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Decoding the Intellectual and Influential Dynamics of Structural Capital: A Multidimensional Bibliometric Analysis

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ABSTRACT

Structural capital is a critical element in fostering innovation and competitive advantage within the rapidly evolving domain of organisational knowledge management. This study explores the intellectual and influential dimensions of structural capital by providing quantitative insights complemented by an extensive literature review. It seeks to elucidate the field's core intellectual framework and identify the key contributors shaping its development. The research examines 54 articles and review papers sourced from the Scopus database spanning the period 1997 to 2023, employing an innovative mixed-method approach to bibliometric citation analysis. Advanced analytical tools, including R Studio, VOS viewer, and Microsoft Excel, were utilised to systematically analyse the data and perform complex bibliometric tests, thereby offering a detailed understanding of the structural capital research landscape. The findings highlight the prominent journals, authors, and collaborative networks that have significantly influenced the field. Notably, the *Journal of Intellectual Capital* emerges as a pivotal platform for academic discourse on structural capital. The study categorises structural capital into six principal domains: business operations and human resource management, organisational dynamics and innovation, industry performance and innovation, financial strategies and human capital, intellectual capital and risk management, and technology and innovation through structural capital. In addition to identifying substantial gaps in the existing literature, the study proposes future research directions, thereby laying a foundation for further empirical inquiry. This research represents a pioneering effort in applying bibliometric methodologies to the study of structural capital. Its findings and pro-posed research avenues provide a robust framework for both practitioners and scholars, contributing meaningfully to the advancement of knowledge in the field.

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1. Introduction

Structural capital is a vital component of intellectual capital, garnering increasing attention due to its significant impact on organizational knowledge management, the promotion of innovation, and the enhancement of competitive advantage [36]. Defined by Edvinsson and Malone [26] and Stewart and Ruckdeschel [53], structural capital encompasses the enduring organizational knowledge, processes, data-bases, and strategies that remain intact irrespective of individual staff turnover. In the contemporary era, characterized by rapid technological advancements and the accelerated flow of information, the importance of structural capital has grown substantially [21; 32; 54].

Structural capital extends beyond conventional performance metrics, significantly enhancing organizational efficiency. It optimizes processes and contributes to a robust organizational knowledge infrastructure, encompassing extensive databases and advanced software systems [37; 41]. By leveraging the collective experience and expertise of the workforce, structural capital enhances product quality, fosters innovation, and fortifies intellectual property rights [33]. Recognizing these advantages, many organizations are increasingly investing in research and development to strengthen their unique structural capital, thereby boosting competitive advantage and resilience against market volatility and industry-specific challenges [46; 49]. This strategic focus not only maximizes profitability but also ensures long-term sustainability. Unlike traditional competitive ad-vantages, which are prone to replication and obsolescence [30], structural capital offers a sustainable edge. Grounded in continuous organizational learning and experience, it is inherently more adaptable and less susceptible to duplication, making it an indispensable asset for enduring success (Housman & Goodman).

According to Martí [38], the intellectual capital domain is under-pinned by the theoretical framework of structural capital, developed by researchers such as [19; 20; 26]. Bontis [19], in his seminal work, identifies structural capital as a critical component of intellectual capital, highlighting its role in facilitating information retention and organizational utilization. Similarly, Edvinsson and Malone [25] conceptualize structural capital as non-human knowledge repositories essential to supporting employee initiatives. However, the advent of digital technologies, big data, and artificial intelligence necessitates a reimagining of structural capital. Since the early 2000s, scholars have explored the impact of digitization on knowledge management [24; 50], prompting a shift from perceiving structural capital as static repositories to dynamic, real-time systems encompassing digital assets and capabilities. Furthermore, globalization and the rise of remote work have introduced new challenges in leveraging structural capital within geographically dispersed organizations.

Research on structural capital remains limited. This study employs a multidimensional bibliometric analysis to trace the evolution of the concept and its influence on scholarly perspectives. By offering a comprehensive and nuanced view, it incorporates emerging theories and trends alongside an empirical examination of structural capital's intellectual framework and impact. The study extends the relevance of structural capital beyond its traditional applications in business and management, highlighting its critical role in technology and sustainability. This multi-disciplinary approach highlights the versatile application of this form of capital across diverse domains, addressing the evolving demands of contemporary business environments. The primary objective of the study is to make a significant contribution to the discourse on structural capital by providing a comprehensive and practical understanding that aligns with the complex challenges and opportunities confronting organizations today.

1.1 Research Questions

1) Which authors and journals are prominent in the field of structural capital research?
2) What are the key components that underpin the research framework for structural capital?
3) What collaborative networks are prevalent in the study of structural capital?
4) How has the theory of structural capital evolved over time, and what are its current areas of emphasis?
5) What future research directions are emerging within the domain of structural capital?

2. Data and Methodology

2.1 Data Collection

To collect data, the Scopus database was chosen due to its extensive use in previous research [6; 14]. This selection was further justified by several additional factors that have made Scopus a focal point in prior studies.

- Scopus is the most comprehensive multidisciplinary data-base of peer-reviewed literature in the social sciences.
- Scopus ranks among the most prestigious databases, including listings from all or most well-regarded journals.
- The database offers advanced search functionalities, enabling efficient cleaning and exporting of relevant data for bibliometric analysis.
- Scopus contains a larger volume of papers on structural capital than other databases, including Web of Science, and generally features more rigorously reviewed research compared to sources such as Google Scholar, EBSCO, or ProQuest.

2.2 Methodology

A meta-literature review method is employed in this study, integrating both bibliometric (quantitative) and content (qualitative) approaches, a combination frequently utilized in contemporary literature [6; 7; 14]. The bibliometric method was first introduced by Price in 1965, aiming to identify and understand the network of articles through their citations. This methodological framework has structured the analysis into five dimensions, as outlined in the following.

1) Bibliometric Citation Analysis
2) Bibliometric Co-authorship Analysis
3) Keyword Analysis
4) Bibliographic Coupling Analysis
5) Content Analysis

3. Results and Discussion

This bibliometric review analyzed 54 scholarly articles from Scopus using the Bibliometric package in R. The analysis generated descriptive statistics, graphical representations, and scientific mapping. The section is organized into four subsections: descriptive analysis, data visualization, intellectual structure, bibliographic coupling, and content analysis.

