



## Multidimensional Scientometric Analysis for the Gig Economy

Sergen Gürsoy<sup>1-a\*</sup>

<sup>1</sup> Kariyer Geliştirme Uygulama ve Araştırma Merkezi, Öğr. Gör., Alanya Alaaddin Keykubat Üniversitesi, Alanya, Türkiye

\*Corresponding author

### Research Article

#### History

Received: 02.10.2022  
Accepted: 20.03.2023

#### Acknowledgment

This study is derived from the author's PhD thesis titled "Exploring the Reasons for Participation in the Gig Economy and the Effect of Job Insecurity on Job Satisfaction According to Economic Earnings", which has not yet been published.

#### ABSTRACT

The phenomenon of globalization, which gained momentum after the 1980s, has become widespread in all parts of society, and research on working life has become a normal situation. The phenomenon of globalization includes the socio-economic structure of society through internet networks. It has considered necessary for individuals to turn into an online business structure that emerges through digital platforms to continue their lives to maintain welfare and peace. Thus, in the changing world order, an increase has been observed in the trending research on the structure of working life in terms of social sustainability. The study aims to obtain a holistic perspective in the multidimensional areas of the gig economy, which is the counterpart of the online working platform. For this purpose, all data (820/732) obtained from the Web of Science database specific to the gig economy has included in the research. Multiple data have analyzed using the CiteSpace software package. Trends in the gig economy within the framework of social network theory, analysis in the context of the country, author analysis, cluster analysis, and representative document analysis have presented. In this context, it is important to be able to analyze in the context of scientometrics within the scope of the literature on the gig economy to obtain systematic findings for future research on the current labor market. Moreover, it can be a source for future studies on the gig economy and can fill the lack of a holistic perspective in the literature on the gig economy. With the research, literature trends, country analyses, relationship networks, author productivity, and the interpretative equivalent of keywords in the literature are revealed. According to the analysis findings; For the gig economy phenomenon, research carries out in different areas of the socio-economic structure, and its states that the studies may increase cumulatively in the future in terms of its social importance and prevalence.

**Keywords:** Gig Economy, Social Network Analysis, Labor Relations, Industrial Relations, Labor Economics  
**JEL Codes:** D85, E24, J01, L00

## Gig Ekonomisi İçin Çok Boyutlu Bilimetric Analiz

#### Süreç

Geliş: 02.10.2022  
Kabul: 20.03.2023

#### Bilgi:

Bu çalışma, yazarın henüz yayımlanmamış olan "Gig Ekonomisine Katılım Nedenlerinin Keşfedilmesi ve İş Güvencesizliğinin Ekonomik Kazanca Göre İş Tatminine Etkisi" adlı doktora tezinden üretilmiştir.

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#### Öz

1980'lerden sonra ivme kazanan küreselleşme olgusu toplumun her kesiminde yaygınlaşmakta ve çalışma yaşamının araştırılması olağan bir durum haline gelmektedir. Küreselleşme olgusu internet ağları aracılığıyla toplumun sosyo-ekonomik yapısına dahil edilmektedir. Bireylerin hayatlarını devam ettirebilmeleri, refah ve huzuru sürdürebilmeleri için dijital platformlar üzerinden ortaya çıkan online bir iş yapısına dönüşmeleri gerekli görülmektedir. Böylelikle değişen dünya düzeninde toplumsal sürdürülebilirlik açısından çalışma hayatının yapısına yönelik araştırmaların eğilimlerinde artış gözlemlenmektedir. Çalışmanın amacı, çevrimiçi çalışma platformunun karşılığı olan gig ekonomisinin çok boyutlu alanlarında bütünsel bir bakış açısı elde etmektir. Bu amaçla, gig ekonomisine özel Web of Science veri tabanından elde edilen tüm veriler (820/732) araştırmaya dahil edilmektedir. CiteSpace uygulaması kullanılarak çoklu veriler analiz edilmektedir. Sosyal ağ teorisi çerçevesinde gig ekonomisine yönelik eğilimler, ülke bağlamında analizler, yazar analizleri, küme analizleri ve temsili belge analizleri sunulmaktadır. Bu kapsamda gig ekonomisine ilişkin literatür kapsamında bilimetric analizler yapabilmek, mevcut işgücü piyasasına ilişkin gelecekte yapılacak araştırmalar için sistematik bulgular elde edilmesi açısından önemlidir. Dahası gig ekonomisine yönelik gelecek çalışmalar için kaynak teşkil edebilecek ve gig ekonomisi için literatürde bütüncül bakış açısı eksikliğini kapatabilecek niteliktedir. Araştırma ile gig ekonomisine yönelik literatür eğilimleri, ülke analizleri ve ilişki ağları, yazar üretkenliği ve anahtar kelimelerin literatürdeki yorumsal karşılığı ortaya konulmaktadır. Analiz bulgularına göre; gig ekonomi olgusu için sosyo-ekonomik yapıda farklı alanlarda araştırmalar yapılmış olup, toplumsal önemi ve yaygınlığı açısından çalışmaların gelecekte kümülatif olarak artabileceği ifade edilmektedir.

**Anahtar Kelimeler:** Gig Ekonomisi, Sosyal Ağ Analizi, Çalışma İlişkileri, Endüstri İlişkileri, Çalışma Ekonomisi

[sergen.gursoy@alanya.edu.tr](mailto:sergen.gursoy@alanya.edu.tr)

<https://orcid.org/0000-0002-9032-2999>

**How to Cite:** Gürsoy Sergen (2023) Multidimensional Scientometric Analysis for the Gig Economy, Journal of Economics and Administrative Sciences, 24 (2):195-210.

## Introduction

Although revolutionary processes occur in the short term in the historical dimension globally, evolutionary transformations may occur in the long run (Wallace, 1870). Toffler (2022) interprets the ongoing last stage of the revolutionary and evolutionary processes as the internet age. As technical developments increase, information has transformed into online networks.

In post-industrial societies, it observes that there is a transition to the service sector beyond the agriculture and industry sector. The increase in the internet-based digital business phenomenon within the service sector structure; has added importance to the global competitiveness of both capital and labor. In the research of Kässä and Lehdonvirta (2018), According to the shared index for internet-based labor platforms, its share that the online business structure has increased by approximately 25% annually on a global basis. As a result of the digital labor platform, recently for the gig economy, There has been an ever-increasing effort that includes workforce preferences, the impact of technology on working life, and socio-economic scope (Hu and Fu, 2021: 2). The Gig Economy includes consumers on one side, intermediary platforms on the other, and the working relationship of workers on the other. It means a one-time, temporary business relationship at the request of the consumer through the platform and is a one-time discontinuous activity (Woodcock and Graham, 2019: 9; Watson et al., 2021). The gig economy in working life has gained importance among the facts that need to be investigated in terms of the survival of working individuals and their families and the sustainability of social peace and welfare.

