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Sorumlu Yazar/ Corresponding Author:
Eda TELLİ,
edatelli@mehmetakif.edu.tr

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AGILITY AND LEADERSHIP IN THE VUCA ENVIRONMENT: A VIEW OF GLOBAL RESEARCH TENDENCIES

EDA TELLİ [1*]

[1] *Dr. Öğr. Üyesi, Burdur Mehmet Akif Ersoy Üniversitesi, Ağlasun MYO, edatelli@mehmetakif.edu.tr*

ABSTRACT
The aim of this study is to present the literature by using the bibliometric analysis method, which offers the opportunity to examine in depth the reflections of agility, which has become a remarkable topic in recent years, in the process of management transformation from a holistic perspective in order to understand the effectiveness of leadership, which plays a major role in the business world where volatility, uncertainty, complexity and ambiguity are high. In the research conducted for this purpose, it was determined that there are 18,379 publications on the concept of agility and agile leadership in the Web of Science (WOS) database, and 1,550 of these publications are in the article type, in the management category, and in the English language. According to some of the findings obtained as a result of the bibliometric analysis, the most studies on agile and agile leadership in the last decade were conducted in 2023 (235) publications and Christopher, M. was the most cited, according to the co-author network visualization, the most linked studies were around Gligor, D. M., Gölgeci, İ. and Holsapple, C.W., the most repeated keyword is agility, the most cited country is USA, and according to bibliometric matching analysis, Benchmarking: An International Journal is one of the most influential journals on document basis.

Keywords: Agility, Agile Leadership, Vuca, Bibliometric Analysis

VUCA ORTAMINDA ÇEVİKLİK VE LİDERLİK: KÜRESEL ARAŞTIRMA EĞİLİMLERİNE BİR BAKIŞ

ÖZ
Bu çalışmanın amacı, son yıllarda dikkat çekici bir konu haline gelen çevikliğin yönetimin dönüşümü sürecindeki yansımalarını, değişkenliğin, belirsizliğin, karmaşıklığın ve muğlaklığın yüksek olduğu iş dünyasında büyük rol oynayan liderliğin etkinliğini anlamak için bütüncül bir bakış açısıyla derinlemesine inceleme imkanı sunan bibliyometrik analiz yöntemini kullanarak alan yazını ortaya koymaktır. Bu amaçla yapılan araştırmada Web of Science (WOS) veri tabanında çeviklik ve çevik liderlik kavramına ilişkin 18.379 yayın olduğu, bu yayınların 1.550'sinin makale türünde, yönetim kategorisinde ve İngilizce dilinde olduğu tespit edilmiştir. Bibliyometrik analiz sonucunda elde edilen bazı bulgulara göre, son on yılda çeviklik ve çevik liderlik üzerine en fazla çalışmanın 2023 (235) yayınla yapıldığı ve Christopher, M.'nin en fazla atıf alan yazar olduğu, ortak yazar ağı görselleştirmesine göre en fazla bağlantılı çalışmanın Gligor, D. M., Gölgeci, İ. ve Holsapple, C.W. etrafında olduğu, en fazla tekrarlanan anahtar kelimenin çeviklik olduğu, en fazla atıf alan ülkenin ABD olduğu ve bibliyometrik eşleştirme analizine göre Benchmarking: An International Journal, doküman bazında en etkili dergilerden biri olduğu ortaya çıkmıştır.

Anahtar Kelimeler: Çeviklik, Çevik Liderlik, Vuca, Bibliyometrik Analiz

INTRODUCTION

The agile management approach, which has become a necessity rather than a feature of the dynamic environment and business world in recent years and transforms management processes, reflects the attitude to be taken against disruptions that will affect the future sustainability and survival strategies of organizations. Today's environment is characterized by volatility, uncertainty, complexity and ambiguity (VUCA), which has affected and continues to affect the business environment. Although a business environment dominated by change and uncertainty continues to exist, on the other hand, it is quite obvious that new generation (digital) technologies accelerate the emergence of new business models and transform organizational structures, necessitating different management skills. In this context, the requirements of the modern business environment require today's leaders to have a deep understanding of both the world and their organization and to be able to integrate the organization into changing and transforming processes. Therefore, today's management must be able to respond to these changes with flexibility and speed, taking into account the characteristics of the environment in which the organization is located.