3.1 Descriptive Analysis

3.1.1 Dataset

The dataset, covering 1997 to 2023 (Table 1), focused primarily on structural capital, comprising

53 documents from 44 sources. This provided a substantial body of work, growing at an annual rate of 5.48%. The average citation rate of 15.70 per document indicated its moderate academic impact and relevance. The documents spanned a broad range of structural capital topics, with 145 keywords and 143 author-specific keywords. A total of 127 authors contributed, reflecting both collaborative and individual research. The predominance of articles indicated that journals are a key platform for disseminating new research on structural capital. Moderate international collaboration was noted, highlighting that structural capital is a dynamic, evolving field of global significance, contributing to our understanding of organizational learning, innovation, and competitive advantage.

Table 1
Summary of Dataset

Description	Results
Main Information about Data	
Timespan	1997:2023
Sources (Journals, Books, etc.)	44
Documents	53
Annual Growth Rate %	5.48
Document Average Age	7.32
Average Citations per Doc	15.70
References	2605
Document Contents	
Keywords Plus (ID)	145
Author's Keywords (DE)	143
Authors	127
Authors of Single-authored Docs	15
Authors Collaboration	
Single-author Docs	16
Co-authors per Doc	2.53
International Co-authorships %	18.87
Document Types	
Article	39
Book Chapter	4
Conference Paper	9
Retracted	1

3.1.2 Sources

Figure 1 presents longitudinal data from 1997 to 2023, showing a clear increase in scholarly research on structural capital, with a notable acceleration after 2008. This growth can be attributed to several factors, including the growing recognition of intellectual capital's importance in organizational models and advancements in research methodologies. The interdisciplinary nature of structural capital has further sparked academic interest, encouraging more research. Additionally, increased global collaboration and strong institutional support have significantly accelerated the field's development.

Figure 2 shows that the Journal of Intellectual Capital is the leading source of research on structural capital, with eight articles published. This prominence highlights the journal's focused contribution and significant impact in the field of intellectual capital. Additionally, other journals such as Knowledge and Process Management and various conference proceedings have contributed to the discourse on structural capital, demonstrating its relevance across diverse fields. The broad range of journals and proceedings involved indicates a vibrant and wide-spread academic discussion on both the theoretical and practical aspects of structural capital.

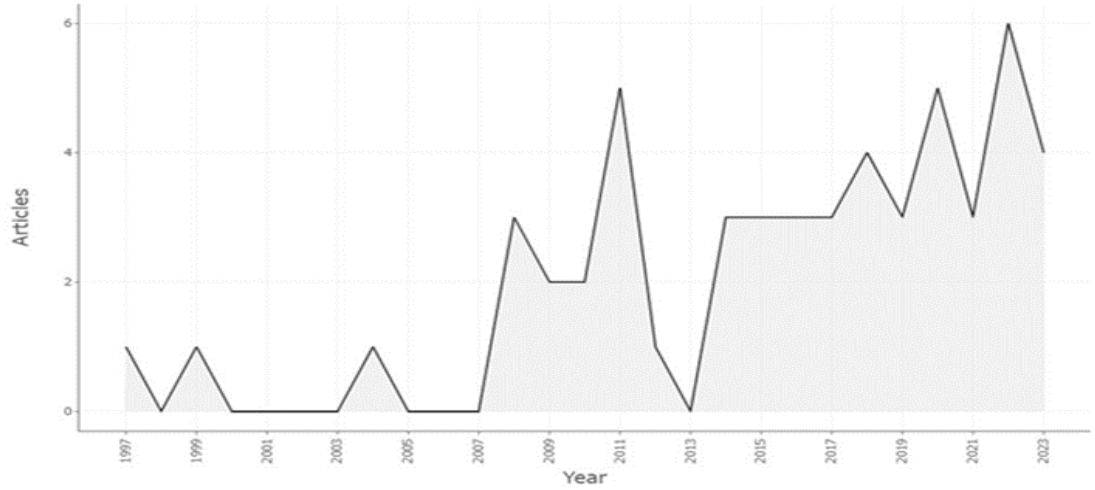

Fig.1. Scientific Productivity

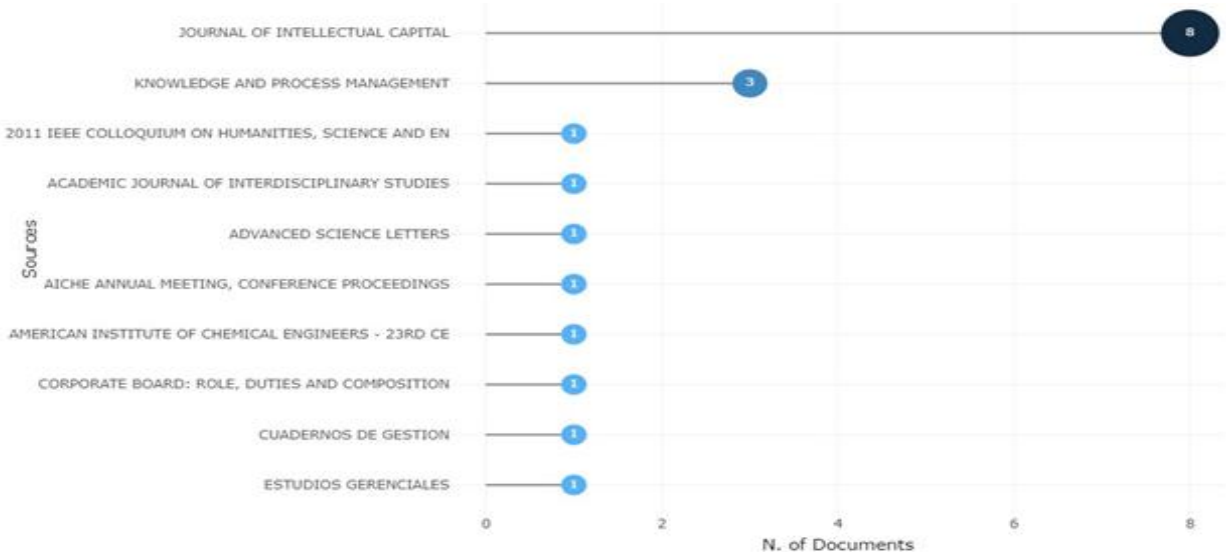

Fig.2. Most Impactful Resources

3.1.3 Authors

The structural capital research data reveals a shift towards collaborative authorship, with contributors like Aramburu, Burns, and Cleary each publishing two articles. This pattern reflects a move from individual to more collaborative, cross-disciplinary research, incorporating diverse methodologies and theoretical perspectives.

