A BIBLIOMETRIC ANALYSIS ON FUTURE RESEARCH TRENDS OF WORKING TIME REDUCTION

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Abstract

Working time reduction (WTR) has been a subject of research in many different areas, affecting work-life balance, productivity and well-being. This subject has attracted media attention and is in the experimental phase or planned in many countries. The primary purpose of this article is to have comprehensive information about the quantity of research conducted on reducing working hours.62 articles focusing on WTR were analyzed. Data were collected from the Web of Science and analyzed with the VOSviewer. The relationship Networks were mapped and interpreted by performed authors, country and keyword analyzed. In studies on WTR, Germany has been identified as the most effective country due to being a pioneer country with the development of technology and the increase in welfare and it has been determined that the UK's publications on the subject have increased with the effects of the implementation of different working models with Covid-19.

Keywords: Working Time Reduction, Bibliometric, VOSsviewer

JEL Codes: J22, J24, J8

ÇALIŞMA SÜRESİ AZALTILMASININ GELECEKTEKİ ARAŞTIRMA EĞİLİMLERİ ÜZERİNE BİBLİYOMETRİK BİR ANALİZ

Öz

Çalışma süresinin azaltılması, iş-yaşam dengesi, verimlilik, refah üzerindeki etkileriyle birçok farklı alanda araştırma konusu olmuştur. Medyada ilgi gören bu konu hali hazırda birçok ülkede deneme aşamasında veya planlanmaktadır. Bu makalenin temel amacı çalışma süresinin azaltılması konusunda yürütülen araştırmaların niceliği hakkında kapsamlı bilgi sahibi olmaktır. Çalışma süresinin azaltılmasına odaklanan makaleler üzerinde durularak 62 makale analize alınmıştır. Veriler Web of Science veri tabanından toplanarak, VOSviewer açık kaynak yazılımıyla analiz edilmiştir. Yazar, ülke, anahtar kelime analizleri yapılarak ilişki ağları haritandırılmış ve yorumlanmıştır. Çalışma süresinin azaltılması konusunda yapılan çalışmalarda, teknolojinin gelişmesi ve refah artışı ile birlikte öncü ülkeler olması sebebiyle en etkili ülke Almanya olarak belirlenmiş ve Covid-19 ile farklı çalışma modellerinin hayata geçirilmesinin etkileri ile İngiltere'nin konu ile ilgili yayınlarının arttığı tespit edilmiştir.

Anahtar Kelimeler: Çalışma Süresi Azaltılması, Bibliyometrik, VOSviewer

JEL Kodları: J22, J24, J8

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1. Introduction

Since the 1970s, average weekly working hours have decreased in many industrialized economies, and working time reduction has been frequently discussed in the literature. Working time reduction is a promising policy for improving welfare in developed countries. Numerous working hour reduction experiments are ongoing or planned (Lucacs &Antal, 2022). When examining the studies in the literature, empirical evidence supports the argument that cuts in working hours can partially explain increased hourly productivity (Cette et al., 2011; Lee &Lim, 2017; Cui et al., 2019).

Working timereduction is an essential area of research, both academically and practically, due to its effects on work-life balance, employee satisfaction, productivity, and overall well-being. While longer working hours have traditionally been thought to increase economic output and thus greater extroversion, recent studies have shown that shorter working hours can increase employee morale and job satisfaction, positively improving long-term momentum. Bibliometric analysis studies have been conducted on concepts such as work-life balance and long working hours, closely related to the subject. However, we believe this article will contribute to the literature based on the view that a bibliometric study specifically on reducing working hours is also necessary. This article examines the quantity and breadth of the academic literature on working hours. The articles on the subject, collaborations across countries, and contributing authors will be analyzed using bibliometric analysis methods. In this way, the current knowledge on reducing working hours will be mapped, and in a sense, it aims to provide essential guidance for future research in the field by reducing working hours for researchers who will study this topic.

2. Literature

2.1. Conceptual Framework

Working time reduction represents the most promising way to keep unemployment low by reducing economic growth pressures (Jackson & Victor, 2011; Antal, 2014; Gerold & Nocker, 2018), with the potential to be one of the greatest achievements of the 21st century that provides environmental, social and economic benefits (Lucacs&Antal, 2023). The change in labor supply and falling fertility rates (Ertürk & Koç, 2023) is an essential reason for reducing average working hours.On the other hand, changing demographics also impact current retirement plans. Retirement plans are linked to future output and can only be financed by goods and services produced by the currently working generation. A growing economy relieves the burden on younger generations (Strunz & Schindler, 2018). Working time reduction can potentially to solve many problems discussed in many areas, with increased productivity and reduced unemployment. One reason for the decrease in average working hours is the change in labor supply. Despite many applications and efforts to reduce working hours, it is accepted that the response of hourly productivity to a decrease in working hours depends on the initial working hours. This affects employee motivation and organization in the workplace. Effects such as the need for more frequent breaks and possible loss of concentration during long working hours will likely affect the organization in the workplace. Therefore, an increase in working hours may not increase the expected output. A decrease in working hours can increaseproductivity by completing tasks on time and by motivational effects (Lee & Lim, 2017). In the study examining the impactof working hour reduction on employment, it was stated that reducing working hours has positive employment effects in most empirical studies. Still, for its success,it was emphasized that education policies designed by drawing attention to skill deficiencies, wage increases and equal income distribution together with productivity gains were necessary (Bosch &Lehndorff, 2001).

