INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 14, Issue 11, (2024) E-ISSN: 2222-6990

Mapping the Terrain of Innovation Leadership Studies: A Bibliometric and Content Analysis Exploration

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To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v14-i11/23291 DOI:10.6007/IJARBSS/v14-i11/23291

Published Date: 15 November 2024

Abstract

This study undertakes a comprehensive examination of the evolution of innovation leadership from 1967 to 2023 based on a bibliometric analysis of articles from the Scopus database. The aim is to understand what has been written about innovation leadership, the key details, and which areas require additional investigation. Considering different perspectives, the study analyses all relevant articles on innovation leadership from 1967 to 2023, ensuring a thorough and reliable literature overview. The bibliometric analysis provides a comprehensive overview of current and future trends in the literature on innovation leadership. It shows the most important articles, the primary authors, frequently used terms, and the topic's development. This information is particularly useful for researchers who study, interact with or make decisions about innovation leadership, as it helps them understand what has been achieved and which areas require additional attention. It also guides future research by suggesting areas worthy of further investigation. The practical implications of this study are significant, empowering the reader with the knowledge to make informed decisions and take effective actions in innovation leadership. The study's findings will empower the audience, equipping them with the necessary knowledge to navigate the complex landscape of innovation leadership.

Keywords: Bibliometric Analysis, Biblioshiny, VosViewer, Innovation Leadership, Ambidextrous Leadership

Introduction

In today's rapidly evolving business landscape, innovation is no longer just an option for success; it has become essential for organisational survival and long-term growth (Supriatna

& Zulganef, 2023; Motwani & Kataria, 2023). With rapid technological advancements and the increasingly competitive global market, organisations must continuously innovate across products, services, and processes to maintain a competitive edge (Zuraik & Perkins, 2020; Zheng et al., 2023). However, innovation is inherently risky and unpredictable, often creating challenges for leaders who must manage the demands of fostering a creative environment and stakeholders' expectations wary of uncertainty. Therefore, leadership is not just essential but critical and significant in initiating and sustaining innovation efforts. It requires a strategic balance between encouraging new ideas and ensuring stability, underscoring the importance of your leadership roles in the innovation process and the relevance of this research to your work.

Studying innovation leadership is crucial as it addresses the urgent need for organisations to harness effective leadership styles that can facilitate and guide these innovation processes. Leaders who embrace adaptability and foster a culture of continuous improvement are essential for creating dynamic environments that encourage employees to explore new ideas and identify novel business opportunities (Kassotaki, 2019; Zirek et al., 2022). This underscores the necessity of leaders who can cultivate an organisational atmosphere where innovation is encouraged, risk-taking is rewarded, and creative thinking is actively supported. The demand for such leaders is growing as organisations recognise that the ability to innovate is intertwined with effective leadership that can bridge the gap between traditional organisational practices and emerging trends. Innovation leadership is increasingly recognised for its potential to improve and transform organisational performance, employee engagement, and satisfaction. Transformational and empowering leadership styles, which provide employees autonomy and freedom to innovate, have been linked to higher levels of creativity and job satisfaction (Arshad et al., 2023; Nguyen et al., 2023). By contrast, overly rigid or controlling leadership styles can suppress innovation, underscoring the importance of identifying and developing leadership styles that align with the demands of a changing workforce and market (Amabile, 1988; Costa et al., 2023; Elenkov & Manev, 2020). Therefore, understanding how different leadership styles impact innovation is critical for organisations that create environments conducive to sustained creativity and competitive advantage.

Moreover, the study of innovation leadership holds particular relevance for industries facing rapid technological advancement, such as technology, healthcare, and education. These sectors require leaders who can navigate the complexities of innovation while balancing the need for efficiency, resource management, and long-term strategy. For instance, in the healthcare sector, innovation leadership can directly influence patient care outcomes through advancements in medical technology and process improvements. Similarly, leaders who embrace innovative approaches can contribute to more effective teaching and learning methods in education, making the study of innovative leadership pertinent across diverse fields. Given these critical applications, there is a growing need to systematically examine and document the current state of innovation leadership research. This study addresses that need by providing a structured bibliometric analysis, identifying key leadership styles that foster innovation, and mapping emerging themes. The aim is to equip organisations, policymakers, and scholars with insights into practical innovation leadership practices, which are essential for developing leaders who can respond to the demands of modern organisational contexts.

Therefore, this research is timely and necessary, as it delves into the foundational aspects of innovation leadership—understanding the traits, practices, and styles that enable leaders to drive innovation successfully. By examining the various facets of leadership that contribute to innovation, this study contributes to the literature. It provides practical guidance for organisations seeking to cultivate leaders capable of fostering a sustainable innovation culture. To facilitate this examination, a bibliometric analysis assesses recent developments, identifies crucial leadership types for innovation, and explores overarching themes in innovation leadership. This comprehensive examination is crucial for organisations seeking influential leaders who can navigate the complexities of the modern business landscape and drive innovation. This analysis involves network analyses examining keywords and titles, aiming to answer specific scientific questions:

RQ1: Regarding the literature on innovative leadership, what are the present states and patterns of publications?
RQ2: Which publications have received the most citations in research on innovative leadership?
RQ3: Who are the most productive participants in innovation leadership regarding writers, source titles, and citations?
RQ4: What is the overarching subject pattern for significant keywords in the research on innovation leadership?
RQ5: What are the present states of knowledge organisation in innovation leadership research concerning co-citations, collaboration, and co-occurrence networks?
RQ6: What common threads can be found throughout the research on innovative leadership?

The paper's framework consists of two main parts. The first part delineates the bibliometric process during the development of the literature review and its relation to innovation leadership, utilising software packages such as Biblioshiny and VosViewer. This section includes references and flowcharts to aid readers in comprehending the bibliometric analysis's outcome. The second part focuses on the results of the bibliometric analysis, addressing the research questions. It encompasses a discussion of the results, their contribution to the field, study limitations, recommendations for future research, and potential avenues for further investigation. The framework aims to provide a clear and structured presentation of the research findings, facilitating the reader's understanding of the essential outcomes and implications of the study.

Methodology

Bibliometric Analysis Method

Bibliometrics, which focuses on measuring scholarly output, was founded in the early 20th century. There were many applications of bibliometrics, but one of the oldest was in library science. It tracked the size and development of library collections and analysed reading habits for different media (Narin & Stevens, 1971). Thanks to the proliferation of extensive digital databases in recent decades, bibliometrics has become widely used for assessing and analysing the scholarly research landscape. With the advent of the digital age and large databases such as Scopus and Web of Science, bibliometrics has undergone a fundamental transformation, enabling researchers and academic institutions to analyse and compare their collective output for the first time in history (Larivière et al., 2015). Researchers, policymakers, and funding bodies now use bibliometric analyses to assess and better understand scientific

work's creation, dissemination, and impact (Glaenzel & Schubert, 2005). Research topics and trends are analysed based on citation data, networks of scientists working together and publications (Leydesdorff, 2008).

Defining Keywords

Following the study's objectives, the researcher selected the following key phrases: "innovation leadership" and "leadership in innovation." The final search for articles was performed using the following query: "TITLE-ABS-KEY (('innovation* leadership' OR 'leadership in innovation*' OR 'radical innovation* leadership' OR 'process innovation* leadership' OR 'ambidextrous leadership' OR 'incremental innovation* leadership' OR 'open* innovation* leadership' OR 'disrupt* innovation leadership' OR 'adopt* innovation leadership' OR 'diffuse* innovation leadership' OR 'innovation* leadership' OR 'breakthrough leadership')).