3.1.4 Country-Wise Contributions

Indonesia leads global scientific production with 24 articles, followed by Malaysia and Spain, as shown in Table 2, indicating strong focus on structural capital research in these countries. However, the USA leads in total citations, despite publishing fewer articles, highlighting the significant global impact of its research. Iran and Italy also rank highly in citations, underscoring the global recognition of their work. The distribution of contributions between developed and emerging economies demonstrates the universal relevance of structural capital, with emerging economies like Indonesia, Malaysia, and Iran advancing scientific production, while developed nations like the USA and Italy contribute through impactful research. This global participation fosters a dynamic, collaborative effort, enhancing the overall understanding of structural capital.

Table 2
Top 10 Countries Regarding Productivity and Citations

Indonesia	24	USA	150
Malaysia	14	Iran	133
Spain	14	Italy	94
China	10	Portugal	52
Italy	9	Ireland	50
Iran	8	Argentina	31
USA	8	Malaysia	30
UK	6	Spain	24
Brazil	5	Austria	15
Peru	5	Brazil	7

3.1.5 Documents

Singh et al. [52] article on management information systems, published in MIS Quarterly, stands as the only publication among the top 10 most cited papers in the intellectual capital domain to exceed 100 citations, with a total of 144 as shown in Figure 3. This distinction underscores the paper's significant impact and its foundational role in the intellectual capital literature. Although the remaining papers do not reach this citation threshold, they still make substantial contributions to the scholarly discourse. Notable among them are the works by Benevene and Cortini [17], Hejazi et al. [28], and Ordóñez de Pablos [45], which have been cited between 77 and 95 times, demonstrating their continued relevance and influence on both the theoretical and practical aspects of intellectual capital research.

The collection of these papers reflects the dynamic and evolving nature of intellectual capital research, which covers a broad array of structural elements, implications, and applications. The diversity of topics ad-dressed, alongside the varied methodologies employed—as evidenced by citation counts and publication outlets—emphasizes the multidimensional character of the field. These seminal works exemplify the competitive academic environment and ongoing scholarly exchange that drive the growth and refinement of the field. This comprehensive analysis highlights the importance of sustained inquiry and dialogue to deepen the understanding and application of intellectual capital across diverse organizational contexts.

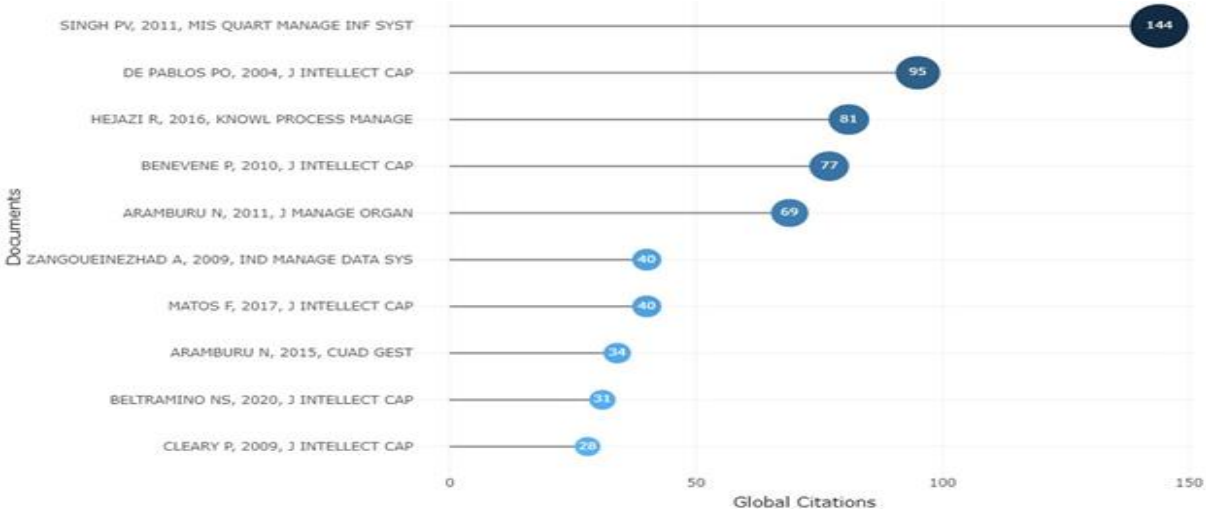

Fig.3. Most Cited Documents

3.1.6 Keywords

An analysis of term frequency data across the intellectual capital literature as shown in figure 4 revealed that "structural capital" emerged as a notable theme, occurring six times, closely following

"intellectual capital" and "knowledge management," both mentioned seven times. This suggests substantial research focus on the structural aspects of intellectual capital, positioning it alongside core concepts such as intellectual capital and knowledge management. The recurrence of terms like "human capital," "commerce," and "industry," each appearing multiple times, high-lights the interdisciplinary nature of the field and its relevance across various organizational and business contexts. The word tree further identifies recurring terms such as "information management," "performance," and "organization," each cited twice, underscoring their significance within the intellectual capital discourse. The inclusion of more specialized terms, such as "customer relationship management," "digital assets," and "competitive intelligence" (each cited once), indicates the field's exploration of nuanced topics. This diversity reflects the broad applicability of intellectual capital and its integration with multiple business functions and strategies.