According to the study's main conceptual framework, it aims to analyze the gig research data obtained from the Web of Science database and to reveal its effect on the literature from a holistic perspective. The trend toward the gig economy is increasing day by day, which is the primary motivation for revealing the holistic and up-to-date perspective of the studies on the subject. In the research, a holistic view of the gig economy provide by the study trends towards the gig economy, the focus of the countries on the subject, the keyword analysis (helpful in determining the common working areas), the interpretation of the most important representative documents within the scope of the subject. It's stated in the literature that scientometric studies on the gig economy have not yet been conducted, and the research is the first scientometric study within the scope of the subject. It makes up for the lack of up-to-dateness, holistic perspective, and scientometrics studies in the literature. Moreover, it's thought that the research can be a source in gig economy studies as it is a suggestion for future scientific studies, which is the purpose of scientometric studies.

## Literature Review

As stated in the World Economic Forum; the center of the power mechanism globally; The increase in the Cyber-Physical Systems and automation systems carried out by

computer and internet networks have revealed the phenomenon of the gig economy (Schwab, 2017). By allowing the way the work is carried out regardless of place and time, it is possible to obtain production and service continuously. The freelance form of the online working platform dates back to the establishment of the Elance company in 1999 and had not yet gained importance as of the period (Oyer, 2020: 3). As the process progressed, the work carried out with internet-based applications and the gig economy gained importance after the 2008 crisis (Aloisi, 2016).

North American English used the concept of the gig as a "temporary job" phrase. Since it is defined as both a one-time job and a temporary job, the concept does not mean keeping one's job regularly. It is a one-time event and has a discontinuity until the next study (Woodcock and Graham, 2019: 9). Ultimately, the gig relationship includes freelance-temporary-independent work. As Horowitz points out (2011); It states that with the transition from the agricultural sector to the industrial sector, such an evolutionary process has not been experienced in a century-old period, and the gig economy can be defined as an industrial revolution.

The "Online Labor Force Index", which examines labor markets within digital platforms, is the first economic indicator that indicates the online gig economy, equivalent to classical labor market data in working life. The number of people involved in project-oriented or temporary business structures among online platforms aimed to measure the supply and demand of online workers for countries and professions by tracking . It describes how the use of digital labor has changed over time, across countries and occupations. The first measured index (100.0) was in 2016 and the highest index (224.3) was on April 18, 2022. The structure of online work constantly increased on average. (iLabour, 2022).

There is an increase in the trend towards the academic literature, with the phenomenon of Industry 4.0 and Society 5.0, which is the current stage in the socio-economic context globally, and the gig economy, which is a temporary way of working (Batmunkh et al., 2022). The gig economy has taken its place in the labor market in the last ten years. In light of current data, the scientometric analysis of the gig economy, which is shown as the working style of today and the future, is important in terms of determining the current situation and trends for future studies on the phenomenon and revealing the necessary guidelines for the field.

## Social Network Theory

Social network theory, which was introduced by Barnes in 1954, with other people around him used this theory to determine the connections of the individual. Social network theory is one of the research factors in the discovery, distribution, and use of knowledge (Dunn, 1983). Social network theory focuses on the social relations of individuals and the transfer of information,

and the effect on behaviors and attitudes obtained through the personal or platform channel (Liu et al., 2017). It helps in defining social relationships among individuals, examining relationship sources, and classifying relationships. In this context, it can reveal relations between individuals who are involved in social relations or not. Bibliometric or scientometric research techniques have been using Social Network Theory extensively, especially in recent years. As a result of bibliographic data, it allows the investigation of the social network structure, the effects on social relations, and the connection networks of the actors (institution, country, author, etc.) in the social network (Al et al., 2012).

### Philosophy and Method of Research

The basis of the research is based on certain interests. Accordingly, scientific research interests constitute the source of research-oriented activities and direct research (Günbayı & Sorm, 2018). The source of interest in our research is called hermonitic interest. Within the scope of the gig economy, scientometric analysis is included in the Post-Modern/Anti-Positivist scientific understanding. For this purpose, the study is evaluated within the scope of the qualitative research method. As a matter of fact, in many studies similar to our research, qualitative interpretation of quantitative data is made in bibliometric and scientometric analysis methods (Buter et al., 2004; Buter et al., 2006; Zavarraqi and Fadaie, 2012: 277; Ibrahim et al., 2015).

Idealism, which is one of the philosophies that includes qualitative research, constitutes the main philosophy of the study. Idealism is the general name of the teachings that transform the existence, matter, object, idea, and view (Terzi, 2018: 19; Skodo, 2014). With the interpretative/hermonitic paradigm, which is the sub-paradigm of the philosophy of idealism, the minds of individuals are tried to be understood and explained. The real information to be obtained in the research is based on the perspectives and opinions of the people (Günbayı, 2019; Reeves & Hedberg, 2003; Guba & Lincoln, 2001).

According to the axiology of the research, when the international literature is searched through the Web of Science (WoS) database, the bibliographic research on the gig economy saw that only four studies are included, and especially one of them is examined through the WOS channel for bibliometric analysis. No studies used the CiteSpace software package. Research is important in terms of the almost non-existence of current scientometric studies on economics, continuous updating of the literature, and gaining a holistic perspective in terms of scientific research.

### The Problem of Research

The problem in the research constitutes a source in the analysis and finding process. The research aims to support future studies within the scope of the gig economy and to

reveal future guidelines. In this context, the research questions are;

- Within the scope of the gig economy, the trends of the research in the literature follow their course?
- How can the networks of relations and productivity of countries be interpreted among the countries conducting research within the scope of the gig economy?
- How can productive writers' relationship with the gig phenomenon be interpreted within the scope of the gig economy?
- Keywords in research within the scope of the gig economy; How can the contribution and impact of flashpoints, networks of collaboration, theme (cluster) analysis, and the resulting representative documents be interpreted?

### Database of the Research

In the research, data were obtained from the Web of Science (WOS) channel (Pranckutė, 2021; Li et al., 2018; Zhu and Liu, 2020), which is one of the most important and most effective databases globally. It is the oldest and most widespread database globally, providing raw data and special access opportunities for bibliometrics and scientometrics research with high reliability (Birkle et al., 2020). The WOS data channel helps us to deeply explore and examine the citation relationships of the social sciences (Web of Science Group, 2019: 2). Other reasons for WOS data channel selection; It is the oldest database globally and includes over 18 thousand very high-quality journals and approximately 1.5 billion citations (Wang, 2018). Moreover, in other databases (Scopus, Google Scholar, etc.), choosing the most appropriate data channel is very important for validity, as research data may contain duplicate data (Harzing & Alakangas, 2016). Another reason for choosing, it seems to work quite compatible with the "Plain text" plugin, which is one of the extensions of the WOS database included in the scope of the CiteSpace software package (Zhang et al., 2020). As Chen, the founder of the software package, stated in the CiteSpace guide (2016: 41), WOS is the most basic and most important database of the application.

