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GIG ECONOMY AND SUSTAINABLE DEVELOPMENT: BIBLIOMETRIC ANALYSIS AND IDENTIFICATION OF FUTURE RESEARCH DIRECTIONS

Łukasz Jarosław KOZAR[1*], Szymon BOLIMOWSKI[2]

[1] University of Lodz, Faculty of Economics and Sociology; lukasz.kozar@uni.lodz.pl, ORCID: 0000-0002-8426-8471
[2] Graduate of the University of Lodz; s.bolimowski@wp.pl, ORCID: 0009-0007-7834-2149
* Correspondence author

Purpose: The aim of this article is to identify the most common fields of study undertaken by researchers in scientific papers covering simultaneously the gig economy and sustainable development.
Design/methodology/approach: The research study used a structured literature review method. The structured bibliometric query Q1 allowed for the exploration of the Scopus database. As a result, 48 scientific studies from the period 2017-2023 were selected for analysis, which simultaneously addressed the issues of the gig economy and sustainable development.
Findings: The analyses carried out showed that the issue of sustainable development is addressed in the context of the gig economy. This is a relatively new research area, as shown, for example, by the generated database of studies used for the bibliometric analyses conducted. The issues of sharing economy and decent work are important areas addressed in the context of the gig economy. It was noticed that there was a lack of author keywords covering 'green' issues.
Research limitations/implications: Research results based on other databases (e.g. Web of Science) may lead to different results. It should be noted that the different bibliometric databases do not overlap, which is related to the indexing of scientific journals or publications in the databases. Nonetheless, a universal query was used in the study, which can be used in the various bibliometric databases once it has been adapted to their respective query form. In addition, the various databases are constantly being supplemented with new scientific papers, which also depends on the publishing process. Hence, the content of the Q1 query can in future be used for comparison purposes with the results obtained, or to compare different bibliometric databases with each other.
Originality/value: In the discussion that followed, attention was drawn to the issues of green jobs and green self-employment. In the authors' opinion, such research directions, although not yet visible in the authors' keywords, will be developed soon in the context of studies covering the issues of the gig economy and sustainable development considering the green transformation of the economy taking place. This article is addressed to all those who are interested in the issues of the gig economy and sustainable development.
Keywords: gig economy, green jobs, green labor market, green self-employment, sustainable development.
Category of the paper: Literature review.

1. Introduction

The dynamics of changes in the field of socio-economic reality that have been taking place in recent years is recognized by numerous researchers in their scientific reflections (e.g. Kozar, 2019; Kulkova, 2021; Wood et al., 2023; Wright et al., 2017). These changes are the result of, among other things, the development of technology and increasing digitization in almost every sphere of socio-economic life (e.g. Carby-Hall, Méndez, 2020; Van Rensburg et al., 2019). One can observe, for example, the rise of artificial intelligence in many areas of the economy (e.g. Bickley et al., 2022; Makridis, Mishra, 2022), or the implementation of blockchain technology to improve different logistics processes (Raja Santhi, Muthuswamy, 2022; Wodnicka, 2019). The gradual transition of numerous countries to the path of sustainable development also has a not insignificant impact on the dynamics of the introduced solutions, in the opinion of the authors of this article. As a result, scholarly considerations are increasingly paying attention not only to the issue of the changing labor market (Westerveld, 2019), but also to the issue of shifting working conditions (Pichault, McKeown, 2019). It can be seen, for example, that with the development of technology and increased accessibility to the Internet, new models of employment are emerging (Cornelissen, Cholakova, 2021; Murdoch et al., 2021). Hence, given the issues outlined above, it is important to note that the discussion of the future of work is increasingly being addressed by researchers in the literature (e.g. Aroles et al., 2019; Borzaga et al., 2019; Wood, Lehdonvirta, 2023). Within the scope of this discussion, the issue of the gig economy has an important place (e.g. Graham et al., 2017; Mieruch, McFarlane, 2023; Shrivastava, Roy, 2020; Stewart, Stanford, 2017).