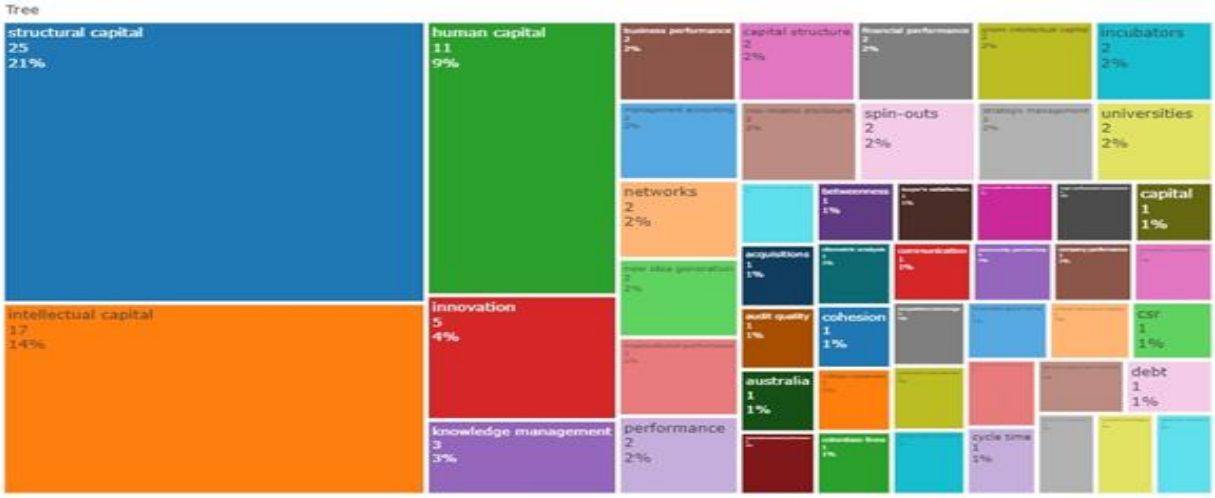

Fig.4. Word Tree

The word dynamics over time as shown in figure 5 reveal a growing focus on "structural capital," with its mentions steadily increasing and reaching a peak of 25 by 2023. This trend is mirrored by the upward trajectory of terms such as "intellectual capital" and "human capital," reflecting an expanding re-search focus in these areas. The consistent mention of "knowledge management" underscores its enduring relevance as a foundational element within intellectual capital studies. In recent years, terms such as "business performance," "capital structure," and "financial performance" have gained prominence, indicating a rising interest in examining the tangible impacts and outcomes of intellectual capital on organizational performance.

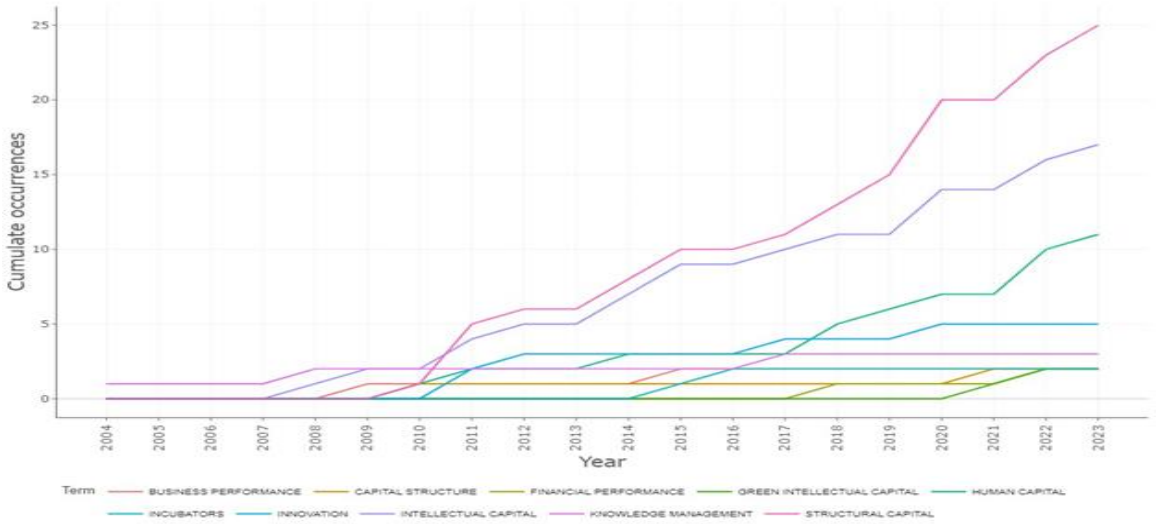

Fig.5. Word Dynamics

3.1.7 Trending Topics

Figure 6 illustrates a notable shift in the landscape of intellectual capital research, highlighting the central concepts of "competition" and "human capital." As the field has expanded to encompass a broader range of topics, the frequency of mentions of "structural capital" has risen significantly, peaking at 25 mentions in 2020. This trend reflects a growing academic interest in the structural dimensions of intellectual capital, underscoring its importance in shaping the organization's knowledge assets and strategic framework.

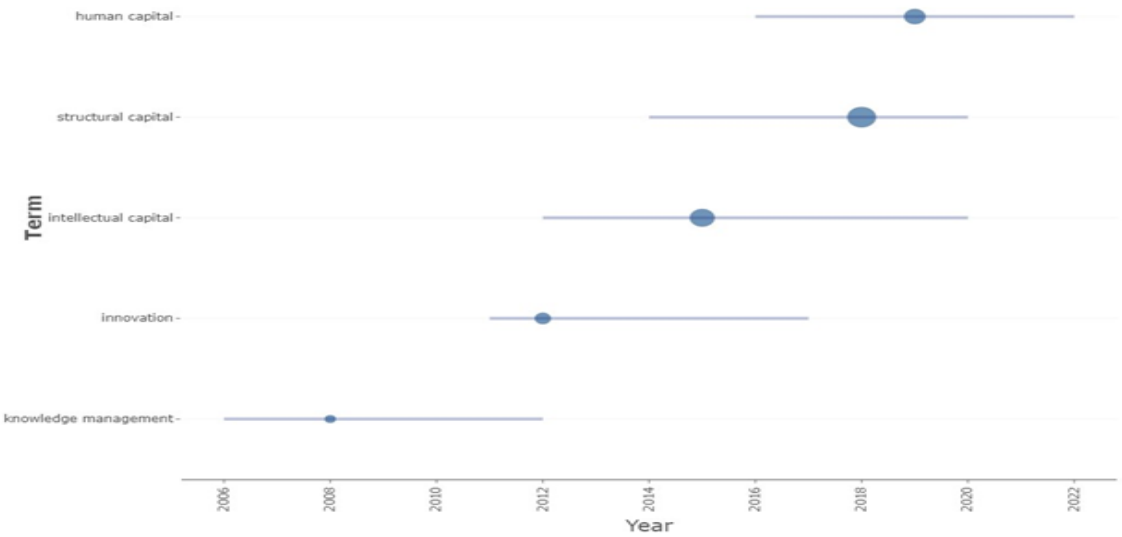

Fig.6. Trending Topics

The data reveals a significant shift in the field towards a deeper exploration of "structural capital," alongside the continued importance of "intellectual capital" and "human capital." The growing prominence of "structural capital" in recent years reflects the field's response to the increasing complexity of organizations and the need for strong structural frameworks within intellectual capital. This shift indicates the maturation of the field, moving from a focus on competitive and individual factors to a more integrated, systemic view of intellectual capital, with a particular emphasis on the critical role of structural factors in promoting organizational innovation and sustainability.