The data in the study were obtained through purposeful criterion sampling. This sampling method includes providing data for the study to conduct in-depth research in the study (Büyüköztürk et al., 2012; Yağar and Dökme, 2018: 6). In this context, all data in the WOS database that examines the phenomenon of gig economy when the data is taken with the purposeful criterion sample constitutes the sample.

### Query Scope and Research Data

By filtering "Subject" in the search tab in the WOS database, it is aimed to include the title, summary, author, keywords, and keyword pluses of the gig economy in the research with effective and appropriate data for the subject. The data query is TITLE-ABS-KEY-KEY-KEY PLS:

("Gig Economy") OR ("Gig Economies") OR ("Gig Economics"). In addition to the specified criteria, individual studies were manually confirmed. In addition, the analysis option was applied in the software package to remove possible duplicate studies. For this reason, 732 studies, not all 820 studies, are acceptable analysis data about gig studies. The reason for choosing these phrases is to present a comprehensive perspective on the subject. The scope of the search allows for the emergence of current findings on the phenomenon and making future guidelines by directly obtaining data on the gig economy. In the final sense, the date of data acquisition: 31.08.2022.

When the double studies in the WOS channel were not included in the analysis, it was 820 studies in total. To determine the trends in the gig economy from a holistic perspective, no country, time, or language restrictions were applied. The data are in order; article ( $N=655$ ), early access ( $N=77$ ), proceeding paper ( $N=63$ ), editorial material ( $N=46$ ), book chapter ( $N=38$ ), revised articles ( $N=27$ ), book review ( $N=20$ ), book ( $N=4$ ), meeting summary ( $N=2$ ), correction ( $N=1$ ), letter ( $N=1$ ), news item ( $N=1$ ) were included in the study.

### Analysis Method of Data in Research

After the 1960s, Bibliometrics, Scientometrics, and Informetrics research gained a high trend in academia to obtain a holistic view of the data (Qiu et al., 2017). The common goal of various metrics; The aim is to address the related components to provide dynamism to the cumulative accumulation of literature with different disciplines (Hood and Wilson, 2001). On the other hand, there are definitional and usage differences in metric methods. Bibliometric expressions; It is based on document, library, and information management. Scientometric expressions; It aims to find inferences and suggestions for the course of scientific research (academic literature). The Informetrics method, on the other hand, is the rapid development of information technologies and the analysis of information through informatics (Yang, et al., 2016; Brookes, 1990; Wang and Pang, 1998). As the aim of our research, it is seen that the scientometric method is more appropriate since the target is determined to produce inferences and policies for the academic literature. Scientometric methods are the analysis method used to evaluate studies for scientific research and to take a role as a guide to science policy (Egghe, 2005). The scientometric method plays a fundamental role in deciding and managing scientific developments with mathematical methods in the academic literature (Qiu et al., 2017). The bibliometric method is preferred in order to keep the bibliographic studies on the gig economy up-to-date and to not have used bibliometric studies within the scope of the subject yet. Moreover, since the gig economy phenomenon has the potential to affect current and future fields of study, it was deemed necessary to evaluate the literature on the subject and propose policies for future studies. Algorithm-based scientometrics analysis, which provides the

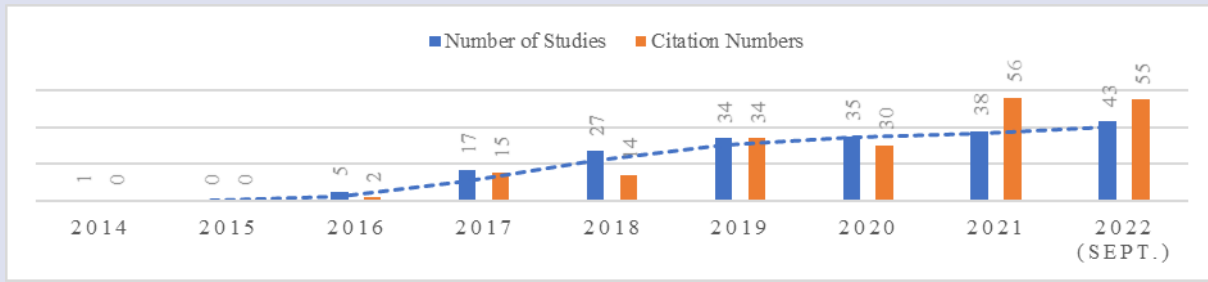
opportunity to gain a holistic perspective and visualize research with technological developments, has recently increased its importance (Petticrew and Roberts, 2006). Scientometric analysis techniques produce transparent, consistent, and objective results for the determined study group (Eck & Waltman, 2014). In both micro and macro context, it aims to reveal future guidelines by making the phenomenon recognizable by sharing findings for university institutions and policymakers (Sooryamoorthy, 2020). It is a very valuable technique in terms of using the data on the subject as a whole and revealing important connections or gaps in various fields (Hu and Zhang, 2017). Research questions have been a source for the use of scientometric analysis within the scope of the gig economy. Research trends in the academic literature on the gig economy allow inferences to determine how much importance is attached to the scope of the subject and its potential. The analysis of the countries and authors will play a role in enabling the grounding of the subject based on the countries and authors working primarily for future studies within the scope of the subject. Most importantly, keyword and theme analysis; provides the opportunity to present policies on which areas of gig economy research are trending, which areas are lacking, and which areas need to be studied.

The 6.1.R3 version of the CiteSpace software package was used in the study. The software package has gained popularity with its emergence (Ping & Chen, 2017). Authors, countries, keywords, research trends, etc., specific to the subject studied. It is a Java-based application that visualizes and analyzes relationships (Chen, 2006; Cobo et al., 2011). In the study conducted by Dang et al. (2021: 5), analysis software packages such as VOSviewer, BibExcel, UCINET, and CiteSpace were tested, and it was concluded that CiteSpace had fewer errors and missing/escaping codes and this affected the reliability of the research. According to Li and Chen's (2016) research, it was determined that CiteSpace was the application with the highest level of coverage for using multidimensional bibliographic link networks and multiple analysis techniques. Globally important scientists; It is based on revealing research trends, research limitations, and research points by considering the literature standing in mass (Dang et al., 2021: 4).

