

**TRANSITION FROM INSTITUTIONAL PARADIGMS TO SUSTAINABILITY: A
BIBLIOMETRIC REVIEW OF SCIENTIFIC PRODUCTION**

**TRANSIÇÃO DE PARADIGMAS INSTITUCIONAIS PARA A
SUSTENTABILIDADE: UMA REVISÃO BIBLIOMÉTRICA DA PRODUÇÃO
CIENTÍFICA**

**TRANSICIÓN DE PARADIGMAS INSTITUCIONALES A LA SOSTENIBILIDAD:
UNA REVISIÓN BIBLIOMÉTRICA DE LA PRODUCCIÓN CIENTÍFICA**



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ABSTRACT

This research aims to conduct a bibliometric mapping of institutional change related to sustainability. To this end, a search was carried out in the Scopus, SciELO, and Web of Science databases using the keywords "institutional change and energy and environmental science." The search was limited to scientific journals from the last five years. The objective

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was to perform a bibliometric mapping on the topic of institutional change and sustainability, and to analyze the performance of the bibliometric results, considering several aspects. The method used in the research was descriptive, which aims to transcribe, describe, interpret, and explain the results obtained with the aid of bibliometric analysis. This aims to identify and analyze the profile of scientific production on a given topic, using a quantitative approach through descriptive statistics. From the point of view of bibliometric networks, it was observed, through the mapping of keywords, that the researched topic is inserted in different contexts, separated into three aspects: 1 – institutional change, 2 – institutional structure, and 3 – sustainability. All the selected articles point to institutional change as one of the mitigating actions in relation to sustainable development. This change involves the restructuring of institutions. The process is slow and gradual because there are resistance mechanisms, mainly from the economic sector, but also partly from the academic sector. Researchers argue that the Sustainable Development Goals (SDGs) have a limited and inadequate conceptualization, which hinders their practical application. Although they aim to promote sustainable patterns, the SDGs fail to provide clear targets and effective guidance for the necessary institutional changes. The authors report that a holistic view of the challenges is important and describe the blockchain-based micro-network model, proposing changes in institutions as well as in the scientific and academic environment.

Keywords: Institutional Change. Sustainability. Bibliometrics.

RESUMO

Esta pesquisa tem como objetivo realizar um mapeamento bibliométrico a respeito da mudança institucional relacionada à sustentabilidade. Para isso, foi realizada uma pesquisa nas bases de dados Scopus, Scielo e Web of Science, usando a palavra-chave “institutional change and energy and environmental science”. A pesquisa foi delimitada considerando apenas os periódicos científicos de 2018 a 2022. O objetivo foi analisar o desempenho dos resultados bibliométricos, considerando alguns aspectos. O método utilizado na pesquisa foi o descritivo, que objetiva transcrever, descrever, interpretar e explicar os resultados obtidos com o auxílio da análise bibliométrica. Esta visa identificar e analisar o perfil da produção científica de um determinado tema, fazendo-se uso da abordagem quantitativa através da estatística descritiva. Do ponto de vista das redes bibliométricas, observou-se, por meio do mapeamento das palavras-chave, que o tema pesquisado está inserido em diferentes contextos, separados em três vertentes: 1 – mudança institucional, 2 – estrutura institucional e 3 - sustentabilidade. Todos os artigos selecionados apontam a mudança institucional como uma das ações mitigadores em relação ao desenvolvimento sustentável. Essa mudança passa pela reestruturação das instituições. O processo é lento e gradual, porque existem mecanismos de resistência principalmente por parte do setor econômico, mas também em parte do setor acadêmico. Pesquisadores argumentam que os Objetivos de Desenvolvimento Sustentável (ODS) possuem uma conceituação limitada e inadequada, o que prejudica sua aplicação prática. Embora busquem promover padrões sustentáveis, os ODS falham em oferecer metas claras e orientações eficazes para as mudanças institucionais necessárias. Os autores relatam que é importante uma visão holística dos desafios e descrevem o modelo das micro redes baseado em blockchain, propondo mudanças nas instituições assim como no meio científico e acadêmico.