Search Strategy

This study aims to analyse articles on the topic of innovation leadership. For this purpose, the researcher used the online database Scopus. This database was selected due to its reputation as the largest source of citations and abstracts in technology, social sciences, economics, management, and supply chain and logistics (Fahimnia et al., 2015). This database contains articles from reputable academic publishers, including Emerald, Elsevier, Springer, Inderscience and the Taylor & Francis Group. Figure 1 shows the phases of the search strategy and the procedure for conducting the bibliometric analysis.

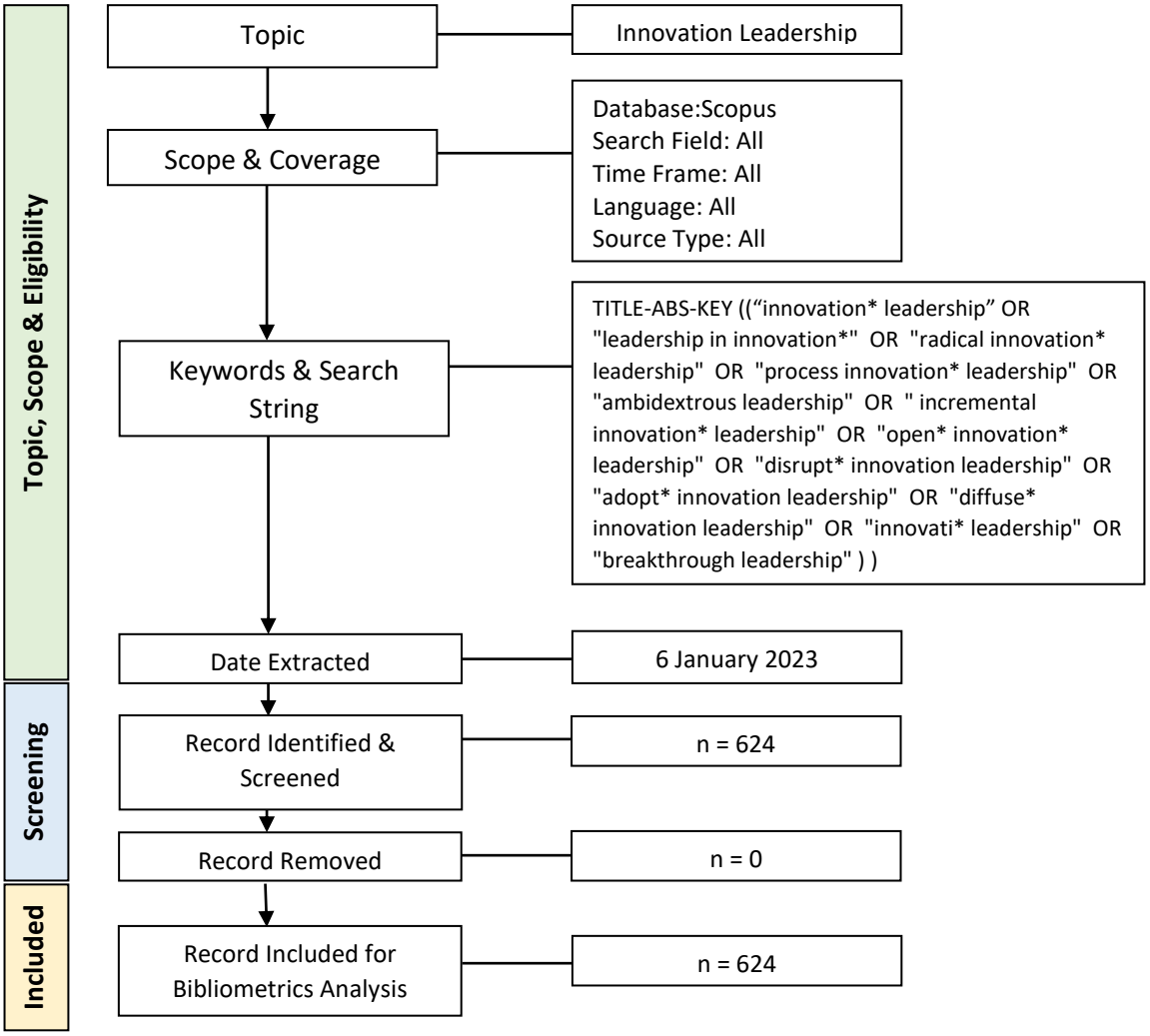

Figure 1 The phases of the search strategy and the procedure for conducting the bibliometric analysis.

Tool and Data Analysis

This study utilised Biblioshiny, a powerful data analysis tool embedded in the Bibliometrix R package, to achieve its objectives and answer specific research questions. Developed in 2017 by Aria and Cuccurullo, Biblioshiny is designed to track scientific patterns meticulously. Written in the R language, an open-source environment and ecosystem, its robust statistical algorithms characterise Biblioshiny, access to high-quality numerical routines and integrated data visualisation tools (Aria & Cuccurullo, 2017).

To begin the analysis, the researchers obtained a representative database of documents from Scopus in CSV format. This dataset was then imported into Biblioshiny, where the analysis function was used to gain comprehensive insights into various facets of scholarly production. The results include examining annual scholarly production, identifying the most prolific authors, analysing frequently used terms, identifying the most popular journals, examining international collaborations between countries and other relevant aspects related to the chosen research topic.

At the same time, the bibliometric network was set up and visualised using VosViewer. The co-occurrence network of author keywords was examined through careful analysis, and an overlay visualisation of these keywords was created. The application of the VOS approach is particularly noteworthy as it is recognised as one of the most effective methods for analysing scientific mapping and provides better results, especially for medium and large datasets (Moral-Munoz et al., 2019).

Bibliometric Results

Main Information

1967 was the year in which the Scopus database first recorded an article on innovative leadership. The total number of articles has risen steadily to 2.51 per cent annually. Table 1 contains information on all articles published on innovative leadership between 1967 and 2023. This information includes data on the average number of years between publications, the average number of citations per document, the average number of citations per year, the document types, the content of the documents, the authors and the collaboration of the authors.

Table 1
Main Information

Description	Results
Main information about the data	
Timespan	1967:2023
Sources (Journal, Books, etc.)	479
Documents	624
Annual Growth Rate	2.51%
Average citations per document	13.22
References	28275
Document Types	
Article	433
Book	18
Book chapter	56
Conference paper	57
Conference review	2
Editorial	7
Erratum	1
Letter	2
Note	6
Review	41
Short survey	1
Document Contents	
Keywords Plus (ID)	1746
Author's Keywords (DE)	1512
Authors	
Authors	2770
Authors of single-authored documents	176
Authors collaboration	
Single-authored documents	195
Co-Authors per Documents	4.66
International co-authorship %	16.35

Annual Publication Trends

Figure 2 shows the annual publication patterns from 1967 to 2023, including the total number of publications, the total number of citations per document and the citation years. The results of this bibliometric study show that the total number of publications remained relatively unchanged from 1967 to 2022, which we found very interesting. The number of publications published increased dramatically from only 25 between 1967 and 1999 to 599 (2001 – 2023). 76 and 62 articles were published in innovation leadership in 2022 and 2019, respectively, contributing to the enormous number of publications in this field. Based on the results of the exploratory study, it was clear that researchers working in this area will continue to focus on this topic. 2004 had the highest average number of citations per publication (188 articles). After that, the average number of citations per year and the number of citations per year decreased, although annual publications continued to increase. This analysis shows that research has been limited to a few aspects of this topic.

