

Business Model and Digital Innovation: A Bibliometric Analysis

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Abstract

The increasing recognition of design management capabilities as a driver of innovation and business performance in small and medium-scale enterprises (SMEs) has attracted scholarly attention across multiple disciplines. This study provides a comprehensive bibliometric analysis of literature focusing on the intersection of business, digital innovation, design management, and SME performance. Using Biblioshiny, a web-based application integrated with the RStudio Bibliometric package, we systematically examined 12,476 peer-reviewed articles published between 2015 and 2025. The result of the analysis identified document sources, key authors countries, affiliations, corresponding authors, most cited journals, trending topics, influential articles, thematic clusters, TreeMap and collaboration networks in this research domain. Using the search string TITLE-ABS-KEY (business AND model AND innovation) AND PUBYEAR > 2015 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA, "BUSI")). It identified growing scholarly interest with dominant themes revolving around digital innovation strategy, dynamic capabilities, and sustainable business model innovation. Moreover, the study highlights emerging trends in digital transformation, stakeholder engagement, and environmental sustainability within SME innovation practices. This paper offers valuable insights for researchers, policymakers, and practitioners seeking to understand and enhance design-led innovation strategies in SMEs. It will also assist fresh post graduate students in this area to fill their gaps with available trending topics.

Keywords: Digital Innovation, Bibliometric Analysis, Business Management, Business model, Artificial Intelligence

Introduction

In today's rapidly evolving and highly competitive business landscape, the need for continuous innovation has become indispensable, particularly for small and medium-scale enterprises (SMEs), which are the backbone of many economies worldwide. These enterprises play a pivotal role in job creation, technological advancement, and inclusive economic development. However, the capacity of SMEs to sustain innovation and competitiveness is often constrained by limited resources, underdeveloped infrastructure, and a lack of strategic design integration. Amid these challenges, **design management capabilities** have emerged as a powerful enabler of business innovation, allowing SMEs to enhance product development, optimize user experience, and improve operational efficiency. The study of business innovation through the lens of design management is essential not only because it addresses a gap in scholarly understanding but also because it equips policymakers, business practitioners, and researchers with a nuanced framework to support SME transformation. A robust understanding of how SMEs harness design-led strategies to innovate enables more targeted interventions, the creation of supportive ecosystems, and improved policy formulation for sustainable growth. This study is timely and relevant, offering an evidence-based bibliometric analysis of the intersection between business innovation, design management, and SME performance. By using tools like **Biblioshiny** and **RStudio**, we systematically examine patterns, trends, and thematic clusters across 157 peer-reviewed studies from 2000 to 2024. The goal is to uncover actionable insights into how design thinking and innovation coalesce to boost SME competitiveness. Ultimately, the findings benefit scholars aiming to advance theory in business innovation, practitioners seeking strategic guidance, and policymakers striving to foster SME development through innovation-driven strategies

Research Questions

This study aims to explore the evolving scholarly landscape at the intersection of business innovation, design management, and SME performance using bibliometric methods. The following research questions guided the investigation:

1. What are the dominant themes and emerging trends in the literature on business model and digital innovation between 2015 and 2025?
2. Who are the most influential authors, journals, and institutions in the field of business innovation and digital transformation?
3. What geographical regions and countries have contributed most significantly to the advancement of research in this domain?

Literature Review

Business Innovation and Design Management in SMEs Small and medium-scale enterprises (SMEs) are essential to the global economy, serving as engines of innovation, employment, and economic growth (Lu et al., 2025). In the context of increasing global competitiveness, design management has emerged as a critical enabler of innovation and performance among SMEs. Design management capabilities refer to the strategic use of design processes and thinking to enhance business outcomes, foster innovation, and create customer value (Tuffuor et al., 2025). In recent years, scholarly interest has shifted towards understanding how design and innovation capabilities can synergize to improve SMEs' performance, particularly in developing economies (Kassa & Kegne, 2025; Huy & Phuc, 2025). The following sections explore various thematic areas revealed through bibliometric analysis using

Biblioshiny and RStudio. Strategic Design Management as a Driver of Innovation, design management is no longer viewed merely as an aesthetic or product development tool; it is now a strategic function that shapes the direction and competitiveness of SMEs. Tuffuor et al. (2025) emphasize that SMEs that integrate design at the strategic level are more likely to innovate and achieve market differentiation. Similarly, López Fernández and Oliver (2025) highlight that strategic design allows SMEs to align internal resources with external opportunities, leading to more sustainable innovation outcomes.

Moreover, Hafeez et al. (2025) point out that innovation intermediaries within digital ecosystems support SMEs in navigating the complex innovation landscape through effective design collaboration and technology transfer mechanisms. Furthermore, innovation capability defined as a firm's ability to develop new products, services, or processes is intrinsically linked to firm performance (Prakhar et al., 2025). In SMEs, innovation capabilities are often constrained by limited resources and managerial capacity. Yet, dynamic capabilities such as adaptability and learning orientation can help SMEs leverage design thinking to remain competitive (Sadiq et al., 2025). While design management enhances these capabilities by enabling iterative problem-solving and customer-centric product development (Lu et al., 2025; Mishra & Jain, 2025). Wang et al. (2025) further argue that sustainable performance among energy enterprises stems from integrating environmental design into innovation strategies. Hence, the digitalization of business processes has accelerated innovation and reshaped the landscape for SMEs. Skare et al. (2025) emphasize that digital transformation, when coupled with design-led innovation, can create inclusive and sustainable business models. Digital accounting and digital ecosystems play mediating roles in intensifying business model innovation (Huy & Phuc, 2025). Wang and Zhang (2025) introduce the concept of ambidextrous green innovation combining exploitative and explorative innovation strategies enabled by AI and digital employees, which is particularly relevant for online retail SMEs. The above therefore brings about the idea of sustainable innovation, which is a pressing concern in today's business environment. Li and Wu (2025) propose that climate finance and sustainability orientation are central to business model innovation in developing countries. This is echoed by Chinwego et al. (2025), who focus on stakeholder collaboration and customer discovery as critical components in sufficiency-driven models such as rare earth recycling. Manotti et al. (2025) examine the technology affordance perspective, showing that SMEs in the New Space Economy benefit from sustainable business model innovation facilitated through strategic design. These findings demonstrate that sustainability and design management are interdependent rather than parallel strategies.