It is seen that the number of studies on working time reduction is increasing rapidly. Although the studies are generally country-based, it has been observed that there are studies examining different country groups. While country-based studies typically cover developed countries, it is seen that very few studies have addressed emerging economies (China (Xia et al., 2018) and Hungary (Köllo &Reizer, 2021)). If we examine some of these studies;

Gilles, F. (2015) examined the effects of the 35-hour work week experience on shift working hours (COT) in France. They concluded that working time reduction did not change shift hours, and that firms expanded shift work as a way to maintain output and increase capital efficiency. They also reported

that these results may have helped firms reduce the increase in production costs and increase employment.

Cardenas & Villanueva (2021), in their study on the reduction of working hours and wage balances, conducted a simulation analysis for the Spanish economy and concluded that the working time reduction could be implemented without the need to reduce the wages of full-time employees, that the hourly labor productivity would increase by 5.5% and that the five-hour working hour reduction would lead to a 1.4% increase in GDP with an increase in the labor share.They reported that the decrease in working time could improve working and living conditions and be implemented as a policy tool to increase GDP and contribute to a more equitable and sustainable growth model.

Pullinger, M. (2014) evaluated innovative working hours policies in the Netherlands and Belgium by examining the environmental and welfare literature on working hours, leisure time and income. He emphasized that working time reduction would also require other policy changes in high-income countries and could lead to environmental and welfare benefits and, therefore, be a potential policy tool for sustainable economies. The Paris Agreement, accepted at the UN climate change conference in France in 2015, entered into force on November 4, 2016. It invited countries to create long-term low greenhouse gas emission development strategies by banding together to fight climate change and adapt its effects (UNFCCC, 2015). The reflections of the agreement on studies can be seen in the increase in studies in the field of environment and environmental sciences on working time reduction.

Lucacs&Antal (2023), while discussing the potential benefits of working time reduction, mention that cuts in working time may have environmental benefits since longer working hours are generally associated with higher production and consumption levels and tend to increase ecological burdens. Working hour reduction with its environmental impacts is becoming an exciting policy for ecological economists (Gerold& Nocker, 2018; Pullinger, 2014; Fitzgerald, 2018; Ciepslinki et al., 2021). In their study, Fitzgerald et al. (2018) found that the relationship between emissions and working hours in the United States is strong and positive. They concluded that working time reduction can contribute to an increase in the quality of life, a decrease in unemployment, and a decrease in emissions. Another study examining the social and structural effects of the Italian energy and climate-integrated policy plan emphasized that reducing working hours could complement environmental policies by reducing demand and emissions while improving income distribution (Ciepslinki et al. 2021). King, LC. &Van Den Bergh, JCJM. (2017) propose scenarios to reduce working hours by 20% to reduce greenhouse gas emissions in the UK. They stated that the four-day workweek policy, which has the potential to change social patterns and behaviors significantly, could enhanceenvironmental benefits and should be considered as an option for reducing emissions.

2.2. Literature

In the literature review conducted for studies related to the reduction of working hours, it is also seen that there are not many bibliometric studies on the subject. However, bibliometric studies play an active role in revealing the development process and characteristics of scientific studies (Yıldırım & Çelikkaya, 2022). In bibliometric analysis, mathematical and statistical methods are used to analyze the development process of the relevant field from a historical and conceptual perspective. At the same time, studies are conducted on who, what, where and how researched within the methodological framework (Sanchez et al., 2017).

One of the few bibliometric studies on this subject is Campbell's (2023) study titled "The four-day work week: A Chronological, Systematic Review of the Academic Literature." The study has three legs. In his systematic literature analysis, he categorized the positive and negative views on the subject in the academic literature in terms of reducing working days and hours. He also conducted a clustering study on the groups supporting the positive view and the equivalent of media support in academic studies. Thirdly, he made a chronological analysis of the subject in his research and predicted how past studies could affect future studies.

Liu et al. (2018) examined working hours, which are closely related to the subject. In their bibliometric analysis, they revealed in detail the relationships between the keyword working hours and

other related keywords. They also examined the evolutionary process of the keyword working hours by mapping this relationship network.

