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BIBLIOMETRICS ANALYSIS OF DIGITAL LEADERSHIP RESEARCH

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ABSTRACT

This paper presents a comprehensive analysis of digital leadership research using bibliometric analysis and network visualization techniques. The study utilizes bibliometrics to gain insights and comprehend patterns in scientific publications related to digital leadership. Data from various sources, including articles, conference papers, and book chapters in the Scopus database, was analyzed using mathematical and statistical methods. The search term "digital leadership" resulted in 127 relevant publications from Scopus.com. Through bibliometric parameters such as authors, citations, keywords, and publication countries, the study offers a systematic research method for thematic analyses. The findings from this research provide researchers with specific inquiries and recommended considerations at each stage of the bibliometric analysis process. The study sheds light on the trends and developments in digital leadership research, identifying potential research gaps and opportunities for future investigations. By utilizing robust research methodologies, this paper contributes to understanding digital leadership and informs scholars on the key themes shaping the field's trajectory.

Keywords: *Bibliometric analysis, digital leadership, transformational leadership, innovation, organization performance.*

1. INTRODUCTION

Digital leadership has become an area of growing significance in recent years due to the rapid advancements in technology and digital transformation (Ratajczak, 2022). Globalization has led to a rapid acceleration of changes, particularly in the realm of technology, where significant advancements have been witnessed. Leadership models have also transformed and adapted to keep pace with the evolving landscape (Baglama et al., 2022). As organizations strive to adapt to the evolving digital landscape, effective leadership becomes critical in navigating through these changes successfully. However, despite the increasing importance of digital leadership, there remains a need for more research in this field, as indicated by the relatively low number of publications available on the topic.

Several studies related to digital leadership have been conducted globally by various researchers, including Mihardjo et al. (2019), Ghamrawi and Tamim (2023), Baglama et al. (2022), Tigre et al. (2023), Tanucan et al. (2022), Zupancic et al. (2017), Acharya et al. (2022), Mollah et al. (2023), Sarfraz et al. (2022), Shin et al. (2023), Karakose et al. (2022), Munsamy et al. (2023), Niu et al. (2022), Hanandeh et al. (2023), Quaquebeke and Gerpott (2023), Desmaryani et al. (2022), and Pham and Vu (2022).

Based on the above background, the research problem is: (1) What is the trend of digital leadership publications over the years, and how does it reflect the growth and potential of this emerging field? (2) How does the distribution of digital leadership publications vary across different formats and subject areas, and what does it signify about the multidisciplinary nature of digital leadership research? (3) Which are the top journals publishing digital leadership

research, and how do they contribute to advancing the knowledge in this field? (4) Which countries are leading in digital leadership research, and what factors may contribute to their prominence in this area? (5) How do the themes in digital leadership research cluster together, and what insights can be drawn from the network visualization of these themes? (6) What hypotheses are derived from each cluster of themes, and how can they form the basis for building a comprehensive digital leadership model?

Based on the research problem, this paper aims to address several fundamental questions to understand digital leadership and its implications comprehensively. The research problem revolves around six essential inquiries:

The first research problem focuses on analyzing the publication trend of digital leadership over the years. By understanding the growth and evolution of research output, researchers can gain insights into the emergence and potential of this emerging field.

The second research problem investigates the distribution of digital leadership publications across different formats and subject areas. This analysis sheds light on the multidisciplinary nature of digital leadership research, encompassing various domains such as social sciences, business and management, and computer science.

The third research problem examines the top journals that publish digital leadership research. These reputable journals are crucial in advancing knowledge in this field and serve as valuable resources for researchers and scholars.

The fourth research problem identifies the leading countries in digital leadership research and explores the factors contributing to their prominence in this area. This analysis provides insights into cross-cultural perspectives on digital leadership practices.

The fifth research problem explores how themes in digital leadership research cluster together. The network visualization of these themes allows researchers to identify patterns and connections, providing a comprehensive understanding of the diverse aspects investigated within this domain.