Similarly, business ecosystems offer SMEs opportunities for collaborative innovation and resource sharing (Miah et al., 2025). Haftor et al. (2025) highlight that innovation ecosystems activate lock-in mechanisms that help SMEs sustain competitive advantages through shared knowledge and technology infrastructure. Dynamic interactions between entrepreneurial domains and ecosystem outcomes are increasingly mediated by design and innovation strategies (Lucarelli et al., 2025). Such ecosystems also facilitate co-opetition a hybrid of cooperation and competition which strengthens SMEs' innovation portfolios (Klimas et al., 2025). Therefore, design management capabilities in SMEs are strongly influenced by knowledge management practices. Sadiq et al. (2025) argue that green creativity, dynamic capabilities, and knowledge sharing are vital for entrepreneurial success. Similarly, Silesky-Gonzalez et al. (2025) find that entrepreneurial intention in university students is significantly

shaped by education and design-oriented thinking. Knowledge-centric design fosters adaptive learning, which is key to sustaining innovation in volatile environments (Galindo-Martin et al., 2025). Fosso Wamba et al. (2025) also explore the ethical dimensions of generative AI, suggesting that ethical design can enhance innovation value in knowledge-intensive enterprises. The rise of artificial intelligence (AI) has expanded the frontiers of design and innovation. Teng et al. (2025) provide evidence that Gen-AI redefines value propositions in business model innovation, particularly in the IT sector. Lee et al. (2025) take a macroeconomic approach, exploring AI's role in the new energy systems and labour market dynamics. AI and machine learning also play crucial roles in predictive analytics and customer engagement, enabling SMEs to co-create solutions with customers (Raile et al., 2025; Singh et al., 2025). These insights highlight the need for SMEs to cultivate AI-literate design teams that can translate data insights into actionable innovation.

Several studies underscore the regional dimensions of innovation performance in SMEs. For example, Kassa and Kegne (2025) examine innovativeness among SMEs in Ethiopia, identifying access to finance, training, and infrastructure as key enablers of design-based innovation. Similarly, Wang et al. (2025) discuss green entrepreneurship in China as a model for environmentally sustainable SMEs. Sector-specific analyses such as in pharmaceuticals (Kharat et al., 2025), tourism (Milbourn et al., 2025), and transportation (Gomes et al., 2025) illustrate how design management must be contextually tailored to industry-specific challenges and opportunities.

Innovation and Business Performance

Innovation has long been considered a cornerstone of SME competitiveness. Empirical studies show that firms with strong innovation capabilities tend to outperform their peers in terms of growth, profitability, and market share. The role of dynamic capabilities such as sensing, seizing, and reconfiguring opportunities has been emphasized in recent literature (e.g., Sadiq et al., 2025; Hafeez et al., 2025). Design management, when aligned with innovation strategy, can serve as a critical enabler of these dynamic capabilities. Small and medium-scale enterprises (SMEs) are essential to the global economy, serving as engines of innovation, employment, and economic growth (Lu et al., 2025). In the context of increasing global competitiveness, design management has emerged as a critical enabler of innovation and performance among SMEs. Design management capabilities refer to the strategic use of design processes and thinking to enhance business outcomes, foster innovation, and create customer value (Tuffuor et al., 2025). In recent years, scholarly interest has shifted towards understanding how design and innovation capabilities can synergize to improve SMEs' performance, particularly in developing economies (Kassa & Kegne, 2025; Huy & Phuc, 2025). The following sections explore various thematic areas revealed through bibliometric analysis using Biblioshiny and RStudio.

Strategic Design Management as a Driver of Innovation

Design management is no longer viewed merely as an aesthetic or product development tool; it is now a strategic function that shapes the direction and competitiveness of SMEs. Tuffuor et al. (2025) emphasize that SMEs that integrate design at the strategic level are more likely to innovate and achieve market differentiation. Similarly, López Fernández and Oliver (2025) highlight that strategic design allows SMEs to align internal resources with external opportunities, leading to more sustainable innovation outcomes.

Moreover, Hafeez et al. (2025) point out that innovation intermediaries within digital ecosystems support SMEs in navigating the complex innovation landscape through effective design collaboration and technology transfer mechanisms.

Innovation Capabilities and Performance Metrics

Innovation capability defined as a firm's ability to develop new products, services, or processes is intrinsically linked to firm performance (Prakhar et al., 2025). In SMEs, innovation capabilities are often constrained by limited resources and managerial capacity. Yet, dynamic capabilities such as adaptability and learning orientation can help SMEs leverage design thinking to remain competitive (Sadiq et al., 2025).

Design management enhances these capabilities by enabling iterative problem-solving and customer-centric product development (Lu et al., 2025; Mishra & Jain, 2025). Wang et al. (2025) further argue that sustainable performance among energy enterprises stems from integrating environmental design into innovation strategies.

Digital Transformation and Design-Driven Innovation

The digitalization of business processes has accelerated innovation and reshaped the landscape for SMEs. Skare et al. (2025) emphasize that digital transformation, when coupled with design-led innovation, can create inclusive and sustainable business models. In particular, digital accounting and digital ecosystems play mediating roles in intensifying business model innovation (Huy & Phuc, 2025). Wang and Zhang (2025) introduce the concept of ambidextrous green innovation combining exploitative and explorative innovation strategies enabled by AI and digital employees, which is particularly relevant for online retail SMEs. Furthermore, sustainable innovation is a pressing concern in today's business environment. Li and Wu (2025) propose that climate finance and sustainability orientation are central to business model innovation in developing countries. This is echoed by Chinwego et al. (2025), who focus on stakeholder collaboration and customer discovery as critical components in sufficiency-driven models such as rare earth recycling. Manotti et al. (2025) examine the technology affordance perspective, showing that SMEs in the New Space Economy benefit from sustainable business model innovation facilitated through strategic design. These findings demonstrate that sustainability and design management are interdependent rather than parallel strategies. Hence, several studies underscore the regional dimensions of innovation performance in SMEs. For example, Kassa and Kegne (2025) examine innovativeness among SMEs in Ethiopia, identifying access to finance, training, and infrastructure as key enablers of design-based innovation. Similarly, Wang et al. (2025) discuss green entrepreneurship in China as a model for environmentally sustainable SMEs. Sector-specific analyses such as in pharmaceuticals (Kharat et al., 2025), tourism (Milbourn et al., 2025), and transportation (Gomes et al., 2025) illustrate how design management must be contextually tailored to industry-specific challenges and opportunities.

Challenges and Future Directions

Design management involves the application of design principles to business strategy, operations, and innovation processes. In the context of SMEs, design management is increasingly recognized as a means to enhance product development, customer experience, and brand positioning. Studies such as Tuffuor et al. (2025) highlight how design management capabilities contribute to organizational adaptability, market responsiveness, and sustained

performance. However, challenges such as limited resources, lack of design literacy, and low strategic prioritization persist among SMEs. Despite the demonstrated value of design management, many SMEs continue to struggle with its integration due to limited financial resources, lack of digitally skilled personnel, infrastructure and poor institutional support (Wei & Zhang, 2025; Magnaghi et al., 2025). Institutional policies must promote capacity-building programs and foster public–private partnerships to bridge this gap (Raile et al., 2025). Moreover, future research should focus on measuring the ROI of design strategies, exploring gender-inclusive innovation (Skare et al., 2025), and leveraging AI ethics for sustainable innovation (Fosso Wamba et al., 2025). As shown by Salmerón et al. (2025), agility, openness, and continuous design innovation will determine the long-term competitiveness of SMEs in an increasingly digital economy. There is the need for more financial support for research from the academia. Moreover, future research should focus on measuring the ROI of design strategies, exploring gender-inclusive innovation (Skare et al., 2025), and leveraging AI ethics for sustainable innovation and digital solutions (Fosso Wamba et al., 2025). As shown by Salmerón et al. (2025), agility, openness, and continuous design innovation will determine the long-term competitiveness of SMEs in an increasingly digital economy. Finally, more funding should be provided for researchers in this area to foster further development in business innovation.