3.2 Thematic Map and Evolution

The two-dimensional thematic map presented the typological themes identified through co-word analysis, effectively grouping keywords to highlight the dominant themes within the research domain [22]. These themes were carefully categorized, with each theme represented as a distinct bubble on the graph. The themes were grouped into four quadrants based on their centrality and density, providing a clearer understanding of their role and evolution in intellectual discourse. This approach offered a structured framework for navigating the complex field of intellectual capital. Keywords Plus in Figure 7 revealed a nuanced landscape of intellectual capital in the thematic map. The prominence of dominant themes like "intellectual capital" and "structural capital," which scored highly on centrality measures, indicates their central importance to the field. Positioned in the motor quadrant, these themes reflect a well-established and pivotal discourse in intellectual capital. Conversely, themes such as "human capital" and "information management" exhibited varying levels of centrality and density, highlighting their evolving roles and stages of development within the broader re-search context.

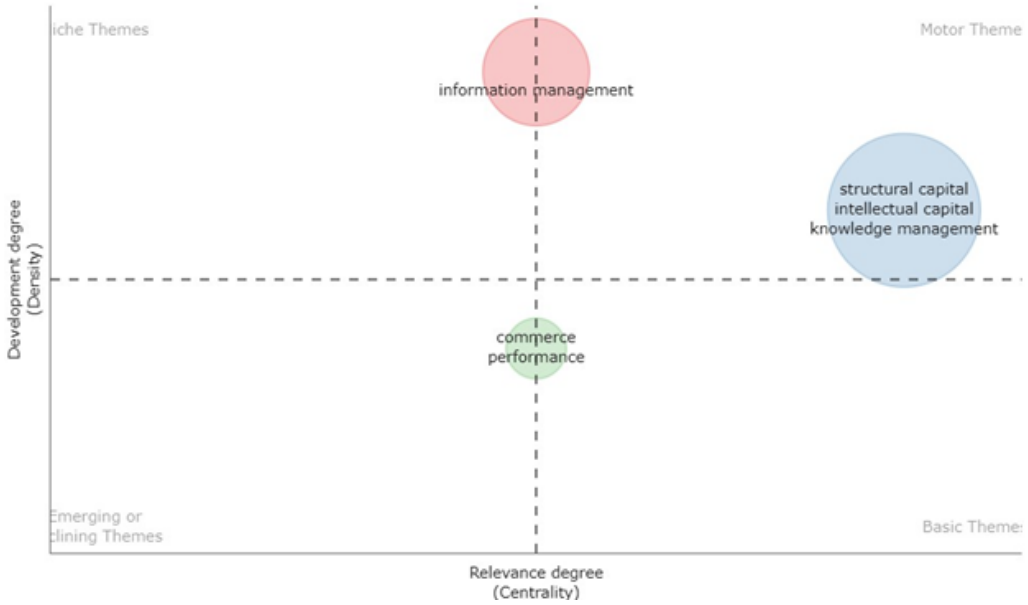

Fig.7. Thematic Map Based on Keywords Plus

A distinct set of themes emerged from the author's keywords, with "structural capital" and "intellectual capital" retaining their prominence, underscoring their continued importance as shown in Figure 8. The introduction of themes like "human capital," "innovation," and "green intellectual capital" added new dimensions to the intellectual capital discourse. The centrality and density metrics of these themes indicated their varying levels of influence and development within the field. For instance, "green intellectual capital" appears to be an emerging area of interest, growing in significance but not yet a dominant topic, likely positioned in the primary or niche theme quadrant. Figures 7 and Figure 8 illustrate that while core themes such as "structural capital" and "intellectual capital" shared commonalities, each thematic map highlighted distinct aspects of the intellectual capital domain. The variation in themes and their positioning across the quadrants emphasized the multi-faceted nature of the field, reflecting diverse research focuses, methodologies, and emerging areas of interest.

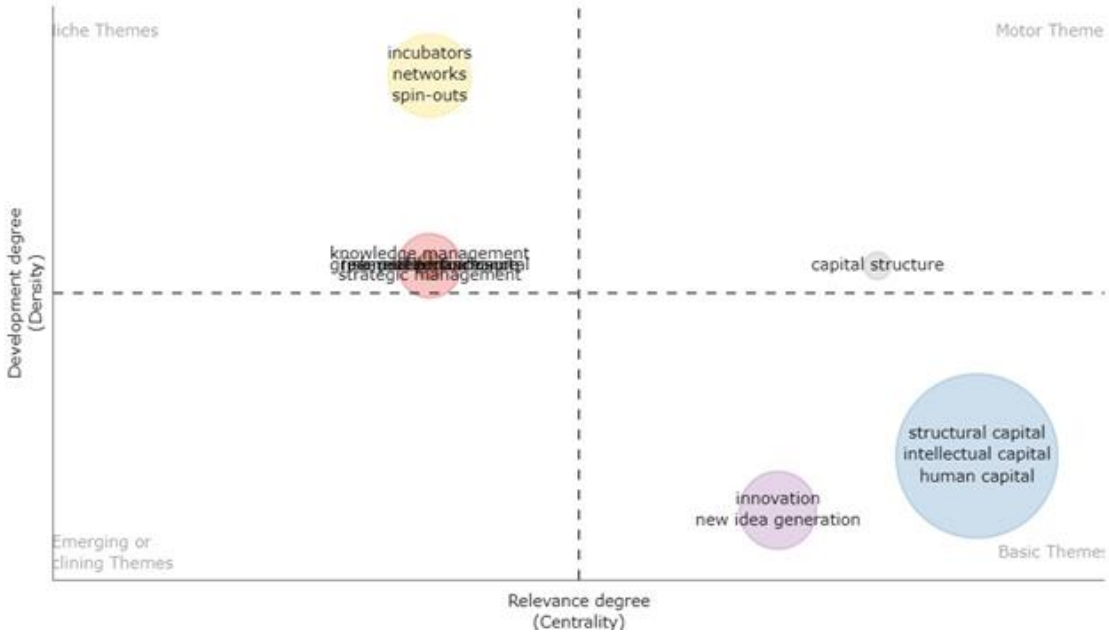

Fig.8. Thematic Map Based on Author's Keywords

3.3 Bibliographic Coupling and Future Research Directions

3.3.1 Co-occurrence Analysis of Keywords and Future Re-search

The co-occurrence analysis of keywords as shown in figure 9 identified five distinct clusters, each representing a complex thematic area with significant implications for both future research and practical application. These clusters, distinguished by their color codes, capture the multifaceted nature of organizational dynamics, innovation, and performance.