The gig economy is characterized by flexible and independent workers (Duggan et al., 2022; Kost et al., 2020; Mbali, Anyikwa, 2022), who often perform short-term projects or offer services on online platforms. The work provided in the gig economy can generally be divided into three key categories, namely on-demand work within apps (e.g. Dukes, 2022; Kaine, Josserand, 2019; Mehta, 2023), crowdwork (e.g. Connelly et al., 2021; Di Gangi et al., 2023; Shafiei Gol et al., 2019), and work related to operating resources for short-term rental (e.g. Huang et al., 2021; Monahan, 2021). It should also be noted that some researchers indicate that the development of the gig economy can support the transition to a low-carbon society (Liu et al., 2023). Thus, the gig economy, in the opinion of the authors of this article, can support the implementation of sustainable development into economic practice. Consequently, it can also contribute to the green transformation of the economy.

In terms of the gig economy, whether it is coupled with sustainable development, there is a shift away from classic models of work. We are then specifically talking about the provision of work and services or business through online platforms (e.g. Hagiu, Wright, 2019; Kässi, Lehdonvirta, 2018; Koutsimpogiorgos et al., 2020), remote work (e.g. Rochadiat et al., 2020; Tyutyuryukov, Guseva, 2021) and cloud working (e.g. Ruggieri et al., 2016; Tucker, 2020),

collaborative employment (Arriagada et al., 2023), algorithmic work (e.g. Altenried, 2021; Bucher et al., 2021; Wood et al., 2019) and work automation (e.g. Jarrahi et al., 2021; Nguyen, 2018). Given the multiplicity of issues related to work in the gig economy identified above, it can be pointed out that the further development of the gig economy challenges traditional labor market structures and requires the adaptation of laws and policies to both protect and better meet the needs of those working in this area. Hence the perceived calls for the creation of a new definition of a self-employed but economically dependent person (e.g. Gospodarek, 2019; Musiała, 2014; Santagata de Castro, 2019), or a worker subordinated to platforms (e.g. Kobroń-Gąsiorowska, 2023; Świątkowski, 2020).

The aim of the article is to identify the most common research areas undertaken by researchers in scientific papers simultaneously covering the gig economy and sustainable development. To achieve such a goal, the Scopus database was explored. To enable comparison of the obtained research results with other bibliometric studies, a structured literature review (SLR) method was adopted. This method, thanks to the use of a query (Q1), makes it possible to conduct an identical study in the future for comparative purposes (to identify the changes taking place in the research area undertaken). Bibliometric analyses were performed using the VOSviewer software (version 1.6.20). In addition to the SLR method, the study also used the classical literature review (CLR) method, which also allowed us to deepen the description of the results obtained and to conduct a discussion around the future directions of research relating to the issue of the gig economy around the issue of sustainable development.

In this article, four interrelated sections are distinguished. The introduction points out the timeliness and complexity of the research issue undertaken. This section of the article also outlines the purpose of the research, presents the basic research assumptions along with an indication of the base explored and the research methods adopted. The second section was directed at exploring the methodology. Here, among other things, the constructed Q1 question is presented, and attention is paid to the various research activities. In turn, the penultimate section presents the results of the bibliometric analyses undertaken. The section also includes a discussion and identifies future directions for gig economy research around the issue of sustainable development. The final section summarizes the analyses undertaken.

2. Research methodology

The study conducted was divided into three key research stages (stage I - conceptualization of the research, stage II - extraction of data from the analyzed database, stage III - analysis of the obtained results). At each stage, strictly defined research activities were carried out (Figure 1), which, implemented step by step, led to the realization of the set research aim.

