclination reflects the firm's tendency to leverage external ideas and commercialize intellectual property, and has been shown to positively impact perceived firm performance, particularly in Taiwanese electronic companies (Hung & Chiang, 2010). According to these authors, in this context, EO plays a moderating role, strengthening the positive effects of OI proclivity on firm performance. Additionally, social media has emerged as a valuable tool for facilitating OI, with its adoption influenced by managerial attitudes and EO (Linde, 2017). EO has been widely associated with enhanced innovation performance and a greater inclination toward innovation in firms (Schueffel, 2014). Studies suggest that higher levels of EO positively influence a company's openness and willingness to engage in OI (Linde, 2017; Schueffel, 2014).

2.3. Organizational culture, innovation, and performance

OC has been extensively studied as a significant antecedent influencing organizational behavior, innovation, and firm performance, with different culture types affecting the level and kind of behaviors exhibited (Fernandes et al., 2023; Ronnie et al., 2017; Schein, 1984, 1993; Tung & Verbeke, 2010). The pioneer work of Schein (1984) conceptualized organizational culture as a set of shared assumptions guiding perception and action within an organization. Two decades later, Cameron and Quinn (2011) developed the competing values framework to diagnose and model organizational culture. Fondas (1991) and Hofstede (2011) also made significant contributions to the study of organizational culture by examining how cultural values influence organizational behavior.

From the perspective of creativity, Martins and Terblanche (2003) analyzed the importance of innovation in the corporate culture, suggesting that in knowledge-based organizations, success and survival depend on creativity and innovation. They identified various cultural factors that foster innovation, designing a model that considers the interaction between organizational factors such as strategy, structure, support mechanisms, behaviors that stimulate innovation, and communication. Here, flexible strategies and structure promote innovation by developing a future-oriented vision. Support mechanisms, such as recognition and resource availability, are decisive. Participative behaviors and an open, democratic communication culture drive creativity and innovation in organizations.

To validate the scale in emerging economies, Carmona et al. (2020) adapted Martins and Terblanche's (2003) model, applying it to the Brazilian textile sector. The results identified three key cultural dimensions for innovation: strategy, innovation stimuli, and communication. These dimensions align with EO factors, highlighting the importance of a clear strategy, innovation encouragement, and effective communication within the organization.

In the relationship between culture and open innovation, Yun et al. (2020) posit that OC plays a dynamic and mediating role in enabling open innovation, shaped by the interaction of entrepreneurship, intrapreneurship, and organizational entrepreneurship. Rather than viewing culture as static, the authors conceptualize it as an evolving construct that supports firms in managing innovation complexity and fostering adaptive capabilities. This dynamic culture enhances knowledge integration, collaboration, and strategic renewal, positioning it as a key enabler of OI and improved organizational performance.

Moreover, research emphasizes the importance of a flexible and adaptive OC to foster innovation and EO. For example, Zahra et al. (2004) suggest that family businesses may have unique organizational cultures influencing their EO and performance. Dess and Lumpkin (2005) underline the need for a culture that supports risk-taking and innovation to achieve high performance. Additionally, the literature on how OC can adapt to respond to rapid changes in the business environment highlights that an OC promoting flexibility and adaptability is essential for firms to thrive in a volatile, uncertain, complex, ambiguous, and hyperconnected environment (Peretz et al., 2018).

Recent studies also highlight the need for alignment between OC and EO to achieve superior performance (Kuckertz et al., 2024). According to Ling et al. (2020), firms developing an OC that supports entrepreneurial behaviors and risk-taking attitudes by top management tend to show higher innovation performance. This stresses the importance of organizations not only adopting values and practices that foster innovation but also ensuring that these values align with a strategic orientation toward entrepreneurship.

Specific culture settings also require strategic alignment with EO, also in the open innovation context, for producing better performance. Different configurations of OI and EO lead to varying performance levels in SMEs (Gaied & Zouaoui, 2021). In creative industries, innovation capacity mediates the EO-performance relationship, underscoring the dual necessity of opportunity recognition and creative capability development (Parkman et al., 2012). In the technological scenario, effective implementation of OI depends not only on external collaborations but also on internal factors such as IT strategies, where flexibility and breadth enhance both radical and incremental innovation (Cui et al., 2015).

3. Method

The choice to conduct a systematic literature review (SLR) to explore the relationship between OI, EO, and OC and their impact on performance stems from the need for a transparent approach to identify, assess, and synthesize relevant studies. To overcome the limitations of traditional reviews, the study employed bibliometric analysis and content analysis. Following SRL principles helps minimize bias, reduce random errors, and enhance the credibility and reliability of the findings, leading to more robust conclusions (Bigliardi et al., 2020).