Rashmi &Kataria (2021) conducted systematic literature and bibliometric analysis on work-life balance, another perspective on reducing working hours. In their study of 945 documents in the literature, they prepared a bibliometric analysis of the publications and a link map of their keywords and supported it with systematic literature analysis.

In their study titled "Mapping the work-life balance (WLB) research landscape: a bibliometric analysis", Pratiwi &Wahyuningsih (2023) conducted a study on the keywords of documents published in the SCOPUS database over a 10-year period. In their study, an analysis was made on the connections of WLB keywords with other related keywords and the areas where the subject has developed in the last decade were determined. It investigated how the COVID-19 pandemic affected the keywords in this decade and associated them with working from home.

In their study, Fitrayani &Iskandar (2024) focused on the connection of the keywords and the development of the subject in terms of morale-motivation and productivity without much mentioning the reduction of working hours, which WLB is most related to. They also examined the relationship between the COVID-19 pandemic and WLB from a bibliometric perspective.

Finally, in their study, Verma et al. conducted comprehensive research on WLB and revealed how the subject has evolved from the past to the present. (2024) have made a significant contribution to the subject by providing thematic and bibliometric information. In their studies, they have reached conclusions that will help human resource management experts, practitioners and policy makers who make plans to advance WLB and increase the well-being of employees.

Apart from these studies, there are even studies that specifically examine the subject of WLB based on professions, sectors or pandemics (Franco et al.,2020; Kaur& Rani, 2024; Prado-Gasco et al., 2021; Fauzi et al., 2024). No bibliometric analysis or systematic literature review has been conducted directly on the concept or keyword of reducing working hours. However, working hours have been a highly debated topic in recent years. Based on this, it is inevitable that our study will eliminate this deficiency and shed light on new studies on the subject.

3. Materials and Methods

Bibliometrics, which aims to quantify written communication processes, applies mathematical and statistical methods to books and other communication tools (Prıtchard, 1969). Using bibliometric analyses, an essential approach in the bibliometrics study, influential researchers, organizations, countries and their connections can be shown and compared (Özköse & Gencer, 2017). Bibliometric analyses, the methodology used to evaluate scientific publications, provide comprehensive information about a field's intellectual structure and information flow and guide researchers, policymakers, and sector practitioners (Biju et al. 2024). Systematic reviews, the type of review conducted in academic research, provide in-depth study analysis. At the same time, this method can be complicatedwhen too many search results are obtained, and bibliometric analysis can provide an advantage in terms of saving time. Considering the large number of articles determined at the beginning, bibliometric analysis instead of systematic review allows the examination of studies that can be pioneers in a specific research area (Turner, 2024). Therefore, by choosing bibliometric analysis in the study, a quantitative breakdown of the literature will be obtained for researchers who want to work on this subject. VOSviewer 1.6.2 open source software was used to perform bibliometric analysis and mapping. Data from WoS were analyzed and mapped with the help of VOSviewer software.

3.1. Research Design

This study collected data from the Web of Science database, and a 'refining' process was carried out. Web of Science was used because it is a database that indexes effective and reliable international publications. The research was conducted in the form of a subject heading; the words 'working time reduction' used in the title, abstract and keywords of the studies were searched. Among the basic features of the VOSviewer software, co-authorship and citation analyses were performed and data cleaning was

performed before the data was analyzed. Words with the same meaning were combined in the keyword analysis. Author names were checked, and errors were eliminated to prevent erroneous results.

The program offers text mining practicality thanks to particular algorithms and clustering-based studies (Çolak and Koç, 2023). The size of a circle shows the total number of simultaneous occurrences of an item and colors are used to indicate the cluster to which an item belongs (Van Eck et al., 2010). Objects placed close to each other are considered to be strongly related, while objects near far from each other are considered to be weakly related or unrelated (Van Eck and Waltman, 2008). The more important the item, the bigger its label and circle, and the circle of each item is shown in the color of the item (Van Eck and Waltman, 2009). In this study, citation analysis, co-authorship, keyword analysis and country analysis will be done and mapping will be done with the help of software.

3.2. Data Set

A search was ruled in all areas of the Web of Science database with the keyword 'working time reduction'. As a result of the search conducted on 20.06.2024, 99 different scientific studies were classified in all categories of Web of Science. The topics shown in th Table 1, are the ones selected in between the date range of 1987 to 2024.