Cluster 1 (Red): The Business Operations and Human Resource Management cluster highlights the critical link between human capital and company performance. It emphasizes the role of personnel management in driving business outcomes and suggests future research on optimizing structural capital—such as processes, technologies, and culture—to improve human capital strategies.

Cluster 2 (Green): The Organizational Dynamics and Innovation cluster emphasizes the role of organizational structures and culture in fostering innovation and managing information. It highlights how businesses' ability to innovate and their information management strategies impact adaptability and competitiveness. Future research could explore how structural capital, such as databases, intellectual property management, and knowledge systems, supports innovation and efficient information management.

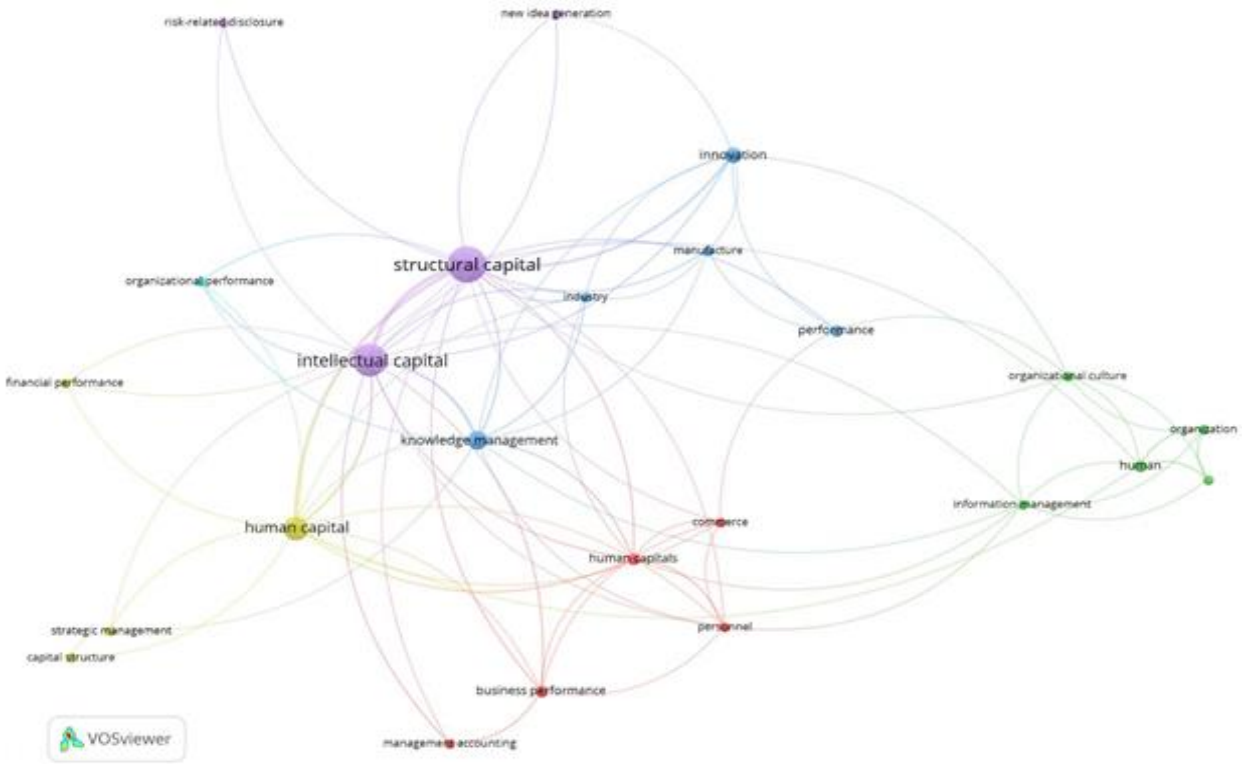

Fig.9. Cluster Visualization of Keywords

Cluster 3 (Blue): The Performance and Innovation in Industry cluster examines the link between organizational performance and industry-specific innovation, particularly within manufacturing and knowledge management. It posits a reciprocal relationship between organizational performance and the continuous application of knowledge and innovation in industrial contexts. Future research should investigate how enhancing structural capital can improve knowledge management practices and optimize manufacturing processes, thereby driving improvements in organizational performance.

Cluster 4 (Yellow): The Financial Strategies and Human Capital cluster focuses on the interplay between capital structure, financial management, human capital, and strategic management in influencing organizational performance. It suggests that effectively managing capital structure and human capital is essential for financial stability and success. Future research should explore the dynamic relationship between structural and human capital in shaping financial strategies and overall performance. This could involve examining how elements of structural capital, such as financial management systems, organizational policies, and corporate governance, interact with human capital to develop flexible and resilient financial strategies. Such studies should aim to understand the synergistic effects of these capitals on financial health, particularly in the context of economic uncertainties and market fluctuations.

Cluster 5 (Purple): The Intellectual Capital and Risk Management cluster emphasizes the critical role of both structural and intellectual capital in fostering innovation and managing risks effectively. It under-scores the importance of generating innovative ideas, enhancing risk-related disclosures, and optimizing structural capital. Future research may explore how structural capital, such as organizational routines, pa-tents, and customer relationships, can be integrated with intellectual capital to promote innovation and mitigate risks. This line of inquiry could also focus on strategies for valuing and maximizing structural capital, and its role in enabling organizations to remain agile and resilient in a rapidly evolving business environment.

In conclusion, these clusters emphasize the ongoing importance of generating new ideas, adapting strategies, and effectively utilizing human and intellectual resources. They highlight various interconnected areas that present opportunities for both academic inquiry and practical innovation. As the business environment continues to evolve, these thematic areas will be pivotal in shaping the future of organizational performance and resilience. The potential for further research in these domains is extensive, offering significant contributions to both theory and practice in the fields of business and management.