Agility provides the ability to respond quickly to unexpected changes that affect the organization and thus a proactive approach (Haider et al., 2021). Similarly, it is defined as the ability to respond to unpredictable changes in the competitive and highly uncertain business environment for the development, survival and sustainability of businesses (Susitha et al., 2024). Therefore, the proactivity, flexibility, adaptability to technological change and agility of agile leaders in shaping the future of their organizations will be very important, especially in order to adapt to the conditions brought by the VUCA world. Based on this understanding, the aim of this study is to fill the gap in the literature although there are many studies from different perspectives (Baran & Woznyj, 2020; Bir & Koç, 2022; Nurhaeni et al., 2022; Aftab et al., 2022; Eckstein et al., 2023) on agility or agile leadership in the VUCA environment / world / era, but there were not able to locate a study that is consisted of both variables that evaluates both together at the time of the research, and to provide an up-to-date approach to researchers on agility and agile leadership in the field of management and to create a roadmap. For this purpose, the bibliometric analysis method was used, which allows quantitative analysis of scientific studies and has a high potential to provide research impact on large volumes of scientific data (Hadiastriani & Djarot, 2024). Within this scope, firstly, a conceptual framework regarding agility and agile leadership in the VUCA environment was presented. Then, articles written in the management category and in English language were selected from the Web of Science (WOS) database with the keywords "agility", "agile leadership" and "agile leader" and analyzed. In addition, bibliometric analyses were performed and the results were interpreted using the VOSviewer program, which allows the creation and visualization of bibliometric networks related to publications (Van Eck & Waltman, 2017). In this context, it can be said that for future research, vuca environments require a strategy that requires businesses to be quite proactive. Therefore, when we look at the frequently studied keywords, it is seen that the ability to adapt to changes in the vuca environment has gained importance for today's and future worlds. Indeed, it is obvious that concepts such as digitalization, flexibility, durability, Industry 4.0 are related to agility and agile leadership, and that it is a necessity for businesses to transform into agile structures and ensure their continuity for the future business world.

It can be said that this study fills this gap in terms of seeing current trends and deficiencies on the subject, as it was a study examining vuca, agile and agile leadership in the field of management within the scope of bibliometric analysis at the time the research was conducted, and that it serves as a guide for researchers who want to conduct research in the future. On the other hand, in recent years there has been a transition to a technology and human-centered process called Industry 5.0. Therefore, people need to develop their competency skills and upskilling and re-skilling are important due to the different business models. It can be thought that this will be achieved through agile leaders and organizational agility, which is also expressed as the ability to adapt to changes.

Futhermore, this study has been prepared in accordance with research and publication ethics.

I. CONCEPTUAL FRAMEWORK: THE LINKS BETWEEN AGILITY, AGILE LEADERSHIP AND VUCA

Today, the ability to adapt to change and, more importantly, to lead change and innovation is critical to the success and sustainability of organizations. For this reason, the need for organizations to agile their ways of doing business and structures in order to combat the uncertainty, complexity and ambiguity brought about by the speed of change is coming to light. In particular, the uncertainty created by the environment has a profound impact on organizations. Examples of the dynamic and challenging VUCA environment include market disruptions (volatility), geopolitical shifts (uncertainty), complex technology ecosystems (complexity) and unclear industry regulations (ambiguity) (Johannes & Tatiana, 2024). Thus, a key factor in VUCA periods must have unique, adaptive, agile, mechanisms and capabilities, thanks to their valuable, rare, inimitable and non-substitutable qualities (Atanassova et al., 2025). As a matter of fact, uncertainty and ambiguity change the skills and competencies that leaders need to have in today's age, as it causes situations of inability to predict or predict the future. In this context, both strengthening the organizational structure in the face of challenges, that is, making it agile, and making this change permanent by pioneering this change increases the need for agile leaders.

The concept of agility is defined as the development of a business in a competitive market with unexpected and sudden changes, customer-oriented evaluation of products and services, and the ability to respond quickly to changing markets. (Yusuf et al., 1999). On the other hand, in recent years, it has become a concept that has begun to gain importance in almost every field, especially by being actively used by practitioners in the field of information systems development as a way to respond to environmental changes (Chouki et al., 2021). The main advantage of an agile organization is that it has the organizational flexibility to adopt the management tool that will provide the greatest competitive advantage for each project to be carried out, thus providing a structure that can enable them to succeed in an environment of unpredictable, continuous and unexpected change (Sanchez & Nagi, 2001). In this context, it is argued that the VUCA world defined as volatility, uncertainty, complexity and ambiguity creates an environment of multiple risks for leaders and that agility is the key to managing these changes (Bennett & Lemoine, 2014). Therefore, today's leaders must have the agility to cope with these conditions that threaten the future of their organizations and the changes that will invalidate their plans. Recognizing these trends over the last decade, organizational change experts have been promoting the need to develop "agile" companies - organizations that anticipate and respond quickly to rapidly changing conditions in a way that effectively manages both technical and stakeholder complexity (Joiner & Josephs, 2007). In this framework, agility as just one of the skills that leaders should have in the global business world has left the management with the fact that it is much more than a characteristic. Agile leadership is defined as a dynamic ability to anticipate changes in the business environment and respond to them by taking quick and flexible actions (Setiawati, 2021). In other words, it is stated that agile leaders are individuals who can ensure the adaptation of innovation processes in organizations and the survival of organizations in competitive environments full of uncertainty and complexity and similarly, who can realize the rapid development of learning and improvement by being sensitive to emerging challenges or opportunities (Akkaya et al., 2022).