The final research problem involves formulating hypotheses derived from each cluster of themes. These hypotheses are the basis for building a comprehensive digital leadership model and can be tested empirically to enhance the understanding of digital leadership dynamics.

This paper employs bibliometric analysis, a robust and systematic research method that utilizes mathematical and statistical techniques to examine scientific publications. By leveraging data from the Scopus database and analytical tools like Scopus Analyze and VOSviewer, the study explores patterns, trends, and critical insights within digital leadership research. The bibliometric analysis allows for a rigorous and objective examination of the landscape of digital leadership, contributing to advancing knowledge in this emerging field.

2. METHODOLOGY

This research paper utilizes bibliometric analysis, which employs mathematical and statistical techniques to examine scientific publications, including papers, books, and other forms of communication (Donthu et al., 2021). The main objective of bibliometrics is to gain insights and comprehend patterns in scientific publications (Kalantari et al., 2017; Zupic & Čater,

2015). By utilizing bibliometric parameters like authors, citations, keywords, and publication countries (Durmus Senyapar et al., 2023; Fan et al., 2023), the bibliometric analysis provides a robust and systematic research method, enabling thematic analyses of selected studies. Utilizing these bibliometric parameters, the study derives valuable insights and comprehensively analyses the chosen research themes.

Data Source

This research used bibliometric methods to analyze data from various sources, including articles, conference papers, book chapters, and other relevant documents available in the Scopus database. The specific search term for data retrieval was “digital leadership,” which yielded 127 publications from Scopus.com.

Bibliometric analysis involves quantitative examination and evaluation scholarly publications to identify patterns, trends, and critical insights within a specific research area. By analyzing the data retrieved from the Scopus database using the search term "digital leadership," the researchers aimed to gain a comprehensive understanding of the scholarly output related to this topic. The Scopus database is a widely used and respected platform that indexes various academic literature, making it a valuable source for conducting bibliometric studies.

The 127 publications obtained from Scopus.com serve as the foundation for the subsequent analyses in this study. Researchers can utilize various bibliometric parameters, such as authorship, citation patterns, publication trends, and keyword frequencies, to explore the evolution and impact of digital leadership research over time. Additionally, bibliometric analyses can help identify influential authors and institutions, the most relevant research topics within the field, and potential research gaps.

Using bibliometric methods in this study provides a rigorous and objective approach to examine the landscape of digital leadership research, enhancing the understanding of this emerging field and informing future research directions.

Method

The bibliometric analysis emphasizes specific inquiries and recommended considerations for researchers at each stage. Step 1 involves clearly defining the objectives and scope of the bibliometric study. Before Step 2, scholars should carefully choose the appropriate bibliometric analysis techniques. In Step 3, meticulous data collection for the bibliometric analysis is crucial. Lastly, in Step 4, researchers should conduct the bibliometric analysis and thoroughly document and present their findings (Donthu et al., 2021).

This research method utilizes bibliometric analysis and draws data from Scopus and VOSviewer to depict research trends concerning EV adoption. The study employs analytical and visualization tools to analyze patterns, connections, and developments in the adoption of electric vehicles (Al Husaeni & Nandiyanto, 2022).

3. RESULT

The publication trend focusing on digital leadership has been experiencing significant growth, as depicted in Figure 1. However, despite this upward trend, the number of research papers and publications on digital leadership still needs to grow. For instance, according to the Scopus

database, there are only 127 publications with titles related to digital leadership. The scarcity of research in this area may indicate an opportunity for researchers to explore further and contribute to understanding digital leadership and its implications.

