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WEB OF SCIENCE DATABASE-BASED BIBLIOMETRIC ANALYSIS OF INTERNATIONAL PUBLICATIONS IN THE FIELD OF GREEN TRANSFORMATIONAL LEADERSHIP

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ABSTRACT

Green transformational leadership (GTL) is a new leadership that supports the formation of environmentally conscious leaders from modern leadership types. For this reason, it has become one of the important topics of new research and has become increasingly widespread as a research topic. In addition, no research has been found that includes bibliometric analysis related to GTL. The aim of the research is to determine the international researches made in the Web of Science database on GTL by bibliometric analysis method. In the analysis, the word “GTL” was entered into the Web of Science database and the search was made by selecting the “all field” part. All authors in the web of science database were searched based on years, documents, categories, languages, publication titles, publishers and indexes. All 73 studies found in the search were included in the study. VOSviewer Version 1. 6. 19. was used to perform bibliometric analysis of 73 studies. Methods such as co-creation, citations, bibliographic matching, co-citation analysis were used. As a result of the analysis, the following data were obtained: While the most publications (25) were made in 2022, the most published type of publication was articles (71), the most publications were in the field of environmental science, the most used language in the published studies was English (72), the most publications in the Web of Science indexes were in the Social Sciences Citation Index (SSCI) (52). In addition to these, the most broadcasting publisher is Mdpi (21); The university with the most publications is Beijing Institute of Technology (5). The magazine with the most publications is Sustainability (13), and the country with the highest publication is China (39). The most common keyword is GTL (45), the most cited document is Singh (548), the most cited source is Sustainability (189), the most cited author is Chen Yu-Shan (445), the

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most cited university is National Taipei University (445), the most cited country is China with 571 citations. Finally, Türkiye ranks 4th with Malaysia with 6 publications.

Keywords: Green Transformational Leadership, Bibliometric Analysis, Web of Science, VOSviewer.

JEL Codes: M10, M14, M54, C1.

1. INTRODUCTION

With the occurrence of environmental events in the world, the concept of environment has started to be an issue that attracts the attention of not only people but also businesses. The increase in environmental pollution and the release of wastes to the nature in a way that harms the environment cause climate changes and events that threaten nature.

For this reason, businesses have started to turn to green management practices. It works and is managed with a green, that is, environmentalist perspective, in departments such as marketing, production, human resources, research and development, together with green management practices. Green management practices are also best implemented by green transformational leaders.

In addition, customers now prefer companies that are sensitive to the environment, do not harm the environment, and attach importance to social responsibility projects in the field of product or service purchases.

Not only the business but also the employees should have the awareness of protecting the environment. It is the green transformational leaders who will bring this awareness to the employees in the enterprise. Thus, businesses no longer need only leaders but also green transformational leaders.

2. CONCEPTUAL FRAMEWORK

There is no single definition of GTL. There are definitions based on multiple different perspectives. For this reason, it is useful to look at various definitions to understand GTL.

GTL is a type of leadership that motivates followers to achieve the goals around them and inspires followers to perform above their expectations. In addition, it is the type of leadership that ensures the adoption of the environmental goals of the organization by the followers, wants to increase the green consciousness of the workforce, is a role model for the evolution of this awareness into behavior, and motivates the workforce to do their best to achieve the environmental goals of the organization (Kerse, et al., 2021).

According to another definition, GTL is a view of transformational leadership that supports green initiatives and is environmentally oriented as a whole. In addition, green transformational leaders, which cover the main task forms of transformational leadership,

green motivation, green personalized thinking, green influence and green intellectual encouragement, which is an emerging concept related to green management, aim to develop the green vision of the staff and motivate the staff in order to achieve the green goals. They contribute (Tuna and Yıldız, 2023).

In addition, GTL behaviors have a critical importance in renewing the resource base of organizations and green transformational leaders have an orientation towards environmental resources (Özgül, 2023).

Green transformational leaders are the type of leadership that tries to find ways to solve the problems in this field by considering the impact of the organizations' reactions to the environment in terms of their economic performance. A transformational leader who attaches importance to green values does the necessary work to increase the environmentalist behavior of his followers, to increase the motivation of his employees and to increase sustainable organizational development. Thus, both economic and environmental performance are affected, and it also helps the workforce to be more sensitive to the environment as environmental concerns increase. GTL is directed to the points that are beneficial to the organizational environment and is the basis for the sustainable development of the business. In addition, green transformational leaders can establish strong bonds with their followers and enable them to attach more importance to green values (Acar, 2022).