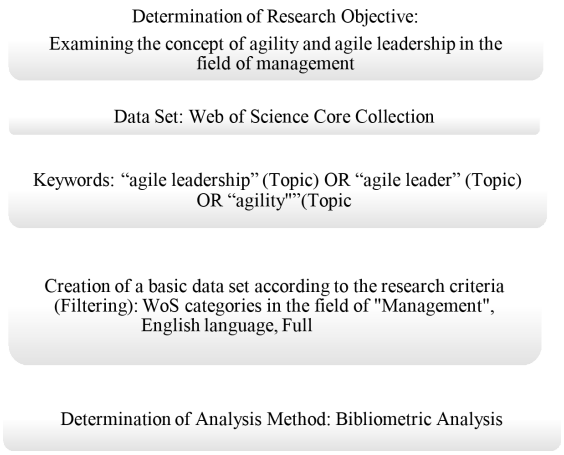
It is seen that agile leadership has been studied as a research topic in various disciplines. According to Nurhaeni et al. (2022), it has been revealed that agile leaders should have organizational-oriented characteristics such as being flexible, visionary, open, adaptable, responsive, change maker, problem solver. On the other hand, agile leaders should exhibit dynamic abilities, be able to assess the needs of the organization's resources that will carry it into the future and develop strategies for productivity where it can create a sustainable value by adapting to change, and also have the competence to use both new

technology and new technology learned by adjusting internal resources to the external environment (Kaya, 2023). Akkaya &Yazıcı (2020) argue in their study that agile leaders have six main characteristics: speed, change, flexibility, competence, collaboration, results and self-awareness, and at the same time, the most important element that feeds an agile leader is their proactive approach and creative behavior to seek the fastest and most appropriate solutions to the needs of the moment arising from the environment and technology. Thus, leaders with an agility approach that initiates and sustains continuous change by combining themes such as innovation, speed, flexibility, change, dynamic capabilities and quality with the organization's processes, structure and technology outside of traditional patterns gain importance because they are leaders who can respond to the challenges presented by uncertainty and ambiguity, in other words, the VUCA environment (Özdemir & Çetin, 2019). In fact, in the "VUCA world", i.e. the ability to anticipate or respond quickly to external changes, agility and leadership capable of putting it into practice are essential to survive and compete successfully, especially in today's turbulent environment characterised by technological advances and digitalisation (Troise et al., 2022).

II. METHODOLOGY

Bibliometric analysis is a method that quantitatively analyzes scientific publications to create measures of scientific activities and research performance (Farooq, 2024). In other words, it is a particularly valuable method for identifying research trends, assessing the impact of research outputs, and understanding the intellectual structure of a field over time (de Barros et al., 2025). Bibliometric analysis was performed using vosviewer to identify key research trends, applying co-occurrence of keywords analysis, citation network analysis, co-citation analysis, co-authorship analysis and bibliographic coupling analysis mapping. In this context, the methodological approach adopted in the study is designed to achieve the proposed goal by mapping the issue of what kind of leader to be in this process that transforms management as a result of the necessity of a business world that is constantly changing, complexity, uncertainty and ambiguity. In line with the purpose of the research, bibliometric analysis was conducted to reveal the importance of the subject. The methodology of the research is summarized in Figure 1:

FIGURE 1 | Methodology of the Study



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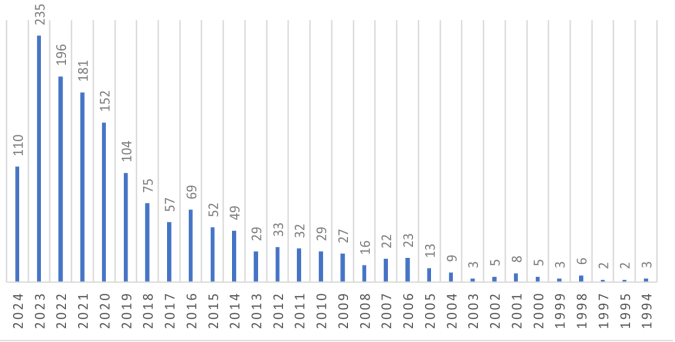
Figure 1 shows the steps of the research process. The first step in the research process was to conduct a broad and fundamental literature review of the concepts that this study would introduce. Then, the data set from which the sample of the research will be determined and the database (Web of Science) from which the data will be obtained were determined. Web of Science is a database that provides comprehensive and high quality information sources for bibliometric research (Gaurav et al., 2021). Therefore, this study was conducted using the WoS Core Collection, which provides the most comprehensive search capabilities related to agility and agile leadership. The data were obtained by performing certain steps. First of all, the search was conducted in the Web of Science database with the keywords "agile leadership" (Topic) OR "agile leader" (Topic) OR "agility" (Topic). On July 18, 2024, 18,379 publications were reached as a result of the first search without filtering. Then, filtering was made within the framework of the purpose of the research. As a result of filtering, based on the data obtained on the relevant date, 1,550 data sets were reached in the article type, Web of Science management category and English language. After determining the data set, 1,550 articles were analyzed using VOSviewer, a visualization software for bibliometric networks, and the findings were interpreted.