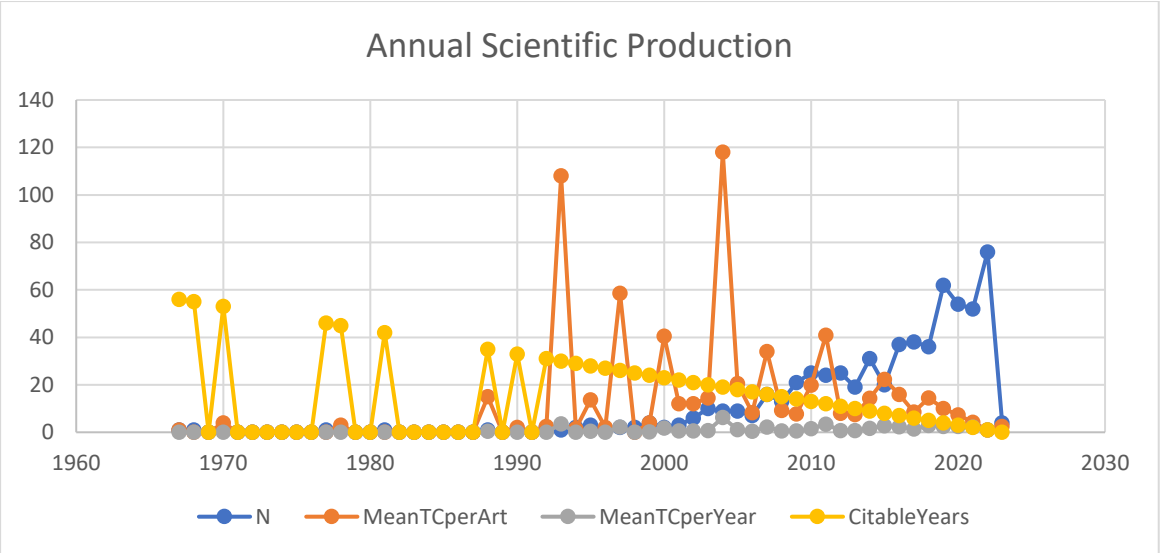

Figure 2 Annual Publications Trends

Note (s): N=Total publications; MeanTCperArt=Mean Total Citations per Article; MeanTCperYear: Mean Total Citations per Year; Citable Years: Number of citations per year

Figure 3 shows a three-field plot analysis of this bibliometric data. The fields on the left side represent the best-known authors, the fields in the centre represent the keywords, and the fields on the right represent the periodicals. The plots show that the author's publications focussed primarily on Rosing K, Zacher H, lekhyan lm and Ngibe M, who came chronologically after them. In the meantime, the Leadership and Organisation Development Journal has established itself as one of the most frequently published journals in the field by these 20 authors. The Nursing Administration Quarterly, The Leadership Quarterly, and the journal Frontiers in Psychology follow suit. These provide an overview of the specialist publications published on innovation leadership. "Ambidextrous leadership" was the most common keyword, followed by "innovation" and "leadership". The seven leading authors used these keywords in at least one published article. According to the results of this study, ambidextrous leadership has been the most important form of innovation leadership in recent years. In addition to these keywords, the researchers discovered a significant correlation between innovative leadership and the disciplines of healthcare and small and medium-sized enterprises (SMEs).

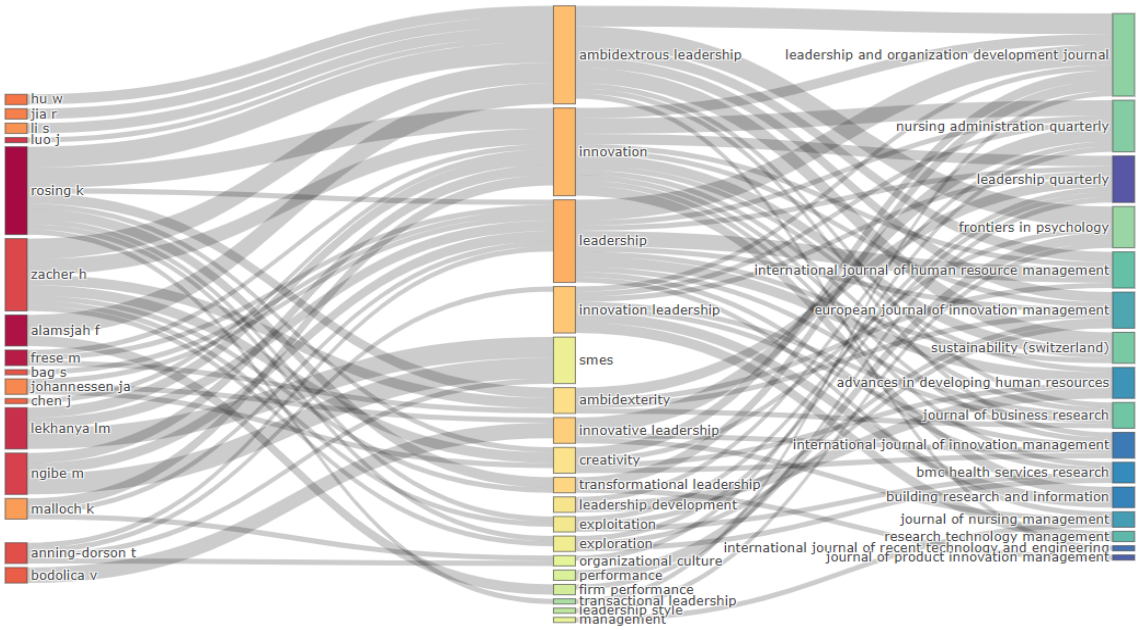

Figure 3 Three field plots

Despite researchers' growing interest, innovation leadership has received little attention in academic *Source Impact*
publications. Source impact highlights the most important sources of knowledge in this subject area to give researchers and academics a starting point for searching for further references. Table 2 shows the h-index, g-index and m-index, as well as the total number of citations (TC), the number of articles (NP) and the start of the year (PY start) for a total of 20 different journals and conference proceedings covering a wide range of disciplines, such as care administration, human resource management, business research, innovation management and psychology.

By quantifying the number of articles published and the number of citations these articles have received, the h-index can determine the productivity and overall influence of a particular author or journal. A variation of the h-index, the so-called g-index, considers the distribution of references to different publications. The m-index is another variant considering the period since the author's first publication. According to the results, the Journal of Nursing Administration and the Leadership and Organisation Development Journal have an h-index of 6. Therefore, the journals have the most references, followed by several publications with an h-index of 5. The European Journal of Innovation Management and Frontiers in Psychology have a g-index value of 4 and are the publications with the highest result. The m-index value for Sustainability (Switzerland) is 0.714, making it the category with the highest result overall.