Palavras-chave: Mudança Institucional. Sustentabilidade. Bibliometria.

RESUMEN

Esta investigación tiene como objetivo realizar un mapeo bibliométrico del cambio institucional relacionado con la sostenibilidad. Para ello, se realizó una búsqueda en las bases de datos Scopus, SciELO y Web of Science, utilizando la palabra clave "cambio institucional y energía y ciencia ambiental". La búsqueda se limitó a revistas científicas publicadas entre 2018 y 2022. El objetivo fue analizar el desempeño de los resultados bibliométricos, considerando diversos aspectos. El método empleado fue descriptivo, con el fin de transcribir, describir, interpretar y explicar los resultados obtenidos mediante el análisis bibliométrico. Esto busca identificar y analizar el perfil de la producción científica sobre un tema determinado, utilizando un enfoque cuantitativo a través de la estadística descriptiva. Desde la perspectiva de las redes bibliométricas, se observó, mediante el mapeo de palabras clave, que el tema investigado se inserta en diferentes contextos, divididos en tres aspectos: 1) cambio institucional, 2) estructura institucional y 3) sostenibilidad. Todos los artículos seleccionados señalan el cambio institucional como una de las acciones de mitigación en relación con el desarrollo sostenible. Este cambio implica la reestructuración de las instituciones. El proceso es lento y gradual debido a la existencia de mecanismos de resistencia, principalmente del sector económico, pero también, en parte, del sector académico. Los investigadores sostienen que los Objetivos de Desarrollo Sostenible (ODS) presentan una conceptualización limitada e inadecuada, lo que dificulta su aplicación práctica. Si bien buscan promover estándares sostenibles, los ODS no ofrecen metas claras ni una guía eficaz para los cambios institucionales necesarios. Los autores señalan la importancia de una visión holística de los desafíos y describen el modelo de microred basado en blockchain, proponiendo cambios tanto en las instituciones como en el entorno científico y académico.

Palabras clave: Cambio Institucional. Sostenibilidad. Bibliometría.

1 INTRODUCTION

In 2015, the United Nations established the Sustainable Development Goals (SDGs), creating a political guide to address global socio-environmental crises. The so-called 2030 Agenda focuses on the urgent transformation of consumption and production patterns, especially in the face of a world population that is moving towards eight billion people and demands more sustainable urban solutions. However, the implementation of these changes is hampered by the rigidity of bureaucratic systems, which are not yet accustomed to adaptive and flexible management models in the face of climate variations.

A central point of sustainability is the diversification of the energy matrix. Historically based on large hydroelectric plants and biomass, renewable energy now needs to explore untapped potential and adopt alternative sources. For this transition to occur in a practical way, it is essential to have specific government regulations and incentives, responding to the exhaustion of models based on non-renewable sources.

To understand how these transformations occur, sources define institutions as enduring norms, rules, and procedures that shape social and political behavior. Some key features of these structures are:

- **Stability:** Generally, institutions do not change instantaneously; their evolution is usually **slow and gradual**.
- **Interconnection:** Changes in an institution often have repercussions on other entities and public policies.
- **Rules of the Game:** They work as the guide for the actions of individuals and organizations, and can be formal or informal.

Institutional change can be triggered by internal or external shocks. From the perspective of historical institutionalism, the "critical junctures" stand out, which are gaps in periods of crisis that allow for a lasting change in the trajectory of a policy or institution.

The article in question seeks to map the profile of scientific production on this topic in the Web of Science, Scopus and Scielo databases. The focus is to analyze how new norms and regulatory procedures are restructuring the sustainability paradigm and how the behavior of social groups can influence or even create new institutions.

2 METHODOLOGY

The method used in the research was descriptive, which aims to transcribe, describe, interpret and explain the results obtained with the help of bibliometric analysis. This aims to

identify and analyze the profile of the scientific production of a given topic, making use of the quantitative approach through descriptive statistics.