III. FINDINGS

A. DESCRIPTIVE AND BIBLIOMETRIC FINDINGS

This section presents the results of the descriptive and bibliometric analysis based on the purpose of the study. Firstly, findings are presented through indicators such as the number of articles published in the literature on agility and agile leadership on a yearly basis, the distribution of journals according to the WoS index, and the productivity of authors according to the number of publications and citations. At the same time, the results of bibliometric analysis using methods such as co-author analysis, co-citation analysis, co-occurrence of keyword analysis and bibliographic coupling are presented with visual mapping technique.

FIGURE 2 | Distribution of Articles by Years



Source: *Created by author*

Figure 2 shows the yearly distribution of studies on agility and agile leadership. Looking at the last ten years, it was revealed that the most studies were conducted in 2023 (235 publications). It is noteworthy that the number of articles in the field of management related to agility and agile leadership has increased especially since 2017. On the other hand, the fact that the calendar year 2024 has not yet been completed (including articles until July 18, 2024) can be said as a reason for the low number of studies conducted in this year. Since the date of the analysis is July 18, 2024, information for 2025 is not included in the graph. However, in future studies on this subject, the findings of 2025 can also be analyzed and interpretations can be made regarding the findings.

TABLE 1 | Distribution of Journals According to WoS Index

Web of Science Index	Number of Records
Social Sciences Citation Index (SSCI)	999
Emerging Sources Citation Index (ESCI)	483
Science Citation Index Expanded (SCI-EXPANDED)	255
Book Citation Index – Social Sciences & Humanities (BKCI-SSH)	62
Book Citation Index – Science (BKCI-S)	13
Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH)	13
Conference Proceedings Citation Index – Science (CPCI-S)	2
Arts & Humanities Citation Index (A&HCI)	1

Source: *Created by author*

Table 1 shows the distribution of journals publishing on agility and agile leadership according to the WOS index. According to the table, the highest number of articles (999) related to the concept is in the Social Sciences Citation Index (SSCI). After SSCI, the indexes with the highest number of articles are ESCI (483 articles) and SCI-EXPANDED (255 articles).

TABLE 2 | Top Ten Most Prolific Authors by Number of Publications and Citations*

Author	Number of Publications	Author	Number of Citation
Suresh, M.	12	Christopher, M.	1296
Gligor, D.M.	10	Wieland, A.	941
Liu, H.	8	Shankar, R.	913
Golgeci, İ.	7	Wallenburg, C.M.	832
Luftman, J.	7	Kosonen, M.	788
Gligor, D.	7	Sambamurthy, V.	769
Holsapple, C.	7	Agarwal, A.	767
Shankar, R.	6	Tiwari, M.K.	767
Dubey, R.	6	Dubey, R.	761
Kock, A.	6	Suresh, N.C.	750

Source: *Created by author*

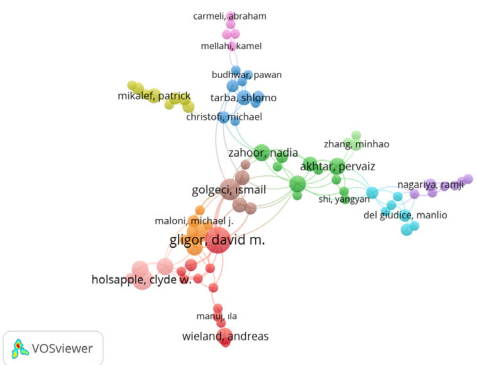
* The number of citations of authors in the research field and obtained from the Wos Core Collection database on July 18, 2024.

The distribution of studies on agility and agile leadership according to the number of publications and citations of the top ten most productive authors is given in Table 2. According to this, it is seen that Suresh, M. is the author who has published the most articles on agile and agile leadership in the management category in the last decade. (See 12 publications). Following him, Gligor, D.M. and Liu H.F. are in the top three with 10 and 8 articles, respectively. Likewise, in terms of the number of citations, it was concluded that Christopher, M. was the most cited (1296 citations). On the other hand, Shankar, R. who has 6 publications, ranks third in the number of citations with 913 citations, although the number of publications is less compared to the others.