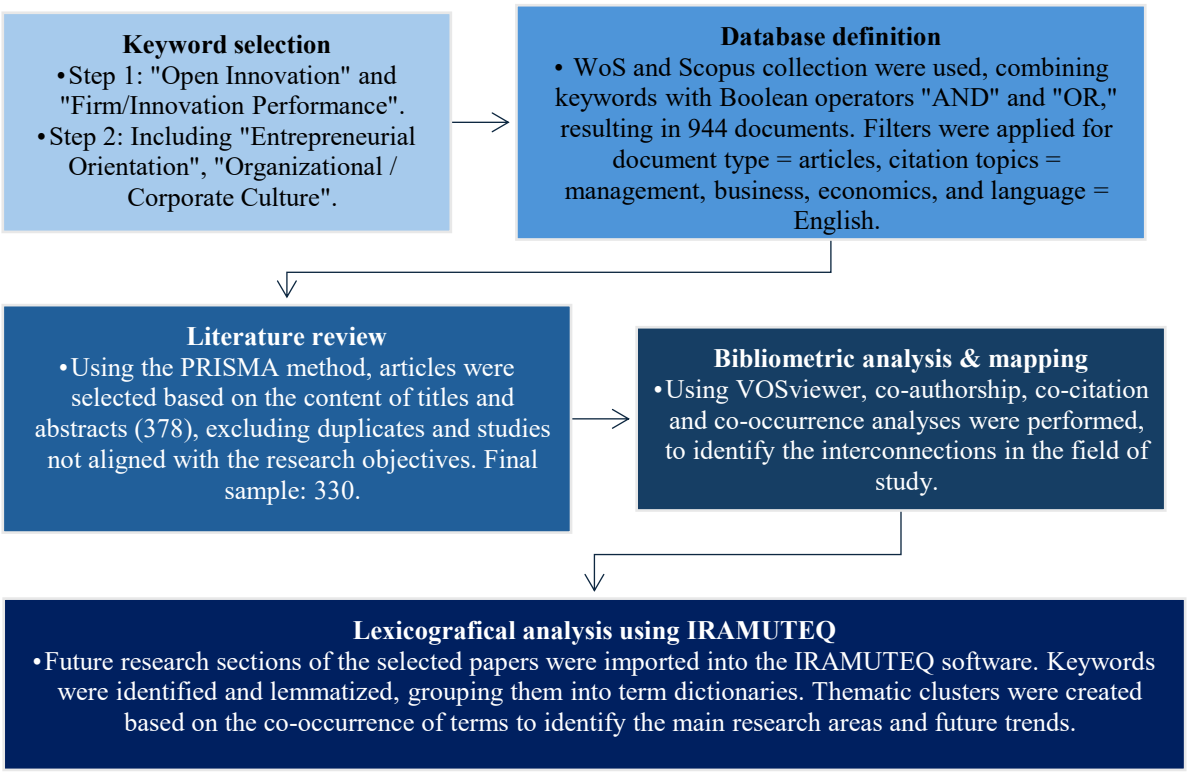
Bibliometric review was performed through mapping, using the VOSviewer® software complemented by a SRL using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method. The SLR was held through lexicographic analysis with the use of IRAMUTEQ software, for identifying patterns, trends, and emerging areas in the literature on OI, EO, and OC about innovation and firm performance (Casprini et al., 2020; Quintino Sant'Ana et al., 2024).

Following, a description of the tools. The PRISMA technique provides a structured approach to systematic reviews, ensuring the identification, selection, and evaluation of studies.

This methodology is important for gathering relevant research, assessing its content (Moher et al., 2009). VOSviewer, a specialized bibliometric software, enables the construction and visualization of co-citation, co-authorship, and term co-occurrence network graphs, helping to the identification of trends and patterns within large bibliographic datasets, aiding in answering our first research question (Van Eck & Waltman, 2010; Zupic & Čater, 2015). Lastly, IRAMUTEQ facilitates statistical textual analysis, employing lexicographic and similarity analysis. This analysis was important for addressing the second research question (Camargo & Justo, 2013; Marchand & Ratinaud, 2012) and is outlined in Figure 1.

The Web of Science Core and Scopus collections were selected as sources to ensure a representative corpus, thereby ensuring the robustness of the analysis. The PRISMA strategy to search and select the articles included in the review required the definition of specific queries to be inserted into the identified database using two steps. Specifically, the following queries were entered for step 1: (TITLE-ABSKEY ('open innovation') AND TITLE-ABS-KEY ('performance')) AND (LIMIT-TO (DOCTYPE, 'ar') OR LIMIT-TO (DOCTYPE, 'ip') OR LIMIT-TO (DOCTYPE, 're')) AND (LIMIT-TO (LANGUAGE, 'English')) AND (LIMIT-TO (SRCTYPE, 'j')).Which means that we only considered academic journal articles published or in press, in English. We also restricted our search to the areas of Management and Business. Following, all the references were inserted into the reference management tool. This first step ended with 944 articles, after subtracting the duplicates and reviewing possible errors in the data import. Step 2 included 2 more keywords: entrepreneurial orientation and organizational culture. This resulted in 378 articles. After reading titles, abstracts and keywords, 48 papers were excluded, for being out of scope. Details are presented in Figure 1.