The databases used were the Web of Science, Scielo and Scopus, which are available on the journal portal Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). These databases have databases of abstracts and citations of peer-reviewed literature, including scientific journals, books, and conference proceedings, which cover topics from various areas of knowledge.

The search was carried out on 03/09/2026, covering the period from 2018 to the year 2023. This period was defined, due to the greater availability of open articles. The terms used were searched in the title, abstract, and keywords of the articles. The search was restricted to articles from open journals. The syntax of the databases was as follows: "institutional change and energy and environmental science". The main search was through the keyword "institutional change", restricting the search to the keywords: energy and environmental science".

The data related to these documents (journals, authors, references, citations, etc.) were stored in a text file for performance analysis and bibliometric mapping. The descriptive analysis and mapping were performed by the Bibliometrix software, which is part of RStudio, which is the most popular integrated development environment (IDE) for the R programming language, being widely used in data science, statistics and academic research.

The method of analysis of the empirical objects will follow three main phases organized as follows:

Preparatory phase: Cut out the theme and keyword for the research (institutional change and energy and environmental science); Search in databases (web of Science and Scopus); Export the data to the Bibliometrix application in RStudio; Generate the quantitative data tables and graphs in Bibliometrix.

Analytical phase: Review of the literature on the subject; Grouping of quantitative data in tables and graphs generated in Bibliometrix; Bibliometric analysis.

Descriptive phase: Interpretation of the results found in the Bibliometrix.

3 BIBLIOMETRIC ANALYSIS

The objective of this section is to analyze the performance of bibliometric results, considering some aspects, such as the annual scientific production, the evolution of citations, relevant sources and authors, world scientific production and the bibliometric networks that most collaborate with each other in scientific productions on the theme transition of institutional

paradigms and sustainability. Table 1 shows the main data on this survey in the period from 2018 to 2023. 298 documents were found in the databases (web of Science, scielo and scopus) with 1030 authors involved and 20,986 references.

Table 1

Summary of the survey data

Key information about the survey data	
Description	Results
Time Range	2018/2023
Sources (newspapers, books, etc.)	129
Documents	298
Annual growth rate (%)	-36,9
Average document age	2,83
Average citations per document	12,54
References	20986
Authors	1030
Most used keywords (ID)	1346
Keywords by author (DE)	1130

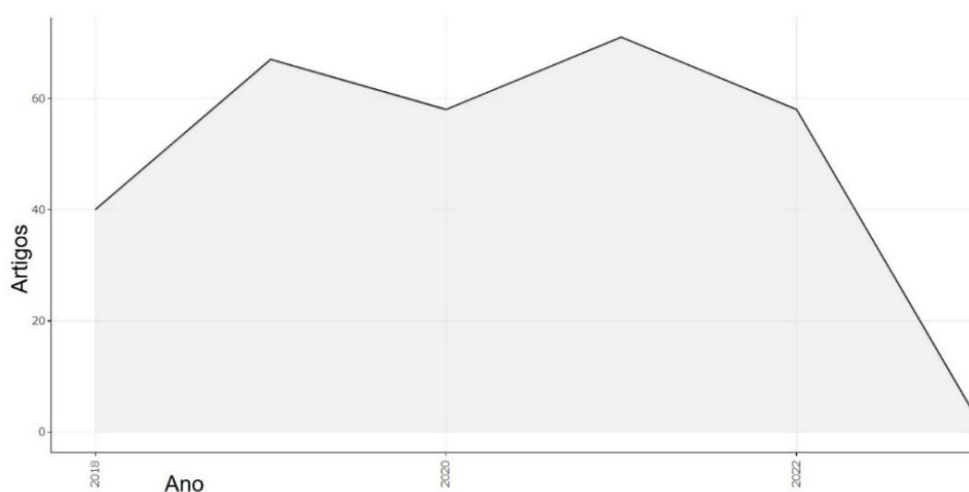
Source: Web of Science search result, Scopus, Scielo, obtained from Bibliometrix (2023)

4 ANNUAL SCIENTIFIC PRODUCTION

Figure 1 shows the evolution of the number of publications from 2018 to 2023 on the topic of transition of institutional paradigms and sustainability. It can be identified that in 2018 there are 40 articles published, with a noticeable increase in 2019 to 70 articles, almost doubling compared to the previous year. Until 2022, the situation of the average number of publications remains unchanged, but in 2023, due to being still at the beginning, the number of publications was not so expressive.