Research Methodology

The study applied a bibliometric analysis method, this was done by searching for articles, review papers, conference papers on business model and innovation from Scopus database. The string used was (business AND model AND innovation) AND PUBYEAR > 2015 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA, "BUSI")). Which shows a growing scholarly interest in the topic from 2015 - 2025, with dominant themes revolving around innovation strategy, dynamic capabilities, and sustainable business model innovation. 26,646 papers were found in the first search, however when it was limited to just business management and accounting subject area. Only 12,476 papers were finally generated and exported to biblioshiny application with Rstudio for the bibliometric analysis which is shown in the next section.

Results and Discussions

Most Relevant Sources

In the domain of business and innovation research, the most relevant and influential sources have been identified based on the volume of articles published. As shown in Table 1, the *Journal of Cleaner Production* emerges as the leading source, contributing the highest number of publications (185 articles), reflecting its prominent role in promoting sustainable and innovative business practices. This is closely followed by *Technological Forecasting and Social Change* with 170 articles, highlighting its importance in examining future-oriented business strategies and innovation trends. The *Journal of Business Research* (121 articles) and *Business Strategy and the Environment* (111 articles) also feature prominently, indicating strong academic interest in strategic approaches to environmentally sustainable business models. Additionally, sources such as *IEEE Transactions on Engineering Management* (95 articles) and the *European Journal of Innovation Management* (93 articles) provide substantial contributions, underlining the interdisciplinary nature of innovation research spanning engineering, management, and business domains. Conference proceedings, such as those published in the *Springer Proceedings in Business and Economics* (86 articles) and the

European Conference on Innovation and Entrepreneurship (ECIE) (82 articles), further demonstrate the dynamic and evolving discourse in this field. Finally, journals like *Technovation* (74 articles) and *Cogent Business and Management* (66 articles) offer diverse perspectives on technological innovation and business management, reinforcing the breadth and depth of scholarship in the intersection of business and innovation.

Table 1.

Most relevant Sources

Sources	Articles
Journal Of Cleaner Production	185
Technological Forecasting and Social Change	170
Journal of Business Research	121
Business Strategy and The Environment	111
Ieee Transactions on Engineering Management	95
European Journal of Innovation Management	93
Springer Proceedings in Business and Economics	86
Proceedings of the European Conference on Innovation and Entrepreneurship, Ecie	82
Technovation	74
Cogent Business and Management	66

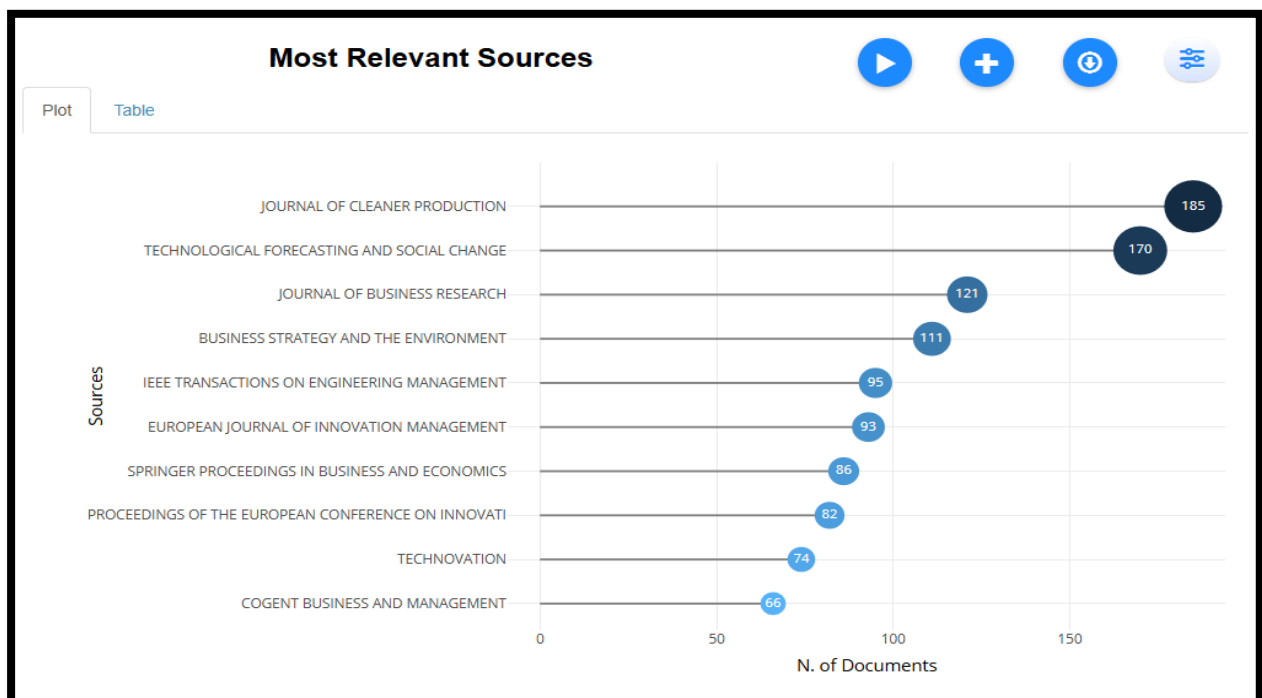


Figure 1. Most Relevant Sources

Most Relevant Authors

The breakdown of the most relevant authors in the field of business and digital innovation, as presented in Table 2, reveals a core group of scholars who have made significant contributions to the literature. Leading the list is Parida V, with 34 articles and a fractionalized count of 8.87, indicating a high level of collaboration in multi-authored publications. Liu Y follows with 27 articles (7.95 fractionalized), showcasing consistent productivity and engagement in the field.

Notably, Li X and Wang Y both have 26 publications, with Li X having the highest fractionalized count (9.45), reflecting substantial individual contribution despite frequent co-authorship. Ghezzi A and Kraus S also stand out with 23 and 22 articles, respectively, highlighting their strong presence in innovation research. Kumar A (20 articles), Kanbach DK (18), Li J (18), and Kohtamäki M (17) round out the top contributors, with varying degrees of fractionalized contributions. These authors play a crucial role in shaping the discourse on business and innovation, often serving as intellectual anchors within collaborative research networks that span disciplines such as strategic management, entrepreneurship, and technological innovation.