B. CO-AUTHORSHIP ANALYSIS

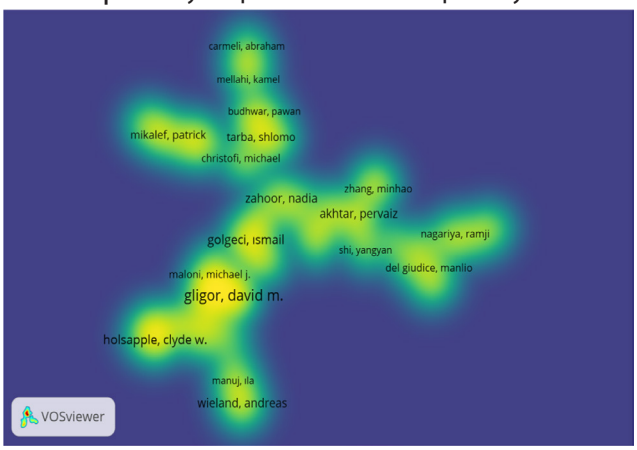
Co-author analysis reveals the network relationships that important researchers form by collaborating on scientific articles (Zupic & Čater, 2015). It is also the analysis that reveals who are the most highly connected authors in this network (Kumar, 2015). Based on this information, co-authorship analysis was conducted in order to determine the connection relations between the authors who have the most joint publications on agility and agile leadership in the field of management. When selected according to having at least two publications and two citations in the application phase of the analysis, 77 out of 461 authors were found to be in collaboration and highly interconnected (see Figure 3). In addition, according to the co-author network visualization, it was found that the most linked studies are around Gligor, D. M., Gölgeci, İ. and Holsapple, C.W. This is also supported by the density map in Figure 4.

FIGURE 3 | Co-authorship Network Visualization



Source: *Created by author*

FIGURE 4 | Density Map for Co-authorship Analysis



Source: *Created by author*

Figure 4 shows the density map for the co-authorship analysis. When looking at the density map in the co-authorship analysis, yellow areas indicate high density, while blue areas indicate less dense links. In this context, it can be seen that there is a density around Gligor, D. M. who has the highest link strength in the studies. Following him, Gölgeci, İ. and Holsapple, C.W. show other authors with high connection strength.

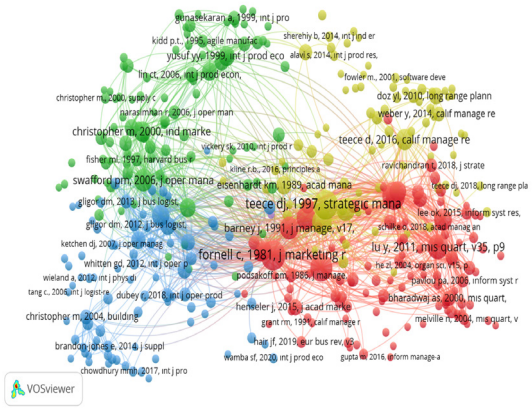
C. CO-CITATION ANALYSIS

Co-citation analysis is described as a method based on the assumption that when two publications are cited together, they are semantically linked and measures the co-citation strength of publications based on how often they are cited together in a new study (Saxena et al., 2024). In this study, co-citation analysis was evaluated according to references.

1. Co-citation analysis of cited references

When the minimum threshold value of 20 was selected, 373 out of 66587 references were found to meet this threshold value. Figure 5 shows the network visualization of the co-cited references.

FIGURE 5 | Network Visualization of Commonly Cited References



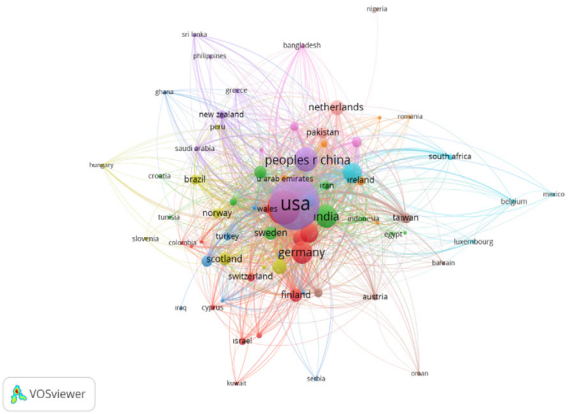
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As a result of the co-reference analysis, it was concluded that the most cited article (283 citations) was "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error" by Fornell C. & Larcker, D.F. (1981) in the Journal of Marketing Research, followed by "Dynamic Capabilities and Organizational Agility" by Teece, D., Pisano, G. & Shuen, A. (1997) "Dynamic Capabilities and Organizational Agility" published in Strategic Management Journal with 267 citations and Sambamurthy, V., Bharadwaj, A. & Grover, V. (2003) "Shaping Agility through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms" ranks in the top three with 241 citations.

D. CITATION ANALYSIS

Citation analysis provides analysis themes showing the relationship between documents, sources, authors, universities and countries. As a result of the citation analysis based on countries, the visualization of the most cited countries is given in Figure 6.

