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Innovation Behavior Research: Global Trends and Emerging Themes in Entrepreneurial Business Practices

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ABSTRACT

Innovation behavior research has emerged as a critical field due to its role in enhancing business competitiveness and organizational performance. **This bibliometric** analysis aims to provide a comprehensive understanding of global trends and emerging themes in innovation behavior research from 2015 to 2024. Dimensions database found 11,798 articles were identified and analyzed using **VOSviewer software. Results** reveal that Australia, China, the United Kingdom, and the United States are the top contributors to this research, with strong international collaboration networks highlighting the global nature of this field. Brock University, Jiangsu University, and Erasmus University Rotterdam stand out for their collaborative networks and strategic research directions. In the author-based analysis, research efforts primarily focus on exploring the relationship between entrepreneurial orientation, transformational leadership, and innovation behavior. Frontiers in Psychology and Sustainability emerge as influential journals, covering topics like digital transformation, organizational behavior, and sustainable business practices. Groundbreaking studies have developed frameworks linking innovation behavior with knowledge sharing, digital transformation, and conflict management. Keyword co-occurrence analysis highlights ”innovation”, ”performance”, and ”leadership” as frequently occurring terms. Their prominence reflects a core focus on understanding how innovation directly impacts organizational outcomes and underscores the importance of transformational leadership in fostering innovation behavior. **The findings** provide valuable insights into global innovation behavior research, identifying emerging interdisciplinary themes like digital transformation and sustainability. Future research should explore global collaboration networks, interdisciplinary approaches, and the influence of leadership styles on innovation behavior.

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1. INTRODUCTION

Innovation behavior plays a crucial role in the competitive positioning and long-term sustainability of businesses, particularly in the digital economy and cyberpreneurship landscape. Companies worldwide are increasingly adopting innovative strategies to adapt and thrive in dynamic markets. The transformation of business models and rapid technological advancements have driven significant interest in understanding innovation behavior from both practical and academic perspectives [1].

Innovation behavior can be understood as the deliberate process of creating, introducing, and applying new ideas within a work role, group, or organization to improve performance and achieve organizational objectives [2]. At the individual level, this behavior involves active participation in generating and implementing new methods or concepts, contributing to the development of innovative products, services, and operational processes that enhance organizational efficiency and creativity [3].

The study of innovation behavior has become a focal point in business and management research due to its critical role in driving organizational growth and responding to rapidly evolving market environments. Employing bibliometric methodologies, which involve quantitative analysis of textual content and citation data, provides a comprehensive approach to evaluating the expansive literature on this topic [4]. These methodologies are particularly effective in uncovering research patterns and trends, enabling a systematic evaluation of thematic and citation landscapes within the field [5].

Bibliometric techniques are instrumental in identifying research clusters and mapping connections between studies based on their quantitative outputs and relevance [6]. This analytical approach enables researchers to uncover dominant themes and patterns within the extensive body of scholarly communication on innovation behavior, providing valuable insights into the field [7].

This research utilizes the Dimensions database, renowned for its extensive repository that includes over 144 million research articles, papers, and gray literature, enriched with ancillary information such as grants, patents, and policy documents [8, 9]. Dimensions employs the Digital Object Identifier (DOI) system, enabling precise and extensive searches for research articles based on specific keywords. This indexing system is notable for its breadth across all scientific disciplines, providing citation metrics comparable to those of Scopus [10]. It also offers refined search capabilities, including filters for publication year, researcher credentials, research categories, publication types, source journals, and access type, thereby facilitating targeted data extraction for in- depth analysis [11].