3. LITERATURE REVIEW

Studies on GTL have been increasing over the years. For this reason, it is useful to take the studies that have attracted attention especially in recent years as a basis. The table below lists some of the studies done in the field of GTL.

Author(s)	Results of the Research
Sanjay Kumar Singha, Manlio Del Giudice, Roberto Chiericic and Domenico Graziano.	It has been determined that green human resources practices mediate the effect of GTL on green innovation. In addition, they found that green human resource management indirectly affects the environmental performance of the enterprise through innovation.
Yu-Shan Chen and Ching-Hsun Chang.	Green dynamic talents and GTL have exerted a positive influence on both green creativity and the performance of green product development. Furthermore, the constructive associations between the performance of green product development and its two precursors, namely green dynamic capabilities and GTL, are, to some extent, moderated by green creativity.
Swati Mittal and Rajib Lochan Dhar.	The research findings indicate that GTL has a favorable impact on the development of green organizational identity, consequently fostering green creativity within the organization. Furthermore, the study reveals that resource commitment serves as a moderating

	factor in the correlation between green organizational identity and green creativity.
Wenjing Li, Tahseen Ahmed Bhutto, Wang Xuhui, Qamaruddin Maitlo, Abaid Ullah Zafar and Niaz Ahmed Bhutto.	The study uncovered that GTL significantly influences both green intrinsic motivation and green creativity, essential factors for employees in generating environmentally friendly products and services. Additionally, there is a partial mediation of the relationship between GTL and green creativity by green intrinsic motivation.
Yu-Shan Chen, Ching-Hsun Chang and Yu-Hsien Lin.	It was concluded that GTL positively affects green awareness, green self-efficacy and green performance. Additionally, research has shown that the positive relationship between GTL and green performance is partially mediated by two mediators: green awareness and green self-efficacy.
Serdar Çop, Victor Oluwafemi Olorunsola and Uju Violet Alola.	The research findings indicate that GTL yields a positive impact on both green work commitment and green team resilience. Furthermore, it was concluded that green work commitment serves as a complete mediator in the relationship between these variables.
Saira Begum, Muhammad Ashfaq, Enjun Xia and Usama Awan	The results of the study showed that GTL has a significant impact on green thinking, creative process participation and green innovation. In addition, it revealed that green thinking and creative process participation mediated the relationship between GTL and green innovation.
Xingdong Wang, Kong Zhou and Wenxing Liu	It was concluded that the value congruence of followers with their leaders mediated the effects of GTL on green behavior to the workforce. In addition, it revealed that green identity moderates the indirect effect of GTL on the green behavior of the workforce through value congruence. Moreover, the indirect effect showed that the green identity was more positive when it was high than when it was low.
Wengang Zhang, Feng Xu and Xuefeng Wang.	Researchers have determined that GTL positively affects the green creativity of the workforce and that creative process commitment plays a mediating role in the relationship of GTL to the green creativity of the workforce. In addition, the mediating role is driven by the green innovation strategy, which is used as a boundary switch to influence the entire path associated with creative process participation
Muhammad Farrukh, Nabeel Ansari, Ali Raza, Yihua Wu and Hong Wang.	As a result of the research, the importance of GTL in predicting the pro-environmental behavior of the workforce through the mediating role of green human resource management has emerged. In addition, the moderator role of environmental knowledge has been affirmed.

4. METHOD

Bibliometric analysis was performed by obtaining all publications published in the field of “GTL” and indexed in the Web of Science database, without selecting the date range in the analysis (D.A. 25.07.2023). With bibliometric analysis, the situation of GTL in terms of literature was examined. In the analysis, researches made in the world in the field of GTL were taken into consideration. Distribution of publications by years, document types, Web of Science categories, distribution by language, Web of Science indexes were determined. Additionally, co-authorship, co-occurrence, citations, bibliographic matching, and co-citation were examined. VOSviewer 1. 6. 19. Version was used to perform the analysis.