FIGURE 6 | Analysis of the Most Cited Countries



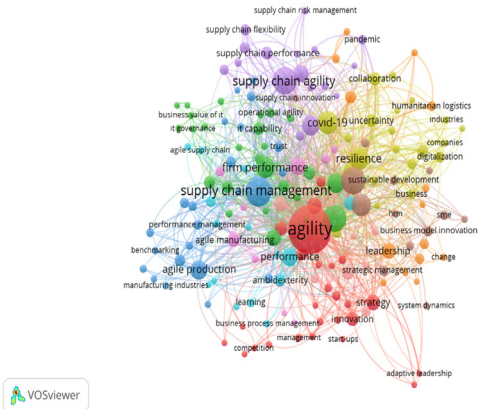
Source: *Created by author*

During the visualization, the minimum number of documents cited on agility and agile leadership was selected as two and the number of citations as two, and 72 out of 84 countries were included in the analysis. According to the results of the citation analysis, when looking at the relationship network between countries (Figure 6), it is seen that the country with the highest number of citations is the USA with 21986 citations. While the USA is in close relationship with China, Greece, New Zealand, Philippines, Saudi Arabia and Sri Lanka in the purple cluster, the UK, which is in the red cluster as the country with the second highest number of citations with 9247 citations, is also in close relationship with countries such as Germany, France and Finland in the similar group. India is again among the top three countries with the highest number of citations (4154 citations) in studies on agility and agile leadership. Similarly, it is quite clear that India is in close cooperation with countries such as Indonesia, Egypt, Tunisia, Sweden, which are in its color cluster in terms of the number of citations it has.

E. CO-OCCURRENCE OF KEYWORDS ANALYSIS

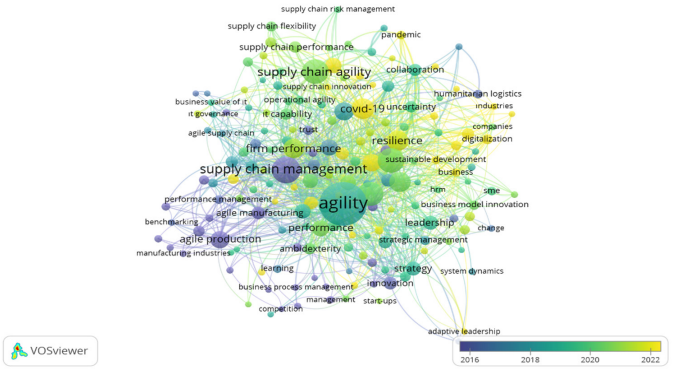
A co-occurrence of keywords analysis was conducted to determine the most frequently used words related to agility and agile leadership in the management category. In the analysis, it was determined that each keyword should be repeated in at least "5" studies. On the other hand, keywords such as country, research method, analysis method, scale development, data collection tools, etc., which were not related to the subject, were removed and keyword analysis was carried out in this way. Thus, 208 words out of 4016 keywords were included in the analysis.

FIGURE 7 | The Most Commonly Used Keywords



Source: *Created by author*

FIGURE 8 | Keyword Network Analysis Time Map



Source: *Created by author*

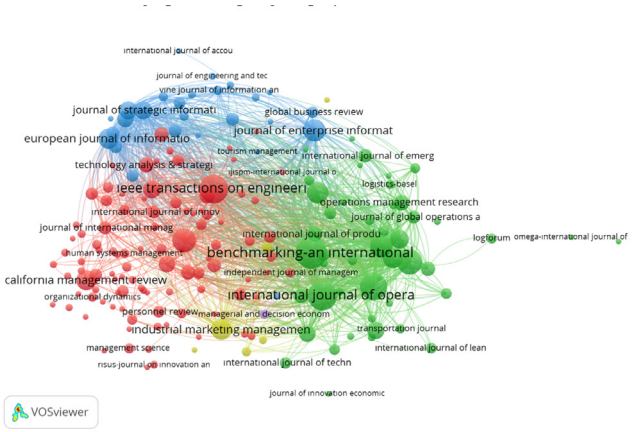
Figure 7 shows the most frequently repeated keywords, relationship networks and total link strength. As a result of the analysis, a total of 174 keywords and 10 clusters were formed by determining the condition that each keyword is repeated in at least "5" studies. As seen in the figure, it is seen that the word with the highest total link strength (530 total link strength) and the most repeated word 256 times is agility. Secondly, supply chain management with 197 total link strength and 98 repetitions and value chain agility with 133 total link strength and 83 repetitions ranked third with the most used keyword. Dynamic capability keyword (81 times) and organizational agility (79 times) are the other most repeated keywords. Looking at the first five clusters that emerged as a result of the common word analysis, it was revealed that the first cluster (red cluster) in the field of management consists of words such as agility, adaptive leadership, strategy, agile software, organizational change, change management, competence, Covid-19, disruption/ disruption, risk management, innovation, creativity, sustainability. The second cluster includes keywords such as adaptability, agility in business processes, enterprise value, competitive advantage, dynamic capabilities, entrepreneurial alignment, digital transformation, firm performance, talent, openness to innovation, market adaptability and organizational agility. In the third cluster, keywords such as agile productions, benchmarking, lean production, production systems, supply chain management, quality, performance measurement, total quality management, trust and value chain are concentrated. The fourth cluster is grouped by keywords such as business, business analytics, digitalization, industry 4.0, decision making, organizational flexibility, robustness, and uncertainty. The fifth cluster is grouped with similar keywords such as environmental uncertainty, pandemic, visibility, information sharing, financial performance, supply chain flexibility, resilience.