Figure 1 – Systematic literature review process steps



Source: Authors own work (2025).

Thus, a final sample of 330 articles that met the research objective, provided the basis for bibliometric analysis and SRL conducted in this study. The lexicographic analysis with

IRAMUTEQ allowed for the identification of thematic clusters, described in the following topics, offering a detailed view of trends and emerging opportunities in research.

4. Results and Discussion

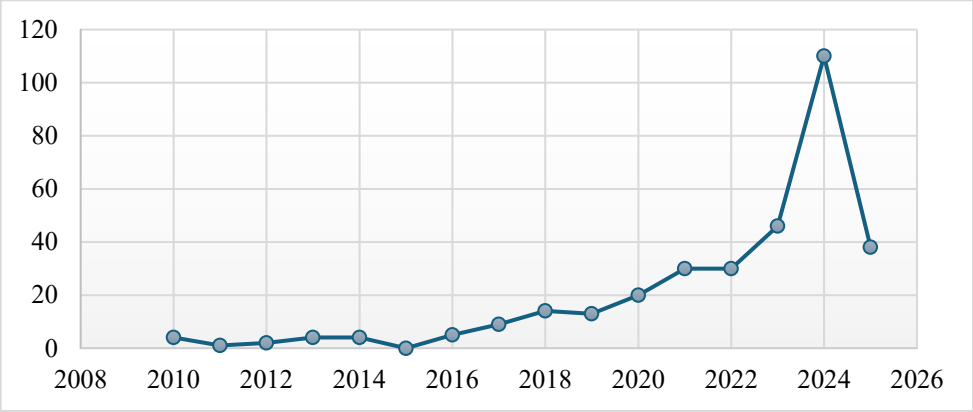
Regarding the first research question, topic 4.1 includes the following analyses: descriptive, including co-authorship, co-citation, and co-occurrence analyses. Topic 4.2 includes the lexicographic analysis for responding to the research question 2.

4.1 Descriptive Analysis

Figure 2 shows the upward evolution of articles related to OI, EO, and OC connected to performance from 2010 to 2025, with 2023 and 2024 as the most productive years.

The most prolific authors in the sample were Zhang, Jianhua (Zhengzhou University, China, 5 papers), Naqshbandi M. (University of Dubai, UAE, 3 papers), Shehzad, Muhammad Usman (3 papers, Zhengzhou University, China), Keftzopoulos Dimitrios (University of Macedonia, Greece) and Adiguzel, Zafer (Sakarya University, Turkey).

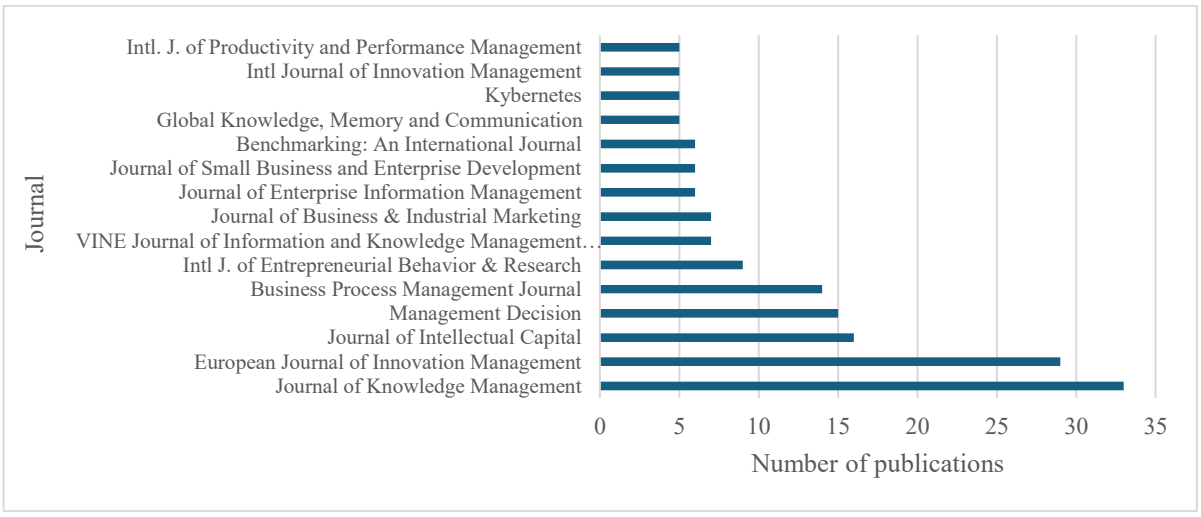
Figure 2 - Number of publications per year



Source: Authors own work. Note: year 2025 partially listed.