Figure 1

Annual scientific production

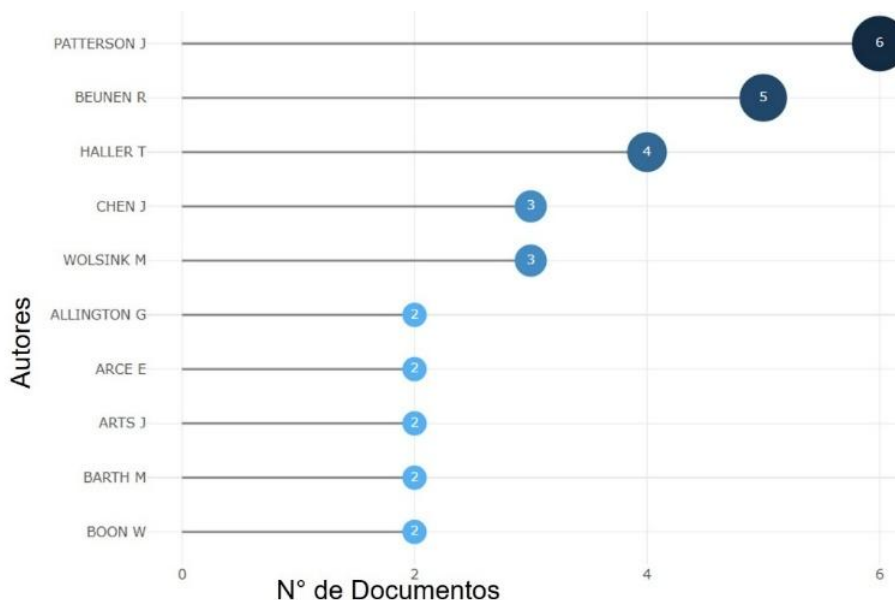


Source: Web of Science search result, Scopus, Scielo, obtained from Bibliometrix (2023)

5 MOST RELEVANT AUTHORS

Figure 2

Most relevant authors

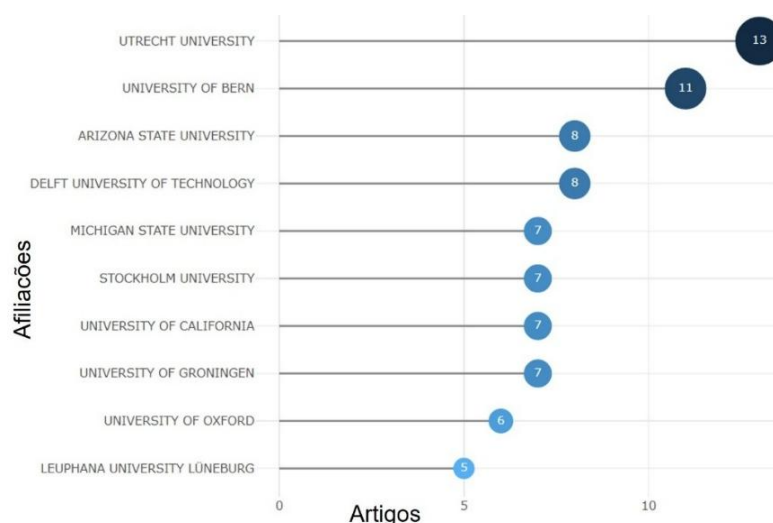


Source: Web of Science search result, Scopus, Scielo, obtained from Bibliometrix (2023)

The ten authors, who published the most on the theme of institutional change and renewable energy, can be seen in figure 2. Patterson is the most relevant with six publications. In second place, the author Beunen (2019) with 5 articles. In third place was the researcher Haller with 4 publications. Chen and Wolsink (2018) were in fourth position in publications, both with 3 articles. The others with two publications each completed the list with 2 articles each.