Figure 8 shows the time distribution of keywords by year. The concepts in the yellow clusters show the keywords used in the studies conducted in recent years, in other words, as we move from dark to light in the time map. In this context, it is seen that the most frequently repeated word agility was studied in previous years. As a matter of fact, between 2020-2022, studies on topics such as flexibility, Covid-19, dynamic capabilities, sustainability, VUCA (volatility, uncertainty, complexity and ambiguity), technological innovations, industry 4.0, digitalization, especially related to agility and agile leadership, started to come to the fore. (See. Yellow circles)

F. BIBLIOGRAPHIC COUPLING ANALYSIS

Bibliographic coupling is an analysis that shows the citation to the same publication or publications from two different studies (Zan, 2019). According to the search criteria with a minimum of two citations, 182 out of 320 sources were matched.

FIGURE 9 | Bibliographic Coupling Map by Journals



Source: *Created by author*

According to Figure 9, it is seen that the influential journals in the field of agility and agile leadership are formed in five clusters Benchmarking: An International Journal is the first most influential journal on document basis. It has a total of 58 publications, 1126 citations and the highest total link strength with 57669. On the other hand, the International Journal of Operations & Production Management has the second highest number of citations and total link strength with 52 publications, 3999 citations and 51921 total link strength. IEEE Transactions on Engineering Management, which is in the top three, is the third journal with 49 publications and 50016 total link strength. On the other hand, the journal has 690 citations.

According to the search criteria with a minimum of two citations and number of documents, it was concluded that the journal with the least number of publications (2 publications), number of citations (6 cited) and total link strength was The Resilience Framework: Organizing for Sustained Viability.

CONCLUSIONS AND RECOMMENDATIONS

This study uses bibliometric analysis to reveal global trends in "agility and agile leadership", which are becoming increasingly important in a world of VUCA (volatility, uncertainty, complexity and ambiguity). In this context, the WOS (Web of Science) database was used to obtain scientific studies in the literature. In addition, the visualization of bibliometric networks was carried out using the VOSviewer program.