The academic inquiry into innovation behavior spans a diverse range of disciplines, from management to digital business and cyberpreneurship [12]. However, despite this extensive coverage, there exists a noticeable gap in a holistic understanding of the existing research landscape particularly in pinpointing the pivotal trends, key contributors, and emergent themes within this domain [13]. This study aims to bridge this gap by conducting a detailed bibliometric analysis using VOSviewer to scrutinize research trends and collaborations within the Dimensions database for the period from 2015 to 2024 [14]. The findings of this paper are particularly relevant to the fields of science, engineering, and technology, as innovation behavior serves as a critical driver of technological advancements and engineering solutions. For example, integrating insights on innovation behavior with engineering management can streamline the development of cutting-edge technologies, while the study of collaborative networks provides potential frameworks for advancing interdisciplinary research in science and technology domains [15]. Furthermore, the emphasis on digital transformation highlights practical applications in areas such as software engineering, data analytics, and automation, which are essential for addressing modern technological challenges. Through this analysis, the research seeks to provide an expansive overview of the evolution and trajectory of innovation behavior studies, highlighting influential works, key thematic concentrations, and the dynamics of academic collaboration in this vital area of scholarly research [16].

2. LITERATURE REVIEW

2.1. Data Collection

This research employs a bibliometric approach to explore publication patterns related to ”Innovation Behavior” keyword [17]. The data was collected from the Dimensions database using the following criteria: the primary keywords included ”Innovation Behavior” and the publication years were limited to 2015 to 2024. The selected documents were journal articles only, the non-journal articles and articles unrelated to innovation behavior were excluded from the analysis [18].

Ensuring the quality of publications is critical, and the focus was placed on high-quality research indexed in reputable international journals. This approach leverages bibliometric methodologies that are widely recognized for their ability to provide a systematic evaluation of research trends and scientific collaboration within a specific field [19]. Bibliometric analysis provides a comprehensive view of research trends and scientific collaboration in a specific field. That understanding these trends is crucial for identifying gaps and opportunities in emerging research areas [20].

2.2. Data Analysis

The data obtained from Dimensions was analyzed using VOSviewer, a software designed specifically for bibliometric analysis and network visualization. The analysis covered several aspects namely firstly country-based bibliometric analysis that examine contributions by country to innovation behavior research. The bibliometric analysis utilizes statistical techniques to identify patterns and connections within the data. For instance, co-citation analysis uncovers relationships between frequently cited articles, while keyword co-occurrence analysis highlights emerging research themes. Visualization tools such as VOS viewer simplify these complex relationships by generating intuitive network maps that illustrate the strength of connections between countries, organizations, and authors. These tools allow researchers to identify clusters of activity and trends with enhanced clarity and efficiency. The organization-based bibliometric analysis will identify leading organizations based on publication numbers and collaboration networks, continue by author-based bibliometric analysis to identify the most productive authors and their collaboration networks, then source-based bibliometric analysis will identify the influential journals in innovation behavior research, continue document-based bibliometric analysis that identifies the most cited papers and influential research in the field, lastly the analysis of keyword co-occurrence to uncovers emerging trends and research topics through co-occurrence keyword analysis. Each analysis generates a network, overlay, or density visualization, providing insights into publication patterns and collaboration in innovation behavior research. To aid understanding, cocitation networks refer to the connections formed when two documents are cited together by other research, indicating a thematic or methodological link between them. This method helps identify influential studies and foundational works within a field. Similarly, keyword cooccurrence analysis involves mapping frequently paired keywords in research articles, revealing emerging topics and trends. For instance, terms like digital transformation and organizational strategy may frequently co-occur, suggesting a strong research focus on their interrelation.

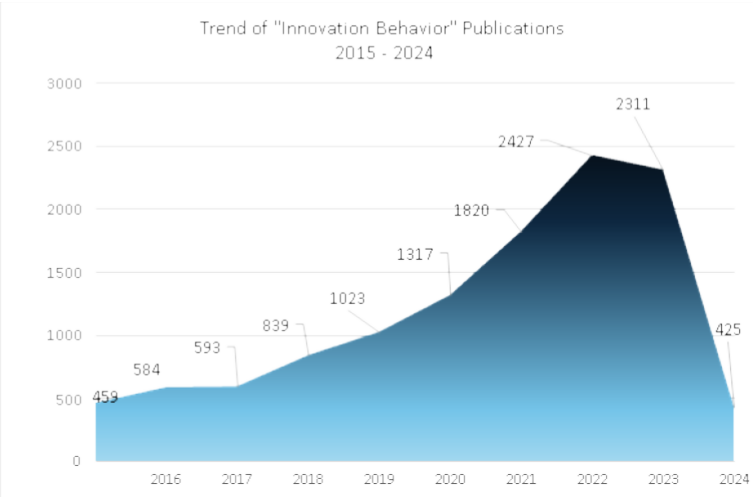

Figure 1. Trend of publications of “Innovation Behavior “in 2015-2024

Source: Dimensions database of “Innovation Behavior” keyword (2024).