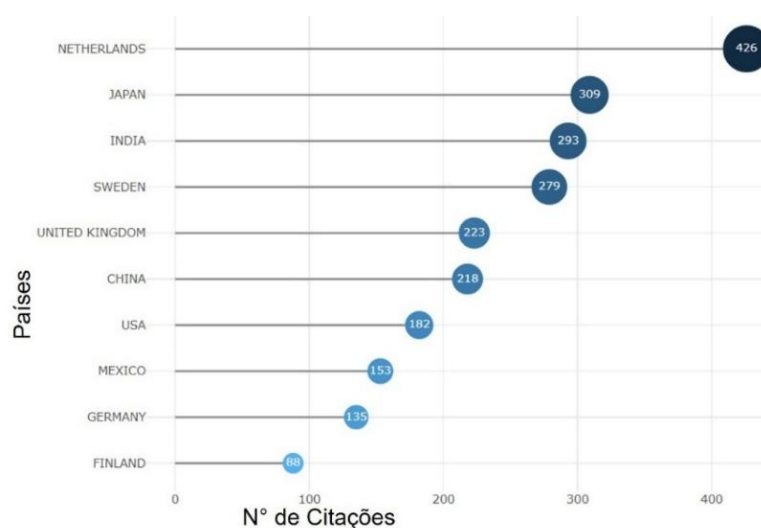
6 MOST RELEVANT AFFILIATIONS

Figure 3 shows the ten most relevant affiliations on the topic in question. Utrecht University was the most relevant with 13 articles, the University of Bern in second place with 11 publications. In third place were the universities Arizona State University and the Delft University of Technology, both with 8 publications. In fourth place with 7 articles each were the following universities: Michigan State University, Stockholm University, University of California and the University of Groningen. In fifth place was the University of Oxford, which published 6 articles. Finally, in sixth place we had Leuphana University Luneburg with 5 publications.

Figure 3*Most relevant affiliations*

Source: Web of Science search result, Scopus, Scielo, obtained from Bibliometrix (2023)

7 SCIENTIFIC PRODUCTION OF COUNTRIES

Figure 4*Most cited countries*

Source: Web of Science search result, Scopus, Scielo, obtained from Bibliometrix (2023)

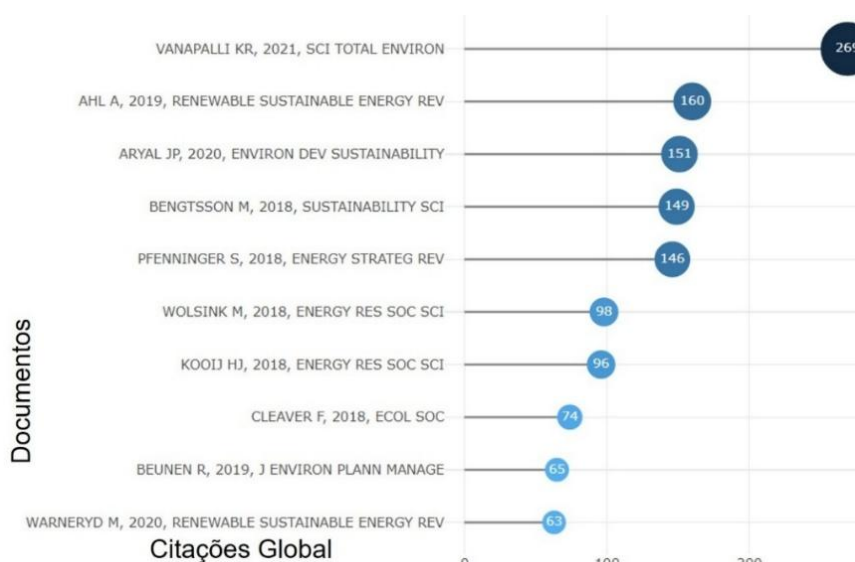
Figure 4 shows the situation of scientific production in the countries in relation to the authors who published on the subject. It is noted that there is a progressive increase, showing that the USA, the Netherlands and the United Kingdom have been standing out, closely followed by China and Germany. It is observed that the number of citations and correspondences confirm what was previously said, that is, the Netherlands with 426 citations, Japan with 309 citations and India 293, demonstrate the predominance in the scientific production on the subject studied