Table 2.
Most Relevant Authors

Authors	Articles	Articles Fractionalized
PARIDA V	34	8.87
LIU Y	27	7.95
LI X	26	9.45
WANG Y	26	8.88
GHEZZI A	23	6.98
KRAUS S	22	5.50
KUMAR A	20	4.73
KANBACH DK	18	5.15
LI J	18	5.93
KOHTAMÄKI M	17	4.72

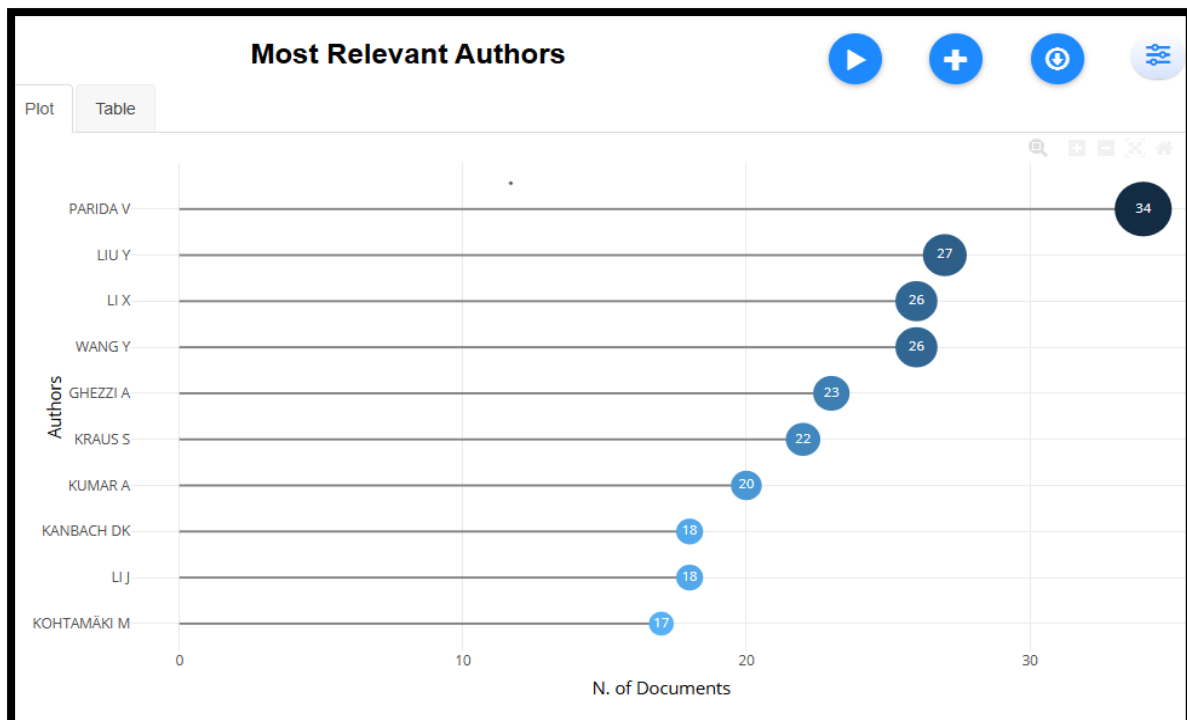


Figure 2. Most Relevant Authors

Most Relevant Affiliation

Table 3. shows the analysis of the most relevant affiliations contributing to business and digital innovation research reveals a diverse range of institutions from across the globe. Notably, *Universiti Sains Malaysia* and *Islamic Azad University* stand out for their impactful scholarly output, with 44 and 36 articles respectively. Their performance is particularly significant when compared to several prominent European institutions. For example, *Universiti Sains Malaysia* surpasses renowned universities such as *RWTH Aachen University* and *Technical University of Munich*, which contributed 38 and 37 articles respectively, reflecting the growing influence of Malaysian research in the global innovation landscape. Similarly, *Islamic Azad University* matches the output of established European institutions like *Linköping University* and *Sapienza University of Rome*, each with 36 publications. This suggests a shift in the global research dynamic, with institutions from Asia and the Middle East playing increasingly prominent roles in the discourse on business and digital innovation. While traditional European universities such as *Politecnico di Milano* (60 articles) and *University of Turin* (59 articles) remain influential, the notable contributions from *Universiti Sains Malaysia* and *Islamic Azad University* underscore the expanding geographical reach and diversity of impactful research in this evolving field.

Table 3.

Most Relevant Affiliation of Authors

Affiliation	Articles
Bina Nusantara University	63
Politecnico Di Milano	60
University of Turin	59
Luleå University Of Technology	58
School of Management	58
University of Vaasa	51
Delft University of Technology	50
University of Tehran	50
Hhl Leipzig Graduate School of Management	46
Universiti Sains Malaysia	44
Zhejiang University of Technology	43
Eindhoven University of Technology	42
Rwth Aachen University	38
Zhejiang University	38
Technical University of Munich	37
Islamic Azad University	36
Linköping University	36
Lut University	36
Sapienza University of Rome	36
University of Murcia	36
University of Kassel	35
Xi'an Jiaotong University	35
University of São Paulo	34
Queensland University of Technology	33

Corresponding Author's Countries in Business and Digital Innovation

corresponding authors' countries in the field of business and digital innovation reveals a highly international research landscape, with notable contributions from both developed and emerging economies. As shown in Table 3, *China* leads with the highest number of publications (592 articles, 8.3%), demonstrating strong national engagement in this domain, supported by a substantial share of single-country publications (SCP = 413) and a significant portion of multi-country collaborations (MCP = 179; 30.2%). *Italy* follows with 368 articles and a higher international collaboration rate (MCP% = 34), reflecting its active participation in global research networks. Interestingly, the *United Kingdom* exhibits the highest level of international collaboration (MCP% = 55.9%) among the top contributors, with 161 of its 288 articles resulting from multi-country partnerships. Similarly, *Finland* (56.5%), *France* (53.8%), and *Malaysia* (45.2%) also demonstrate strong tendencies toward collaborative research, despite having relatively lower article counts. The *United States* maintains a balanced output (298 articles) with a high rate of collaboration (MCP% = 38.9%), underscoring its global research connectivity. Hence, emerging economies such as *India* (327 articles) and *Indonesia* (153 articles) contribute substantially, although their lower MCP percentages (16.5% and 15.7% respectively) suggest a more domestically focused research approach. Meanwhile, *Malaysia's* rising role, with 84 articles and an MCP% of 45.2, highlights its growing impact and international integration in business and digital innovation research. These findings illustrate the global dispersion and collaborative dynamics of scholarly activity in this field, with both established and emerging nations shaping the discourse through varying levels of international engagement.