Figure 3 presents the top 15 journals matching the query. The distribution of publications across journals shows a relevant concentration of studies in outlets focused on knowledge and innovation management. From the top five journals, the Journal of Knowledge Management accounts for 33 publications, followed by the European Journal of Innovation Management (29), the Journal of Intellectual Capital (16), and Management Decision (15). This pattern suggests a consistent interest in the themes of OI, EO, and OC in these journals.

Figure 3 - Top publication journals



Source: Authors own work. Note: year 2025 partially listed.

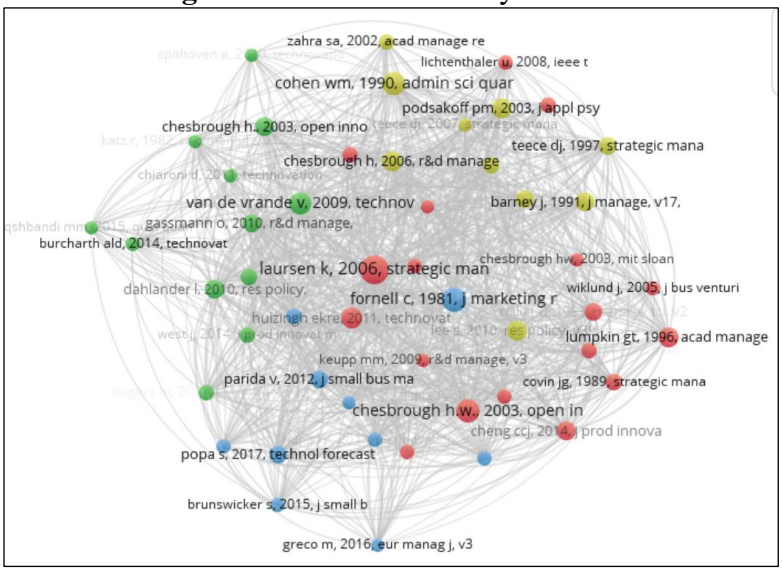
Figure 4 presents the co-authorship networks. VOSviewer identified 28 networks, with 60 authors (out of 1.023 authors) with at least 2 published papers. The largest network with 7 authors (in red color) belonging to Chinese institutions: Le, Phong Ba (Hunan University), Zhang, Jianhua (Beijing Sport University), and the other authors of this network: Shehzad, Muhammad, Hussain, Sajjad Waseel, Abdul, Alam, Sajjad and Zia, Umair belonging to Zhengzhou University, China.

Figure 4 - Co-authors networks

Source: Authors' own work using VOSviewer® (2025).

Next, we performed the co-citation analysis (Figure 5), which is important in bibliometrics for identifying the intellectual structure and interconnections within a field of study. This method analyzes how frequently two documents are cited together, revealing relationships between works and authors. Using the VOSviewer software, clusters of research, emerging thematic areas, and the evolution of theories were discovered, providing a comprehensive view of how these topics interrelate in academic literature, identifying key influences and predominant methodological approaches.

Figure 5 - Co-citation analysis of references



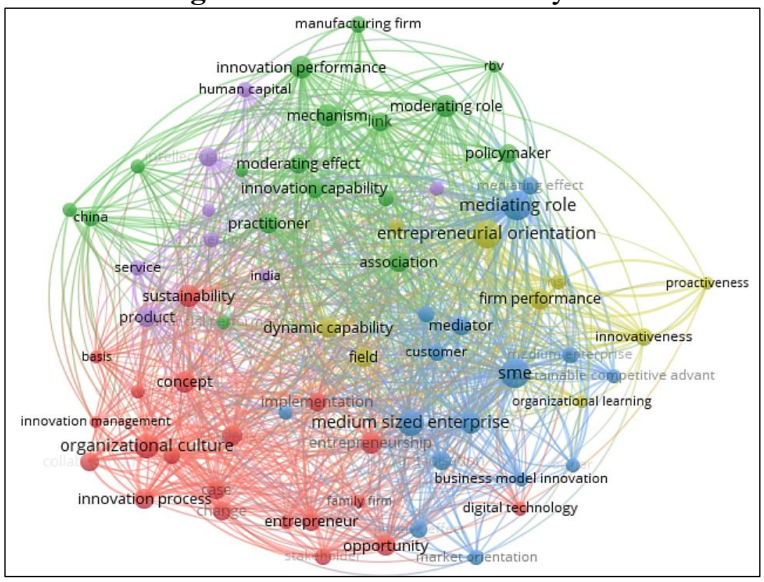
Source: Authors' own work using VOSviewer® (2025).

The parameters used in the VOSviewer tool: minimum number of citations of a cited reference: 10, figure 4 shows the top 50 references with the greatest total link strength, using a basis of 7.003 cited references. The co-citation analysis showed the most influential authors, cluster 1 names: Cheng C., Chesbrough H., Chiang Y.H., Covin J., Enkel E., Huizingh E., Keupp, M., Luarsen, K. Lichtenhaler, U. Lumpkin, G., March, J. Miller D. and Wiklund J.