Figure 1, the trajectory of ”Innovation Behavior” publications over the past ten years is illustrated in the graph above, highlighting a significant upward trend [21]. The data shows a consistent and remarkable increase in interest in this research area, reaching a peak in 2022 with 2,427 articles, which is more than five times the number recorded in 2015 (459 articles). Although there is a noticeable decline in 2024, with 425 articles likely due to incomplete data for the current year, the overall trend underscores sustained and

accelerating growth [22].

In the initial growth period from 2015 to 2018, research output in ”Innovation Behavior” began modestly, with 459 articles published in 2015. However, a steady increase in publications was observed during this period, doubling to 839 articles in 2018. This initial phase laid the foundation for the significant expansion that would follow. The years from 2018 to 2022 marked a period of exponential growth. Publications increased steadily, reaching 1,317 articles in 2020. However, the period from 2020 to 2022 saw an unprecedented surge, with publications more than doubling to 2,427 by 2022. This substantial growth can be attributed to the global disruption caused by the COVID-19 pandemic, which accelerated research into innovation behavior as organizations and individuals adapted to rapid changes in work practices, technology adoption, and digital transformation [23].

The pandemic significantly disrupted economies and accelerated the transition to digital systems. This global phenomenon necessitated a reconsideration of daily activities to align with the new normal, driving individuals and organizations to adopt digital technologies more swiftly [24]. The term ”digital transformation” became ubiquitous, encompassing face-to-face interactions that shifted towards digitalization. Consequently, the pandemic induced disruption catalyzed a shift in human behavior towards digitalization, fostering opportunistic innovation and transformation [25].

The year 2023 witnessed a slight decline, with 2,311 articles published. Nevertheless, the overall upward trajectory of research on innovation behavior remained steady. This trend has sparked considerable interest among academics and researchers, particularly in understanding how global disruptions, such as the COVID-19 pandemic, have accelerated changes in communication systems and caused significant economic shifts [26, 27]. These developments underscore the growing importance of studying innovation behavior to address such challenges and opportunities.

The persistence of innovation initiatives and organizational adaptations has been identified as a key factor positively influencing innovation behavior over time [28]. This research explores the extent to which innovation behavior has been examined worldwide, with a particular focus on its role in business and management contexts. Through bibliometric analysis, valuable insights have been gained into the quantity and quality of research conducted, revealing well-studied areas as well as gaps that warrant further exploration. These findings are particularly relevant in fields such as business, human resource management, and education, where innovation behavior plays a critical role in driving growth and adaptability [29, 30].

3. RESEARCH METHODS

When a research field generates a lot of information in a short period, information overload is inevitable, making the field complex and confusing. Bibliometric analyses utilize statistical techniques to reveal a subject features and dynamics, depending on the unit of study (e.g., documents, journals, authors). Bibliometric methods provide objective insight into ”invisible colleges”, patterns, and trends within a field. They also help in understanding the relationships between the data produced by a subject or study area [31]. The quantitative method of bibliometric inquiry can characterize study designs and features across a range of distributions by combining representational and evaluative approaches.

3.1. Subject Study

In this study, the Dimensions database was used to analyze the keyword ”Innovation Behavior”. The research period was limited to the last ten years, from 2015 to 2024, focusing on publications in business and management, such as trade, marketing, organizational behavior, commercial services, and human society [32]. The Dimensions database extracted 11,798 articles and proceedings published within this timeframe.