of the European countries, the USA and Asia, represented by Japan and China. Countries like Brazil still participate with a small scientific production, compared to the others.

8 MOST CITED DOCUMENTS GLOBALLY

Figure 5

Most cited documents globally



Source: Result of the Web of Science, Scopus, Scielo search, at Bibliometrix (2023)

Figure 5 shows the most cited documents globally. The article *Challenges and strategies for effective plastic waste management during and post COVID-19 pandemic* published by Vanapalli and other authors (2021) in the journal *Science of The Total Environment*, this was the most cited document with 209 citations. In second place is the publication: *Review of blockchain-based distributed energy: Implications for institutional development*, published by researcher Amanda Ahl together with other researchers (2017) with 160 citations, in the journal *Renewable and Sustainable Energy Reviews*. The article *Climate change and agriculture in South Asia: adaptation options in smallholder production systems* occupies the third position, participating with 151 citations. The research of the author Arial developed together with other researchers in the year 2020. The other documents participated with an average of approximately 100 citations.

9 BIBLIOMETRIC NETWORKS

Figure 6 shows the network of co-occurrence of the keywords; in it, the following are observed: the most frequent terms, with the occurrences proportional to the size of the circles and label; the associations between the words, given by the links and proximity; the groups,

the size of the circles increased, and in the quantity, in relation to the other groups. It is noteworthy that the collaboration groups do not connect with each other. This means that collaboration networks can grow even more if connections and integration increase.

10 CONTENT ANALYSIS OF THE FIVE MOST RELEVANT PUBLICATIONS

In this topic, the content of the abstracts of the five most relevant articles found in this bibliometric review was analyzed, and most of the findings identified a strong tendency to use sustainability to enhance the process of institutional change. In the samples examined, it was observed that the researchers used the bibliographic references produced over time, as well as empirical and statistical studies to support their research, which contributed to increase the confidence and security of the results presented. In these terms, with the purpose of verifying which articles published in journals aroused the interest of researchers, this research includes the five most cited articles, with their respective titles and DOI, which showed that sustainability and environmental issues are beneficial to the field related to the transition of institutional paradigms as a whole.

The first article *Challenges and strategies for effective plastic waste management during and post COVID-19 pandemic*, studies conducted by Vanapalli & Al. (2021), the researchers published on the increased complexity of plastic waste management during the COVID-19 pandemic, due to numerous aspects, either because demand has increased or because of the maintenance of hygienic care. The article demonstrates the inadequacies and inefficiencies of our current waste management system in addressing this problem, further increasing dependence on plastic and exacerbating environmental problems. Therefore, the suggestion of the research is to reduce pollution with waste management, prioritizing policies, changing social and individual behaviors through government and corporate action.

Ahl & Al. (2019) published the second article, called *Review of blockchain-based distributed energy: Implications for institutional development*, where they recognize the complexity of the energy situation, in which the distribution of its sources is essential. The aim of the paper is to holistically explore the potential challenges of blockchain-based microgrids and propose implications for the institutions involved, as well as the academic world. In this sense, the research is distributed according to the following analytical structure: 1) Technological, 2) Economic, 3) Social, 4) Environmental and 5) Institutional dimensions. Hence, gradual institutional changes that leverage regulatory and community-building sandbox approaches are proposed as potential avenues to incorporate this multidimensionality.