Understanding the Publication Trend in Digital Leadership

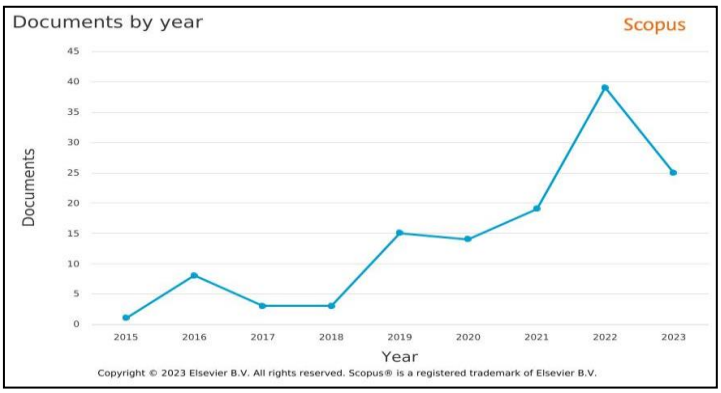

Figure 1. Trend of Digital Leadership Publications
Sources: Scopus Analyze (2023)

In 2015, only one paper was published, while in 2016, the number increased to eight. The following year, in 2017, there were three papers published, and in 2018, the number remained the same at three papers. In 2019, the count rose to 15 papers; in 2020, were 14 papers published. The year 2021 saw an increase to 19 papers; in 2022, there was a significant surge with 39 papers published. As of July 2023, have been 25 papers published on this topic.

The increasing trend in digital leadership publications suggests that this area is an emerging field of study with growing significance. Researchers interested in leadership, technology, and digital transformation can delve into this domain and contribute to digital leadership's theoretical and practical aspects.

Despite the upward trajectory, the relatively low number of publications indicates untapped research potential. Numerous aspects of digital leadership may still need to be explored, leaving room for novel research ideas and unique perspectives.

The domain of digital leadership is inherently multidisciplinary, involving elements of management, technology, psychology, and organizational behavior. Researchers from diverse backgrounds can collaborate and contribute their expertise to enhance the understanding of digital leadership's intricacies.

The exponential growth of digital leadership publications indicates that this field will continue to evolve. As technology and organizational practices progress, researchers can explore new dimensions of digital leadership, such as ethical considerations, sustainable practices, and artificial intelligence integration.

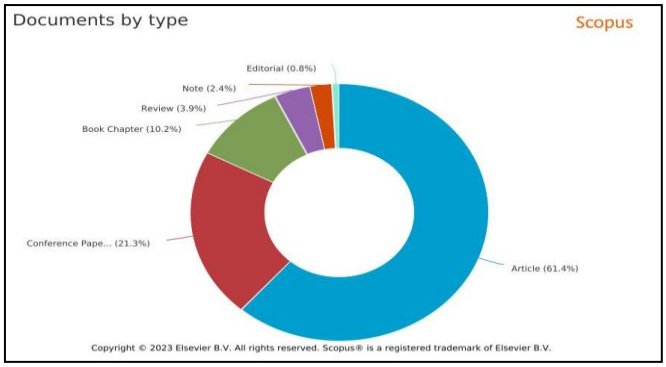

Figure 2. Distribution of Digital Leadership Publications by Type
Sources: Scopus Analyze (2023)

The publications related to digital leadership are primarily found in reputable journals, accounting for 61.4% of the total, followed by conference papers at 21.3%. The remaining publications are distributed among book chapters (10.2%), reviews (3.9%), notes (2.4%), and editorials (0.8%) (refer to Figure 2). Among these publications, the majority are concentrated in subject areas such as Social Sciences (19.6%), Business and Management (18.1%), and Computer Science (15.6%), with the remaining belonging to various other fields (see Figure 3).

Analyzing Publication Formats and Subject Areas in Digital Leadership

The high percentage of publications in the Social Sciences subject area suggests that digital leadership is not only a technological domain but also encompasses social and behavioral aspects. This aligns with the growing importance of understanding human behavior and organizational dynamics in the context of digital transformation and leadership.

The significant presence of digital leadership publications in the Business and Management subject area further highlights the relevance of digital leadership principles and practices in the corporate world. It suggests that businesses seek ways to enhance their leadership strategies in the digital age.

Moreover, the relatively large proportion of publications in the Computer Science subject area emphasizes the technical aspects of digital leadership. It indicates that researchers and practitioners are exploring innovative technologies and computational methods to improve digital leadership effectiveness.