### Results

#### Numbers and Trends of Gig Economy Studies

820 data were put into the software package, and 732 of these data could be read and included in the analysis. Approximately 90% of the studies obtained from the WOS data channel were included in the analysis. According to the findings, it is seen that the first study on the gig economy emerged in 2014. Although there was no study in 2015, there was a continuous increase in the number of studies and citations in the following years.



Şekil 1. Gig Ekonomisi İçin Çalışma Sayısı ve Eğilimler  
Figure 1. Number of Studies and Trends for the Gig Economy

Table 1. Top Five Countries by Number of Publications

Çizelge 1. Yayın Sayısına Göre İlk Beş Ülke

Frequency	Centrality	Burst	Countries	Years	Half-Life
213	0,35	3,68	USA	2014	5,5
140	0,51		ENGLAND	2016	3,5
73	0,13		AUSTRALIA	2017	2,5
41	0,15		CHINESE	2017	3,5
39	0,10	2,82	CANADA	2017	2,5

No study has been carried out in 2014 on the gig economy. It is seen that organizations such as Freelancer.com (2022), which was established in 2004, and Uber (2022), which was established in 2009, have not yet become widespread as of the period. As the dominance of these organizations in working life increases, it is observed that the trend of research also increases. The years 2015-16 and 2016-17 have been the breaking points of sudden breakthroughs in research on the concept of the gig economy. At this stage, the rise of the gig economy inevitably emerges as a result of the penetration of technological transformation into society. The prevalence of Uber in all countries of the world was towards 2015. As of this year, it has been put into use in 58 countries and more than 300 cities that have spread globally (Melhem, 2015). There has been an increase in the number of research and the number of citations, especially between 2016 and 2017, and progress has been made with great proportions. Filtering was done over the WOS data channel by considering the breakout periods between 2015 and 2017, and it was observed that the most cited studies were mainly about the labor market and working conditions (Graham et al., 2017; Spreitzer et al., 2017; Fleming, 2017; Stewart and Stanford, 2017; Chen and Sheldon, 2016).

In 2018, it was seen that the Covid-19 pandemic did not begin, so the number of studies on the gig economy increased at its usual pace. With the effect of the pandemic, the trend towards online working structure has increased, which has brought the trend in the literature (Chen et al., 2022; Webb et al., 2020; De et al., 2020; Isin and Ruppert, 2020). Many authors have stated that there are new business structures regarding the gig economy and increases in the form of remote work during the pandemic process (Umar et al., 2021; Spurk and Straub, 2020; Harpur

and Blanck, 2020; Stephany et al., 2020). In 2020, with the increase in the number of online jobs and workers, the interest in the gig economy has increased, bringing high numbers of studies and citations in the literature.

#### Country-Based Studies and Collaborations

As a result of the analysis of the data, nodes and links about the countries have emerged. Research on the gig economy was conducted in 58 different countries. Countries have established 143 networks, and each country has an average of 2,46 networks.

It is seen that developed countries are dominant as the country of origin of studies on the phenomenon of the gig economy. The USA, which has emerged as the only country that has developed the process since the first study within the scope of the gig economy, is the country with the highest number of publications. The prevalence of this interest, the high bursting point and centrality rate, and the long half-life confirm the importance of the US in the phenomenon of the gig economy. It is seen that the country that creates a source for the infrastructure for academic literature is the USA. The high importance attached to entrepreneurship and start-ups in the US country makes it commonplace to increase interest in the gig economy and thus online business forms (Reynolds & Curtin, 2008; Ziakis et al., 2022; Finkle & Olsen, 2019; U.S. Department Of Labor, 2022).

It has been seen that the studies originating in England mostly consist of studies on the economy, management, Organization, and industrial relations. It is seen that England is the country with the highest centrality rate and therefore the level of importance of the studies. Because England has such a high degree of centrality, it is seen that the country's studies are constantly important in every period.



Şekil 2. Ülkeler Arası İlişki Ağı Haritası  
Figure 2. Inter-Country Relationship Network Map

Table 2. Top Five Authors by Number of Publications  
Çizelge 2. Yayın Sayısına Göre İlk Beş Yazar

Frequency	Authors	Years	Half-Life
13	Graham M.	2017	2,5
12	Lehdonvirta V.	2017	1,5
8	Gandhi A.	2018	0,5
8	Sucahyo Y.	2018	0,5
6	Wood A.	2019	-0,5

Research originating in Australia has focused mainly on the industrial relations system. It has been observed that there is a high level of interest in working conditions. It has been observed that the dependent employment rate of both countries is low (OECD, 2022). It is considered normal that academic studies on the subject are so high due to (OECD, 2022) the increase in demand for temporary work (due to the observance of work-life balance).

The country of China is in fourth place in the number of studies, and it is seen that a significant level of the increase in the studies on the case, which has only started in 2018, is related to industrial relations due to the Covid-19 pandemic (Umar et al., 2020; Chen et al., 2022; Wu et al., 2019; Charness and Chen, 2020).

In Canadian studies, it is seen that concepts such as job security problems, emotional labor factors, welfare phenomena, and risk conditions are given importance (Stewart & Standford, 2017; Ashford et al., 2018; Lewchuk, 2017; Zwick, 2018). With the protection of individual rights in Canada and the direct inclusion of 13% of workers in the gig economy (Cision, 2022), it is seen that the interest in working conditions is normal and is among the subjects that can be worked on in the future. Considering the online business structures for other countries, it is thought that inferences can be made for the gig economy.

The colors in the nodes define the temporal dimensions. Lines between nodes indicate relationship networks (Chen, 2014). When the network of relations

map is analyzed, it is seen that the ratio of connection networks of the Netherlands-Norway countries is 1.0 and there is a high correlation between them. Both countries conducted research mainly in the fields of management and industrial relations, and their connections were inevitable. In addition, it is seen that a 0.71 level of relationship network has been established between Norway-Finland, Russia-Türkiye, Switzerland-Portugal, South Korea-Wales, and Indonesia-Taiwan. It has been observed that the ratio of relations networks is low due to the high number and prevalence of relations networks in the countries that produce the most publications.

#### Authors' Productivity

Considering the authors for the gig economy, 127 networks of connections were identified among 225 different authors or authors. In 2019 ( $N=45$ ), the tendency of the authors toward the phenomenon increased, and the relationship connections reached the highest level in this period.