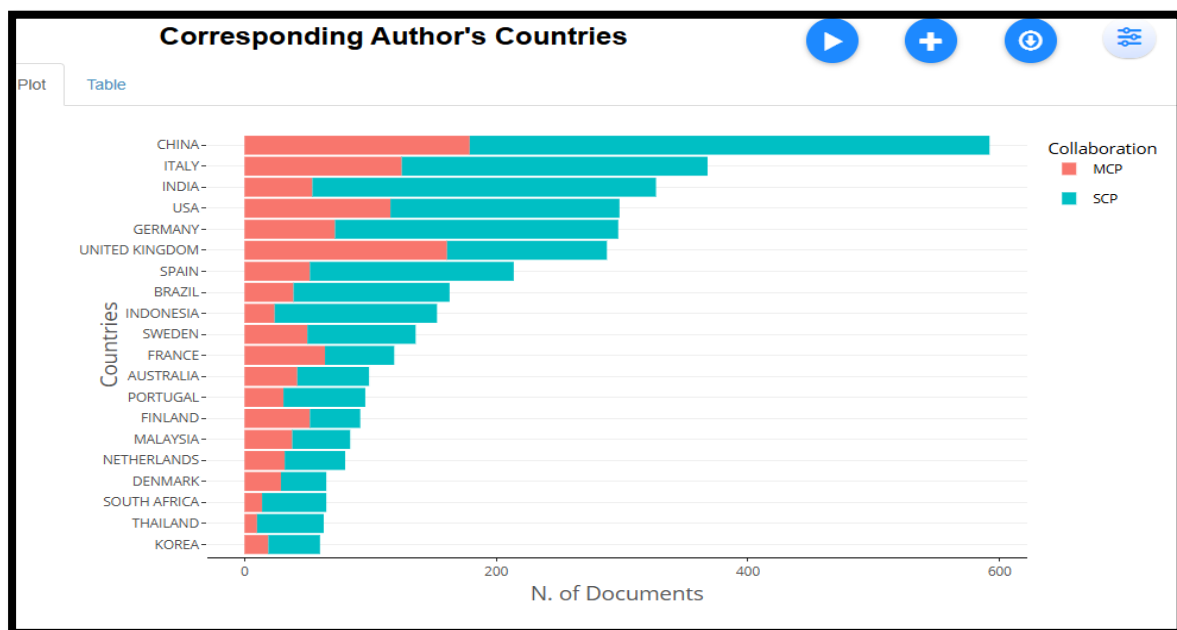


Figure 3. Corresponding Authors Countries

Table 4

Corresponding Authors Countries

Country	Articles	Articles %	SCP	MCP	MCP %
China	592	8.3	413	179	30.2
Italy	368	5.2	243	125	34
India	327	4.6	273	54	16.5
Usa	298	4.2	182	116	38.9
Germany	297	4.2	225	72	24.2
United Kingdom	288	4.1	127	161	55.9
Spain	214	3	162	52	24.3
Brazil	163	2.3	124	39	23.9
Indonesia	153	2.2	129	24	15.7
Sweden	136	1.9	86	50	36.8
France	119	1.7	55	64	53.8
Australia	99	1.4	57	42	42.4
Portugal	96	1.4	65	31	32.3
Finland	92	1.3	40	52	56.5
Malaysia	84	1.2	46	38	45.2
Netherlands	80	1.1	48	32	40
Denmark	65	0.9	36	29	44.6
South Africa	65	0.9	51	14	21.5
Thailand	63	0.9	53	10	15.9
Korea	60	0.8	41	19	31.7
Canada	55	0.8	31	24	43.6
Turkey	53	0.7	41	12	22.6
Norway	50	0.7	26	24	48
Switzerland	49	0.7	35	14	28.6
Iran	48	0.7	40	8	16.7

Most Cited Countries in Business and Digital Innovation

The analysis of the most cited countries in the field of business and digital innovation underscores the prominence of both traditional research powerhouses and emerging contributors. As shown in Table 5, *Italy* leads with a total of 12,647 citations and an average of 34.4 citations per article, followed by *China* (8,534 citations) and the *United Kingdom* (7,283 citations), which also demonstrates strong performance with an average of 25.3 citations per article. *The Netherlands* stands out with the highest average citations per article (78.9), indicating the exceptional impact of its scholarly output despite a lower total article count.

Importantly, *Saudi Arabia* has demonstrated a noteworthy performance in comparison to several European countries. With 904 total citations and an average of 23.2 citations per article, Saudi Arabia surpasses countries like *Portugal* (1,235 citations, 12.9 average), *Korea* (994 citations, 16.6 average), and even *Canada* (935 citations, 17.0 average) in terms of citation impact. Its performance is also comparable to *Norway* (1,297 citations, 25.9 average) and *France* (2,996 citations, 25.2 average), highlighting the country's growing influence in the discourse on business and digital innovation. This trend signals the increasing recognition and visibility of research emerging from Saudi Arabia within the global academic community. It

also reflects the strategic investments in research and development by Saudi institutions, enabling them to produce high-impact work that rivals that of established European counterparts. As the field continues to evolve, such contributions from emerging regions are likely to further shape and diversify the global research landscape.

Table 5
Most Cited Countries

Country	TC	Average Article Citations
Italy	12647	34.40
China	8534	14.40
United Kingdom	7283	25.30
Germany	6926	23.30
Netherlands	6315	78.90
Sweden	5080	37.40
Usa	4782	16.00
Finland	4223	45.90
Spain	3713	17.40
India	3159	9.70
France	2996	25.20
Brazil	2614	16.00
Austria	2480	53.90
Australia	2030	20.50
Denmark	2011	30.90
Iran	1906	39.70
Indonesia	1605	10.50
Malaysia	1504	17.90
Norway	1297	25.90
Portugal	1235	12.90
New Zealand	999	40.00
Korea	994	16.60
Pakistan	939	21.30
Canada	935	17.00
Saudi Arabia	904	23.20