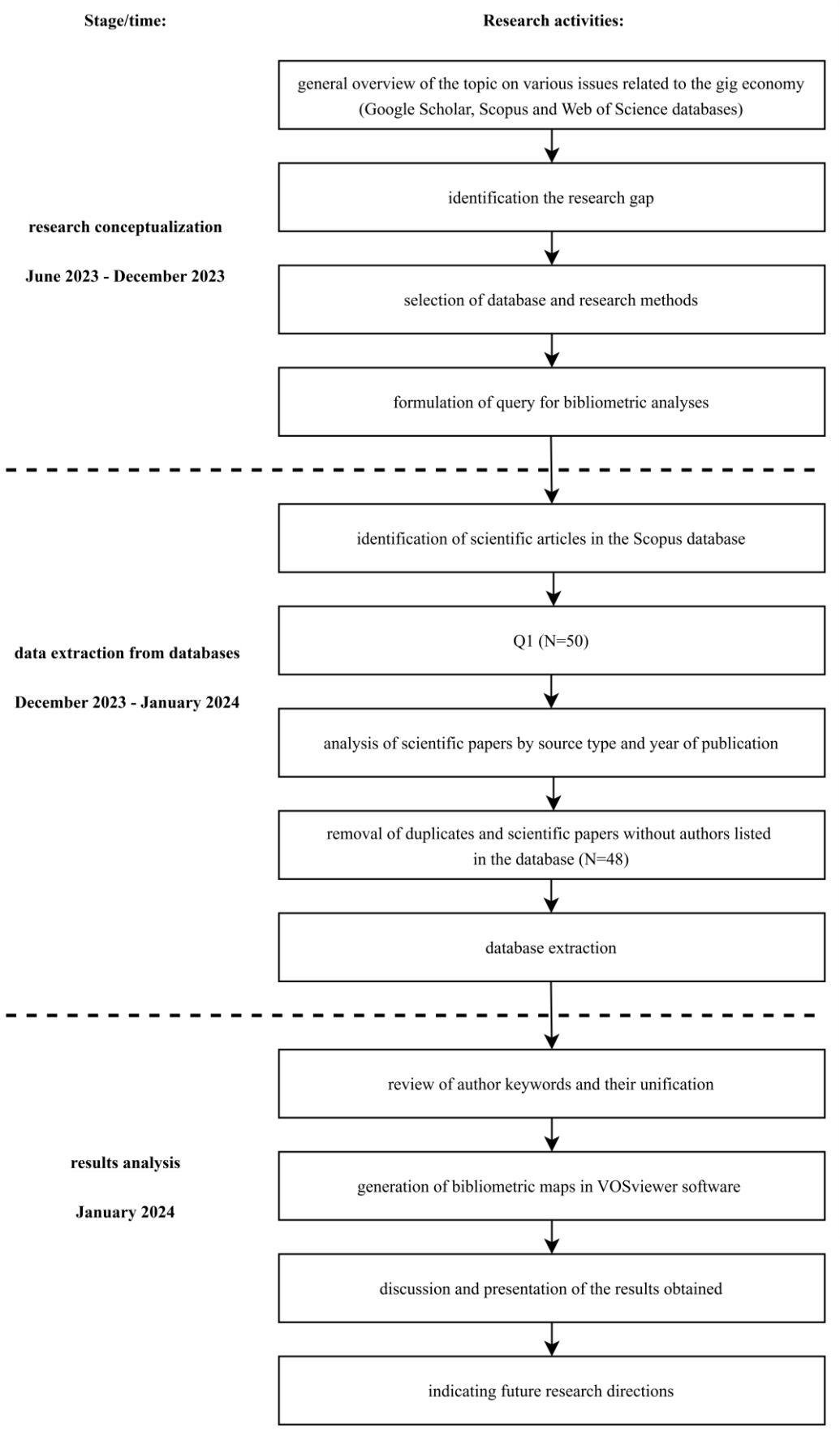

Figure 1. Research procedure stages and timeline.

Source: Authors' elaboration.

The research conceptualization stage began with a general review of scientific publications for gig economy issues. The review was conducted using Google Scholar and two bibliometric databases (Scopus and Web of Science databases). Based on the review, a research gap was recognized in the form of analyses in the gig economy and sustainable development. The research objective was then formulated. At this stage of the research, an appropriate quality database and research methods were also selected, which would identify the most common research areas undertaken by researchers in scientific papers covering both the gig economy and sustainable development. As a result, the Scopus database was selected.

The main rationale underlying the choice of the Scopus database was the fact that this database is considered by the scientific community to be a high-quality source of information (Baas et al., 2020). The indicated opinion is due, among other things, to the procedure for indexing scientific journals in this database after first meeting strict scientific standards. The Scopus database is characterized by international coverage and allows searching for information based on defined bibliometric queries. Moreover, it should be noted that the Scopus database has already been used for various types of bibliometric research in the area of the gig economy (e.g. Batmunkh et al., 2022; Guduru et al., 2023; Silva, Moreira, 2022). Due to the choice of SLR as a research method, a Q1 research query was constructed to explore the Scopus database (Table 1).

Table 1.
Search queries syntax details

Database	Symbol	Query syntax	No. results
Scopus	Q1	TITLE-ABS-KEY ("gig econom*" AND ("sustainable development" OR sustainability)) AND PUBYEAR > 2016 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (PUBSTAGE, "final"))	50

Source: Authors' elaboration.