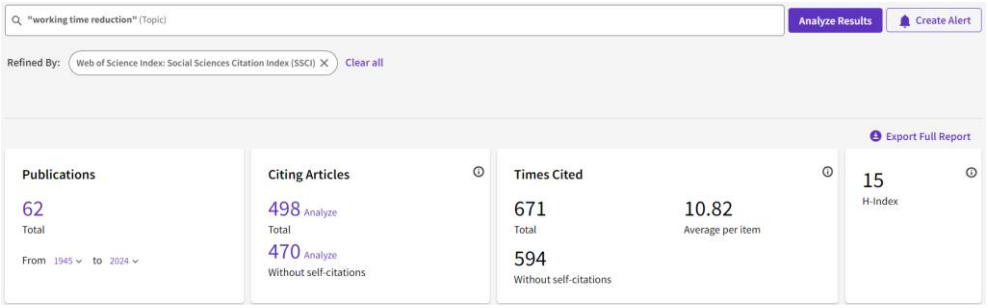
In the dispersion of documents according to their types, "article," "early access," "book chapters," and "review article" options are selected and "refined." The refinement process was performed by selecting SSCI publications for the scientific studies examined, and 62 scientific studies were analyzed. Some studies (SCI-EXPANDED index, CPI-SSH index, A&HCI index and CPCI-S index) were not included because they were in different indexes and outside the field (e.g., Clinical radiology).

Table 1. Web of Science Categories of Publications Included in the Analysis

Web of Science Categories	Record Count	% of 62			
Economics	30	48.387	Business	1	1.613
Environmental Sciences	16	25.806	Construction BuildingT.	1	1.613
Environmental Studies	12	19.355	EnergyFuels	1	1.613
Ecology	7	11.29	Construction BuildingT.	1	1.613
Political Science	4	6.452	EnergyFuels	1	1.613
Social Sciences Interdisciplinary	4	6.452	EngineeringCivil	1	1.613
Green Sustainable Science T.	3	4.839	EngineeringEnvironmental	1	1.613
IndustrialRelationsLabor	3	4.839	EngineeringIndustrial	1	1.613
Public Administration	3	4.839	Ergonomics	1	1.613
Social Issues	3	4.839	Ethics	1	1.613
Social Work	3	4.839	Geography	1	1.613
Sociology	3	4.839	GeographyPhysical	1	1.613
Development Studies	2	3.226	Gerontology	1	1.613
GeosciencesMultidisciplinary	2	3.226	History	1	1.613
Management	2	3.226	History Of Social Sciences	1	1.613
MeteorologyAtmospheric Sciences	2	3.226	HospitalityLeisureSportT.	1	1.613
Regional Urban Planning	2	3.226	HumanitiesMultidisciplinar	1	1.613
Business	1	1.613	Psychiatry	1	1.613
Construction BuildingTechnology	1	1.613	PublicEnvironmentalO.H.	1	1.613

Table 1 shows the distribution of 62 publications on working time reduction within WOS categories. As Table 2 shows, the subject of working time reduction is mostly gathered under the title of economics, followed by environmental sciences and environmental studies. What is interesting here is that the literature on which the analysis is based is examined by different disciplines.

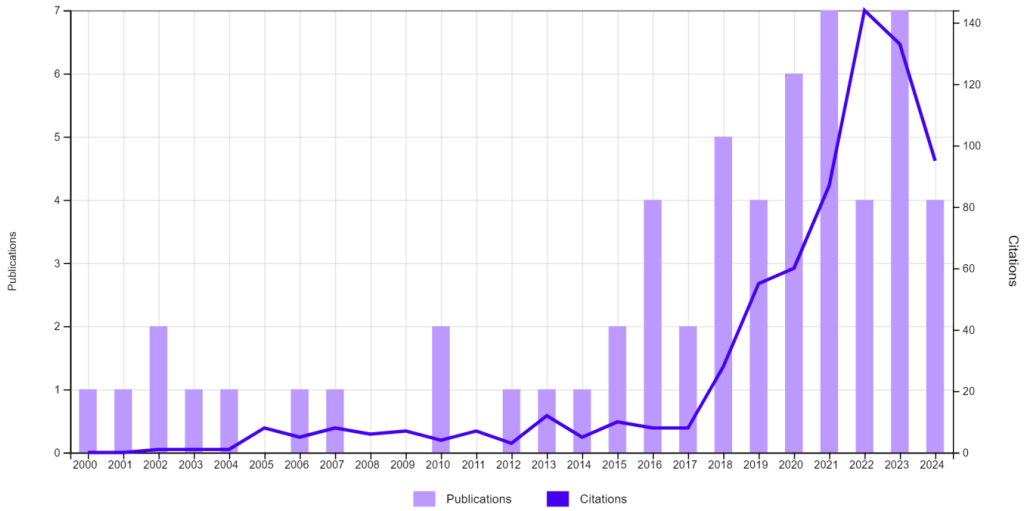
Picture 1. WoS Analysis Results Screenshot



Source: Picture 1. WoS Analysis Results Screenshot

The information on the publications reached as a result of the search in the Web of Science database is visualized. The 62 publications included in the analysis contain 498 analysis data. The publications were cited 671 times, but 594 of them did not cite their publications. The average number of citations is 10.82, and the H-Index value is 15. The distribution according to WoS categories according to the Web of Science search results is also shown in Table 2.