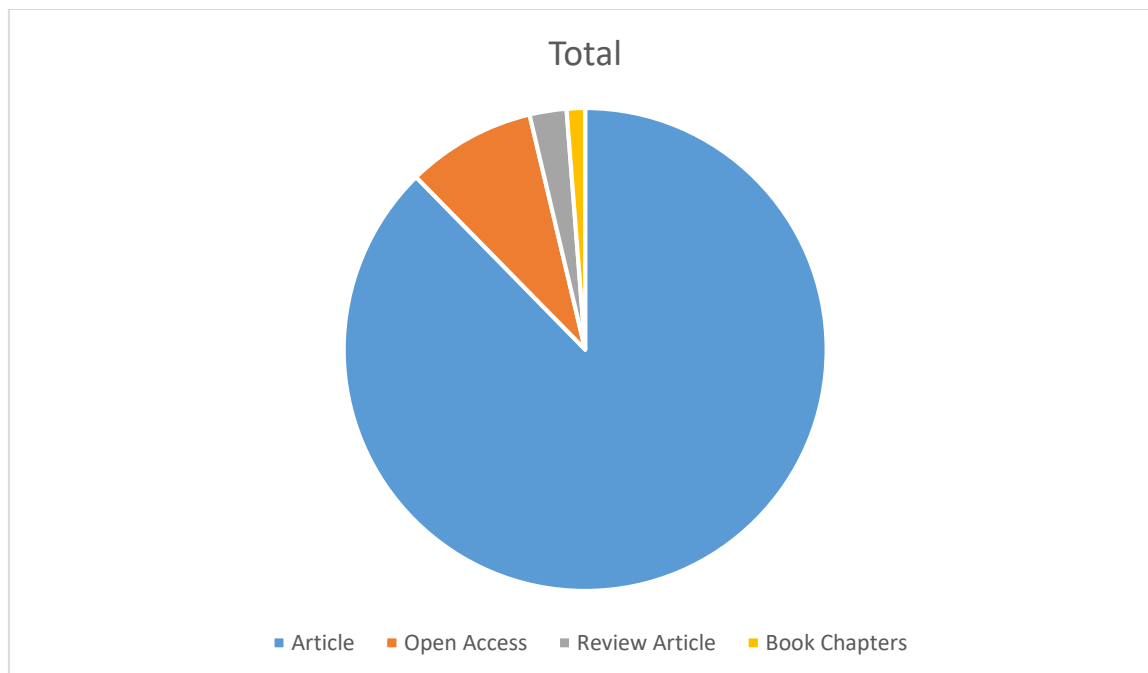
5. FINDINGS

When the data obtained from the VOSviewer database were examined, the first publication was made in 2013. As it can be understood from here, it is seen that researches on GTL have started recently. Regarding this, it would be correct to say that GTL is a new research area.

Table 1. Distribution of Publications in the Field of Green Transformational Leadership by Years

Release Year	Number of Publications
2013	1
2014	1
2016	1
2017	1
2018	2
2020	7
2021	18
2022	25
2023	17
Total	73

Looking at Table 1, it is seen that the most publications were in 2022 (25), followed by 2021 with 18 publications. In addition, it is understood that 17 publications have been made even though 2023 is not over. This means that the subject is getting more and more important. In addition, at least one publication was made in 2013, 2014, 2016 and 2017 (1). It was observed that no studies were conducted in 2015 and 2019.



Graph 1. Document Type of Publications in the Field of Green Transformational Leadership

In Graph 1, it is seen that the most publications are articles (71), and the least publications are book chapters (1). The article is followed by Early Access (7) and Review Article (2). It is the most document type article about GTL. It would be correct to say that those who work in this field publish articles in the form of articles.

Table 2. Categories of Publications in the Field of Green Transformational Leadership

Web of Science Categories	Number of Publications
Environmental Sciences	24
Environmental Studies	22
Management	20
Green Sustainable Science Technology	17
Business	16
Psychology Multidisciplinary	11
Economics	4
Hospitality Leisure Sport Tourism	4
Engineering Environmental	3
Regional Urban Planning	3
Engineering Industrial	2
Industrial Relations Labor	2
Public Environmental Occupational Health	2
Agronomy	1
Engineering Civil	1

Engineering Manufacturing	1
Ethics	1
Food Science Technology	1
Mathematics	1
Multidisciplinary Sciences	1
Pharmacology Pharmacy	1
Psychology Clinical	1
Social Sciences Interdisciplinary	1

When the Web of Science categories of the publications on GTL are examined in Table 2, the most frequently published topics are as follows: Environmental Sciences (24), Environmental Studies (22), Management (20), Green Sustainable Science Technology (17), Business (16), Psychology Multidisciplinary (11). As can be seen in Table 2, other subjects have been less studied.