Based on the Q1 query, the second stage of the research involved the extraction of extracted data from the Scopus database. For this purpose, the titles, abstracts, and keywords of scientific papers available in the Scopus database were searched. Since the third stage of the research will involve bibliometric analysis considering the author's keywords using the VOSviewer software, it was assumed that only scientific papers written in English would be selected. Considering good practice in this type of analysis, the year in which the analysis is carried out was not included, so 2024 was omitted from the query. The query to the Scopus database initially selected 50 different scientific papers for further analysis (Table 2). At the next step of the analysis, those publications that did not have an assigned author were removed from the selected publications. This process contributed to the extraction of the final database of 48 scientific publications for further analysis related to the set research goal (date of extraction of the database 18.01.2024).

Table 2.
Scientific papers identified for research in Q1 query by source type and year of publication

Type of scientific paper source	Head in uppercase letters							
	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Total**
Article	2	0	3	4	7	7	5	28
Conference paper	0	2	0	1	1	2	2	8
Book chapter	0	0	0	0	2	4	1	7
Book	0	0	1	0	2	2	0	5
Conference review	0	0	0	1	0	1	0	2
Total	2	2	4	6	12	16	8	50

Source: Authors' elaboration based on the Scopus database.

The final stage of the research presented in Figure 1 was based on the CLR method and bibliometric analysis using the VOSviewer software. Based on the review of the selected scientific studies, the obtained results of the undertaken considerations in the field of gig economy issues raised in the field of sustainability issues were presented, the discussion was carried out and conclusions were made.

3. Results and discussion

In terms of the 48 scientific publications analyzed, 221 author keywords were found to be assigned. The indicated set of authorial keywords was subjected to a standardization procedure, which aimed to standardize them in terms of the form of writing (e.g., due to differences in the linguistic notation of the same words - American English, British English, the use of singular or plural for a given word, or the use of various types of authorship abbreviations). The result was the substitution of three keywords (gig-economy for gig economy, smart cities for smart city, and 'gig' economy for gig economy), which also contributed to the final selection of 218 unique original author keywords for analysis. The minimum number of co-occurrences of a keyword accepted for research was two. Of the selected unique author keywords participating in the analyses, 17 met the indicated research threshold. In terms of such a score, two author keywords relating to the name of the country (Malaysia) and the research method used (bibliometric analysis) were excluded from further analysis. Hence, in the next stage of the research, based on the remaining 15 author keywords in a VOSviewer software, a visualization of their network of links was generated (Figure 2). The result was a bibliometric map of links consisting of four clusters representing the most frequently cited issues related to the gig economy based on original author keywords. The resulting visualization shows author keywords in the form of nodes. Between the nodes are lines representing the connections between each author keywords. The most frequent author keywords in the analyzed articles are distinguished on the bibliometric map by the size of the node.

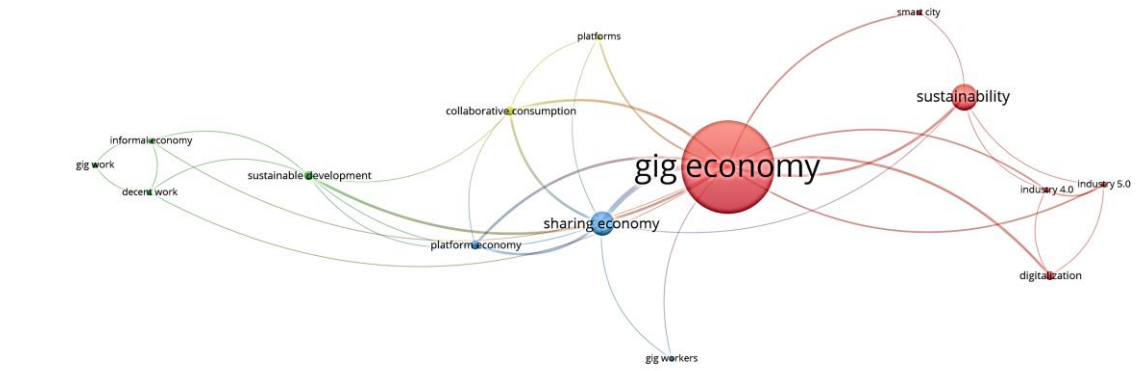

Figure 2. Bibliometric map of co-occurrence results of author's keywords based on the generated database for bibliometric analysis.

Source: Author's elaboration in VOSviewer software (version 1.6.20).