Figure 5 shows the co-occurrence analysis, performed using VOSViewer. Co-occurrence analysis of keywords is a bibliometric technique used to identify relationships between terms within a corpus of documents. By examining the frequency with which keywords appear together in the same articles, patterns and thematic clusters can be detected, providing a clear view of the most interconnected and emerging research areas.

This procedure started with the purification of the database thesaurus, to clean possible duplicates or random words in the corpus. The parameters used were, minimum number of occurrences of 10, with 217 meeting the threshold (out of 7.738 terms). Based on the relevance score of the 217 terms, we selected the 130 most relevant terms at a 60% level. For the sake of the visual sharpness of the graphic, Figure 4 shows the top 70 terms.

Figure 6 - Co-occurrence analysis



Source: Authors' own work using VOSviewer® (2025).

In the co-occurrence map in Figure 6, we found 5 clusters linked to open innovation: 1. Innovation management and organizational culture (red cluster); 2. linkages between open innovation, innovation capabilities, and performance (green); 3. Business model innovation and performance (blue); 4. entrepreneurial orientation and dynamic capabilities for innovation (yellow), and 5. human capital and product-service innovation (purple). Follow a brief explanation of each identified cluster.

First cluster: *innovation management and organizational culture* includes the conceptual and managerial foundations of innovation, focusing on entrepreneurship, organizational culture, innovation processes, and sustainability as key elements in fostering open innovation, emphasizing how firms' internal dynamics enable or constrain their openness to flows of collaboration and external knowledge. Table 1 lists some representative studies:

Table 1: Open innovation, innovation management, organizational culture (red cluster)

Authors and country	Considerations
Wang et al. (2018). China.	This study uses a case study approach to examine how new ventures acquire information and funding through the implementation of open innovation.

Naqshbandi & Tabche (2018). India.	This work argues that empowering leadership facilitates a learning culture, which in turn enhances open innovation outcomes. Their study illustrates how leadership behaviors foster absorptive capacity and openness to external ideas.
Tian et al., (2018). Spain.	This article provides a systematic review of the literature on how organizational culture influences open innovation.
Srisathan et al. (2020). Thailand and China.	The study shows that organizational culture and sustainability orientation significantly influence OI performance in SMEs, with sustainability mediating the relationship between culture and innovation, and highlighting how cultural values, such as teamwork and customer orientation) sustain OI capabilities over time.
Bhatti et al. (2021). Pakistan.	This study explores the factors that influence the adoption of open innovation by IT organizations, particularly focusing on the role of social media and knowledge management capabilities in emerging markets.
Garrido-Moreno et al. (2020). Spain.	This study examines how social media use can be strategically managed to create business value, particularly in the Spanish hotel industry, through the lens of dynamic capabilities.
Singh et al. (2021). United Arab Emirates.	The study explores top management's knowledge value and internal knowledge-sharing practices as antecedents to OI and firm performance. This emphasizes the role of executive commitment and intra-organizational learning in OI.
Konno & Schillaci (2021). Japan.	This paper reviews the evolution of knowledge creation theory and its impact on innovation management, especially in the context of "Society 5.0," emphasizing the importance of socio-economic fusion.
Valmohammadi et al. (2024). Iran.	The study explores the relationship between business analytics, corporate entrepreneurship, and OI within Iranian organizations, highlighting open innovation's mediating role.
Choi et al. (2024). United States.	This paper compares innovation in small family firms versus nonfamily firms and explores how organizational culture impacts innovation in these contexts.
Izotova & Bolívar-Ramos (2024). Spain	This paper investigates how the diversity of a firm's partners in OI affects its ability to develop radical innovations, specifically examining the impact of functional and geographical diversity in collaborations on radical innovation performance, also considering the moderating effect of firm size.
Pfajfar et al. (2024). Slovenia.	This paper introduces the concept of international dynamic marketing capabilities, providing a new framework for understanding marketing capabilities in international enterprises.
Shahin et al. (2025). Jordan.	This study investigates the role of adhocracy culture in promoting open innovation within small and medium enterprises (SMEs).

Source: Authors own work (2025).

The studies in cluster one explore the dynamics of innovation within organizations, emphasizing the relationship between open innovation, organizational culture, and innovation management. While several works highlight open innovation's adoption and implementation, examining factors like social media utilization, knowledge management capabilities, partner diversity, and resource acquisition in new ventures, others emphasize the influence and impact of organizational culture, particularly in family firms and SMEs, pointing to the importance of specific cultural types like adhocracy and learning cultures.

Second cluster: *linkages between open innovation, innovation capabilities, and performance.* Explores how innovation capability, green innovation, and financial performance are interconnected, emphasizing moderation and mediation mechanisms that impact firms, particularly in manufacturing. Table 2 lists some representative studies of this cluster.

Table 2: Open innovation, innovation capabilities, and performance (green cluster)

Authors and country	**Considerations**
Reed et al. (2012). USA.	This paper explores how community-controlled open innovation affects competitive advantage and explains how it alters the sources of economic rent.
Asiaei et al. (2023). Iran	This study explores how knowledge assets and innovation ambidexterity create synergy to affect firm performance. It shows that structural and relational capital indirectly affect firm performance through innovation ambidexterity.