3.2. Indicatory of Research

Analysis was conducted using VOSviewer software version 1.6.19 on the 11,798 articles obtained from the Dimensions database. VOSviewer, developed by Leiden University, is a professional tool for structuring and visualizing bibliometric networks [33]. It also includes text mining functions to build and visualize co-occurrence networks of significant labels extracted from scientific documentsn. The results are presented through network visualization, overlay visualization, and density visualization. The indicators presented include the number of publications, citations, and the total strength of relationships between the displayed items [34].

3.3. Research Procedure

All articles related to "Innovation Behavior" were collected from the Dimensions database. VOSviewer software was used to analyze, visualize, and assess the bibliometric data. VOSviewer is especially useful in bibliometric studies because it clearly identifies significant authors, journals, and themes [32]. The software also provides accurate representations of the underlying dataset, offering distinct advantages over other mapping tools. VOSviewer layered label layout vividly displays dense network node interactions, making it ideal for analyzing complex networks and large-scale data created by a high number of citations and keyword co-occurrences [35]. In bibliometric analysis, five research steps culminate in data interpretation, starting with keyword inquiry.

Figure 2. Stages to Conducting Bibliographic Analysis

Figure 2. Stages of the bibliometric analysis approach are as follows:

- Keyword Research

  The keyword "Innovation Behavior" was input into the Dimensions database to collect data. Classification Refinement

- Classification Refinement

  The researcher ensured the search results were relevant to "Innovation Behavior." The results were then exported to Microsoft Excel using the Dimensions databases export feature, allowing selection based on parameters like publication type, year, country, source, and author [36].

- Threshold Setting

  The researcher selected each search result separately using VOSviewer to determine the appropriate threshold limit.

- Bibliographic Visualization

  Data were collected from visualizations of country-coupled bibliographies, organization-coupled bibliographies, source (journal)-coupled bibliographies, author-coupled bibliographies, document-coupled bibliographies, and keyword co-occurrence bibliographies based on titles and abstracts.

- Bibliometric Analysis

  The final step involved bibliometric analysis using statistical graphics. By visualizing and analyzing the data with VOSviewer, the 11,798 articles related to "Innovation Behavior" were mapped to identify critical contributing variables and potential areas for improvement.

4. RESULT AND DISCUSSION

Deductive data analysis approaches were used to produce focused results, such as country-to-country, organization-to-organization, source-to-source, author-to-author, and document-to-document bibliographic coupling. Text data was utilized to create a map based on the title and abstract occurrence of keywords, enabling researchers to navigate through this material more easily.

Table 1 demonstrates the highest number of publications in 2022, with 2,427 articles, which is nearly five times the 2015 figure of 459. Over the past ten years, the field has published 11,798 articles, with the highest achievement in 2022 accounting for 21% of the total. The percentage increase has shown significant growth over the years, particularly between 2018 and 2022. Research in the field of "Innovation Behavior" has garnered substantial interest, partly due to the COVID-19 pandemic, which accelerated digital transformation

and innovation behavior as grounded theory of innovation, innovation behavior plays a crucial role in developing firms capabilities, particularly in their evolutionary theory of economic change.The impact of disruptive business processes during COVID-19 prompted companies to rapidly enhance their technological capabilities and transition to automated, self-sufficient, and intelligent manufacturing systems). The advancements brought about by the digital revolution have enabled better connectivity and more efficient communication among supply chain partners.

Table 1. Number of Publications of "Innovation Behavior" (2015-2024)

Publication year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**Grand Total**
Number of Publications	459	584	593	839	1,023	1,317	1,820	**2,427**	**2,311**	425	11,798
%	4%	5%	5%	7%	9%	11%	15%	**21%**	**20%**	4%	100%

This bibliometric analysis was carried out through data mining from Dimensions database. Generally, 28% of research on behavior control originates from multidisciplinary research that integrates business, management, economics, agriculture, and environmental sciences. Furthermore, 58% of articles are interdisciplinary studies between environmental and social sciences. These disciplines reflect only a part of the three pillars of sustainable development: environment, society, and economy. As environmental behavior becomes increasingly important worldwide, applying innovation theory in environmental science research will expand and cover more topics in the future.