Regarding the total number of citations, Leadership Quarterly has the most citations, with 670, followed by the Journal of Business Research, which has the second most citations, with 182. The number of articles published varies between 2 and 15, with 10 articles in Frontiers in Psychology being the most cited. Other journals also publish a considerable number of articles. The starting year of each publication is also included in the statistics, ranging from 1999 to 2021, providing insight into the productivity and influence of different journals on different topics. This information, which can be helpful for researchers looking for credible sources of information for their work, has been compiled from various sources.

The data indicate that the academic literature strongly represents the care management field. The high h-index supports this finding, as does the total number of citations for the Journal of Nursing Administration and Nursing Administration Quarterly. The data also indicate that the field of nursing administration is strongly represented in the academic literature. In addition, psychology appears to be well represented, as the journal Frontiers in Psychology has the most published articles and a reasonably high g-index. The results also suggest that several of the journals included in this analysis have experienced a significant increase in the number of citations and their influence throughout the study. A good example is the European Journal of Innovation Management, which has only been published since 2021. Although it is a comparatively new journal, it already has a higher g-index and a higher total number of citations. Given these results, it seems likely to grow in importance in the coming years.

The article "Social Entrepreneurship and Societal Transformation: An Exploratory Study", written by Sarah, David and Christine, received the most citations with 750, namely 37.50 per year. This was followed by an article by Kathrin Rosing entitled "Explaining the Heterogeneity of the Leadership-Innovation Relationship: Ambidextrous Leadership"," which received a percentage of 16.64%, based on its 94 local citations and 565 global citations. This shows that ambidextrous leadership widely dominates the world of innovation leadership research, be it in team innovation, exploration and exploitation behaviour or self-innovation. Whether the focus was on team innovation, exploration and exploitation behaviour or self-innovation, this result was the case. Looking at the h-index, 350 publications have a maximum of three references. There are more than three references in each of the remaining 350 publications. This result shows that although the Journal of Nursing Administration has published the most publications (15), the impact of these publications is not yet visible. The researchers and authors relevant to this study did not discover any links between their work and the publications. Therefore, the topic of a particular article could increase the breadth of this body of knowledge by increasing the likelihood of significant and relevant papers being published in a particular area. Table 2 provides a summary of review articles published on topics related to innovation leadership.

Table 2
Source Impact

Element	h_index	g_index	m_index	TC	NP	PY_start
Journal of Nursing Administration	6	9	0.286	99	15	2003
Leadership and Organization Development Journal	6	8	0.353	328	8	2007
Nursing Administration Quarterly	5	6	0.238	39	7	2003
Sustainability (Switzerland)	5	7	0.714	58	7	2017
International Journal of Human Resource Management	4	5	0.16	128	5	1999
Journal of Business Research	4	6	0.667	182	6	2018
Advances in Developing Human Resources	3	3	0.176	40	3	2007
Building Research and Information	3	3	0.143	56	3	2003
European Journal of Innovation Management	3	4	1	46	4	2021
Journal of Nursing Management	3	4	0.15	72	4	2004
Leadership Quarterly	3	3	0.214	670	3	2010
Research Technology Management	3	5	0.333	33	5	2015
Technological Forecasting and Social Change	3	3	0.333	161	3	2015
ASEE Annual Conference and Exposition, Conference Proceedings	2	4	0.125	16	4	2008
BMC Health Services Research	2	3	0.286	10	3	2017
California Management Review	2	2	0.118	29	2	2007
Chinese Management Studies	2	2	0.5	14	2	2020
Creativity and Innovation Management	2	2	0.4	24	2	2019
Educational Management Administration and Leadership	2	2	0.286	48	2	2017
Frontiers in Psychology	2	4	0.5	20	10	2020

Authors Impact

Table 3 contains information on the productivity and influence of 20 writers assessed using various bibliometric indicators. This information is presented in tabular form. These bibliometric statistics provide information about the influence of several researchers on a particular topic. The information collected on each researcher includes the h-index, g-index and m-index, as well as the total number of citations (TC), the number of publications (NP) and the year of publication (PY start). The h-index for this data set varies from 2 to 5, with Rosing K having the highest h-index of 5. Rosing K is followed by nine authors with an h-index of 2 and 8 authors with an h-index of 3. The h-index is a popular measure to assess a researcher's productivity and influence. The g-index is a variation of the h-index in which articles that have received many citations are weighted more heavily. In this particular

collection, Berardi AG has the highest g-index at 0.667. In second place is Rosing K, which has a g-index of 0.357. As the g-index considers the number of citations of an author's most frequently cited works, it offers a different perspective on the productivity and impact of authors than the h-index. The h-index, on the other hand, only considers all of an author's citations. Accordingly, Rosing K. has the highest h-index of 5 and the highest g-index of 6, indicating that she has published many significant articles regularly cited. In addition, her research received the highest total number of citations, 868, further evidence of her work's importance. In comparison, the h-indices and number of citations are lower for some other researchers, suggesting that the impact of her work in this area is less significant.

The m-index is a measure that considers an author's total number of publications and citations to determine an author's overall productivity and influence. The person with the highest m-index in this collection is Anning-Dorson T, who has a score of 0.375. In second place is Bag S, which has a score of 0.25. The m-index is a valuable metric that you can use to assess the productivity and influence of authors with few articles that have received many citations. You can gauge the importance of an author's work by the number of citations their publications have received. Rosing K. has the most citations in this collection, with 868 citations, followed by Frese M., who has the second highest number of citations, with 625 citations. When determining the importance of an author's work, the total number of citations is often used as a yardstick. Measuring an author's productivity is possible based on the number of publications.

The data also includes the number of publications by each researcher and the year in which these publications were produced. Interestingly, some researchers with a comparatively low h-index and a comparatively low number of references have been publishing since 2009, such as Malloch K and Chou CM, while others, such as Berardi AG and Akbari M, have only published in recent years. These results show that the length of a researcher's career and the time they publish can influence their influence in the field. In general, the statistics provide insights into the productivity and influence of researchers working in a particular field and emphasise the importance of disseminating highly calibrated research referenced by many other researchers.

The fact that Rosing K. has the highest number of citations and the highest h-index among the authors considered for this study shows that she has been very productive and influential in this field. Rosing K. may continue to be an exceptionally effective and influential researcher. Similarly, Annig-Dorson T and Berardi AG have high m-indices and g-indices, respectively, suggesting that their work has had a significant impact compared to the number of publications they have produced. This result may indicate that their work has the potential to be significant in the future, even if they do not publish as frequently as some of the other authors included in the analysis. This result suggests that their work has the potential to be relevant in the future. The authors included in this analysis vary in their productivity and influence, and this may continue to be the case in the future.