Nakabuye et al. (2023). Uganda.	This study investigates the relationship between technology orientations and export performance of SMEs. It finds that technology orientation has a positive relationship with performance, and supply chain agility moderates this relationship.
Nawroth et al. (2023). Germany.	This simulation study examines the effects of open innovation on the entrepreneurial success of SMEs under different market conditions.
Yoon & Oh (2024). South Korea	This study examines the roles of entrepreneurial orientation and government support in open innovation of manufacturing firms.
Ibarra-Cisneros et al. (2024). Mexico.	This paper analyzes the impact of entrepreneurial and customer orientation on innovation in the restaurant industry, and consequently financial and market performance.
Khayyam et al. (2024). Pakistan.	This research examines the roles of technological readiness, internal and external knowledge sources and resource orchestration capabilities in achieving ambidextrous green innovation.

Source: Authors own work (2025).

Table 2 explores the interconnectedness of OI, innovation capabilities, and firm performance, often with a focus on green aspects. Studies across various countries examine factors influencing performance, such as business analytics, knowledge assets, technology orientation, entrepreneurial orientation, and customer orientation. These factors are analyzed in contexts ranging from SMEs and the restaurant industry to the pursuit of green innovation, highlighting the diverse ways innovation contributes to organizational outcomes.

Third cluster, *business model innovation and performance* highlights how business model innovation, market orientation, and customer focus influence SME performance, through organizational factors. Table 3 shows some representative studies of this cluster.

Table 3: Open innovation, business model and performance (blue cluster)

Authors and country	Considerations
Pratono (2018). Indonesia.	This study provides evidence that trust plays a pivotal role in social networks, which enable the observed firms to achieve the performance.
Hassan et al. (2020). Pakistan.	This study indicates that improving the knowledge management capability and innovative climate means the mechanisms of mediation and moderation through which entrepreneurial orientation, ICTs, and organization structure impact the open innovation, which, in turn, impact SMEs' innovative performance.
Rosyidi et al. (2025). Indonesia	This study analyzes how market orientation (competitor and customer orientation) influences organizational learning, change process and change context, and its impact on organizational performance in Sharia banking, with religiosity as a moderator.

Source: Authors own work (2025).

Table 3 highlights studies that examine how business model innovation, market orientation, customer focus, along with other organizational factors, influence SME performance.

Fourth cluster, *Entrepreneurial orientation and dynamic capabilities* examines how entrepreneurial orientation (risk-taking, proactiveness, and innovativeness), along with organizational learning and dynamic capabilities, drive firm performance and innovation. Table 4 describes some representative studies of this cluster.

Table 4: Entrepreneurial orientation and dynamic capabilities for innovation (yellow cluster)

Authors and country	Considerations
Paoloni et al. (2020). Italy.	This article reviews the literature on knowledge management, intellectual capital, and entrepreneurship, discussing the need for an integrative framework to understand their interrelations and impact on innovation.
Ahmad et al. (2021). Pakistan.	This research investigates the direct and indirect relationships between entrepreneurial orientation, absorptive capacity, and open innovation, and their impact on firm performance in Pakistani SMEs.
Al-Hakimi et al. (2022). Yemen.	The study analyzes the impact of EO and knowledge sharing on open innovation and organizational performance in Yemeni SMEs, finding that entrepreneurial orientation positively influences both knowledge sharing and open innovation.

Chiang & Hsieh (2022). China.	This study explores how entrepreneurial orientation interacts with different types of open innovation (breadth and depth) to influence innovation performance, considering the moderating effect of information technology capability.
Waseel et al. (2025). Pakistan.	The study examines the relationships between empowering leadership, learning culture, open innovation outcomes, absorptive capacity, and openness to external ideas, finding that empowering leadership fosters a culture that enhances OI.

Source: Authors own work (2025).

Findings suggest that EO enhances absorptive capacity, knowledge sharing, and innovation outcomes, with effects influenced by factors like IT capability and leadership style.

The fifth cluster (purple) discusses *human capital and product-service innovation*, with attention to how human, intellectual, and knowledge resources contribute to innovation efforts, especially in emerging markets. In line with this, Asiaei et al. (2023) posit that knowledge assets can influence firm performance indirectly by supporting innovation ambidexterity. In the context of "Society 5.0," Konno and Schillaci (2021) describe a shift toward socio-economic integration, which requires knowledge ecosystems to go beyond traditional corporate boundaries to support innovation processes, so managing knowledge and intellectual capital becomes relevant. Paoloni et al. (2020) suggest developing a framework that connects intellectual capital with knowledge management practices to make better use of innovation opportunities.