4.1. Country-based Analysis

Figure 3. Presents the network visualization of country contributions in innovation behavior research. To prevent deficiencies in country publications, a threshold of at least five publications with two citations per bibliographic couple was applied. The Dimensions database identified 68 countries with bibliometric links out of the 110 countries related to innovation behavior tracked over the past 10 years.

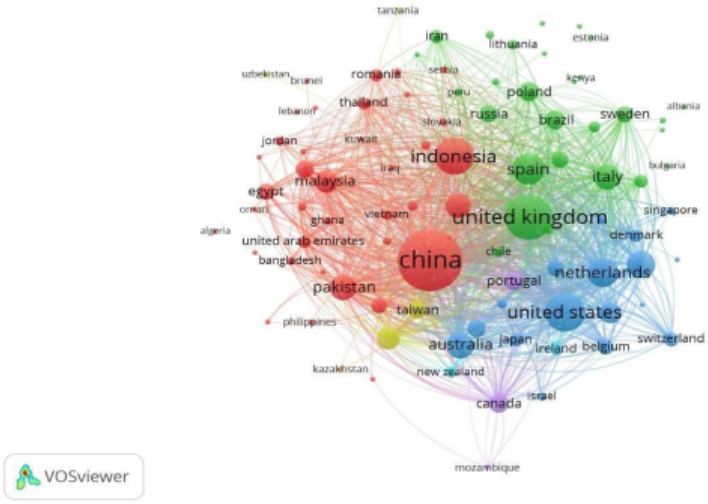

Figure 3. The network visualization of Country-coupled bibliography "Innovation Behaviour"
Source: Data processing by VOSviewer (2024).

Australia ranks first among the top ten countries contributing to innovation behavior research, with a total of 394 publications, 12,978 citations, and a total link strength of 761,615. This highlights Australia pivotal role in advancing the field, supported by its strategic focus on aligning innovation with critical issues in digital business management. China, positioned second, has made substantial contributions with 683 documents, 14,650 citations, and a total link strength of 1,565,605. The country rapid growth in innovation behavior research is driven by its dedicated efforts to develop and strengthen its digital business ecosystem. A strong collaboration between universities, government agencies, and industries has been instrumental in fostering innovation and sustaining this progress.

The United Kingdom also ranks high with 1,112 documents, 36,335 citations, and a total link strength of 1,830,232. The UK contribution in this area focuses on strong international collaboration, particularly with other European countries. The United States, a global hub for innovation research, recorded 803 documents, 21,895 citations, and a total link strength of 1,172,210. The United States plays a pivotal role in shaping innovation research, particularly through its contributions to strategic management and digital business. Its influence is reflected in the development of frameworks and strategies that guide global research efforts in these areas. Other countries in the top ten include Pakistan, the Netherlands, Spain, South Korea, Germany, and Malaysia. Pakistan, for instance, ranks fourth with 367 publications, 7,326 citations, and a total link strength of 1,125,084, particularly through its collaboration with China and Malaysia.

4.2. Organization-based Bibliometric Analysis

Figure 4 provides an overlay visualization of collaboration between organizations in innovation behavior research. This analysis shows that Brock University ranks highest with 38 documents, 919 citations, and a total link strength of 183,868. Research conducted at Brock University primarily focuses on exploring the relationship between digital transformation and innovation behavior in Small and Medium-sized Enterprises (SMEs). This research highlights how digital transformation can drive innovation and improve organizational adaptability in resource-constrained environments.