Table 3. Distribution of Publications in the Field of Green Transformational Leadership by Language

Publication Language	Number of Publications
English	72
Chinese	1
Total	73

In Table 3, it is seen that almost all of the publication language of the studies on GTL is in English (72). Chinese follows it with 1 broadcast.

Table 4. Directory of Publications in the Field of Green Transformational Leadership

Web of Science Index	Number of Publications
Social Sciences Citation Index (SSCI)	52
Science Citation Index Expanded (SCI-EXPANDED)	28
Emerging Sources Citation Index (ESCI)	10
Book Citation Index – Social Sciences & Humanities (BKCI-SSH)	1

In Table 4, it is understood that the studies on GTL are mostly published in the Social Sciences Citation Index (SSCI) (52) and Science Citation Index Expanded (SCI-EXPANDED) (28) in the Web of Science index.

Table 5. Research Areas with Publications in the Field of Green Transformational Leadership

Research Areas	Number
Environmental Sciences Ecology	33
Business Economics	29

Science Technology Other Topics	18
Psychology	12
Social Sciences Other Topics	6
Engineering	5
Public Administration	3
Public Environmental Occupational Health	2
Agriculture	1
Food Science Technology	1
Mathematics	1
Pharmacology Pharmacy	1

If we look at Table 5 in GTL, the most researched areas are respectively; Environmental Sciences Ecology (33), Business Economics (29), Science Technology Other Topics (18), Psychology (12).

Table 6. Authors Publishing in the Field of Green Transformational Leadership

Authors	Number of Publications
Chen, Yu-Shan	3
Özgül, Burcu	3
Wang, Juanru	2
Yu, Xuan	2
Xu, Feng	2
Zehir, Cemal	2
Ashfaq, Muhammad	2
Hasanein, Dr. Ahmed Mohamed	2
Maitlo, Qamaruddin	2
Sobaih, Abu Elnasr	2
Begum, Saira	2
Zhang, Wengang	2
Kusi, Manita	2
Abu Elnasr, Ahmed E.	2
Xia, Enjun	2
Awan, Usama	2
Chang, Ching-Hsun	2
Cui, Ri	2
Farrukh, Muhammad	2
Gharbi, Hassane	2

According to Table 6, the authors who published the most about GTL are listed above. There are two authors with the most publications. These are 3 publications and Chen, Yu-Shan and Özgül, Burcu. Since the remaining authors have only one publication, they are not included in the table.

5.1. VOSviewer Maps

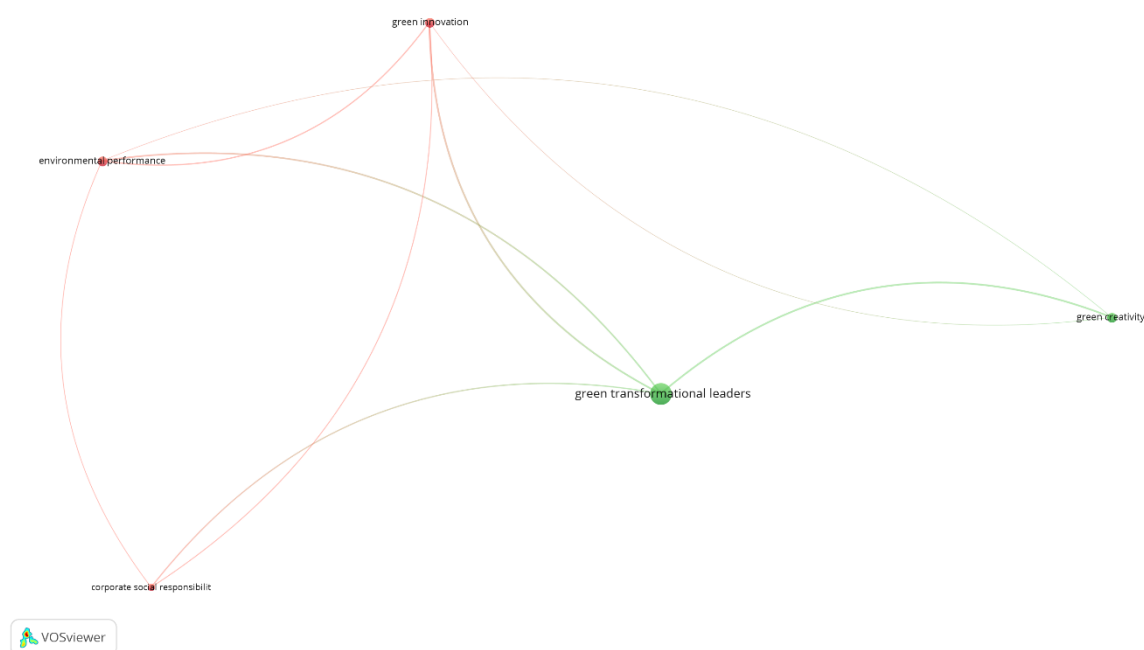
Analysis was conducted using all VOSviewer mapping methods to examine the content of research in GTL.