The construction of each of the four clusters is further presented in Table 3, where the color of a given cluster and the author keywords included in its scope are shown. The VOSviewer software assigned a given author keyword to only one cluster. The order of the listed author keywords in Table 3 is due to their alphabetical order. The number of co-occurrences (O) indicated in parentheses in Table 3 denotes the number of scientific papers (out of the 48 analyzed) in which a given word appeared as an author keyword. On the other hand, the number of links (L) indicates how many authorial keywords the analyzed keyword links to in the generated bibliometric map.

Table 3.
Keyword co-occurrence clusters presented in Figure 2

Cluster	Color	Keywords
1	red	digitalization (O = 3, L = 3); gig economy (O = 31, L = 13); industry 4.0 (O = 2, L = 4); industry 5.0 (O = 2, L = 4); smart city (O = 2, L = 2); sustainability (O = 9, L = 5)
2	green	decent work (O = 2, L = 4); gig work (O = 2, L = 2); informal economy (O = 2, L = 4); sustainable development (O = 3, L = 6)
3	blue	gig workers (O = 2, L = 2); platform economy (O = 3, L = 4); sharing economy (O = 8, L = 7)
4	yellow	collaborative consumption (O = 3, L = 5); platforms (O = 2, L = 3)

O - number of co-occurrences, L - number of links.

Source: Authors' elaboration in VOSviewer software (version 1.6.20).

The information presented in Table 3 indicates a variety of issues that have been raised by researchers in at least two different scientific papers, both of which referred to the gig economy and sustainable development. It is important to note that the issue of the role and importance of digitization for the gig economy is raised here in different contexts. For example, it should be emphasized here that the relationship between digitization, the gig economy and low-carbon development is discussed (Liu et al., 2023). Also noticeable are references to the issues of

industry 4.0 and industry 5.0 (Rahman et al., 2020). Although Rahman et al. (2019) highlights the changes taking place in business organizations in terms of moving away from the traditional reliance entirely on full-time employees. These changes can be observed in business organizations moving toward the gig economy and industry 5.0 (Rahman et al., 2019). The issue of the gig economy in the context of sustainability is also discussed when researchers explore the smart city issue (Bates et al., 2018; Khamis, 2021).

According to the authors of this article, a very important observed research area is the issue of decent work. In this area, scientific inquiries aimed at analyzing the potential of the gig economy for the creation of decent work are discernible (Cieslik et al., 2022), or the issue of decent working conditions for non-standard workers is raised (Loganathan, 2022). It should be emphasized at this point that one of the extremely important elements determining decent work and raised by researchers is the issue of decent working time (Rodrigues et al., 2021).

In addition to the issue of decent work, the literature also recognizes other issues related to gig workers. One of the issues raised is the lack of adequate legal protection for those who take up employment in this way. Hence, a kind of challenge in view of the development of the gig economy is the need to ensure the protection of gig workers' rights in the long term (Ahsan, 2020). This is very important, as many unethical practices are observed in the gig labor field (Kapoor, Agarwal, 2022). As the authors of this article recognize, unethical practices in the gig economy area are due, among other things, to the fact that this area of the economy is growing rapidly, while quite often there is a lack of adequate legal regulations to protect gig workers.

Also observed are references to the gig economy when discussing issues of collaborative consumption (Klarin, Suseno, 2021; Kozlenkova et al., 2021; Qureshi et al., 2021) and the sharing economy (Ahsan, 2020; Davies et al., 2017; Hart, Pomponi, 2021). The indicated issues are sometimes discussed simultaneously in the same scientific studies (Aditi, Bharti, 2021). According to the authors of the article, in the coming years, due to the growth of interest from researchers in the issues of the gig economy and the sharing economy, more studies combining the indicated research areas should be expected. In addition, considering the issue of sustainable development, discussions of issues related to various green research threads may also appear in such analyses in the future. Within the scope of the analyses carried out, a bibliometric map was also generated to indicate the changes occurring in the scope of the discussed issues over time (Figure 3).