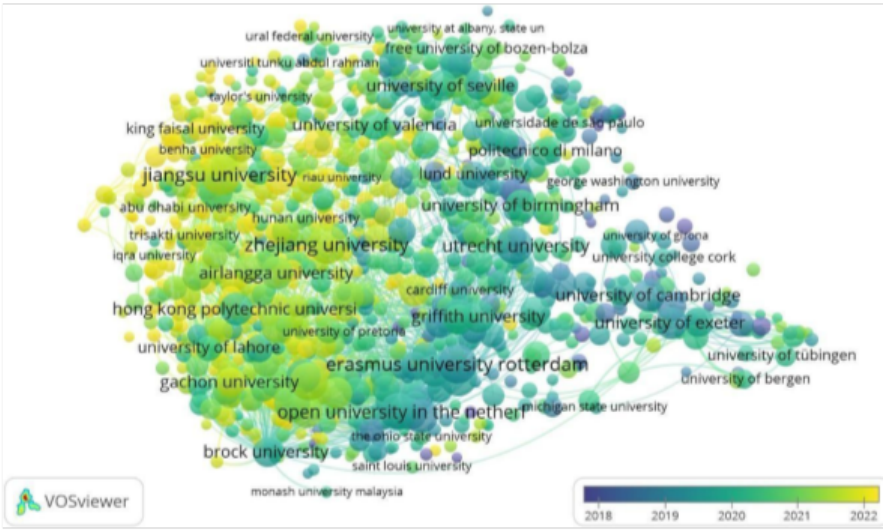

Figure 4. The network overlay of organization-coupled bibliography “Innovation Behaviour”

Jiangsu University ranks second with 69 documents, 997 citations, and a total link strength of 182,193. Research from the university frequently connects innovation behavior with sustainable growth strategies and collaborative efforts between firms, emphasizing its role in advancing organizational resilience and long-term sustainability. Erasmus University Rotterdam ranks third with 65 documents, 4,823 citations, and a total link strength of 178,618. Collaboration between universities and industry is recognized as a critical factor in enhancing research quality and impact. This synergy fosters the exchange of knowledge, resources, and expertise, driving innovation and advancing the practical applications of research findings. COMSATS University Islamabad and Renmin University of China are also among the top organizations, with 49 and 57 documents, respectively. These universities play a strategic role in fostering innovation by establishing close cooperation with industry. Such partnerships enable the practical application of research findings and promote the development of innovative solutions that address real-world challenges. Other leading organizations in the top ten include the University of Groningen, Gachon University, Zhejiang University, the Open University in the Netherlands, and Korea University. Each organization has strong collaboration networks both domestically and internationally, reflecting the growing global attention to innovation behavior research.

4.3. Author-based Bibliometric Analysis

Author-based analysis, as shown in Figure 5, identifies leading authors in innovation behavior research. Dirk De Clercq ranks first with 33 documents, 730 citations, and a total link strength of 44,831.

Entrepreneurial orientation has been shown to have a significant impact on innovation behavior, with organizational commitment serving as a mediating factor in this relationship. This dynamic highlights the importance of fostering an entrepreneurial culture within organizations to drive innovation effectively.

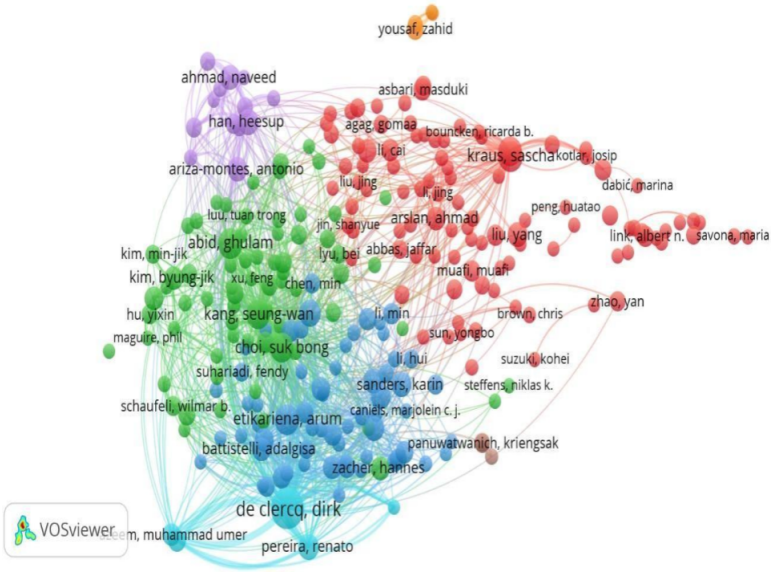

Figure 5. The network of author-coupled bibliography "Innovation Behaviour"
Source: Data processing by VOSviewer (2024).