5.1.1. Mapping Based on Co-occurrence Data

The coexistence analysis of the keywords used by the authors in the documents (VOSviewer) is in formation together in the bibliometric analysis. The part in which the keywords in the co-occurrence are analyzed is an important form of analysis that forms the basis of the research areas and topics. Thus, the keywords describe the co-occurrence network.

5.1.1.1. Mapping of Author Keywords

In GTL research, the program (VOSviewer) determined the minimum number of repetitions of a keyword to be 5. 5 out of 135 keywords meet the required threshold. In addition, the size of the circle means that the number of keywords is used a lot, and the smallness of the circle means that it is used less.



Map 1. Keyword Analysis Used for Research on Green Transformational Leadership

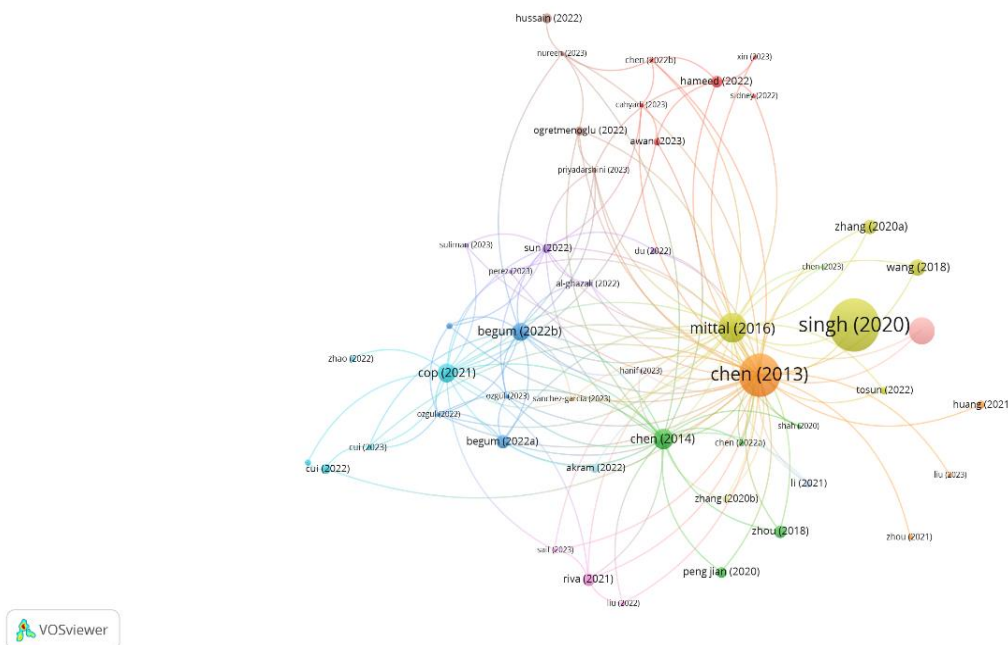
According to Map 1, words with high total link strength are seen according to the co-occurrence network analysis of the keywords used in GTL research. These words are “green global leaders”, “green innovation”, “environmental performance”, “green creativity” and “corporate social responsibility”.