Table 3
Authors Impact

	Element	h_index	g_index	m_index	TC	NP	PY_start
1	Rosing K	5	6	0.357	868	6	2010
2	Anning-Dorson T	3	3	0.375	94	3	2016
3	Frese M	3	4	0.214	625	4	2010
4	Luo J	3	4	0.25	26	4	2012
5	Malloch K	3	3	0.2	20	3	2009
6	Zacher H	3	4	0.3	329	4	2014
7	Akbari M	2	2	0.25	34	2	2016
8	Avgerinou MD	2	2	0.2	32	2	2014
9	Bag S	2	3	0.25	34	3	2016
10	Berardi AG	2	2	0.667	14	2	2021
11	Bodolica V	2	3	0.5	29	3	2020
12	Braganza A	2	2	0.182	16	2	2013
13	Carmeli A	2	2	0.143	162	2	2010
14	Chen J	2	3	0.333	97	3	2018
15	Chen L	2	2	0.286	29	2	2017
16	Chen SC	2	2	0.143	15	2	2010
17	Chou CM	2	2	0.143	15	2	2010
18	Crutchfield N	2	2	0.182	13	2	2013
19	Gantz NR	2	2	0.095	46	2	2003
20	Gerlach F	2	2	0.5	26	2	2020

The information in Table 4 refers to the number of national and international citations of research articles related to innovation leadership. The citations are divided into two categories: local and global. Local citations refer to the number of references to a document within the same country where it was published. In contrast, global citations refer to the number of citations outside that country. The last column shows the proportion of local references compared to references from other parts of the world. The chart shows sixteen different research papers; the earliest was published in 2010, and the most recent in 2020. The number of local citations can range from six to ninety-four, while the number of global citations can range from nine to five hundred and sixty-five. The LC/GC percentage can range from 16.13% to 70.83% of the total. It is important to note that while some papers have a higher total number of citations, their LC/GC ratio is comparatively low. This analysis suggests that the articles are better known in specific countries but less well known in other regions. Other articles have a higher LC/GC ratio, suggesting they have received greater global recognition.

Overall, the results indicate that ambidextrous leadership is becoming more recognised in innovation leadership. More and more research is being conducted to investigate the relationship between ambidextrous leadership and innovation and how this leadership style can promote employee originality and effectiveness. Several academic papers are investigating the role of social and organisational variables in developing ambidextrous leadership and creativity. Most studies have found a significant or positive relationship between these variables, supporting the assumption that ambidextrous leadership behaviour positively influences the implementation of innovative ideas.

Table 4
Most Cited Authors Globally

	Local Citations	Global Citations	LC/GC Ratio (%)
Rosing, K., Frese, M., & Bausch, A. (2011). Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership. *The Leadership Quarterly*, *22*(5), 956-974.	94	565	16.64
Zacher, H., & Rosing, K. (2015). Ambidextrous leadership and team innovation. *Leadership & Organization Development Journal*, *36*(1), 54–68.	64	163	39.26
Zacher, H., Robinson, A. J., & Rosing, K. (2016). Ambidextrous leadership and employees' self-reported innovative performance: The role of exploration and exploitation behaviours. *The Journal of Creative Behavior*, *50*(1), 24–46.	30	93	32.26
Zacher, H., & Wilden, R. G. (2014). A daily diary study on ambidextrous leadership and self-reported employee innovation. *Journal of occupational and organisational psychology*, *87*(4), 813-820.	27	71	38.03
Gerlach, F., Hundeling, M., & Rosing, K. (2020). Ambidextrous leadership and innovation performance: a longitudinal study. *Leadership & Organization Development Journal*, *41*(3), 383-398.	17	24	70.83
Alghamdi, F. (2018). Ambidextrous leadership, ambidextrous employee, and the interaction between ambidextrous leadership and employee innovative performance. *Journal of Innovation and Entrepreneurship*, *7*(1), 1–14.	17	45	37.78
Luo, B., Zheng, S., Ji, H., & Liang, L. (2018). Ambidextrous leadership and TMT-member ambidextrous behaviour: the role of TMT behavioural integration and TMT risk propensity. *The International Journal of Human Resource Management*, *29*(2), 338-359.	16	44	36.36
Tung, F. C. (2016). Does transformational, ambidextrous, transactional leadership promote employee creativity? Mediating effects of empowerment and promotion focus. *International Journal of Manpower*, *37*(8), 1250–1263.	16	42	38.10
Carmeli, A., Gelbard, R., & Gefen, D. (2010). The importance of innovation leadership in	15	93	16.13

cultivating strategic fit and enhancing firm performance. *The Leadership Quarterly*, *21*(3), 339-349.			
Tuan Luu, T. (2017). Ambidextrous leadership, entrepreneurial orientation, and operational performance: Organisational social capital as a moderator. *Leadership & Organization Development Journal*, *38*(2), 229–253.	14	41	34.15
Trong Tuan, L. (2017). Reform in public organisations: The roles of ambidextrous leadership and moderating mechanisms. *Public Management Review*, *19*(4), 518-541.	13	48	27.08
Oluwafemi, T. B., Mitchelmore, S., & Nikolopoulos, K. (2020). Leading innovation: Empirical evidence for ambidextrous leadership from UK high-tech SMEs. *Journal of Business Research*, pp. *119*, 195–208.	12	31	38.71
Ma, J., Zhou, X., Chen, R., & Dong, X. (2019). Does ambidextrous leadership motivate work crafting? *International Journal of Hospitality Management*, pp. *77*, 159–168.	12	38	31.58
Bledow, R., Frese, M., & Mueller, V. (2011). Ambidextrous leadership for innovation: The influence of culture. In *Advances in global leadership* (Vol. 6, pp. 41-69). Emerald Group Publishing Limited.	12	39	30.77
Rosing, K., Rosenbusch, N., & Frese, M. (2010). Ambidextrous leadership in the innovation process. *Innovation and international corporate growth*, 191-204.	12	21	57.14
Probst, G., Raisch, S., & Tushman, M. L. (2011). Ambidextrous leadership: Emerging challenges for business and HR leaders. *Organisational Dynamics*, *40*(4), 326-334.	10	43	23.26

Topic Trend

An examination of the annual occurrence of keywords used by the authors in their research revealed a striking theme, as shown in Figure 3. This analysis is based on a dataset of 624 documents from 1967 to 2023, with a minimum and maximum threshold of 5 for the frequency of keywords within a year. It shows that over the years the most important word. According to the data, interest in innovation leadership has steadily increased, peaking in 2020. Since 2010, there has been a steady increase in articles dealing with innovative leadership, with 2016 being the median year.

In addition, an ongoing interest in organisational culture and originality is essential for promoting innovation. Education and history were also popular topics, probably due to a desire to learn from past achievements and setbacks to innovate and evolve. In addition,

there is a growing interest in female leadership, healthcare and human experimentation, suggesting an increasing emphasis on how innovation can improve healthcare outcomes. In general, the trend points to an increasing recognition of the importance of leadership in creating innovation and a continued interest in the various factors that contribute to successful innovation, such as organisational culture, originality and diversity.