Figure 1. Times Cited and Publications Over



Source: Figure 1. WoS Analysis Results Screenshot

Graph 1 shows the distribution of these studies by year and the distribution of citations to these studies by year. As can be understood, the studies started to intensify in 2015. Considering the increase in the number of citations, it is seen that the subject has been given more importance in scientific studies as of 2018. Two publications published in 2015 examined the results of the 35-hour workweek experience in France. The increase in the number of citations to publications from 2015, when the interest in the subject increased, to 2019 was remarkable, and it was determined that this interest increased by different disciplines. When the publications between these years were examined, it was understood that these were the years in which the central and prominent studies were published (Fitzgerald et al. (2018); Antal, M. (2018)). In addition, studies on the environment and climate change have attracted attention (Shao, QL, & Rodriguez-Labajos, B (2016); King, LC, & Van Den Bergh, JCJM. (2017); Xia et al. (2018); Hanbury et al. (2019)). 3 of the 5 publications published in 2018 were environmental studies, and 8 of the 15 were published between 2016 and 2019 under environmental sciences and environmental studies. The international Paris Agreement, which is legally binding on climate change, was signed on December 12, 2015, and entered into force on November 4, 2016 (UNFCCC, 2015). The agreement may be one of the reasons for the increase in interest in publications, provides impetus for new studies, and shows that interest in climate change and sustainability issues has increased. The standard view in the studies addressed under the title of environment was that shorter

working hours could have environmental benefits. There are 4 publications and 76 citations for the year 2024 until the date of this analysis, 20.06.2024. It is anticipated that interest in the subject will increase under the headings of economy and environment with the experiences in countries where shorter working hours are implemented, studies on climate change and the implementation of different working models due to the Covid-2019 pandemic, and the analysis of the results of these experiences.

4. Findings

The findings obtained within the scope of the study were examined under 5 headings: These headings are Co-Authorship Analysis, Keyword Analysis, Document Citation Analysis, Inter-Author Citation Analysis and Country-Based Citation Analysis.

Co-Authorship of Authors Analysis: The relationship between the elements is determined by the number of documents written together in the analysis type. Table 2 was created to observe the authors' productivity. It shows the top ten authors with the most documents, the most citations and the average number of citations.

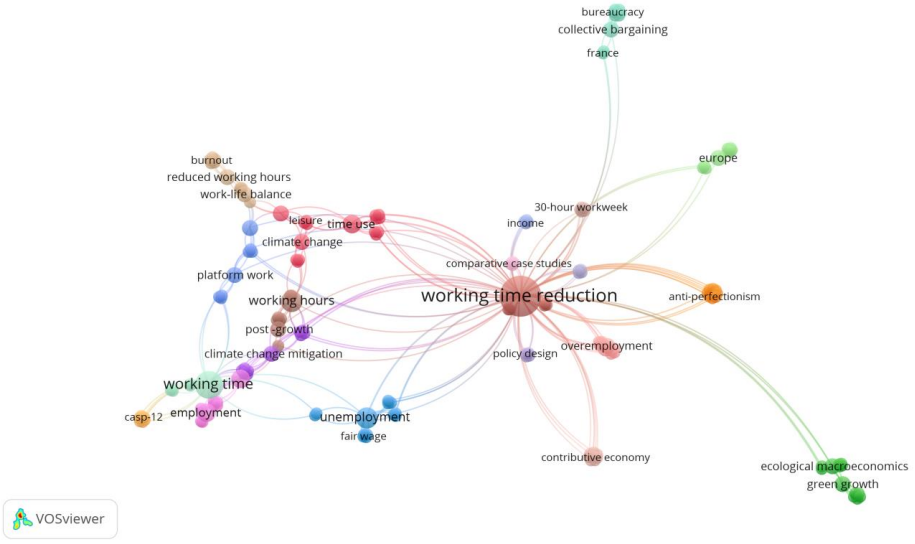
Table 2. The order of the authors according to the number of documents, citations and average citation

Author	Document	Author	Citations	Author	Average Citation
Antal, Miklos	4	Fitzgerald, J.B.	78	Pullinger, Martin	71
Cieplinski, Andre	3	Pullinger, Martin	71	Jorgenson, A. K.	62
D'alessandro, S.	3	Jorgenson, A. K.	62	Schor, Juliet B.	62
Guarnieri, Pietro	3	Schor, Juliet B.	62	Bosch, G.	53
Fitzgerald, J.B.	2	Bosch, G.	53	Lehndorff, S	53
Shao, Qing-Long	2	Lehndorff, S	53	Fitzgerald, J. B.	39
Burchell, Brendan	2	Antal, Miklos	50	Carpintero, Oscar	33
Rubery, Jill	2	Carpintero, O.	33	Fernando Lobejon, L.	33
Wels, Jacques	2	FernandoLobejon, L.	33	Javier Miguel, L.	33
Pullinger, Martin	1	JavierMiguel, L.	33	King, Lewis C.	33

Source: Compiled by Authors from Web of Science Analysis Results

Co-Occurrence of Keyword Analysis: This helps to identify the primary topics discussed in the field by visualizing the similarities between keywords or topics that frequently occur together in the literature (Rejeb, et al. 2020). Each node in the visualization represents a keyword, and larger nodes represent the most frequently occurring words.