5.1.2. Mapping Based on Citation Data

The citation is an important element that contributes to the success of the person researching and writing the document and showing the level of success. For this reason, cited documents in the program (VOSviewer) are analyzed in terms of sources, authors, universities and countries.

5.1.2.1. Mapping of Documents

VOSviewer bibliometric analysis program determined the minimum number of citations of a document as 0 and 50 documents were reached. However, 49 of the 50 documents were linked. For this reason, according to Map 2, 49 documents with the highest connection strength were included in the evaluation.

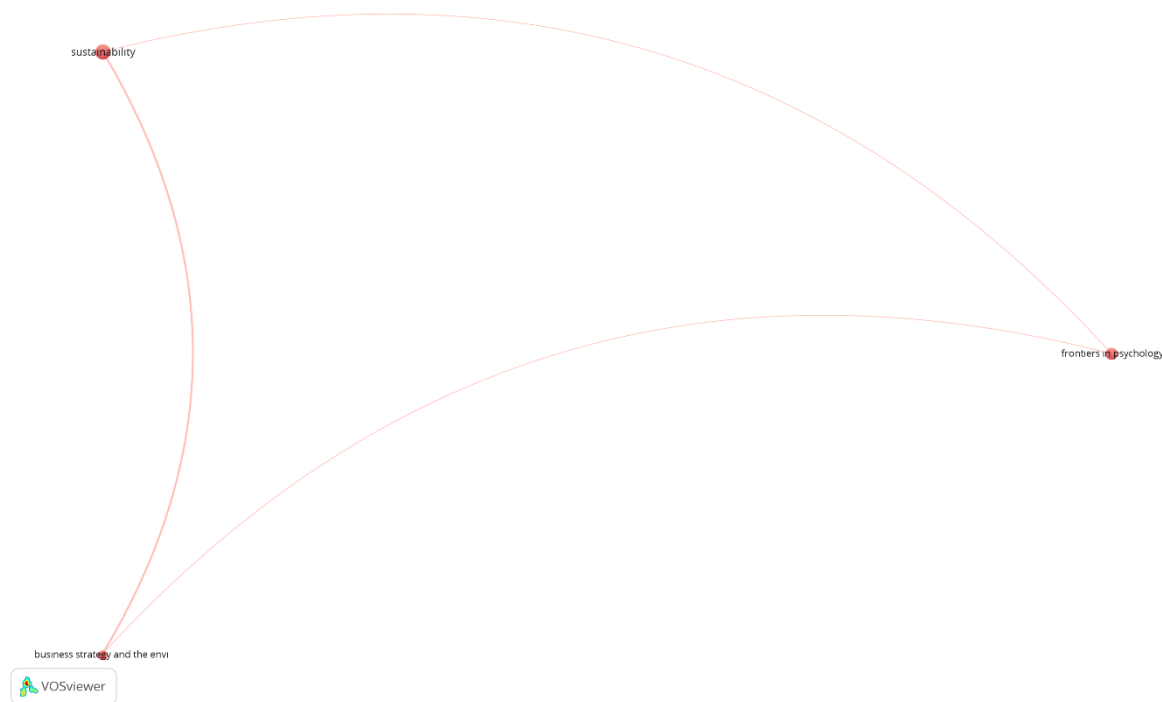


Map 2. Bibliometric Network Analysis of Citation Links in terms of Documents of Publications in the Field of Green Transformational Leadership

As seen in Map 2, the most cited document is Singh. Singh is cited 548 times, followed by the following authors: Chen (355), Mittal (176), Li (143). The authors that Singh is associated with are; Mittal (176), Tosun (12), Wang (53), Zhang (2020a) (42).

5.1.2.2. Mapping Resources

In GTL studies, the program (VOSviewer) considered the minimum document number of a source as 4 in order to find the distribution of citations to sources. Only 3 of 26 sources meet this condition.