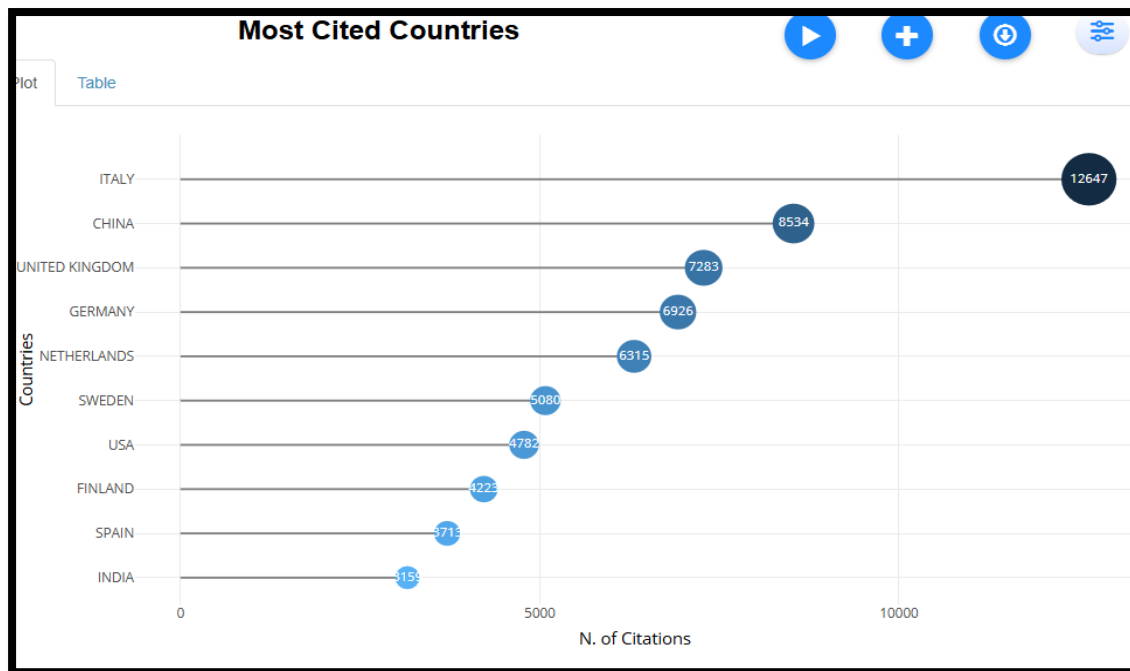


Figure 4. Most Cited Countries

The Most Globally Cited Documents and Authors

The most globally cited documents and authors in the domain of business and digital innovation highlights several high-impact scholarly contributions that have significantly shaped the field. As shown in Table 5, the most cited document is by Verhoef et al. (2021), published in the *Journal of Business Research*, with a remarkable 2,527 total citations, averaging 505.4 citations per year and a normalized citation count of 93.26 indicating its widespread influence in mapping the digital transformation of business models. This is followed by Ghobakhloo (2020) in *Journal of Cleaner Production*, which has garnered 1,403 citations, emphasizing the growing relevance of digitalization in sustainability-oriented business strategies. Other highly influential works include Rachinger et al. (2019), Matarazzo et al. (2021), and Di Vaio et al. (2020), each with over 600 citations, reflecting strong academic interest in topics such as digital business transformation, innovation capabilities, and sustainable development. Notably, Kohtamäki M appears twice on the list with substantial citation counts (667 and 502), underlining his significant scholarly footprint in digital servitization and innovation management. Additionally, authors such as Wamba-Taguimdje, Ghezzi, George, and Li are among the top contributors whose works have attracted wide academic attention across various high-impact journals including *Technovation*, *Entrepreneurship Theory and Practice*, and *Technology Forecasting and Social Change*. These citations not only reflect the relevance of their research but also signal the central role these authors play in advancing theoretical and empirical understanding in business and digital innovation. The diversity of journals and topics covered suggests a multidimensional and interdisciplinary approach that continues to define and expand this evolving field.

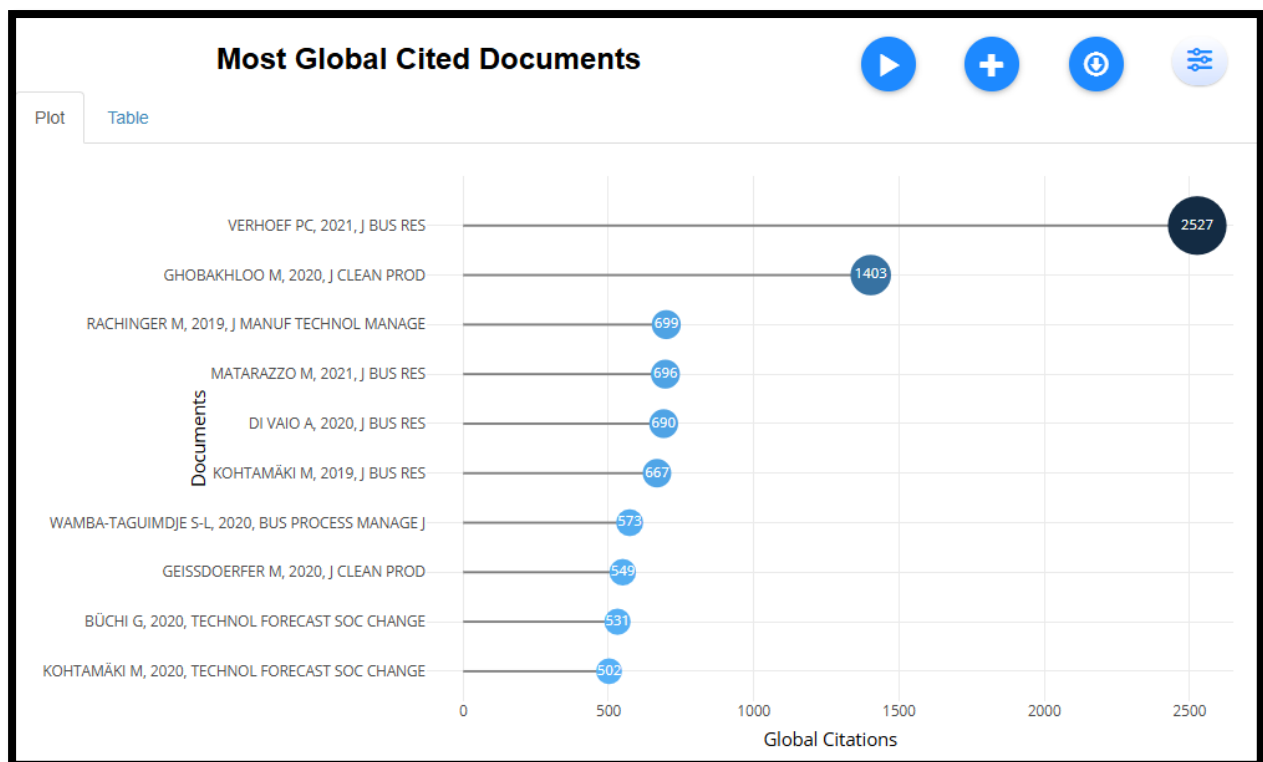


Figure 5. Most Globally Cited Documents

TreeMap Analysis

The analysis of the most frequently used words in business and digital innovation documents, based on the TreeMap and word cloud generated using the Biblioshiny application, reveals the central themes and conceptual focus areas within the literature. As shown in the table, the term “innovation” is the most dominant, appearing 547 times, underscoring its foundational role in the discourse on business transformation and technological advancement. Closely following are “business models” (398 occurrences) and “business model innovation” (327 occurrences), reflecting the scholarly emphasis on how firms restructure their value creation and delivery mechanisms in response to digital disruption. The concept of “sustainable development” (278 occurrences) also features prominently, highlighting the growing integration of environmental and social considerations into business innovation strategies. Terms such as “commerce” (205), “competition” (172), and “business development” (159) further indicate a strong orientation toward market dynamics and strategic growth. “Digital transformation” (150) and “technological innovation” (141) point to the critical role of emerging technologies in reshaping business processes and capabilities. Other frequently appearing words like “decision making,” “circular economy,” “sustainability,” and “artificial intelligence” reveal the multidimensional nature of the research, which spans technological, economic, environmental, and managerial domains. Notably, terms such as “small and medium-sized enterprise” (77) and “technology adoption” (76) indicate a focused interest in how innovation affects and is adopted by SMEs, which are vital engines of economic growth. Finally, the keyword analysis reflects a rich and evolving research landscape centered on innovation-driven change, digital capabilities, sustainability, and strategic reconfiguration, thereby offering comprehensive insights into the key drivers and challenges of business and digital innovation.