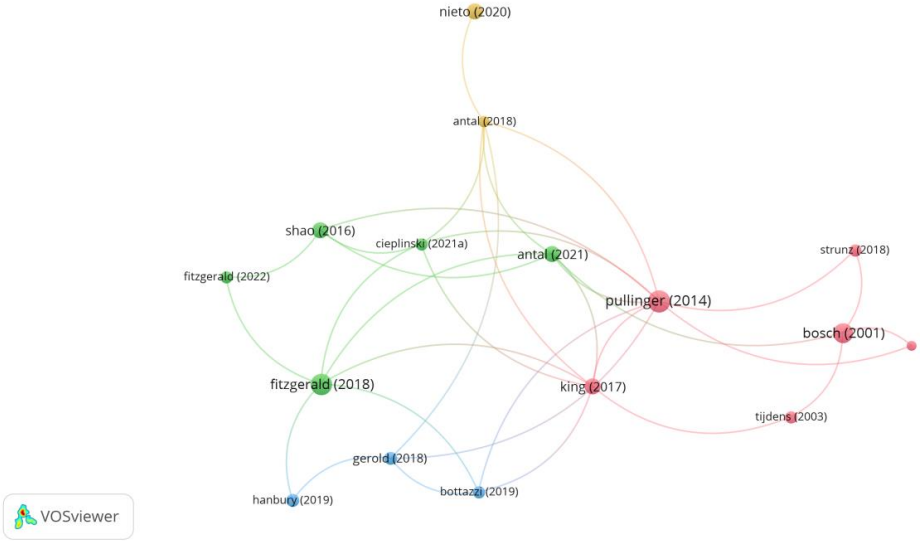
Figure 2. Keyword Link Map



In the mapping that emerged by matching the keywords, 211 words were analyzed. The word "working time reduction" is mentioned in the center of the map 21 times and has an impact of 96. Other keywords are listed as working time, working hours, economic growth and unemployment in order of impact.

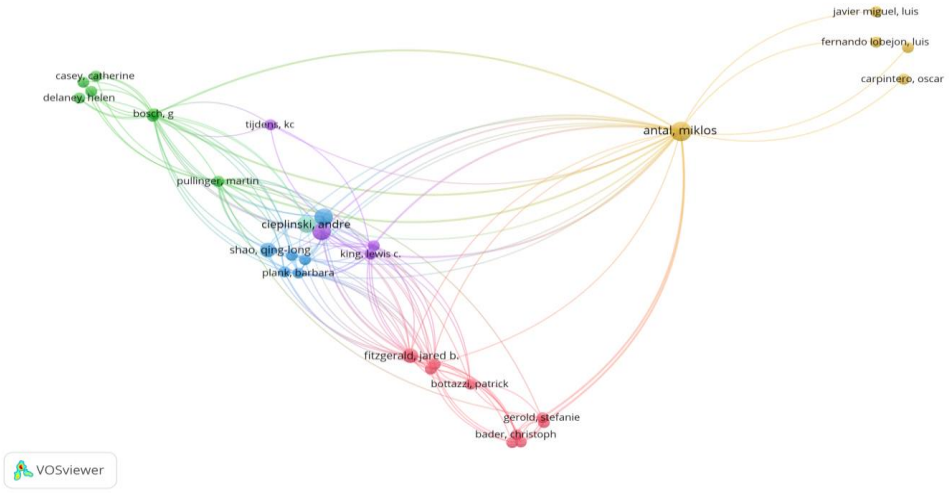
Document Citation Analysis and Mapping by h-Index: The H-Index value of 62 documents related to working time reduction was determined as 10. In the analysis conducted using citation-document matching in the VOSviewer program, the minimum number of documents was defined as 1, the number of citations the document received was determined as 10, and 24 out of 62 papers were matched. In other words, 24 studies meet the minimum 10 citation criteria. The mapping of documents based on citation analysis is shown in the figure below. Fitzgerald (2018) &Pullinger (2014) are at the center of the study.

Figure 3. H-index Citation Link Map



Citation Authors Analysis and Mapping: Thisindication of the extent to which researchers cite other authors in the same research field.

Figure 4. Citation-Author Analysis Link Map



The 60 authors shown in Figure 2 are grouped into 6 different clusters. The distribution of authors by clusters is also shown in Table 3.