Unlike other authors, Graham, who had the highest number of studies, had a centrality rate of 0,01 (no rate for any other author) and a half-life rate of 2,5. Therefore, it is seen that the author is an important and long-term writer in the eyes of gig economics. Graham's work mainly consists of factors that directly concern working life such as flexibility, insecurity, bargaining power, labor process, and commodification (Anwar and Graham, 2021; Anwar

and Graham, 2020). Lehdonvirta, which has the second highest number of studies; It has been observed that the gig economy conducts research by addressing interests related to the field of labor economics, such as flexibility, digital work, worker, freelance work, job quality, non-standard work, online labor markets (Wood et al., 2019; Graham et al., 2017; Lehdonvirta, 2018; Kässi and Lehdonvirta, 2018). The studies of Gandhi, which ranks third in terms of the number of studies, it has been observed that research are carried out in the context of work psychology by considering concepts such as motivation factors, intention, and satisfaction (Prabowo et al., 2019; Auditianto, 2019). In Sucahyo's research on the gig economy, themes such as sustainability, business models, behavioral intention, technology acceptance, and online courses appear to be dominant (Maulana et al., 2018; Gandhi et al., 2019; Alif et al., 2020).

Considering the referenced authors as well as the productive authors; Researchers such as Wood, Graham, Stewart, Smicek, Rosenblat, Lehdonvirta and Gandini seem to come to the fore. It is seen that when the research areas of the authors who ultimately conducted the research or whose researches are referenced are

taken into consideration, it can constitute a basis for future research.

#### Analysis of Keywords

According to the research findings, it is seen that 329 different keywords and 1581 link networks have emerged. The difference in keywords brings with it an increase in relationship networks. It has been observed that there have been sharp increases in the number of keywords and relationship networks, especially between 2018-19 and 2020-21.

According to the analysis findings, it is obvious that the most used word is gig economy ( $N=345$ ). It is seen that the second most used keyword for the gig economy is worker ( $N=101$ ). Then, the words work ( $N=84$ ), sharing economy ( $N=62$ ), and employment ( $N=41$ ) took place in order. When the words are considered in general, it is seen that this situation, in which the concepts of employment, worker, work, labor, and economy are studied, is closely related to the field of labor economy. It is seen that the number of citations in some studies on this field is higher than in others. (Wood et al., 2019; Howcroft & Bergvall-Kareborn, 2019; Lehdonvirta, 2018).



Şekil 3. Anahtar Kelime Sıklığına Göre Bulut Kümeleri  
Figure 3. Cloud Clusters by Frequency of Keywords

Table 3. Keywords with the Strongest Citation Bursts

Çizelge 3. En Güçlü Atıf Patlamalarına Sahip Anahtar Kelimeler

Keywords	Strength	Begin	End	2014 - 2022
Sharing Economy	2,68	2017	2018	
Decision	1,77	2017	2018	
Precarious Work	1,73	2017	2019	
Migration	1,87	2018	2019	
Union	2,14	2019	2020	
Job Satisfaction	1,84	2019	2020	
Self Employment	1,78	2019	2020	
Digital Labor	2,45	2020	2020	
Uber	2,09	2020	2020	
Big Data	1,92	2020	2020	
Internet	2,78	2021	2022	

The red lines in the graph appearing in the explosion degrees indicate that the trends every year are higher than the investigated variables. It has been observed that the trend of keywords in research on the gig economy increased in 2017. It has been seen that the trends for keywords such as sharing economy, decision, and risk-instability are higher compared to other words. It has been determined that the word with the longest research tendency is about risk and instability in working life. The fact that risk has gained such importance on an economic basis has been the result of employees moving away from the New-Deal social insurance approach (Friedman, 2014; Corujo, 2017). The increase in research on gig workers has been the result of the necessity of investigating the problems related to the scope of social policy (Stewart & Stanford, 2017; Gregory, 2021).

There has been an increase in work trends toward phenomena such as migration, unions, job satisfaction, self-employment, digital work, and big data. It is seen that the keyword with the highest impact power is the internet. Since internet technologies are directly related to the way the Gig economy works (Graham et al., 2017; Alanezi & Alanzi, 2020), the continuity of research on this concept is seen as usual. Considering the level of

centrality, concepts such as gig economy (0,28), job (0,15), precarious job (0,14), sharing economy (0,13), economy (0,09), and worker (0,08) are seen to be of high importance. When these concepts are examined as a whole; As a result of new business structures in the gig economy, it is seen that studies in the field of labor economics and industrial relations gain importance and may gain importance cumulatively in the future (Healy et al., 2017; Economicshelp, 2018).

#### Cluster/Theme Analysis of Keywords

Cluster (theme) analysis is important in terms of reflecting the themes of the most emphasized words and phrases through the algorithm within the software package. Within the scope of theme analysis, the modularity rate indicates the extent to which the clusters diverge from each other. The silhouette value, on the other hand, expresses the quality of the resulting cluster (Chen, 2016). The keywords of the research examined within the scope of the gig economy are very important in terms of determining the clusters by theme/cluster analysis, discovering the content, and providing a holistic perspective.



Şekil 4. Anahtar Kelimelerin Küme/Tema Analizi  
Figure 4. Cluster/Theme Analysis of Keywords

Table 4. Cluster Analysis Representation of Keywords First Three Labels

Çizelge 4. Anahtar Kelimelerin İlk Üç Etiketinin Küme Analizi Temsili

ID	Size	Mean Silhouette	Mean Year	Terms (Local Linear Regression)
0	45	0,707	2019	Microtask Crowdsourcing (91,09, 1,0E-4); Giving Voice (91,09, 1,0E-4); Sensitive Design (91,09, 1,0E-4); Presenting Amazon (86,02, 1,0E-4); Data Sample (86,02, 1,0E-4)
1	44	0,691	2019	Collective Action (132,14, 1,0E-4); Insecurity (104,3, 1,0E-4); Platform Worker (99,43, 1,0E-4); Political Development (97,09, 1,0E-4); Creativity Hoax (92,36, 1,0E-4)
2	40	0,683	2017	Precarious Work (123,72, 1,0E-4); Sharing Economy (109,67, 1,0E-4); Gig Worker (79,06, 1,0E-4); Digital Platform (72,79, 1,0E-4); Systematic Literature Review (72,23, 1,0E-4)



**Table 5.** Key Representational Documentation of Keyword Clusters**Çizelge 5.** Anahtar Kelime Kümelerinin Anahtar Temsili Belgeleri

Cluster #	Citing Papers	Coverage %
#0 Theme	Nelson, G (2020) The Gig Economy Comes To Academia: Job Satisfaction Among Adjunct Faculty. Cogent Education Doi 10.1080/2331186x.2020.1786338	11
#1 Theme	Morales-Munoz, K (2022) The Spatiality Of Collective Action And Organization Among Platform Workers In Spain And Chile. Environment And Planning A-Economy And Space Doi 10.1177/0308518x221103262	8
#2 Theme	Daramola, O (2022) Affordances Of Digital Platforms In Sub-Saharan Africa: An Analytical Review. Electronic Journal Of Information Systems In Developing Countries Doi 10.1002/isd2.12213	9

As a result of the cluster/theme analysis for the gig economy, suitable-good values such as Modularity (Q) value: 0,4407 and Silhouette (S) value: 0,7319 were obtained. The labels of the themes/clusters were analyzed using the Local Linear Regression (LLR) algorithm. This algorithm is used to reveal the most effective and important clusters (Wei et al., 2015: 11). Using analytical analysis, it represents the odds ratios of the labels that best reflect the cluster (Chen, 2006). In total, ten different clusters emerged. The first three clusters were included in the scope of the studies with the similar number of studies.