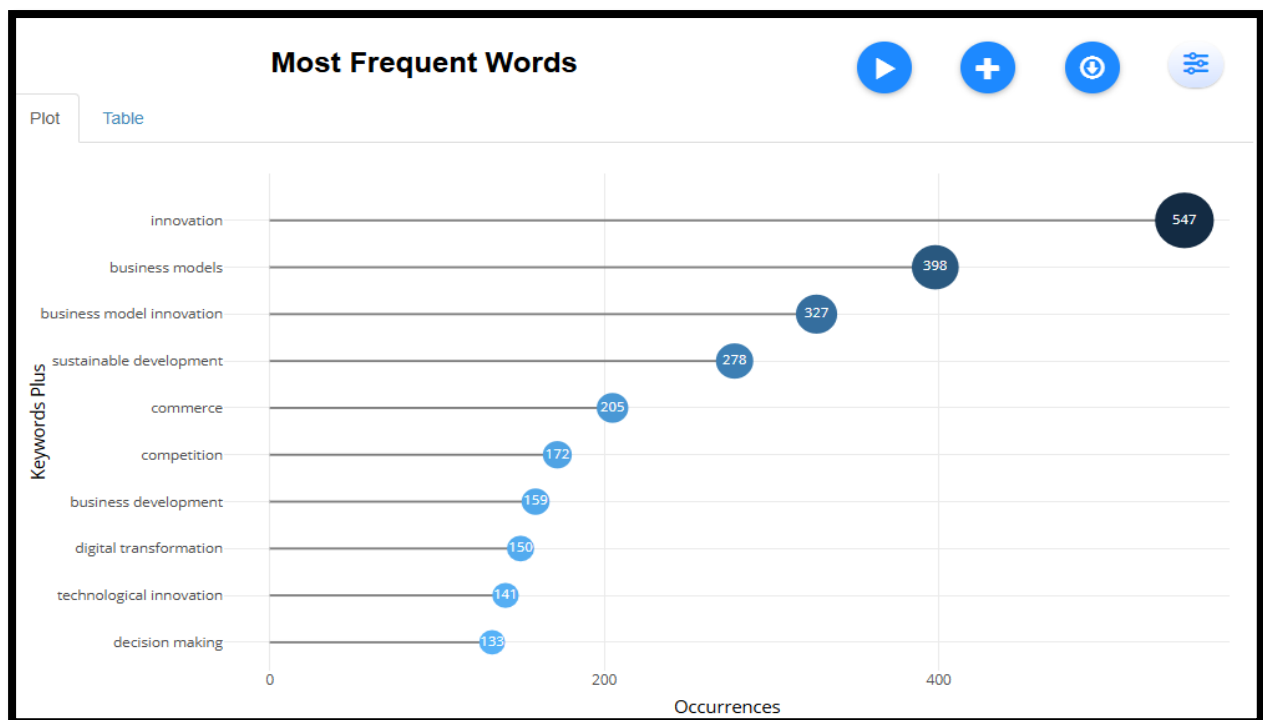


Figure 8. Most Frequent Words

Trending Topics in Business and Digital Innovation

The analysis of trending topics in business and digital innovation research, as shown by the temporal distribution and frequency of keywords, reveals a dynamic shift in scholarly focus over the years. Early research emphasis (Q1: 2020) was rooted in foundational themes such as business modelling (frequency: 73), industrial management (47), service industry (27), and design/methodology/approach (60). These terms reflect the initial efforts to conceptualize and structure innovation within traditional business frameworks.

From 2021 onward, the research landscape evolved toward more contemporary and strategic themes. High-frequency keywords like innovation (547), business models (398), business model innovation (327), sustainable development (278), and digital transformation (150) saw a significant surge. The median and Q3 years for these terms fall between 2022 and 2024, indicating their sustained relevance and ongoing expansion in scholarly discourse. Technological innovation (141), circular economy (117), and dynamics capability (56) emerged strongly in this period, reflecting a growing integration of environmental and capability-based perspectives within digital innovation.

Notably, the most recent emerging topics decentralized finance (24), green development (20), and sustainable development goals (20) have their Q1 appearances in 2024 and Q3 projections into 2025, marking them as forward-looking and rapidly developing areas. These trends suggest a shifting research frontier toward sustainability, fintech, and broader socioeconomic impacts of digital transformation.

Largely, the progression from structural and methodological themes to sustainability, technology adoption, and financial innovation highlights the field's responsiveness to global

digital and environmental challenges. This evolution underscores the increasing complexity and interdisciplinary nature of business and digital innovation research.

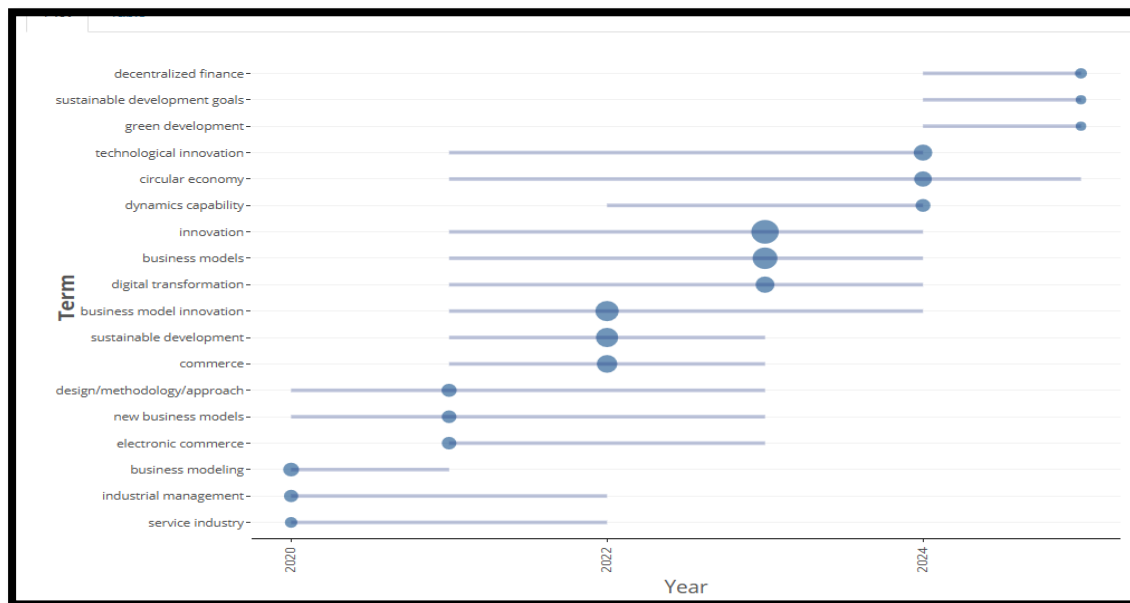


Figure 9 Most Trending Topics in Business and Digital Innovation

Clustering of Documents and Authors in Business and Digital Innovation

The clustering of documents and authors in business and digital innovation literature, as revealed through Normalized Local Citation Scores (NLCS), identifies key contributors and influential works that significantly shape academic discourse in the field. Leading the cluster is Ciampi F. (2021, *Journal of Business Research - A*), with a dominant NLCS of 28.42, indicating a central role in the scholarly network and high impact among peer literature. Following closely is Soluk J., who notably appears twice first with 20.06 in *Entrepreneurship Theory and Practice*, and again with 8.36 in the *European Journal of Information Systems* demonstrating both influence and consistent contribution across journals.