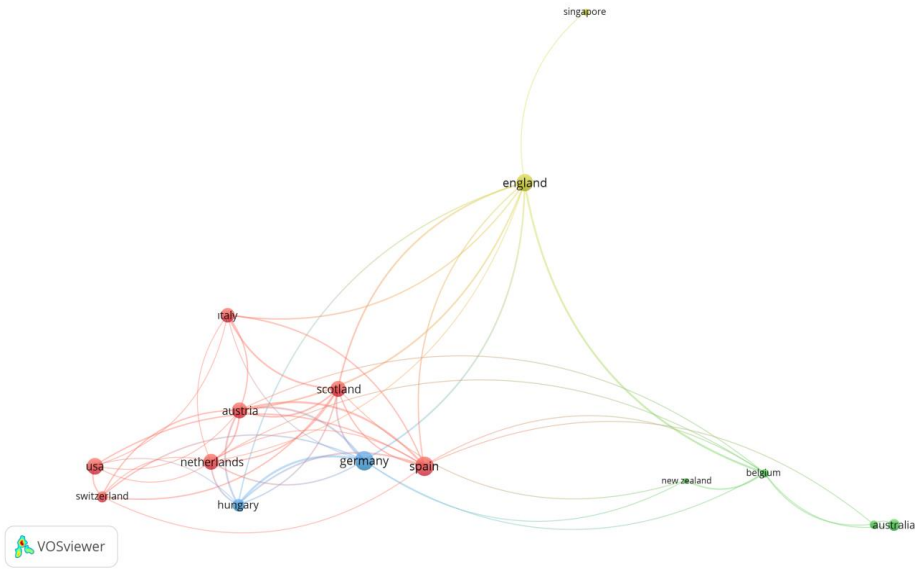
Table 3. Distribution of Authors by Cluster

Cluster	Author	Cluster	Author
Cluster 1	Bader, Chistoph Bottazi, Patrick Fitzgerald, Jared B Gerold, Stefanie Hanbury, Hugo Jorgenson, Andrew K. Moser, Stephanie Nocker, Matthias Schor, Juliet B.	Cluster 4	Antal, Miklos Carpintero, Oscar Fernando Lobejon, Luis Javier Miguel, Luis Nieto, Jaime
Cluster 2	Bosch, G Casey, Catherine Delaney, Helen Lehndorff, S Pullinger, Martin Schindler, Harry Strunz, Sebastian	Cluster 5	Guarnieri, Pietro King, Lewis C. Tijdens, Kc Van den Bergh, Jeoren C. J. M.
Cluster 3	D'Alesseandro, Simone Mokos, Judit Plank, Barbara Rodriguez-Labajos, Beatriz Shao, Ging-Long Wiedenhofer, Dominik	Cluster 6	Cieplinski, Andre

Source: Compiled by Authors from Web of Science Analysis Results

When the results were examined, it was found that Fitzgerald, Jared B. was the most cited author (78 times). The author with the highest total link strength (40) was Antal, Miklos.

Figure 5. Country-Citation Analysis and Mapping



Citation analysis of country: When the countries where articles were published were examined, Germany had the highest number of citations with 104 citations with 7 publications while England had the highest number of publications with 10 articles published. Austria ranks first in terms of the impact of the publication on the field of study. The publication citation and impact table of the 15 countries that met the threshold value of 10 included in the analysis is shown in the appendix. Four clusters were identified with this analysis. The clusters are shown in Table 4.

Table 4. Distribution of Countries by Cluster

Cluster	Country
Cluster 1	Austria Italy Netherlands Scotland Spain Switzerland USA
Cluster 2	Australia Belgium France New Zealand
Cluster 3	Germany Hungary
Cluster 4	England Singapore

Source: Compiled by Authors from Web of Science Analysis Results

The important countries included in this research are Spain, Australia, Germany and England, which form the centers of the clusters.

5. Conclusion

This study aims to provide comprehensive information about the depth, breadth, and quantity of work done to reduce working time. As a result of the analysis of the working time reduction, it was seen that the most influential journal, Ecological Economics, in Germany and the author was Miklos Antal. Amongthe countries that passed the threshold value in the study and entered the analysis, it was seen that the publications for 2015, which could be the beginning of the year of increase in interest in the subject, were the results of France's weekly 35 hours of experience, and that studies on the subject gained momentum after 2019 in England, Belgium, Italy, Austria, New Zealand, Singapore, USA and Switzerland. The results are not surprising.When the analyzed studies were examined, it was understood that some of these countries (France, Belgium, Austria) were pioneers in working time reduction and that short working time processes had already been implemented.It has been concluded that the issue of working time reduction is more on the agenda in these countries, with their high levels of welfare in terms of standardfeatures and the implementation of remote and hybrid working models after COVID-19. The countries analyzed in the conceptual framework have been mentioned, and when the working hours of the leading countries are examined, England has the highest working hours among the European Union countries, and Singapore has the highest working hours among the analyzed countries. The USA is one of the countries with the highest weekly working hours. Other reasons for studying the subject in these countries. It was seen that the analysis of the experiences of countries where different working methods were implemented and working hours were reduced during and after the COVID-19 process is another reason for the increase in interest in the subject in these countries. Examining countries' experiences where different working methods were implemented and working time was reduced during the COVID-19 process and afteris another reason for the increased interest in the subject in these countries.