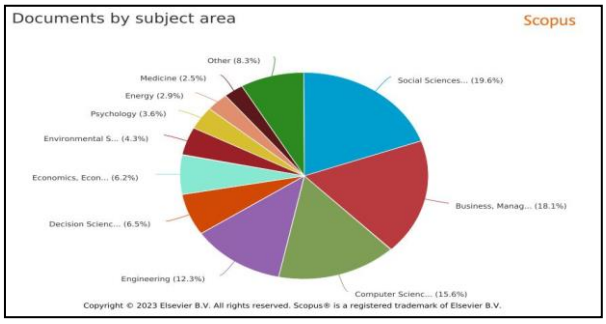

Figure 3. Distribution of Digital Leadership Publications by Subject Area
Sources: Scopus Analyze (2023)

The distribution of publications in different formats and subject areas reflects the growing importance of digital leadership as a research topic and its impact on various fields, including business, technology, and social sciences. Researchers and practitioners should take note of these trends to stay informed about the latest developments and contribute to advancing digital leadership knowledge and practices.

Top Journals in Digital Leadership Research

The top five journals in the academic literature (Figure 4) that have gained prominence and recognition are as follows: First, *Sustainability Switzerland*, a reputable scholarly journal dedicated to advancing research and knowledge in sustainability. Second, *Frontiers in Psychology* is a prestigious journal that provides a platform for cutting-edge research in various psychology domains. Third, the *International Journal of Learning, Teaching, and Educational Research* is a prominent publication in education. Fourth, *Management Science Letters* is a highly regarded journal focusing on the latest management science developments and advancements. Fifth, *Pharmazeutische Industrie* is a notable journal in the pharmaceutical sciences domain, serving as a critical resource for researchers, pharmacists, and professionals in the pharmaceutical industry. These top five journals represent valuable sources of information for researchers and scholars across their respective disciplines, providing a robust foundation for academic discourse and further advancement in digital leadership.

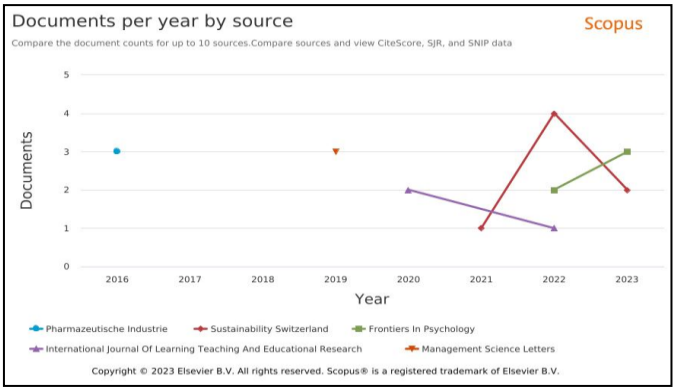

Figure 4. Top Five Journals on Digital Leadership Publication
Sources: Scopus Analyze (2023)

Leading Countries in Digital Leadership Research

Figure 5 presents a graphical representation of the research output and publications related to digital leadership, segmented by the leading countries of origin. Then figure 6 presents the top five researchers from the countries in the digital leadership context. The data indicate that German researchers have contributed the most to this area, with the most research papers and publications. Indonesia follows closely in the second position, while the United Kingdom, Turkey, and the United States occupy the subsequent ranks.

The dominance of German researchers in digital leadership suggests that they have been actively engaged in producing scholarly work on this topic. For researchers from other countries, collaborating with German counterparts could provide valuable opportunities to exchange knowledge, share resources, and foster cross-cultural insights into digital leadership. The fact that Indonesia ranks second in research output indicates a growing interest in digital leadership. Indonesian researchers can leverage this momentum to expand their contributions

further and collaborate with global experts. This trend may also signify the significance of digitalization in Indonesia's business and leadership landscape.