Sampled literature also focuses on open innovation styles: *Outside-in open innovation* - referring to the integration of external knowledge into a firm's internal innovation processes – Seo and Park (2022) emphasize the role of interorganizational learning in enabling inbound open innovation in entrepreneurial ventures. Similarly, Barjak and Heimsch (2023) highlight how an innovation-friendly organizational culture supports the adoption of external ideas within Swiss firms. Liao et al. (2020) further show that a firm's technological capability strengthens the relationship between inbound open innovation and improved performance, underlining the importance of internal absorptive capacity.

Inside-out open innovation - sharing or commercializing internal knowledge beyond organizational boundaries - Cheng and Huizingh (2014) identify this as one of three core modes of open innovation, where firms externalize internal ideas through licensing or partnerships. Singh et al. (2021) add that top management's support for knowledge sharing plays a crucial role in facilitating internal innovation flows, allowing firms to leverage their ideas in external contexts. About *coupled open innovation*, which combines both inbound and outbound flows through collaboration, Cheng and Huizingh (2014) and further developed by Camilleri et al. (2023), who link collaborative efforts to shared value and sustainability goals.

It is worth noting that the most used methods and analytical approaches in the reviewed literature suggest a strong reliance on quantitative, survey-based research designs. Overall, our results reflect a methodological emphasis on empirical, hypothesis-driven research using structured data collection and multivariate analysis techniques. The presence of terms such as "structural equation modeling," "PLS-SEM," and "confirmatory factor analysis" points to the widespread use of advanced statistical techniques for testing causal relationships and validating measurement models. Additionally, concepts like "mediating role," "moderating role," and "effect" highlight a focus on examining indirect and interaction effects. References to "framework," "future research," and "review" suggest that many studies also aim to build conceptual models and identify research gaps.

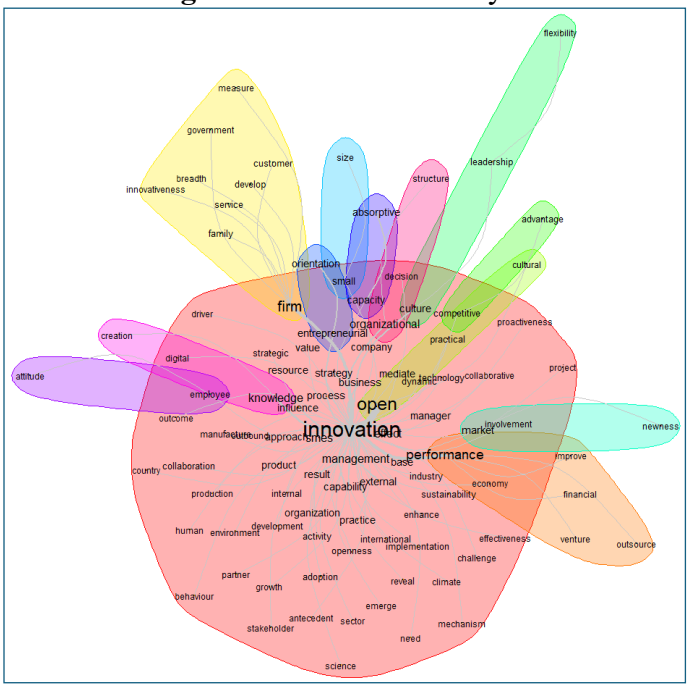
4.2 Main trends and opportunities for future research on OI, EO and OC

The following analyses were conducted to address the second research question: What are the main trends and research opportunities for future research on the relationship between OI, EO, and OC, in relation to innovation and performance?"

For this, the analysis method using IRAMUTEQ was applied to a corpus of 636 text segments, totaling 22.162 occurrences and 4.482 distinct forms. The average text length was 40 words, with an average occurrence per text of 544,05. Notably, 2.663 hapaxes (words mentioned only once) represented 12.02% of all occurrences, highlighting the corpus's lexical diversity. Specificity similarity analyses were used to break down thematic structures and underlying relationships in the data, as follows.

Figure 7 presents a similitude analysis map that illustrates the intellectual structure of research on open innovation. This visualization identifies the most frequently co-occurring keywords in the literature and organizes them into thematic categories, with “open innovation as the central concept. The central position of the term "open innovation" confirms its prominence as the core research construct around which related themes are organized. The spatial proximity and connections between terms reflect the degree of conceptual similarity and co-occurrence in scholarly discourse. Each color-coded cluster represents a specific subdomain or research stream, thereby offering a structured overview of the multifaceted nature of open innovation studies.

Figure 7 - Similitude analysis



Source: Authors own work using Iramuteq® software (2025).

The analyzed corpus points to some research avenues, among them:

The interplay of open innovation and firm characteristics. This strand explores how the characteristics of a firm, such as its size, structure, culture, and strategic orientation (including entrepreneurial orientation), influence its adoption and success with open innovation practices. This aligns with the work of Yoon & Oh (2024) examining entrepreneurial orientation in open innovation and the general theme of how firm-level factors shape innovation strategies.