It is thought that as studies on the experiences of countries where shorter weekly working hours are implemented increase and different working models are implemented due to the COVID-19 pandemic and the results of these experiences are analyzed, the studies on this subject will increase.

The reflections of the Paris Agreement, which entered into force in 2015 and is binding, explain the increase in studies in the field of environment. In addition, other leading countries included in the survey are countries where working hours are likely to be reduced and where the benefits arising from working time reduction by replacing overtime with productivity are discussed. Studies on these countries are expected to increase as discussion about these benefits is brought to the agenda and income levels rise for middle-income countries.

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Appendix

Table A1. Document, Total Link Strength, Citation and Average Citation Counts of All Authors İncluded in the Analysis

Author	Documents	Citations	Total link strength	Averagecitation
Antal, Miklos	4	50	3	12.5
Bader, Christoph	1	18	2	18
Bertogg, Ariane	1	10	2	10
Bessa, Ioulia	1	13	6	13
Bosch, G	1	53	1	53
Bottazzi, Patrick	1	16	0	16
Bradley, Lisa	1	13	3	13
Brown, Kerry	1	13	3	13
Burchell, Brendan	2	13	7	6.5
Carpintero, Oscar	1	33	3	33
Casey, Catherine	1	10	1	10
Cieplinski, Andre	3	27	7	9
Costantini, Edoardo A. C.	1	19	3	19
D'alessandro, Simone	3	27	7	9
De Meo, Isabella	1	19	3	19
Delaney, Helen	1	10	1	10
Distefano, Tiziano	1	11	3	11
Fantappie, Maria	1	19	3	19
Fernando Lobejon, Luis	1	33	3	33
Fitzgerald, Jared B.	2	78	2	39
Gerold, Stefanie	1	20	1	20
Gifford, Jonny	1	13	6	13
Green, Melanie	1	13	6	13
Guan, Dabo	1	22	4	22
Guarnieri, Pietro	3	27	7	9
Hanbury, Hugo	1	18	2	18
Javier Miguel, Luis	1	33	3	33
Jorgenson, Andrew K.	1	62	2	62
Kamerade, Daiga	1	13	6	13
King, Lewis C.	1	33	1	33
Lehndorff, S.	1	53	1	53
Li, Yuan	1	22	4	22
Lingard, Helen	1	13	3	13
Lorenzetti, Romina	1	19	3	19
Meng, Jing	1	22	4	22
Mokos, Judit	1	32	3	32
Moser, Stephanie	1	18	2	18
Nazio, Tiziana	1	10	2	10
Nieto, Jaime	1	33	3	33
Nocker, Matthias	1	20	1	20
Plank, Barbara	1	32	3	32
Pullinger, Martin	1	71	0	71
Raposo, Pedro S.	1	14	1	14
Rocheteau, G.	1	13	0	13
Rodriguez-Labajos, Beatriz	1	31	1	31
Rubery, Jill	2	13	7	6.5
Schindler, Harry	1	16	1	16
Schor, Juliet B.	1	62	2	62
Shan, Yuli	1	22	4	22
Shao, Qing-Long	2	32	1	16
Strauss, Susanne	1	10	2	10
Strunz, Sebastian	1	16	1	16

Tijdens, Kc	1	15	0	15
Townsend, Keith	1	13	3	13
Van Den Bergh, Jeroen C. J. M.	1	33	1	33
Van Ours, Jan C.	1	14	1	14
Wang, Senhu	1	13	6	13
Wels, Jacques	2	13	0	6.5
Wiedenhofer, Dominik	1	32	3	32
Xia, Yang	1	22	4	22

Source: Compiled by Authors from Web of Science Analysis Results

Table A2. Publications, Citations and Total Link Strength of Analyzed Countries

Country	Documents	Citation	Total link strength
Germany	7	104	22
Spain	4	101	19
England	10	84	21
USA	2	78	8
Scotland	1	71	21
Netherlands	5	71	16
Austria	5	68	27
Italy	6	56	12
Hungary	5	42	20
Australia	3	40	2
Switzerland	3	35	10
France	7	20	3
Belgium	6	19	12
Singapore	1	13	1
New Zealand	1	10	4

Source: Compiled by Authors from Web of Science Analysis Results