One notable focus in this field is on leadership styles and their role in fostering innovation, which has been extensively explored in recent research. Scholars with diverse backgrounds have contributed significantly to the advancement of innovation studies, often working within extensive collaborative networks. These collaborations have proven to enhance both innovation and research diversification, demonstrating the value of interdisciplinary and cross-institutional partnerships.

4.4. Source-based Bibliometric Analysis

Figure 6 provides an overlay visualization of the co-publication network among journals. Frontiers in Psychology ranks first with 738 documents, 7,533 citations, and a total link strength of 888,969. This journal covers a wide range of topics, including organizational behavior and innovation.

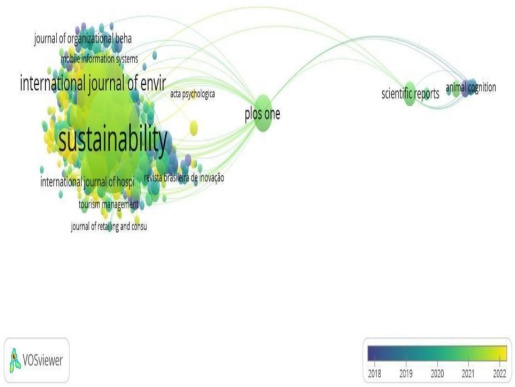

Figure 6. The overlay of source-coupled bibliography "Innovation Behaviour"
Source: Data processing by VOSviewer (2024).

Sustainability ranks second with 827 documents, 11,185 citations, and a total link strength of 786,878. Research in this journal often links innovation with sustainable business practices. Other leading journals in-

clude the International Journal of Environmental Research and Public Health, SAGE Open, and Cogent Business & Management, each contributing significantly to shaping the landscape of innovation behavior research.

4.5. Document-based Bibliometric Analysis

Document-based analysis provides an overview of influential works in innovation behavior research, offering insights into key studies that have shaped the field. These studies highlight diverse frameworks and methodologies, emphasizing the interdisciplinary nature of innovation behavior. Figure 7 illustrates the network of document-coupled bibliographies, showcasing the relationships and impact of prominent research in this domain.

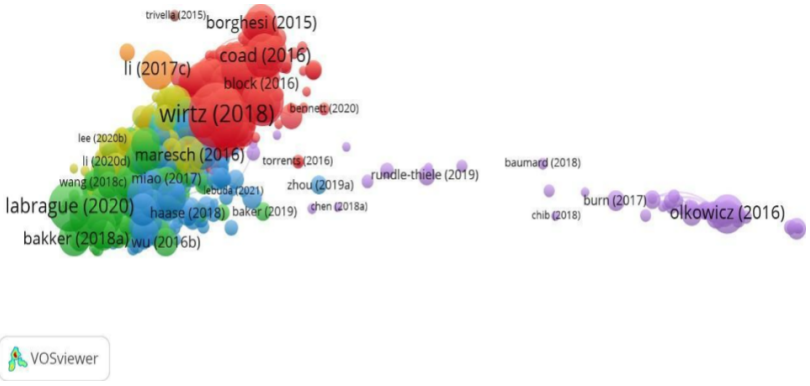

Figure 7. The network of document-coupled bibliography "Innovation Behaviour"
Source: Data processing by VOSviewer (2024).

Asurakkody received 57 citations with a total link strength of 720. Waheed has 26 citations and a total link strength of 1,616. Both papers provided new frameworks for understanding innovation behavior. Other influential papers, such as Wang and Dan, also have significant total link strengths, reflecting a focus on innovation strategies and digital transformation. Giebels received 62 citations with a total link strength of 746, focusing on conflict management and its influence on innovation.