Knowledge management and intellectual capital for innovation, which focuses on how firms leverage their internal and external knowledge resources (human capital, intellectual capital) to drive innovation. It connects with the structured literature review by Paoloni et al. (2020) on knowledge management, intellectual capital, and entrepreneurship, and the study by Asiaei et al. (2023) on knowledge assets and innovation.

The role of absorptive capacity and openness. This strand investigates the ability of firms to absorb external knowledge (absorptive capacity) and their general openness to external

collaboration as key factors in open innovation and subsequent innovation performance. This is touched upon by Waseel et al. (2025) regarding absorptive capacity in the context of empowering leadership and open innovation.

Innovation management and performance outcomes. This broad avenue examines how different innovation management approaches, including open innovation, product innovation, and service innovation, ultimately impact various dimensions of firm performance (financial, market, etc.). The work by Ibarra-Cisneros et al. (2024) linking entrepreneurial and customer orientation to innovation and performance in the restaurant industry falls under this strand.

Finally, the influence of the external environment on innovation considers how external factors such as government policies, market dynamics, and the broader environment (including the digital environment) shape a firm's innovation strategies and outcomes. The interrelation of these strands suggests that future research could fruitfully explore the complex relationships between firm-level resources - human and intellectual capital -, strategic orientations (and OE), innovation strategies - OI, product-service innovation -, dynamic capabilities, e.g. absorptive capacity, and ultimately, firm performance within various market contexts, including emerging economies.

5. Conclusions

This study aims to analyze the academic landscape published on the relationship between OI, EO, and OC, as well as to identify key trends and opportunities for future research in this field, seeking to understand how these factors interact to enhance innovation and firm performance. Among the results, the co-occurrence analysis revealed five main thematic clusters that guide the diverse dimensions of open innovation research.

The first cluster emphasized the role of innovation management and organizational culture in fostering OI, underscoring how internal factors such as leadership styles, learning orientation, sustainability values, and knowledge-sharing practices influence firms' openness to external ideas. This cluster reflects a growing consensus that organizational culture is both an enabler and a mediator in the successful implementation of open innovation, particularly within SMEs and family businesses. The second cluster connected OI, innovation capabilities, and performance, highlighting that technological orientation, absorptive capacity, and resource orchestration are key mechanisms linking OI to improved outcomes, particularly in manufacturing and sustainability-driven contexts.

The remaining clusters further illustrate how OI is embedded in broader organizational strategies. The third cluster pointed to the importance of business model innovation, showing how customer focus, market orientation, and organizational learning drive innovative performance, particularly in SMEs. The fourth cluster reinforced the central role of EO and dynamic capabilities, indicating that risk-taking, proactiveness, and empowering leadership enhance absorptive capacity and facilitate external collaboration. Lastly, the fifth cluster demonstrated the importance of human and intellectual capital in supporting product-service innovation, particularly in knowledge-intensive and emerging-market contexts. Collectively, the findings reveal a multidimensional and integrative view of OI, where cultural, strategic, and knowledge-based capabilities interact to shape innovation performance across different sectors and geographies.

Overall, the results underscore a strong quantitative methodological orientation within the OI literature, as evidenced by the co-occurrence of terms such as "structural equation modeling," "PLS-SEM," and "confirmatory factor analysis." These highlight the prevalence of hypothesis-driven approaches that prioritize empirical validation and multivariate analysis to test causal relationships and evaluate theoretical models. Concepts such as "mediating role" and "moderating role" further indicate a focus on examining complex indirect effects and interaction mechanisms.

The similitude analysis provided deeper insight into emerging research avenues within the intersection of OI, EO and OC. Key future directions include exploring how firm characteristics—such as size, structure, and culture—influence open innovation adoption, as well as how human and intellectual capital are leveraged through knowledge management practices. Other promising areas involve investigating absorptive capacity and openness to external knowledge as mediators of innovation performance and assessing how innovation strategies—particularly those integrating OI, EO, and OC—translate into tangible performance outcomes. Furthermore, the external environment, including digital transformation and public policy, emerges as a critical context shaping innovation trajectories.

At this point, some limitations of the study should be acknowledged. Firstly, the temporal delimitation, from 2010 to 2025, secondly, the definition of the three databases. Despite their relevance, these factors may have led to the exclusion of potentially relevant studies, reducing the scope of the research. Furthermore, the review may not fully reflect the global literature on OI, EO, OC and performance, especially in specific regional contexts.

It is important to note that while certain themes such as performance outcomes and firm capabilities are found well developed, areas like employee involvement, digital transformation, and cultural dynamics remain relatively less explored and may benefit from further empirical investigation and could be listed as new research avenues, beyond the ones listed in the 4.2 section. Moreover, a growing interest in concepts related to sustainability, stakeholder engagement, and market orientation aligned to open innovation with broader societal and economic challenges. This reinforces the need for integrative research studies that connect internal organizational practices with external innovation ecosystems and policy environments.

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