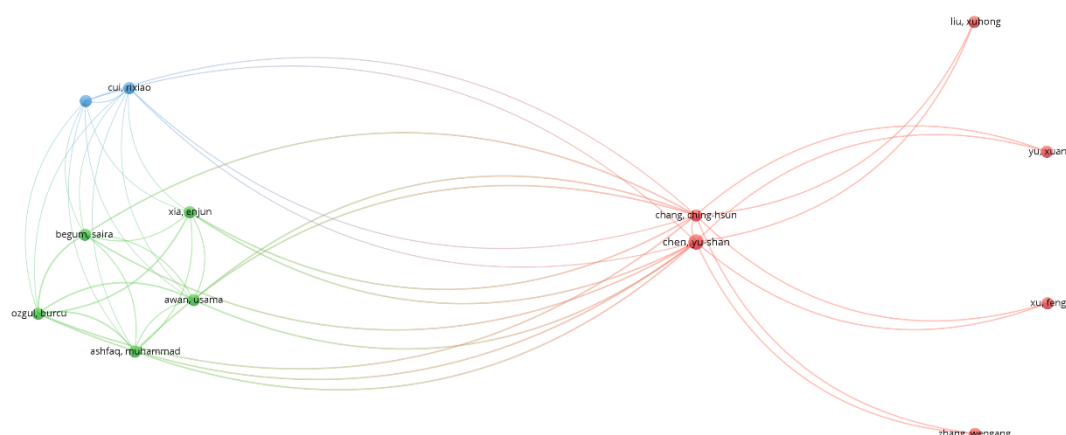


Map 3. A Bibliometric Network Analysis of Citation Links in terms of Sources of Publications in the Field of Green Transformational Leadership

According to Map 3, the most cited source is Sustainability with 9 documents and 189 citations. It is followed by two sources: Business Strategy and the Environment 4 document 168 citations and Frontiers in Psychology 6 document 71 citations. Accordingly, it cannot be said that the number of documents belonging to the source and the number of citations are proportional.

5.1.2.3. Authors' Mapping

The program determined the minimum number of documents as 2 in order to find the distribution of citations by authors. Only 13 of 167 authors fulfill this condition.

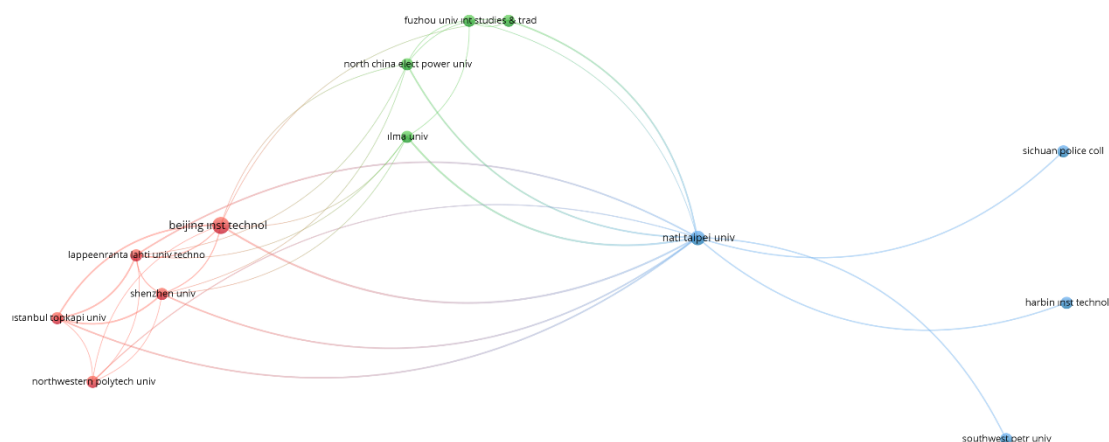


Map 4. Bibliometric Analysis of Citation Links by Authors of Publications in the Field of Green Transformational Leadership

Looking at Map 4, Chen, Yu-Shan 3 documents take the first place with 445 citations, while Chang, Ching-Hsun 2 documents come second with 442 citations. There are 4 authors with 2 documents and 99 citations. These; Ashfa, Muhammad (99), Awan, Usama (99), Begum, Saira (99), Xia, Enjun (99).

5.1.2.4. Mapping of Universities

In research on GTL, the program (VOSviewer) took into account universities with at least 2 documents in order to find the distribution of citations by universities. 13 out of 115 universities meet this threshold.