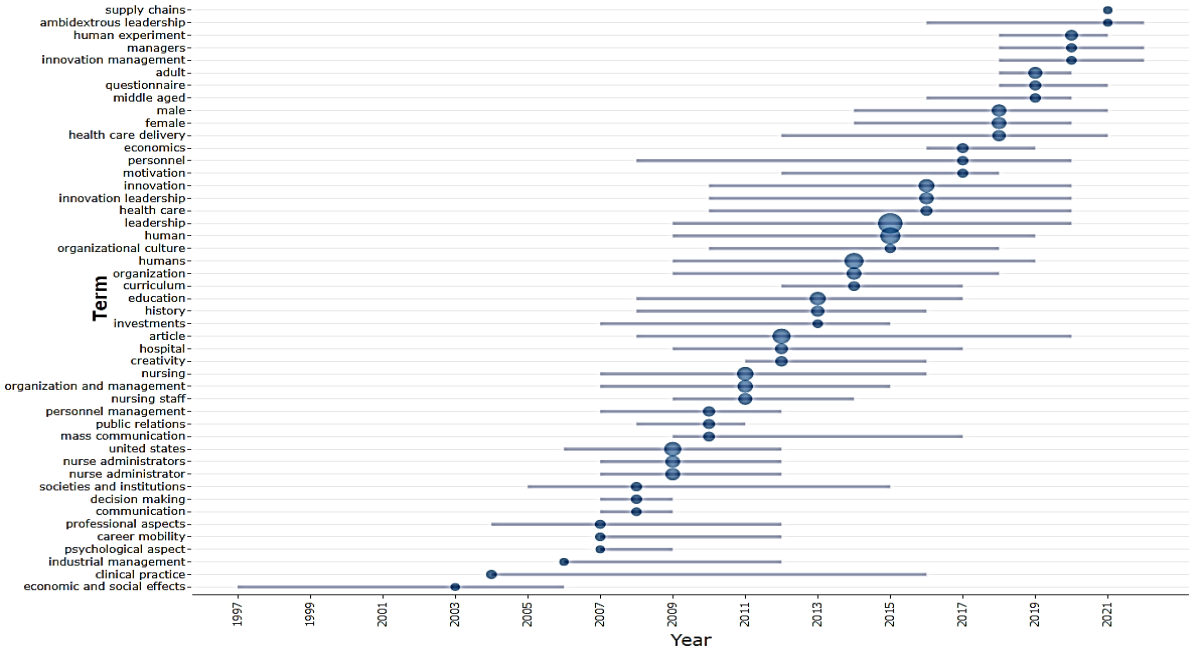

Figure 4 Trend Topic

Bibliometric Coupling

Bibliographic coupling is a technique used in bibliometrics to determine the connection between two scientific texts based on the number of shared references they contain. The “clustering by coupling" refers to identifying groups or clusters of related publications within a broader network through bibliographic coupling. The following diagram illustrates the correlation between different scientific publications in education, leadership and creativity. The information consists of the group names, the frequency with which each group occurs, the degree of importance of each group and the effect each group has.

Group 1, which is made up of "Transformational Leadership - Conf," "Ambidextrous Leadership - Conf", and "Innovation - Conf," has a high prevalence of 68.8% and is paired with "Ambidextrous Leadership - Conf" With a value of 0.45 for its Network Centrality, this organisation shows that it plays an essential role as a node within the more extensive network. With an Impact score of 2.65, this organisation appears to influence the network significantly. Group 2, which is combined with "Creativity - Conf" and "Disruptive Education - Conf'," has a prevalence of 82.1% and is labelled "Innovative Leadership - Conf." The centrality score for this group is smaller, at 0.25, suggesting that it plays a less significant role in the network. The fact that it has a value of 1.86 indicates that it continues to influence the network significantly.

Group 3, which is made up of "Leadership - Conf"," "Innovation - Conf", and "Ambidexterity - Conf"," has the highest incidence at 91.2% and is paired with the other two groups. As this group has a high centrality value of 0.47 and a high impact value of 3.15, it can

be concluded that it plays a vital role in the network and significantly influences it. Group 4, which is combined with "Vietnam - Conf" and "Entrepreneurial Orientation - Conf"," has a prevalence of 80.3% and is labelled "Ambidextrous Leadership - Conf." This group's value of 0.36 for centrality and 2.89 for impact is considered medium. Finally, Group 5 consists of "Innovation Culture - Conf"," "Digital Transformation - Conf", and "Innovation Leadership - Conf." It has a frequency of 75% and is paired with the other two groups. This group scored 0.25 for centrality, considered moderate, and 2.88 for impact, considered high. This analysis shows that it has a significant impact on the network.

Analysing the coupling between different groups of publications sheds light on the relationships between different research topics in education, creativity and leadership. With a high frequency and effect size, the most central and influential organisations are paired with other significant groups. This information can be used to identify critical areas of research in the discipline as well as potential areas of collaboration.

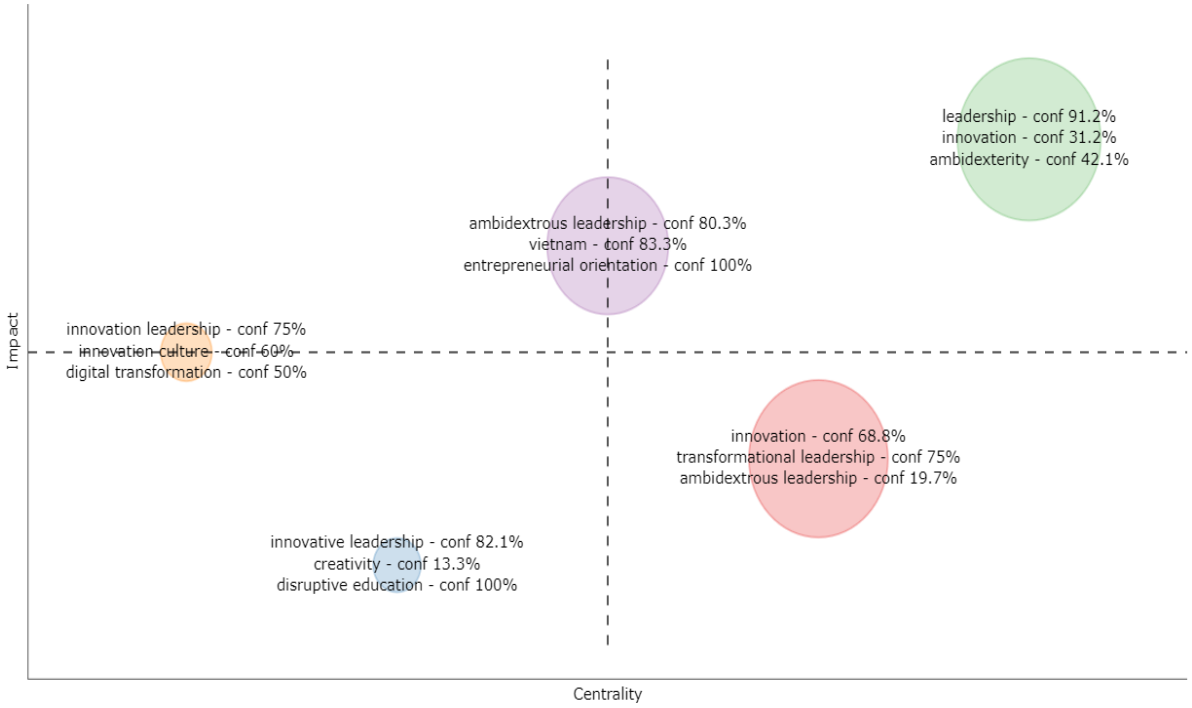

Figure 5 Bibliometric Coupling

Conceptual Structure

A bibliometric conceptual structure is a framework used to analyse the structure and development of the scientific literature on a particular topic. This structure is based on scientific paradigms or research fronts, the prominent research topics, methods and theories for a particular discipline at a particular time. We used VosViewer to perform a co-occurrence analysis of keywords to explore current trends and potential topics in the future.

Co-Occurrence Network

A co-occurrence network graphically represents and visualises any underlying relationship between words, authors or documents by creating clusters using a particular unit of documents. This study uses the co-occurrence network analysis to investigate the

relationships between the authors' keywords in the documents. The study uses a minimum number of occurrences in a document to identify 15 elements that meet this threshold. The resulting co-occurrence network is shown in Figure 6 and consists of six clusters and 29 links, with a total link strength of 54.