When the research on the gig economy is examined as a whole; According to the #0 cluster covering keywords in 2019, micro tasking crowdsourcing, precision design, amazon presentation, sample data, etc. It is seen that internet-themed studies are predominant. Internet-themed studies emerge as an indispensable element of the new labor market in creating the infrastructure for a flexible economy (Goodman and Paolacci, 2017; Porter et al., 2020; Gawer and Srnicek, 2021). It is foreseen that internet-oriented studies can continue with such high importance for internet themes. In cluster #1, collective behavior, precarity, political development, creativity deception, etc. Critical concepts are explored. The prevalence of these critical factors among employees is normally associated with the security problem in the gig economy (Bieber and Moggia, 2021; Ashford et al. 2018). For the job insecurity factor, as a result of the effect of the pandemic, the future concerns and psychological disorders of young people and highly educated individuals who have been isolated from society for a long time emerge (Giorgi et al., 2020). Sharing economy in cluster #2, which ranks third in number; It is seen that the factors that constitute the infrastructure of the phenomenon such as gig employees and the digital platform are at the forefront. gig economy; Since platform economy and sharing economy were sub-themes, it was inevitable to work in these areas (Chen & Sheldon, 2016: 2; Berg et al., 2018). In the #3 theme (N=34), it is seen that there are many studies based on organizational management such as talent management, business identity, entrepreneurship, SCM manager, and motivation. In the #4 theme (N=33), based on 2020, the period when the Uber business spread globally; Concepts such as uberization, digital labor platform, cognitive sustainability have taken their place. In the #5 theme (N=31), factors such as algorithmic management, consumer behavior, and

business context seem to be at the forefront. In cluster #6 (N=30), the current requirements of working styles such as young workers, social support, and self-employment emerge. In cluster #7 (N=23), digital labor market, dependent self-employment, neo-liberal industrial relations, etc. Research on the concept of working in the post-industrial social order is intense. In cluster #8 (N=15), distributive justice, negotiation behavior, psychological contracts, etc. It has been determined that the items in the field of work psychology are predominant. In the #9 theme (N=15), \_hemes insurance, unemployment insurance, \_hemes services, etc. It has been determined that studies based on employee rights and responsibilities are concentrated. In the final sense, the \_hemes are located in multidimensional fields (mainly social sciences) that concern all segments of society in socio-economic terms (Kaine and Josserand, 2019; Belanche et al., 2021; Malik et al., 2021: 13).

**Representative Documents in the Context of Keywords**

As a result of the cluster analysis, the highest ones among the representative documents included in the content that made the theme important were expressed. The ones with the highest coverage value from all the different \_hemes are included in the analysis, and thus a multidimensional holistic perspective is tried to be put forward.

Nelson et al. (2020), which has the highest coverage rate in the #0 theme, examines the relationship between the concept of the gig economy in educational sciences and adaptation to working life. It has been stated that the effect of the status of adjunct faculty members working indefinitely in college and higher education in the USA on job satisfaction is similar to that of assistant faculty members and permanent faculty members. In the #1 theme, Morales-Munoz and Roca (2022), who reached the highest coverage value, share their perspectives on organizations specific to Spain and Chile. It is seen that the social media channel is used for factors such as the transfer of experiences, organization, and solidarity in the classical labor structure. In the postmodern labor structure, it is seen that the local organizations, in the beginning, evolved into a multi-scale structure independent of location in the later process. According to the research of Daramola and Etim (2022), which has the highest coverage rate in the #2 theme; The possibilities created by digital platforms were

expressed. With the prevalence of digital platforms in the Sub-Saharan African region and the lack of support from public/private partnerships in this context, there has been an increase in job opportunities for unregistered businesses. In the study of Bellesia et al. (2019) in cluster #3; Within the scope of irregular business relations in online labor markets, the necessity of creating a job identity for gig employees has been put forward. It is stated that the working structure in the gig economy is in a structure that can restrict the actions of the employees who are asked to continue their labor through internet technologies. It also focuses on improving the orientation of workers towards entrepreneurship in their working characteristics. Klarin and Suseno (2021) reached the highest coverage value in the #4 theme, in their study; It is seen that the Scientometrics analysis method is used with more than two thousand data sets for the sharing economy over the WOS database. Future directions are shared regarding the need to work on business models and entrepreneurship structure in the sharing economy. The study laid the groundwork for the continuation of gig economy research, which is a subset of the sharing economy, for future periods. Healy et al (2020) in cluster #5; tried to express consumers' perspectives towards work and work within the gig economy. Consumers expressed positive views on gig workers' finances, work patterns, and job opportunities. As platform economy research increase continuously, the demands of workers may increase and it will be inevitable for a sustainable society to respond to these demands. #6 set Hossain Khan et al (2022); He made inquiries about social support in case of illness or accident for gig employees. The perception of self-employment in the online working structure has rapidly spread insecurity. Support for online workers in different countries has been examined, and the necessity of meeting the needs of employees for a sustainable labor market has emerged. Williams and Horodnic (2019) in #7; There is a perception that dependent self-employed workers are subcontracted by large companies and that workers are included in the precarious working style. In the context of thirty-five European countries, there is an opinion that the realities of self-employment are revealed against the erroneous perception of employees. In cluster #8, Lemmon et al. (2016) investigate the work performance of independent contractors with psychological contracting, distributive justice, and negotiation behavior in the gig economy phenomenon. It reveals the source and mutual influence of the employee-employer relationship of the psychological contract theory and reveals the key role of negotiation in the independent contractor's performance of the psychological contract. Yuan et al. (2019) on theme #9; He is researching the unemployment and health insurance system for the constantly changing employment relations in the country China. According to the study, the necessity of adapting the health insurance system according to the working style emerges.