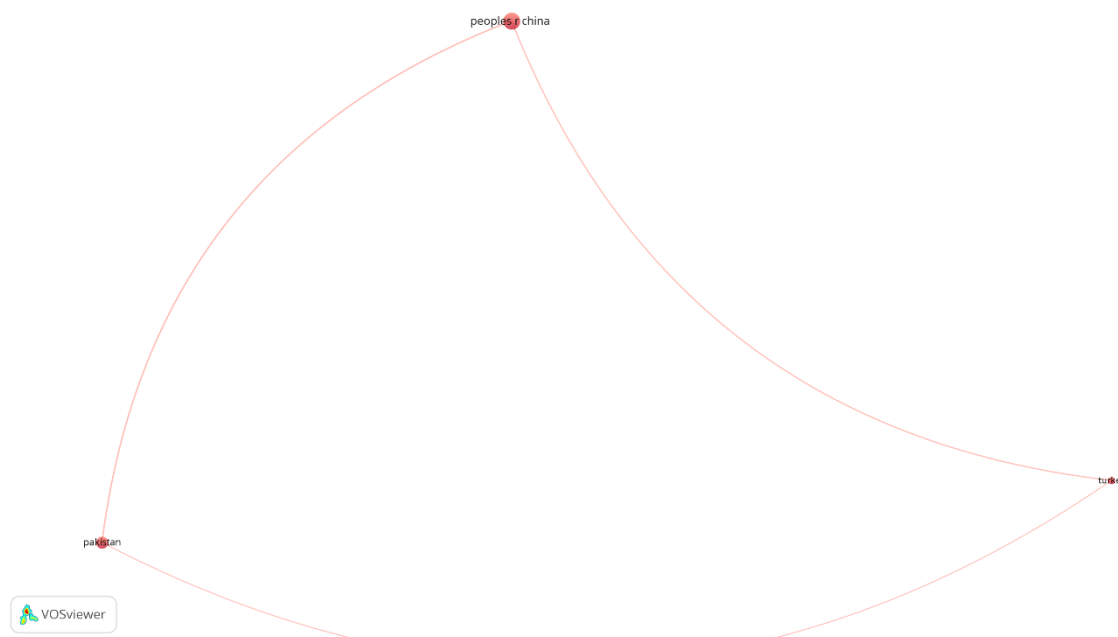


Map 5. Bibliometric Analysis of Citation Links in terms of Universities of Publications in the Field of Green Transformational Leadership

As seen in Map 5, the most cited university is National Taipei University with 3 documents and 445 citations. This university is followed by the following universities, respectively: Beijing Institute of Technology 4 documents 141 citations, Lappeenranta Lahti University Of Technology 2 documents 99 citations and Shenzhen University 2 documents 99 citations.

5.1.2.5. Mapping of Countries

In studies in the field of GTL, the program (VOSviewer) took into account the countries with at least 5 documents in order to find the distribution of citations by country. Only 3 out of 28 countries fulfill this condition.



Map 6. Bibliometric Analysis of Citation Links by Countries of Publications in the Field of Green Transformational Leadership

According to Map 6, the most cited country is China with 27 documents and 571 citations. The other two countries that followed are as follows, respectively: Pakistan with 14 documents and 285 citations, Turkey with 5 documents and 108 citations.

6. CONCLUSION

As a result, in the bibliometric analysis, GTL emerges as a concept that has started to exist in the last ten years in research. Green innovation, green thinking, green human resource management, creative process participation, green product development, green creativity, green organizational identity, green intrinsic motivation, green extrinsic motivation, green awareness, green self-efficacy, green performance, green job commitment and It is observed that they work together with issues such as green team resilience.

Since GTL is generally studied in countries such as China, Pakistan, and Turkey, it is researched in universities in these countries. Universities in countries located in Europe should do more work on GTL. The reason for this is that businesses are beginning to need green transformational leaders, that is, leaders who are sensitive and caring about the environment. Thus, the research will reveal recommendations that will be useful to green transformational leaders.

In addition, the concept of corporate social responsibility, which does not include the word green in the keywords related to GTL, draws attention. As it can be understood from here, it is included in the researches that businesses should turn more towards social responsibility in order to be successful in GTL.

COMPLIANCE WITH ETHICAL STANDARD

Conflict of Interests: There is no conflict of interest between the authors or any third party individuals or institutions.

Note: This study was presented as a summary paper at the 4th Leadership Academy and Management Congress.

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