The six clusters are defined based on different platforms, e.g. "open innovation", "innovation leadership", "leadership", "innovation", "innovation culture", and "transformational leadership". Each cluster contains several keywords related to the platform. Cluster 1, for example, is based on the "Open Innovation" platform and contains keywords such as "innovation leadership", "ethics", "innovation" and "curriculum". The common keywords link the clusters. For example, cluster 2 is linked to cluster 1 by "open innovation" and to cluster three by "innovation leadership". Cluster 4 is linked to Cluster 1 by "open innovation", to cluster two by "innovation leadership", and to Cluster Three by "leadership".

The analysis shows numerous keywords in several clusters, indicating significant platform connections. This examination may suggest that the different platforms are not as distinct as they appear, and there is considerable overlap in the concepts and ideas each platform represents. In general, this paragraph provides a succinct summary of a study that applies the method of Co-Occurrence Network Analysis to examine the connections between authors' keywords that appear in a collection of documents. The study identifies six clusters based on the different platforms and shows how the common keywords connect these clusters. It can serve as a starting point for further research to explore the practical consequences of the relationships between innovation and leadership concepts in different organisational and industrial settings.

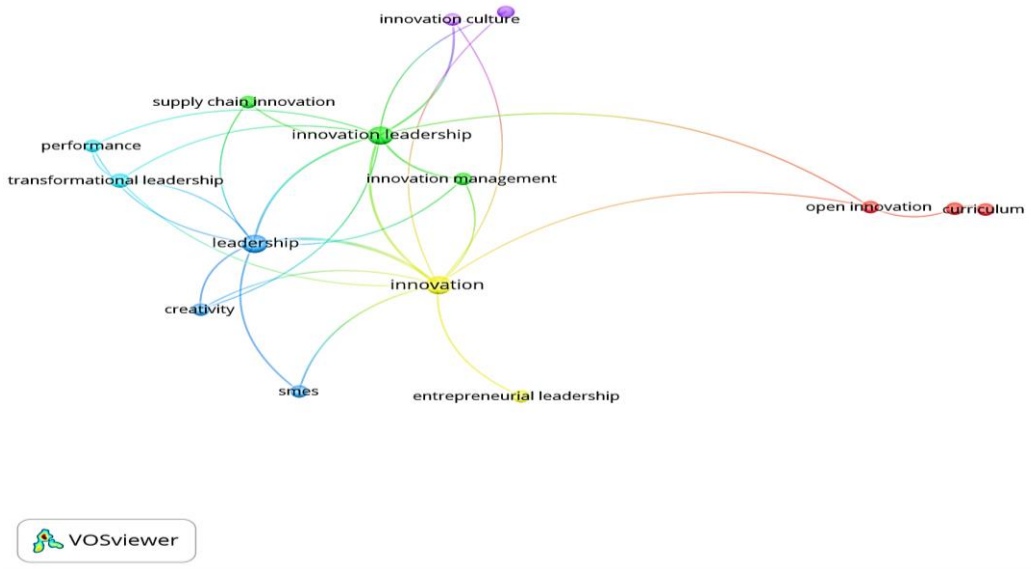

Figure 6 Co-occurrence network of author keywords

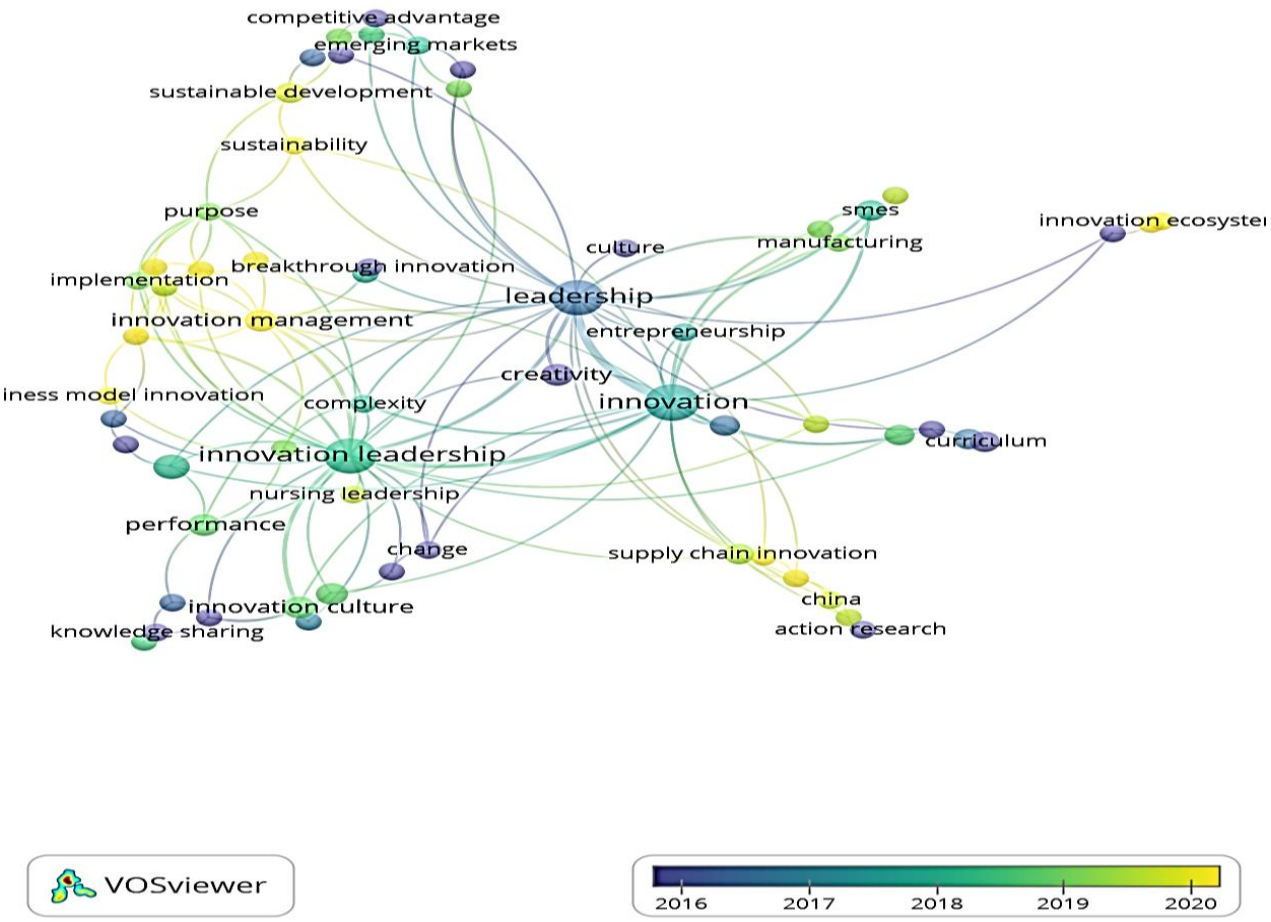

Figure 7 The overlay visualisation of the keywords

The generated overlay visualisation includes 62 elements and 12 clusters, resulting in 154 links and a total link strength of 190, all based on keywords that meet the minimum requirement. With this analysis, we wanted to identify the most frequently used keywords in recent publications. The research found that leadership in innovation was analysed primarily in innovation management, breakthrough innovation, sustainability, supply chain innovation, digital transformation, innovation ecosystem and impact of innovation. This analysis suggests there is still room for further research and exploration of this topic in different research areas. The visualisation of density has also shown that some areas, such as leadership in care and entrepreneurship, deserve further attention.