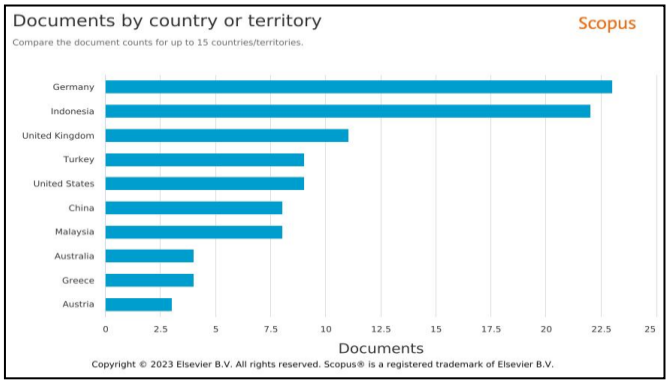

Figure 5. Leading Countries in Digital Leadership Research Output
Sources: Scopus Analyze (2023)

Analyzing publication trends in different countries can help identify potential research gaps for researchers aiming to explore digital leadership. Investigating why certain countries are more active in this field than others could shed light on cultural influences, technological infrastructure, and academic support systems.

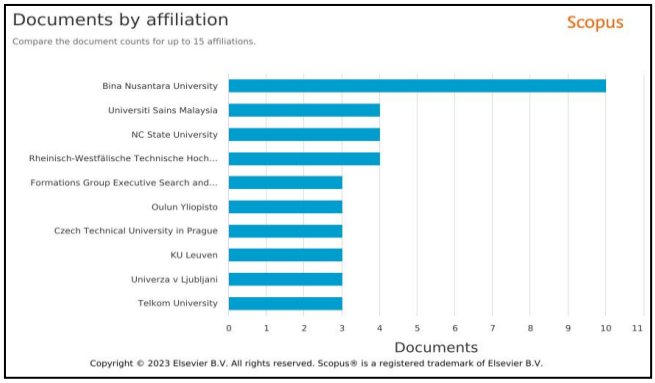

Figure 6. Leading Universities in Digital Leadership Publication
Sources: Scopus Analyze (2023)

Figure 6 illustrates that the top-ranking institution that has published research outcomes on digital leadership is Bina Nusantara University from Indonesia, with authors affiliated with this university also dominating as the top authors, notably Mihardjo (Figure 7). The second position is held jointly by Universiti Sains Malaysia, NC State University, and Rheinisch-Westfälische Technische Hochschule Aachen.

This information is valuable for researchers, policymakers, and institutions interested in digital leadership, as it sheds light on the key players in the field. Collaborations or partnerships with these leading institutions and authors can foster the exchange of ideas, expertise, and resources, ultimately driving further advancements in digital leadership research and practices. Moreover, it showcases the global interest in digital leadership research, with institutions from different countries actively participating and contributing to the body of knowledge in this field.

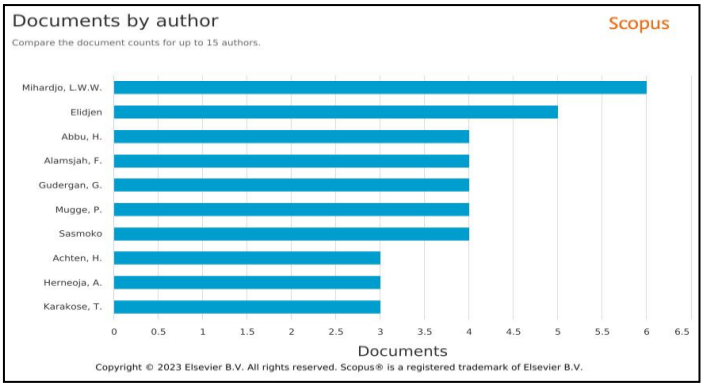

Figure 7. Leading Authors in Digital Leadership Publication
Sources: Scopus Analyze (2023)

With a diverse set of countries represented in the top positions, researchers can adopt a cross-cultural lens while studying digital leadership. Understanding how digital leadership practices vary across different countries and contexts can provide valuable insights for organizations operating in a globalized world.