3.3.2 Bibliographic Coupling and Content Analysis

The primary objective of bibliographic coupling is to examine the connections between citations across scholarly articles and systematically categories the emerging clusters and thematic structures within a data-base. VOSviewer facilitated this analytical process in the current study. As shown in Figure 10, the results were represented in a spectrum of clusters, identified by colors such as green, red, blue, yellow, purple, greenish blue, and orange. Each node in the visualization corresponded to an individual article, with the node's size reflecting the frequency of citations for that article. To ensure accurate labelling and understanding of these clusters, two researchers carefully analyzed the content of each cluster [6], leading to the identification of seven distinct clusters.

Under the theme "optimizing organizational performance and decision-making through strategic management of structural and human capital," Cluster 1 (red) focuses on improving organizational dynamics through intellectual capital management. Future research in this stream will investigate the influence of structural capital on organizational performance and efficiency, expanding upon the foundational work of [1]. Nourani et al. [42] and Shubita [51] examine the components of structural capital and its impact on leverage and efficiency across various industries and cultural contexts. Building on work, Stream 2 aims to develop and test conceptual models that clarify the connection between advanced management accounting systems and business performance.

This stream aims to deepen the understanding of how management accounting can strategically contribute to structural capital, enhancing organizational success across different contexts. The third stream will explore the influence of human and structural capital on audit quality and financial

performance, drawing on the research of [23; 44]. It will involve a comprehensive investigation of the role of structural capital as an intermediary across various industries and countries, with the objective of gaining insights into how intellectual capital impacts audit and financial outcomes.

Lastly, Stream 4 advocates for further research into the role of structural organizational intelligence in competitive intelligence and HRM practices, drawing on the work of [48; 56]. This stream examines the impact of structural, rational, and innovation capital in specific sectors, such as the pharmaceutical industry and competitive intelligence, across various organizational contexts. The ultimate goal is to better understand how intellectual capital can enhance sector-specific strategies and practices, contributing to the broader field of organizational studies.

Cluster 2 (green), themed "enhancing technological and innovative performance through structural capital management," focuses on utilizing structural capital to drive technological innovation. Stream 1 will explore the role of structural capital in technological innovation and the performance of SMEs, guided by the works of [2]. The research will specifically focus on the electronics industry and manufacturing SMEs in emerging markets. Based on the work of Aramburu et al. [10] and Aramburu and Sáenz [9], Stream 2 will examine how structural capital influences a company's capacity for innovation and overall performance, with a particular focus on technology-based companies' ideation and innovation project management.

Stream 3 will explore the integration of structural capital with leader-ship and relational dynamics to enhance organizational efficiency and innovation, especially within buyer-supplier relationships and real estate agencies, drawing on the research of [18; 35]. Finally, Stream 4, led by Hurtado-Palomino et al. [29], will focus on comparative analyses of the moderating effects of structural capital on innovation and pioneering behavior, with an emphasis on the tourism industry. This stream aims to provide valuable insights for firms seeking to improve their competitive advantage in tourism and other sectors by examining how structural capital functions in diverse cultural and organizational contexts. Collectively, these streams con-tribute to an overarching research agenda aimed at understanding and leveraging structural capital to enhance technological and creative performance.