Discussion

This study underscores the essential role of innovation leadership in fostering sustainable organisational success in a fast-paced, competitive global landscape. By examining and defining critical aspects of effective innovation leadership, this research provides a foundation for understanding how various leadership styles contribute to building an adaptable, resilient, and innovation-driven culture. Given the pressing need for organisations to stay competitive through continuous innovation, the study offers practical insights into the leadership qualities that can drive sustainable growth and improve organisational performance. The significance of studying innovation leadership lies in its widespread applicability across industries, impact on organisational culture, and implications for employee satisfaction and productivity.

For leaders and managers, this research provides a comprehensive understanding of the specific leadership approaches that facilitate innovation. For example, leaders who embrace ambidextrous or transformational styles can better foster an environment that encourages risk-taking and new idea generation, thus enhancing an organisation's innovation capacity. Ambidextrous leadership balances resource exploration and exploitation and is particularly effective in creating dynamic environments that respond to immediate needs and future opportunities (Berraies & Zine El Abidine, 2019; Kung et al., 2020). For companies in highly competitive or rapidly changing industries, such as technology, healthcare, and manufacturing, this research offers a roadmap for developing leadership strategies that balance short-term efficiency with long-term innovation, thus improving their overall agility and adaptability (Mueller et al., 2020).

Studying innovation leadership is also crucial for understanding its impact on organisational culture and employee engagement. Leadership styles that encourage openness, flexibility, and a safe space for creative experimentation are vital in establishing a culture that values innovation. Transformational leaders inspire employees to explore new ideas and pursue projects beyond their usual responsibilities, creating a culture of innovation that can significantly boost morale, satisfaction, and retention. Furthermore, the insights gained from this study suggest that a supportive, innovation-oriented culture can foster stronger relationships among employees, leading to a more cohesive, motivated workforce that is both more engaged and better aligned with the organisation's innovation goals (Zuraik et al., 2020; Martinez-Climent et al., 2019).

The research offers valuable guidelines for human resources and talent development professionals by identifying the leadership competencies necessary to promote innovation. Organisations aiming to cultivate an innovation-focused culture can use these insights to tailor their leadership development programs to focus on ambidextrous and transformational leadership traits. By incorporating these competencies into leadership training, HR departments can ensure that emerging leaders are equipped to drive innovation, adapt to changing market demands, and foster a culture that prioritises creativity and strategic risk-taking. Furthermore, the research points to the benefits of diverse leadership approaches, including understanding how gender dynamics can impact innovation culture, which is particularly relevant for organisations focused on promoting inclusive leadership practices (Zuraik et al., 2020; Li et al., 2020).

For policymakers and industry leaders, this study underscores the importance of developing innovation-friendly policies and structures that support effective leadership practices. By understanding the critical role that innovation leadership plays in economic and industrial competitiveness, policymakers can better prioritise and invest in leadership development initiatives. For instance, industry leaders and policymakers might use these findings to support educational programs or public policies encouraging transformational leadership in critical sectors. This is particularly relevant for industries where innovation is essential for addressing societal challenges, such as renewable energy, healthcare, and education, where effective leadership can drive advancements that benefit broader society (Kassotaki, 2019).

The study's findings add depth to the academic literature on leadership and innovation, providing a basis for future research in various fields. Scholars can use this study to explore the nuanced dynamics between different leadership styles and types of innovation, such as incremental versus radical innovation, and investigate how these dynamics vary across organisational contexts. The identified need for research into the boundary conditions of leadership styles, including the interplay between transformational and transactional leadership in fostering innovation, opens new avenues for inquiry that can deepen our understanding of effective leadership in various cultural and industrial settings. Additionally, the study's insights on ambidextrous leadership and organisational adaptability contribute to broader discussions on sustainable leadership, which is increasingly relevant in the context of ongoing environmental and economic shifts (Lukoschek et al., 2018; Rosing et al., 2010).

Innovation leadership is particularly beneficial in sectors where continuous improvement and adaptation are crucial, such as technology, healthcare, finance, and education. Leaders in these industries can leverage the findings to build leadership frameworks that support rapid innovation cycles, enabling their organisations to stay competitive and responsive to change. For instance, healthcare leaders can use these insights to drive innovation in patient care, medical technologies, and operational efficiencies, benefiting patients and improving health outcomes. Leaders who understand innovation leadership can implement new learning models and technologies in education, improving student engagement and educational outcomes. Similarly, in the financial and technology sectors, where customer expectations and technologies evolve rapidly, adopting innovation-oriented leadership can help firms remain at the forefront of industry advancements and deliver cutting-edge solutions to clients.

The study's exploration of gender-related factors in innovation leadership adds a valuable perspective on how diverse leadership approaches influence organisational creativity. Female leaders often embody transformational and inclusive leadership qualities and are highlighted for their potential to foster a collaborative environment that encourages diverse perspectives and creative problem-solving. This insight is particularly significant as organisations prioritise diversity and inclusion in their leadership structures. By understanding how different leadership approaches contribute to an innovation-friendly culture, organisations can promote diverse leadership styles that leverage the unique strengths of each leader, thereby enhancing overall innovation potential (Zuraik et al., 2020).

The study demonstrates that innovation leadership is indispensable for building resilient, adaptable, and forward-looking organisations. This research offers practical and actionable guidance for various stakeholders, from leaders and HR practitioners to policymakers and researchers, by providing insights into the characteristics, behaviours, and contexts that foster effective innovation leadership. Studying innovation leadership highlights the types of leadership needed to drive organisational growth and informs strategies to cultivate a culture that embraces change, encourages collaboration, and prioritises long-term success. As organisations navigate the complexities of today's business environment, understanding and applying the principles of innovation leadership will be increasingly essential for achieving sustained performance and competitive advantage.

Conclusions

This study emphasises the critical role of innovation leadership in driving sustainable success and adaptability in today's dynamic business environment. By analysing the impact of various leadership styles—particularly ambidextrous and transformational approaches—on fostering a culture of innovation, the research highlights the importance of leadership that balances exploration with stability and encourages creative risk-taking. These insights benefit a broad range of stakeholders, including organisational leaders, HR professionals, policymakers, and researchers, who are tasked with developing strategies that enhance organisational resilience and competitiveness.

The findings underscore that effective innovation leadership enhances employee engagement and organisational culture and aligns with broader societal needs in healthcare, technology, and education. Furthermore, the study's exploration of gender dynamics and diversity in leadership approaches suggests that inclusive leadership can support diverse perspectives and foster collaborative innovation. This research provides a foundation for future studies and practical applications, offering actionable insights for organisations aiming to build a culture that prioritises long-term growth and responsiveness to change. As industries evolve and face new challenges, understanding and implementing effective innovation leadership practices will be essential for organisations striving to maintain a competitive edge and drive meaningful change in their respective fields.

Acknowledgement

This research was supported by the Ministry of Higher Education (MoHE) Malaysia through the Fundamental Research Grant Scheme (FRGS/1/2023/SS02/UPSI/02/4).

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