Other notable documents include Matarazzo (2021, *Journal of Business Research*) with an NLCS of 19.64, Santa-Maria (2022, *Business Strategy and the Environment*) at 19.43, and Hock-Doepgen (2021, *Journal of Business Research*) scoring 18.39, each reflecting strong local relevance and influence in advancing discussions around strategy, environment, and innovation. The study by Oliveira-Dias D. (2022, *Management Decision*) also stands out with 11.39, indicating significant scholarly engagement.

Authors with emerging but less concentrated influence such as Adomako (2024, *Thunderbird International Business Review*), Wu (2022, *Journal of Business & Industrial Marketing*), and Ciacci A. (2023, *Journal of Small Business and Enterprise Development*) show potential for future impact as the domain continues to evolve. A larger group of authors including Perotti FA, Tetteh FK, Gamet D, Selezneva A, and Zhao W. are each clustered with a normalized score of 1.00, indicating contributions that, while currently more peripheral, enrich the thematic diversity of the field. This clustering analysis underscores a clear stratification of influence, where a few core authors and documents anchor the discourse, while a broader set of contributions foster cross-cutting themes across business models, technological adoption, sustainability, and strategic innovation.

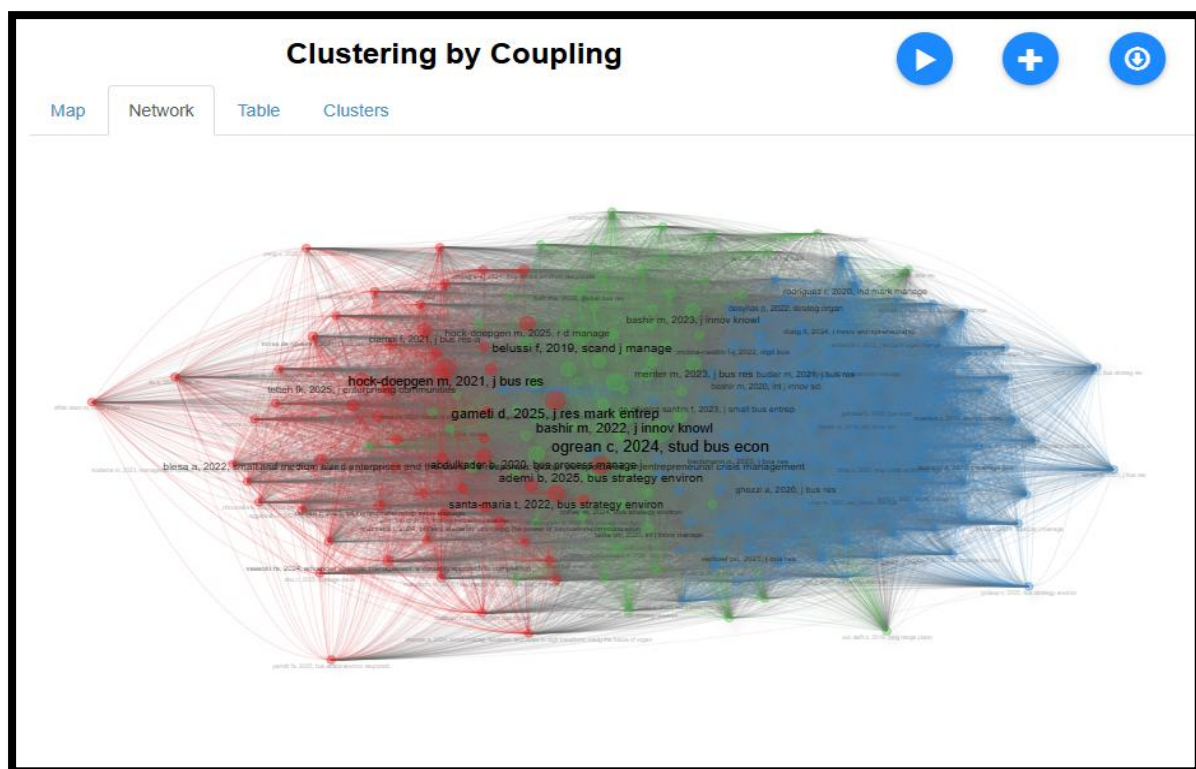


Figure 10. Clustering of Documents and Authors in Business and Digital Innovation

Contribution to Knowledge

This bibliometric analysis contributes to the scholarly discourse on business and digital innovation in several ways:

1. **Holistic Mapping of Literature:** It presents a systematic bibliometric overview of business model innovation in SMEs. By providing clarity on influential publications, authors, institutions, and citation dynamics across two decades. This will enable new scholars and fresh postgraduate students to be able to find trending topics easily and fill the available gaps in the area of study.
2. **Emerging Thematic Areas:** The study identifies critical emerging topics such as circular economy, decentralized finance, AI-driven innovation, and sustainability highlighting the field's responsiveness to global digital and environmental shifts.
3. **Design Management as a Strategic Capability:** It foregrounds the importance of integrating design thinking at a strategic level in SMEs. Which displays how such capabilities align with innovation success and firm performance.
4. **Geographical and Institutional Insights:** The research showcases the growing impact of institutions and countries beyond traditional Western research powerhouses, notably highlighting significant contributions from Malaysia, Iran, and Saudi Arabia.
5. **Methodological Contribution:** Through the application of Biblioshiny and RStudio, the study reinforces the utility of bibliometric tools in conducting large-scale, data-driven literature reviews that inform future research directions.

Recommendations

Based on the analysis and findings, the following recommendations are proposed:

1. *Policy-Level Support*: Governments and institutions should promote public-private partnerships and provide financial and technical support for SMEs to integrate strategic design and innovation practices.
2. *Capacity Building in SMEs*: Targeted training and capacity development programs on digital transformation, design management, and innovation strategy should be created, especially for SMEs in developing regions.
3. *Foster Cross-Border Collaboration*: Researchers and institutions are encouraged to increase multi-country research collaborations to enhance knowledge exchange and diversify perspectives in the field.
4. *Inclusive and Ethical Innovation*: Future innovation strategies should incorporate ethical considerations (e.g., AI ethics, gender inclusiveness) to ensure sustainable and responsible technological advancement.
5. *Sector-Specific Application of Innovation Models*: Policymakers and practitioners should develop industry-specific frameworks that align design and innovation capabilities with the operational realities of sectors such as tourism, pharmaceuticals, and energy.

Conclusions

This bibliometric analysis offers a comprehensive understanding of the evolving landscape of business model and innovation research, with a particular focus on SMEs and design management. The study reveals a shift in scholarly focus from foundational business modelling to strategic themes such as sustainability, digital transformation, and AI-driven innovation. It also emphasizes the increasing participation of emerging economies and non-Western institutions in shaping global innovation discourse. While challenges remain such as limited resources, low design literacy, and institutional gaps the opportunities presented by technological advancement, ecosystem collaboration, and strategic design integration hold significant promise. Ultimately, cultivating dynamic innovation capabilities, supported by robust knowledge management and ethical foresight, will be critical in ensuring the competitiveness and resilience of SMEs in the digital era.

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