When the gig economy is examined in general, it is seen that Industry 4.0 and Society 5.0 phenomena, which form the basis of the concept, contain multidimensional

concepts that cover all segments of society as a result of technological transformations (Robla-Gomez et al., 2017; Yang et al., 2019; Wang et al., 2016). It is usual for the gig economy studies, which are the subset of these social transformations, to be intensively examined in the socio-economic field (820/702 studies), which is directly related to working life. It is seen that the representative documents obtained by cluster analysis are mainly handled with multidimensional concepts in the field of social sciences. As gig employees tried to adapt to the working conditions of the period so that they and their families could survive, it was inevitable to examine the phenomenon predominantly in the socio-economic field. It has been very important to describe the state of the work structure in terms of the sustainability of social welfare and peace (Lupu and Castro, 2021; Novitz, 2021), and being able to make inferences about current situations and the future will have very important results.

## Conclusion

For the concept of the gig economy with scientometric analyzes revealed on the axis of social network theory; A multidimensional holistic perspective tried to be revealed by making trend, country analysis, author, and reference analysis, keyword, and cluster analysis. Interpretations and visualizations of actors and relationship networks were made for the theory.

As a result of the findings, It is seen that the first study on the gig economy was in 2014, but there was no rapid increase in numbers until 2017. After 2017, the trend increased rapidly, and the number of studies and citations reached the highest level in 2021-22. While many factors can show the increase in the counted years, it claims that some of the biggest factors are the result of Uberization and the Covid-19 pandemic (Fleming, 2017; Spurk and Straub, 2020; Harpur and Blanck, 2020; Stephany et al., 2020). According to the findings of the study conducted by Glasner (2021); The countries most likely to show a positive relationship between the minimum wage and uninsured employment are those with a low labor market density and an active Uber work structure. This situation has brought with it many issues that need to be investigated. It claimed that the current debates on the gig economy are carried out in terms of worker status, social rights and responsibilities, legal protections, and organizational form (Nwafor et al., 2022; Atkinson, 2022; Chiu, 2022; Nair, 2022). It is thought that studies on the subject may increase as online business structures gain dominance in the future (Lund et al., 2020; Deloitte, 2020; Bick et al., 2021). The countries that carry out the most work in the gig economy are determined as the USA, England, and Australia, respectively. The centrality rate of the UK and the USA, that is, the level of importance in their work, is quite high compared to other countries. According to the study findings of Batmunkh et al. (2022), the countries that conduct the most research within the scope of the gig economy are in line with our findings. It is the countries with the highest centrality level are similar to the online labor force index data. The iLabour Project data

(2022) is analyzed, the USA is the first and the UK is the second in the online labor force index. In the third place, India (due to software and technological developments) has come to the fore compared to other countries. This work shows that the first ten countries expressed in the findings of our research can use the online business format more intensely when compared to other countries (Ziakis et al., 2022; Finkle and Olsen, 2019; (iLabour, 2022)). The most influential authors in the gig economy are Graham, Lehdonvirta, Gandhi and Sucahyo. It will be important for researchers who will work within the scope of the gig economy to obtain resources by considering the research areas of the authors. In the cluster/theme analysis of the keywords, the spread of the keywords for the gig economy according to time, they included in the scope of multidimensional research in various fields within the context. However, when the keywords are examined as a whole, although there is a diversity of fields, the studies mainly include it is mainly examined in the fields of labor economy and industrial relations such as employment, worker and labor, and working structure. Seven of the eleven concepts that reach the strongest citation burst points from the keywords are directly related to working life. Although it gained popularity from time to time in the eight years, studies in the field continued. Cluster analysis was performed using the CiteSpace software package algorithm and ten various themes emerged. As a result, representative documents were obtained and the most comprehensive representative documents in each different theme were analyzed in the finding phase. Individuals need to adapt to the working conditions of each period to sustain their lives. According to the results of the analysis of the representative documents, the gig economy, which is a subset of Industry 4.0 and Society 5.0 phenomena, is aimed at working life; It is seen that subjects such as working conditions, industrial relations, psychological consequences, employee rights and responsibilities are mainly studied in the socio-economic context. Considering that the online business structure will gain more intensity in the future, it is thought that the importance of gig economy research will increase and studies in different dimensions can be carried out cumulatively. The density is related to the multidimensional sub-branches in the field of social sciences. Although the concepts such as social rights, taxation, ethics, and welfare assurance are not yet at the desired research level, they are among the important issues for working life and it is important to emphasize this deficiency for future studies (Batmunkh et al., 2022). As a matter of fact, according to the results of the study conducted by Abraham et al. (2021), the need for information was shared to determine the situation regarding the rise of self-employment, the gig economy in self-employment, and the impact on gig workers. This information need is based on tax data and self-employment annual socio-economic data. Current deficiencies in the gig economy are important for revealing the research that needs to be studied. Being able to adapt to the gig economy as a necessity of the current working style will be important for the sustainability of social peace and welfare (Larsson

and Teigland, 2020). As a result of its direct interest in working life, it may be important to work in the journals included in the scope of labor economics and industrial relations in order to fill the research gaps. The fact that the subject is carried out intensively with studies originating in labor economics and industrial relations is the result of the fact that the concept takes place in a socio-economic field. Considering that the phenomenon is new in a global sense and will cover all societies in the future, we provide a multidimensional and holistic perspective on the subject and become a guideline and a resource for future studies.

### Extended Abstract

After the 1980s, when globalization gained momentum, the popularity of access to computing networks increased. Instant access to information, money, culture, and trade has begun. Technology-intensive transformations have been experienced in all segments of society. Technological transformations have also emerged as a factor in the labor market, which is the means of sustaining the lives of society and the individuals in which it is located. It has been inevitable to adapt to the digital working order for the continuity of a sustainable society in prosperity and peace. In this context, an increase has been observed in the literature on this subject, especially after the 1980s. As a result of these trends, research on digital working order has been carried out in various fields. The fact that the subject is of such high importance has played a resource role in revealing a holistic perspective of the studies on the subject.

With the evolution of the intensive working life of the industrial sector towards the service sector, digital business structures based on the internet have become inevitable. Internet-based business platforms, especially the concept of the gig economy emerge as a combination of temporary, internet-based, on-demand work factors. The concept of the gig economy has gained importance with the inclusion of the working structure within the socially trending factors (internet networks, digital business structure) so that individuals can maintain their lives in a chaotic environment with the 2008 world global crisis. With the facts of Industry 4.0 and Society 5.0, artificial intelligence technologies are effective in creating an increase in the digital-intensive work environment for all segments of society, therefore the labor market. In the future, with the emergence of the Covid-19 pandemic process, individuals must go beyond their physical classical work. It has become inevitable for individuals to adapt to the working conditions of the day to increase their life and business opportunities. In this context, the concept of the gig is revealed as the definition of "temporary staging", which is used extensively in North American English, and adapted to working life. Upon request of the service, it is interpreted as a one-time, non-continuous action for the service provider.