4.6. Keyword Co-occurrence Analysis

Keyword co-occurrence analysis, as illustrated in Figure 8, reveals the thematic connections and trends in innovation behavior research. "Innovation" emerges as the most frequently occurring keyword, with 1,589 occurrences and a relevance score of 0.9565, reflecting its central role in the field. Strong associations are observed between innovation, digital transformation, and organizational strategy, highlighting their collective impact on driving business success. Additionally, "Performance" frequently appears as a key concept, emphasizing its importance in achieving organizational goals.

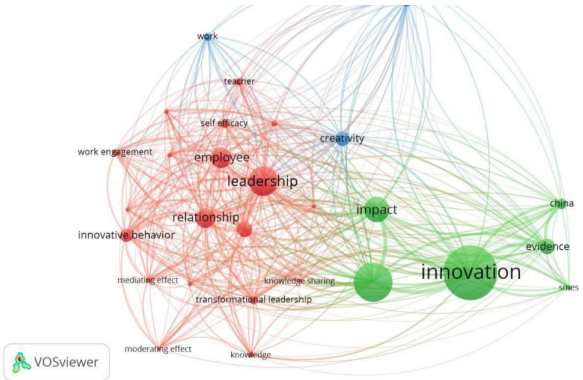

Figure 8. The network of co-occurrence of keyword "Innovation Behaviour"
Source: Data processing by VOSviewer (2024).

Similarly, keywords such as ”leadership”, ”role”, and ”effect” are commonly linked to research trends exploring the relationship between innovation and leadership styles, as well as the contributions of various stakeholders. Transformational leadership, in particular, has been identified as a significant factor in fostering innovation within organizations, underscoring the importance of leadership in shaping innovative practices.

5. MANAGERIAL IMPLICATIONS AND FUTURE DIRECTIONS

Strengthening global collaboration, adopting interdisciplinary research approaches, and exploring the interplay between leadership, organizational culture, and innovation behavior are essential for driving progress. Practical applications include developing digital tools to enhance collaboration, frameworks for integrating sustainability into innovation strategies, and methodologies to evaluate leadership effectiveness across cultures. These efforts bridge the gap between theory and practice, enabling businesses to leverage digital transformation and sustainability trends to foster innovation and competitiveness.

6. CONCLUSION

This bibliometric analysis offers a comprehensive overview of innovation behavior research, identifying significant contributors, trends, and thematic focus areas. Leading countries such as Australia, China, the United Kingdom, and the United States demonstrate the importance of international collaboration, with notable contributions from institutions like Brock University, Jiangsu University, and Erasmus University Rotterdam. Seminal works in prominent journals, including Frontiers in Psychology and Sustainability, have established foundational frameworks linking innovation behavior to digital transformation, knowledge sharing, and sustainability. These findings emphasize the interdisciplinary and global nature of innovation studies.

Despite these advancements, several limitations and gaps warrant further investigation. The relationship between innovation behavior and organizational resilience during crises remains underexplored, as does the long-term impact of digital transformation on innovation within Small and Medium-sized Enterprises (SMEs). Cultural dimensions influencing transformational leadership and their effects on fostering innovation behavior also present valuable avenues for future research. Addressing these areas could yield practical frameworks that integrate innovation strategies with emerging technologies and sustainable business practices, enhancing both academic insights and real-world applications.

Future studies should focus on longitudinal research designs and adopt interdisciplinary approaches to address these gaps. By exploring the interplay between innovation, sustainability, and leadership across diverse cultural and organizational contexts, researchers can develop actionable strategies to guide businesses in navigating the challenges of the digital age. Strengthening collaboration between academia and industry will further ensure that innovation behavior research continues to drive meaningful progress in theory and practice.

7. DECLARATIONS

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7.2. Author Contributions

Conceptualization: HR; Methodology: RT; Software: TW; Validation: AT and AR; Formal Analysis: HR and AR; Investigation: HR; Resources: EA; Data Curation: HR; Writing Original Draft Preparation: RT and TW; Writing Review and Editing: AT and AR; Visualization: EA; All authors, HR, AT, TW, AT, AR and EA, have read and agreed to the published version of the manuscript.

7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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7.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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