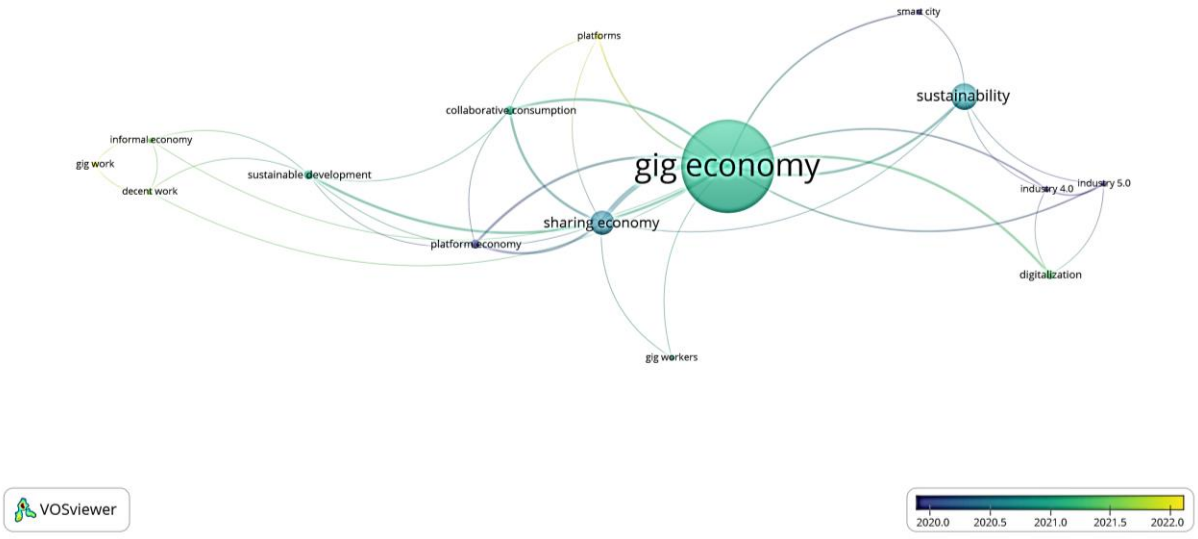

Figure 3. Overlay Visualization of co-occurrence results of author's keywords based on the generated database for bibliometric analysis.

Source: Author's elaboration in VOSviewer software (version 1.6.20).

The analyses carried out, illustrated in Figure 3, indicate the change over time of areas of interest on the part of researchers associated with the issue of the gig economy (the brighter the color, the more current the issue is in scientific inquiry). Nevertheless, at the same time it should be emphasized that the analyzed area is a new research thread that is still developing. The range of issues currently being addressed includes, among others, the already mentioned and discussed issues such as gig workers, gig work, or decent work. Nevertheless, these areas, in the opinion of the authors of this article in the context of sustainable development, and especially in the context of the issue of the economy undergoing a green transformation, still represent an unexplored research gap. There is a lack of research on the impact of gig economy development on the creation of green jobs, or on the development of green self-employment. It should be noted here that issues related to green jobs (Kavuş et al., 2023; Kozar, Sulich, 2023a; Tănasie et al., 2022) and green self-employment (Kozar, 2023; Kozar, Sulich, 2023b) are already a field of scientific consideration in various areas of the economy. So, a fundamental field of future scientific consideration addressed in scientific studies should be whether the development of the gig economy is conducive to the development of a green labor market. In addition, one of the future areas should be an attempt to define when and if gig workers can be called green gig workers at all. Perhaps in time, a model of the green gig economy, along with its key features, will be equally identified by researchers of the subject.

4. Summary

The analyses presented here showed the diversity of issues raised around the gig economy in scientific studies, where at the same time the issue of sustainable development is raised, which poses a significant challenge for researchers of the subject. It should be noted that the gig economy, along with the development of technology and increasing digitalization, is constantly evolving. Hence, it is necessary to see the need to develop appropriate mechanisms in individual countries, aimed at monitoring the development of the gig economy and emerging new solutions in this area, to be able to make appropriate legal changes, so that those who provide services in this way remain under adequate legal protection. Thus, the emergence of work based on online platforms, as part of the broader phenomenon known as the gig economy, poses a serious challenge to labor law regulations in individual countries, calling into question their validity. This aspect will increasingly be highlighted when discussing various issues related to gig economy labor issues (e.g., the issue of decent work), and especially when comparing good practices across countries.

In the analyses undertaken, it was not observed that the authors of the various scientific papers emphasized green research areas through keywords. Nevertheless, the development in this direction of the issue of the gig economy in the context of sustainable development in the opinion of the authors of this article is inevitable. Hence, given the specifics of the gig economy, it would be appropriate to start a discussion in the literature of who is a green self-employed but economically dependent person, or what characteristics a green worker subordinated to platforms should have. Research directed in such a direction would certainly allow for a much better indication of the role and importance of the gig economy in a sustainable development-oriented economy and would at the same time contribute to the development of research around the concept of a green labor market.

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