In order to contribute to the management literature, it is quite clear that bibliometric analysis is an appropriate method to understand the development and evolution of agility and agile leadership, especially globally. In particular, the themes emerging with bibliometrics and the clusters formed by these themes and the network relationships between them, and thus obtaining information about the development of the concepts, the direction in which they have evolved and the direction of future studies, offer a holistic perspective. Hence, this study can be a resource for future researchers interested in agility and agile leadership to learn the main themes. At the same time, considering the descriptive findings in the distribution of agility and agile leadership studies by years, it was revealed that the most studies were conducted in 2023 (235 publications). Distribution of Journals According to WoS Index, the highest number of articles (999) related to the concept is in the Social Sciences Citation Index (SSCI). Looking at the top ten most prolific authors by number of publications and citations it is seen that Suresh, M. is the author who has published the most articles on agile and agile leadership in the management category in the last decade. Likewise, in terms of the number of citations, it was concluded that Christopher, M. was the most cited (1296 citations). When we look at the results of bibliometric analysis, according to the co-author analysis selected according to having at least two publications and two citations in the application phase of the analysis, 77 out of 461 authors were found to be in collaboration and highly interconnected As a result of the co-reference analysis, it was concluded that the most cited article (283 citations) was "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error" by Fornell C. & Larcker, D.F. (1981) in the Journal of Marketing Research. According to the results of the citation analysis, it is seen that the country with the highest number of citations is the USA with 21986 citations. In addition, it can be said that agility and agile leadership are emphasized the most together with concepts such as flexibility, Covid-19, dynamic capabilities, sustainability, VUCA, technological innovations, industry 4.0, digitalization, resilience. Finally, the findings of the study show that in a management where agile understanding is integrated with leadership (such as dynamic ability, speed, flexibility, creativity, resilience features), organizations that can survive in the sustainable and long term are transformed into organizations. In this context, today's understanding of leadership includes an agile management approach that is suited to the world that VUCA has brought. With agile leaders and a collaborative team, organizations can face these challenges and turn them into an advantage. For this reason, it can be suggested that in future research trends, more research should be done on sustainability, green practices, Web3 and artificial intelligence technologies along with agility for the future of the organization and the importance of agile leadership competencies in this regard. When the studies revealing the relationship between VUCA, agility and agile leadership are examined, it can be said that the findings of this study are in parallel with some studies in the literature. Erer (2024) found that the most used keyword in addition to 'VUCA' is 'leadership'. In the Nikseresht et al., (2022) study, it was concluded that artificial intelligence, decision making, VUCA and sustainable development and related terms are some of the main keywords, and in this study, it can be stated that the most used keywords related to agility and agile leadership, especially between 2020-2022, are words such as flexibility, sustainability, dynamic capabilities, VUCA. A systematic research of 116 scopus-indexed research articles on leadership responsiveness within the VUCA framework using the PRISMA technique, the study reveals the strategic adaptability of leadership agility in uncertain environments (Syamsir et al., 2025). Likewise, bibliometric research by Skorková & Burggraf (2024) reveals the growing interest of agile leadership in contemporary management practices in recent years, as well as the impact of digitalization and the role of agile work environments as potential areas for future research. Koçer (2022) underlines that attention should be drawn to the perceptions of agile leadership in universities in the VUCA environment and the understanding of agile leadership should become widespread. According to Yaşbay Kobal (2024) it is important for agile leaders to be prepared for each element of VUCA and to know how to deal with each of them. In another study using a systematic literature review, it was stated that the VUCA era emphasizes the need for adaptive, inclusive and technologically adept leadership in education (Mutil et al., 2024). Therefore, it can be said that this situation draws attention to the need for agility and agile leaders for the dynamic business environment. Otherwise in the systematic literature review conducted by Tandon et al., (2024) on agile leadership, it is stated that it consists of themes such as leadership agility competencies that define agility by synthesizing the existing literature; in this study, it is seen that it consists of themes such as agility, adaptability, dynamic capabilities. Therefore, it can be said that the study differs in this respect. Finally, in the bibliometric analysis study conducted by Ozkan et al., (2024) on agile software publications from Turkey, it was reported that the most cited articles were related to agile. In this study, agility was found to be the most used word. In this context, it can be stated that it is similar to the literature.

In the light of these findings, the following suggestions can be made to practitioners and new academic studies. The contribution of this study to the academia is to present Vuca, agility and agile leadership from a holistic perspective and to provide a literature guide to researchers who want to conduct research on these issues in the coming years. In addition, since the findings cover the period in which the research was conducted, the study may provide guidance for future years. On the other hand, its contribution to practitioners is that the business world is in a constant dynamism and therefore it is very important to take a position in this environment, that is, to develop agile strategies. In order to develop these strategies, adaptability and agile leaders who can keep up will be the key point of this process. Therefore, it is important to be able to cope with the challenges brought by uncertainties as the key to success today and to be able to implement the managerial perspective (such as agility) that can plan and foresee for future periods in practice. In addition, keeping up with the changing world requirements, adaptability, flexibility and resilience can be realized with the idea of agility. For this reason, organizations will be successful with a leadership that determines strategies by putting agility

at the center of the rapidly changing conditions of the day and can adapt to changing conditions and meet the demands. Morever, it can be said that digital technologies, which have developed rapidly especially in the last decade, will create value with agility strategies and leadership understanding that will allow businesses to respond quickly to changing market conditions and customer needs. It is also clear that the digital age requires new and different business competencies. Therefore, in the changing business world, it is important for leadership to act with an understanding that will integrate these changes and transformations into business processes. Moreover, it is highly likely that organizations that cannot adapt to digital technologies in the current era will face the danger of continuing their existence. Thus, in order to retain its competitive power, managements will be able to become resilient with an agility that can initiate change and integrate and sustain change into all business processes, with strategies that will emphasize today's speed, flexibility, teams and creativity. The future business world is evolving into a digital age that includes powerful technologies such as artificial intelligence. Therefore, future researchers can examine the impact of reskilling and upskilling on organizational agility in this era; it is also difficult to make decisions in a business environment with high uncertainty, so this process can be supported by organizational strategies such as staff empowerment.

The limitation of the study is that the data was collected from a single database, namely the Web of Science database, and only the accessible articles in the field of management were subjected to analysis. This is why databases such as PubMed, Scopus, Proquest Dissertations, JSTOR, Springer, and Google Scholar can be used for future studies. On the other hand, by creating codes and categories with a comprehensive content analysis in addition to the themes obtained through bibliometric analysis, the concepts of agility and agile leadership can be better understood and can guide other studies. In other words, despite this limitation, it is thought that this study will contribute to agility and agile leadership research by providing a holistic view with a current and deep literature review in the field of management.

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