Exploring Clusters of Themes in Digital Leadership Research

Figure 8 depicts a network visualization of themes that have emerged in research related to digital leadership. The network is clustered based on the relationships and similarities between the themes. The analysis reveals six distinct clusters, each comprising various interconnected themes:

Cluster 1: This cluster comprises five themes: dynamic capability, innovation, innovation capability, innovation management, and market-oriented. These themes are closely related and form a cohesive group centered around the concept of innovation and its role in digital leadership. Research in this cluster likely explores how dynamic capabilities and innovation drive successful digital leadership strategies and market-oriented approaches.

Cluster 2: This cluster consists of four themes: digital leadership, digital technology, digitalization, and innovative work behavior. These themes revolve around the core concept of digital leadership, examining how it relates to the adoption of digital technologies, the process of digitalization, and its impact on fostering innovative work behavior within organizations.

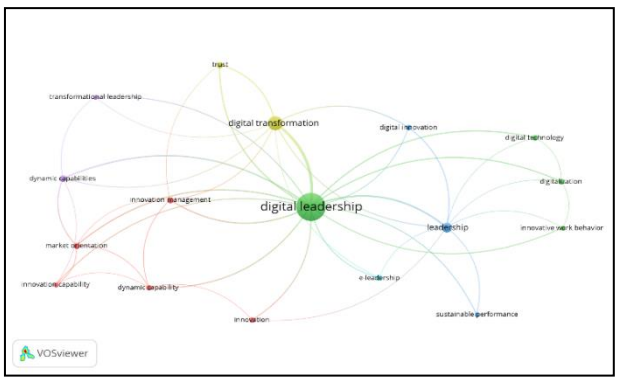

Figure 8. Network Visualization of Themes in Digital Leadership Research
Sources: VOSviewer (2023)

Cluster 3: Comprising three themes, this cluster includes digital innovation, leadership, and sustainable performance. The themes in this cluster suggest that research here may focus on how digital innovation affects leadership practices and how it contributes to sustainable performance outcomes.

Cluster 4: This cluster contains two themes: digital transformation and trust. The interconnectedness of these themes indicates that research in this cluster might explore the critical role of trust in driving successful digital transformation initiatives within organizations.

Cluster 5: Consisting of two themes, dynamic capability, and transformational leadership, this cluster emphasizes the interplay between dynamic capabilities and transformational leadership in digital leadership.

Cluster 6: This cluster comprises a single theme: e-leadership. Research in this cluster likely concentrates on the evolving concept of e-leadership, focusing on how digitalization influences leadership approaches and strategies in the modern digital era.

The network visualization provides insights into the interrelatedness of various themes within digital leadership research. The clustering highlights the convergence of themes with similar underlying principles, suggesting potential areas of synergy and overlap. It also reveals distinct areas of focus, enabling researchers to identify gaps in the existing literature and explore promising avenues for future research. The network visualization ultimately aids in understanding the complex and multifaceted nature of digital leadership and the diverse aspects researchers have been investigating within this domain.

Formulating Hypotheses from Clusters for Building a Model

From each cluster, hypotheses emerge which can become the basis for building a model and be replicated or retested empirically.

Cluster 1 Hypothesis: Organizations that exhibit strong dynamic capabilities and effectively manage innovation are likelier to achieve successful digital leadership strategies and adopt market-oriented approaches. Helpful resources for building this hypothesis are Brunner et al., (2023), Fatima and Masood (2023), Borah et al. (2022), Karippur and Balaramachandran (2022), Jagadisen et al. (2022), Mihardjo et al. (2019), Mihardjo et al., (2019), Sasmoko et al. (2019), Mihardjo and Rukmana (2019), and Mihardjo et al. (2019).

Cluster 2 Hypothesis: Effective digital leadership is positively associated with adopting digital technologies digitalization processes, and promoting innovative work behavior within organizations. Helpful resources for building this hypothesis are Hung et al. (2023), Ghamrawi and Tamim (2023), Mollah et al. (2023), Hanandeh et al. (2023), Salamzadeh et al. (2023), Kokot et al. (2023), Brunner et al. (2023), Shin et al. (2023), and Tigre et al. (2023).