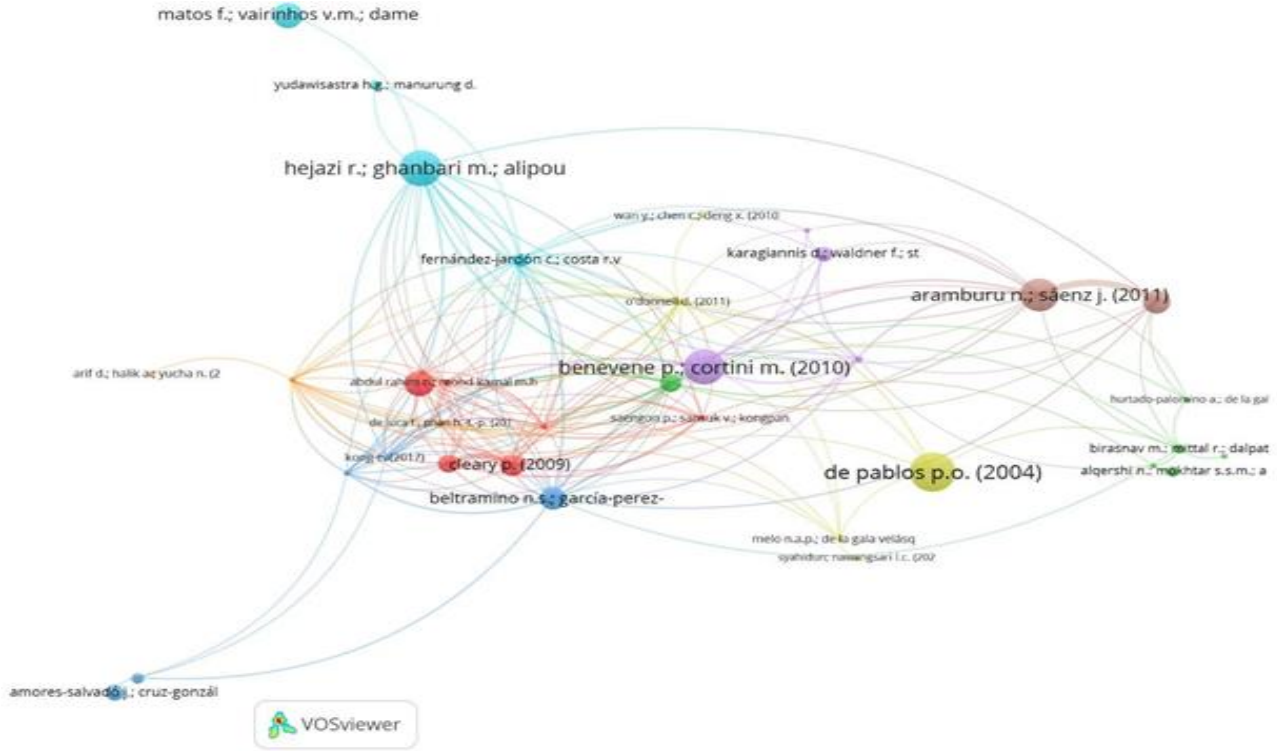

Fig.10. Cluster Visualization of Structural Capital Literature

Cluster 3 (blue) focuses on “leveraging structural capital for enhanced innovation and environmental strategy,” aiming to utilize structural capital to boost innovation, manage risks, and promote environmental sustainability. Stream 1 investigates the impact of green structural capital on new technologies and environmental strategies. Future research could explore its effects across various industries, particularly those with significant environmental impacts, and examine how organizational culture and employee behavior influence the effectiveness of environmental strategies. Stream 2 will investigate how structural capital impacts the performance and innovation of small and medium-sized enterprises (SMEs), particularly in emerging markets. This stream calls for further research across different economic and cultural contexts to uncover new challenges and propose solutions. Finally, Stream 3, based on the work of De Luca [25] and Kong [34], explores structural capital’s role in risk disclosure and human capital management. Future studies could investigate sector-specific applications of structural capital in risk management, focusing on its contribution to sustainable human capital development in social enterprises and emphasizing the role of organizational culture, training, and knowledge management in fostering innovation and ethical practices.

Cluster 4 (yellow) focuses on “leveraging structural capital for enhanced product innovation and firm performance.” Drawing on the work of [27], Stream 1 advocates for comprehensive research to identify and measure the key structural capital elements that drive product innovation in small and medium-sized enterprises (SMEs). This includes investigating how various types of structural capital—such as organizational culture, process optimization, and technological infrastructure—affect innovation strategies and management across different sectors and industries. Building on Hejazi et al. [28] and Yudawisastra et al. [55], Stream 2 encourages exploring the complex interaction between different types of intellectual capital and their impact on firm performance across various industries.

Researchers should explore how the relationships between structural capital and innovation have evolved due to digitalization and globalization. They should also investigate various models of intellectual capital that add value in diverse business contexts. Stream 3 proposes developing and testing frameworks to integrate structural capital management into the strategic and operational planning of smart cities. Future research should operationalize concepts like the “city nervous system” and “city mind,” examining their impact on urban competitiveness, citizen engagement, and sustainability. Additionally, studying how different cities manage structural capital to improve services, infrastructure, and governance could provide valuable in-sights. Together, each stream contributes to a comprehensive re-search agenda aimed at maximizing the application of structural capital across sectors.

Cluster 5 (purple) focuses on "optimizing organizational dynamics through human and structural capital integration," aiming to strategically combine human and structural capital to improve organizational performance, knowledge management, and innovation. Stream 1, inspired by the work of [13; 15; 31], explores the use of advanced IT and e-commerce technologies to transform human capital into structural capital. This stream ex-amines how technologies such as AI and blockchain can be leveraged across different fields and cultures, focusing on small and medium-sized businesses, microfinance institutions, and knowledge-driven sec-tors. It also aims to conduct a cross-industry and cross-cultural analysis to identify both common and unique transformation strategies, helping to develop effective approaches for diverse organizations.

Stream 2, based on Benevene and Cortini [17] and Karagiannis et al. [31], investigates how organizational culture and leadership influence the development and management of human and structural capital, particularly in knowledge-based economies and non-profit sectors. This stream

looks into the impact of different leadership styles on structural capital development and management. It also explores how an innovative, knowledge-centric organizational culture, supported by IT-based management strategies, can enhance knowledge management and foster innovation. Together, these streams work to create a comprehensive approach to leveraging the synergies between human and structural capital, improving organizational performance, innovation, and sustainability.

Cluster 6 (greenish blue) focuses on "optimizing organizational dynamics through green and structural capital integration," aiming to strategically leverage green and structural capital to enhance organizational learning, performance, and sustainability. Stream 1, based on Ordóñez de Pablos [45] work, will investigate how organizations can effectively measure and report structural capital, exploring the impact of various types of structural capital, such as idiosyncratic, core, ancillary, and compulsory capital, on organizational learning to improve knowledge management practices and enhance strategic perspectives and overall performance. Stream 2, informed by Pedraza Melo and Gala Velásquez [47], will examine the mediating role of structural capital in improving the performance of public administrations, analyzing how human and structural capital management practices influence public organizations' performance, particularly in developing economies. Stream 3, drawing from O'Donnell [43] work, will explore the interdependencies between human and structural capital through a Kantian pragmatist lens, delving into the development of the intellectual capital concept and promoting a more relational and realist approach to the agency-structure debate in social theory. Together, these streams form a comprehensive research agenda that seeks to understand how the interaction between green, human, and structural capital can improve organizational performance, sustainability, and innovation.

Cluster 7 (orange) focuses on "Exploring the influence of human and structural capital on organizational performance" to enhance intellectual capital's role in boosting financial outcomes and service delivery. Stream 1, based on Arif et al. [11], will analyses the direct and indirect impacts of human and structural capital on financial performance, with future research aiming to identify key elements of intellectual capital, assess market and technological influences, and develop strategies to maximize its financial impact. This stream may also include comparative studies across sectors. Stream 2, inspired by Aziz et al. [12], will examine the effect of structural capital on service supply chain performance.

Upcoming studies will investigate the role of various facets of structural capital, including organizational processes and technology, in fostering balanced and effective service delivery. The goal is to provide actionable insights for the management and enhancement of structural capital, thereby improving service delivery and overall organizational performance. Collectively, these streams seek to develop a comprehensive research agenda that leverages the synergy between human and structural capital to optimize financial performance and service excellence.

4. Conclusion

This study provides a significant contribution to the evolving field of structural capital research, analyzing 53 scholarly articles from the Scopus database spanning 1997 to 2023. It identifies key journals, authors, and collaborations, with the Journal of Intellectual Capital emerging as a leading publication. The study highlights a shift towards interdisciplinary collaboration, exemplified by scholars like Aramburu, Burns, and Cleary. Through keyword and bibliographic coupling analyses, six thematic streams were identified, covering diverse areas such as business operations, innovation, performance, financial strategies, risk management, and technology. The study also outlines critical future research directions, focusing on the integration of human and structural

capital, its role in driving technological innovation, and enhancing organizational resilience and sustainability. However, its reliance on the Scopus database limits its scope, potentially overlooking non-indexed or non-English contributions. Future research should broaden its scope to include more diverse databases and grey literature to capture a global perspective. Ultimately, this study deepens our understanding of structural capital and lays the foundation for future research, offering valuable insights for enhancing organizational innovation and competitiveness in an ever-changing world.

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