With the digital transformation and increasing social networks, inter-individual connections are gaining momentum. In this context, social network theory is an important approach for determining and interpreting the

connections between individuals. Discovering and sharing information with social network theory plays a role in the transmission of information through social relations and communication through platforms. Interpretation of social networks is an important step, especially as a result of the scientometric research technique. For this reason, it is very important to determine the relationship networks of the actors in the social networks in the literature on the gig economy and to make comments on the connections.

The most important resource for determining the research method is to determine the interest. The source of interest in the research is the hermonitic approach. Data were evaluated by using qualitative research methods within the framework of post-modern/anti-positivist scientific understanding. In the light of quantitative data, the interpretation of qualitative data was made. Through the philosophy of idealism (sub-paradigm interpretive approach), the situation of the individual/ institution/ country is interpreted by obtaining facts through the minds of these actors. Ultimately, all concepts are aimed at obtaining findings as a result of individuals' minds and perspectives. It is seen that certain criteria come to the fore in the context of the axiology of the research. First of all, international literature on the subject was searched within the Web of Science (WOS) database and bibliographic comprehensive data on the phenomenon of the gig economy were revealed. Gig economy data based on bibliographic studies were included in only four studies and it was seen that especially one of them was directly in this context. In addition, there has not been any study that obtained findings on the gig economy using the CiteSpace software package. The research is very important in terms of the fact that there are almost no current scientometric studies, the necessity of following the literature constantly and it can be a source for future scientific research.

It is very valuable in the process of determining the problem of the research, analyzing it, and creating a source for the literature. The research aims to be a resource guide for future studies on the gig economy. It is aimed to reveal analyzes of social actors that are influential in the gig economy. Research questions on this; It aims to determine the trends of literature research on the gig economy, to reveal the relations networks and country analyses between the countries of the authors who make up the source in the literature, to interpret the contribution of productive authors to the field, to interpret the contribution of the keywords to the field with bursting points and theme analyzes.

Research data were obtained from the Web of Science (WOS), one of the most important and influential literature databases globally. It is an effective channel for accessing and interpreting high-confidence data for bibliometric studies. As well as being the world's oldest database, it includes nearly 20 thousand quality journals and approximately 1.5 billion citations. It also works very well with the CiteSpace software package. Since CiteSpace is a tool that contains fewer errors and missing codes than other software packages and increases the reliability of the research, this situation has been a factor in the research

selection. In the research, the purpose-oriented data is interpreted in order to continue the in-depth research by using the criterion sample. All data within the gig economy in the WOS literature channel are included in the research. Within the scope of the gig economy, filtering of title, abstract, author, keywords, and keyword phrases was made. Approximately 80 percent of 820 studies are articles. Apart from this, many species have been included in the scope of the subject.

In the end, 732 of 820 studies were read in full and it was seen that 90 percent of them were included in the research. It is seen that the first study within the scope of the gig economy was in 2014 and the first citation started in 2016. With the increasing importance of Freelancer.com and Uber companies in the following process, it is observed that there has been a sharp increase in the research trend in 2017 and beyond. It is observed that the majority of the break between 2015-2017 is related to the labor market and working conditions, especially with the spread of the gig economy phenomenon in the job markets. With the increase of the Covid-19 pandemic in the period after 2018, it is seen that research trends within the scope of the gig economy have also increased. The increase in the number of online jobs and workers brings with it an increased interest in the gig economy.

When the origin countries of the gig economy research are examined, it is seen that 58 different countries are in a network of approximately three times. It is seen that the most prominent among the countries in the USA. Looking at the bursting point, it is seen that country studies are the most trending and research permanence is the highest when looking at the half-life. The USA is the country that has the first publication and carries the title of the most important country within the scope of the subject. It is seen that US studies are mostly within the scope of career and entrepreneurship. In England, which is the second country with the most publications, studies were carried out mainly within the scope of management and organization. It is seen that the research originating from Australia are directed toward industrial relations. It is common to see that these countries have a low rate of dependent employment and an intense online working structure.

It is observed that there are 225 different authors within the scope of authors and that the authors mainly experienced an increase in trend in 2019. It is seen authors such as Graham, Lehdonvirta, and Gandhi have done the most research and signed the most permanent studies through the half-life. As a common point of these authors, it is observed that they have structures based on labor relations and working conditions in the gig economy.

In the keyword analysis, it is seen that there are 329 different keywords and approximately 5 times as many relationship networks. It is seen that there has been an increase in the number of keywords and relationship networks after 2018. It is seen that the most used keyword is the gig economy in the usual way. It is seen that the words worker, job, sharing economy and employment are used predominantly. These keywords show us that they are directly addressed within the scope of the labor economy.

It has been observed that keyword trends increased sharply in 2017 and continued until 2022. The strongest trending keywords are concepts such as sharing economy, unity, digital worker, internet. The highest trend was toward risk and insecurity. Including gig workers in one-off and precarious jobs and placing them in individual worker status resulted in their inability to benefit from economic, social, and health insurance. This situation reveals the necessity of investigating a socio-political problem. In the final sense, it has been observed that the keywords are mostly related to labor economics, industrial relations, labor relations and working conditions, and it has been observed that as the importance of the subject increases, because of not eliminating the socio-political problem, there will be an increase in the tendency to insecurity.

When the theme/cluster analysis of the keywords for the gig economy is performed, effective and important cluster values have emerged. In total, ten different clusters were obtained, and the first three contained a fairly similar number of studies. It has been observed that the most effective cluster is based on internet technologies, and it has been observed that it forms the infrastructure of the gig economy. The second most effective cluster included insecurity, collective action, political developments, and confirmed the insecurity problem for the gig economy. The third most effective cluster, it is aimed at digital-based workforce platforms that reveal the connection between work and worker, such as platform economy and the sharing economy. Other themes all cover socio-economic-based research areas such as management and organization, digital labor platform, work context, consumer behavior, social support, young workers, dependent self-employment, neo-liberal labor market, unemployment, and health insurance issues. When the representative document for cluster analyzes are considered as a whole, it is seen that the field of labor economy is mainly addressed, although research are carried out in multi-dimensional areas for the labor market within technological transformations. It is a fact that the problems of working life in the socio-economic structure appear as a socio-political problem. In this context, in terms of the sustainability of social welfare and peace, it is important to show a tendency to the problems experienced in working relations as a result of the freedom to work, which is one of the life needs of individuals and their families. It is thought that the importance of the subject will increase gradually when the scope of the gig economy is seen to be newly developed and has a promising structure.

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