Cluster 3 Hypothesis: The level of digital innovation within an organization positively influences leadership practices and contributes to sustainable performance outcomes. Helpful resources for building this hypothesis are Mollah et al. (2023), Shin et al. (2023), Quaquebeke and Gerpott (2023), Karakose and Tülübaş (2023), Zulu et al. (2023), Karakose et al. (2022), Niu et al. (2022), Khaw, et al. (2022), Erhan et al. (2022), Baglama et al. (2022), and Benitez et al. (2022).

Cluster 4 Hypothesis: Trust is crucial in driving successful organizational digital transformation initiatives. Helpful resources for building this hypothesis are Hung et al. (2023), Brunner et al. (2023), Türk (2023), Yao et al. (2023), Imhof and Grivas (2022), Abbu et al. (2022), Abbu et al. (2022), Magesa and Jonathan (2022), and Gudergan et al. (2021).

Cluster 5 Hypothesis: Dynamic capabilities and transformational leadership significantly impact digital leadership effectiveness. Helpful resources for building this hypothesis are Brunner et al. (2023), Karippur and Balaramachandran (2022), Eberl and Drews (2021), and Mihardjo et al. (2019).

Cluster 6 Hypothesis: E-leadership is evolving with digitalization, leading to changes in leadership approaches and strategies in the modern digital era. Helpful resources for building this hypothesis are Kokot et al. (2023), Shin et al. (2023), and Tigre et al. (2023).

These hypotheses allow researchers to explore and test the relationships and interactions between various themes within each cluster. Researchers can validate and strengthen these hypotheses by conducting empirical studies and analyzing data, contributing to a deeper understanding of digital leadership and its underlying factors.

4. CONCLUSIONS

In conclusion, the research problem focused on understanding the trends, distribution, top journals, leading countries, and thematic clusters in digital leadership research. The findings provide valuable insights into the growth and potential of this emerging field, emphasizing the multidisciplinary nature of digital leadership and the need for further exploration.

The publication trend analysis revealed significant growth in digital leadership research over the years, indicating its increasing importance. However, the relatively low number of publications suggests untapped research potential, highlighting the opportunity for researchers to contribute to this field's advancement.

The distribution of publications across different formats and subject areas demonstrated that digital leadership research is not limited to technology alone but involves various aspects, including social sciences, business, and management. This multidisciplinary approach is essential for comprehensively understanding digital leadership in modern organizations.

Identifying top journals and leading countries in digital leadership research showcased global interest and engagement. Collaboration among researchers from different countries and institutions can foster cross-cultural insights and drive advancements in digital leadership practices.

The network visualization of thematic clusters revealed six distinct themes, each offering valuable insights into the interplay between various aspects of digital leadership. The formulated hypotheses from each group provide a solid foundation for building a comprehensive digital leadership model and conducting empirical studies to validate and strengthen these relationships.

The research findings contribute to the knowledge of digital leadership by revealing the current trends and thematic clusters in this field. Researchers can utilize this information to develop theoretical frameworks and models to further our understanding of digital leadership dynamics.

The identified multidisciplinary nature of digital leadership research emphasizes the need for integrated theories and frameworks that consider technological, social, and managerial aspects of leadership in the digital age.

The formulated hypotheses provide a basis for empirical testing, enabling researchers to establish causal relationships between different factors in digital leadership research.

Organizations can benefit from the insights gained in this research to develop effective digital leadership strategies and practices. Understanding the importance of dynamic capabilities, innovation, digitalization, and trust can help leaders navigate digital transformation successfully.

Policymakers can use the findings to create supportive environments for digital leadership research and encourage collaborations among researchers and institutions from different countries.

To further advance the understanding of digital leadership, future research can explore the following areas: (1) Longitudinal studies to track the continuous growth and development of digital leadership research over time. (2) In-depth case studies to investigate successful digital leadership practices in specific organizations or industries. (3) Comparative studies to understand cross-cultural variations in digital leadership practices and their impact on organizational outcomes. (4) Experimental studies to empirically test the formulated hypotheses and establish causal relationships between different variables in digital leadership research.

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