Aryal and Al. (2020) present in their publication *Climate change and agriculture in South Asia: adaptation options in smallholder production systems*, in the journal *Environment, Development and Sustainability*, a systematic review of the impacts of climate change on agricultural production and the main options in this sector, making them available and adapting to such changes. The research concluded that agricultural practices exist and are helping to adapt to climate change, however, the institutional configuration has not been sufficiently mature for the implementation and dissemination of technical solutions. The researchers say it is important to examine how to implement the necessary institutional change, as well as to encourage the generation of investment funds in these changes and to design policies to adapt to climate change in the long term, rather than focusing only on the technological aspect.

In the fourth article discussed, *Transforming systems of consumption and production for achieving the sustainable development goals: moving beyond efficiency*, Bengtsson & Al. (2018) analyzed the Sustainable Development Goals (SDGs), which aim to ensure sustainable consumption and production patterns. The researchers maintain that, although these goals were developed in 2015 and the scientific evidence and importance of the theme, the SDGs do not establish very clear goals or efficient guidelines regarding the operationalization of institutional changes to this agenda. They conclude that the SDGs offer a partial and inadequate conceptualization, making it difficult to implement the goals. As such, the survey offers not only analytical results, but also suggestions on how governments and other stakeholders could effectively pursue Sustainable Consumption Patterns (HCPs).

Pfenninger & Al. (2018) published in the *journal Energy Strategy Reviews* the article *Opening the black box of energy modelling: Strategies and lessons learned* about the great transition in the global energy system, in government and academic planning and decision-making. The researchers give importance to transparency and the open availability of energy models and data to the detriment of current models, which are closed. The research proposes a practical how-to guide based on the collective experience of the members of the *Open Energy Modelling Initiative (Openmod)*.

11 CONCLUSIONS

The objective of this study was to carry out a bibliometric mapping on the theme of transition of institutional paradigms and sustainability. It was observed that there are already a reasonable number of studies that study this theme, but the scientific production still shows evolutionary progress. This shows the importance of co-evolution of economic variables on the

one hand and conventional or state planning and, on the other, those of institutional change to establish a virtuous circle of development.

From the point of view of bibliometric networks, it was observed, through the mapping of keywords, that the researched theme is inserted in different contexts, separated into three strands: 1 – *institutional change*, 2 – *institutional structure* and 3 – *sustainability*.

All selected articles point to institutional change as one of the mitigating actions in relation to sustainable development. This change involves the restructuring of institutions. According to Ahl & Al. (2019), the process is slow and gradual, because there are resistance mechanisms mainly on the part of the economic sector, but also on the part of the academic sector. The authors report that a holistic view of the challenges is important and describe the blockchain-based microgrid model, proposing changes in institutions as well as in the scientific and academic environment. Another example of a model is the one proposed by researchers Cleaver & Whaley (2018), who defend adaptive governance, in which it has gained space in academic and political circles. Warneryd (2020), in his research on community microgrids, reports that formal institutions influence informal institutions, although their objectives are different.

Researchers who have examined the Sustainable Development Goals (SDGs) — focused on ensuring sustainable production and consumption patterns — point to critical flaws in their framework. According to the study, despite the relevance of the theme and the scientific basis available since 2015, the SDGs lack clear and effective guidelines to transform institutions in practice. The conclusion is that the conceptual definition of these objectives is limited and insufficient, which creates real obstacles for the goals to be successfully achieved.

Beunen & Patterson (2019) argue that there is a critical need to pay attention to the fundamentally political character of institutional work, the cumulative effects of action carried out by multiple actors, and the communicative and discursive dimensions. These researchers argue that the concept of institutional work opens up new possibilities to unravel the long-standing challenge of understanding institutional change in environmental governance.

In general, it can be said that the more developed countries are more articulated or are more visible with the institutional change linked to the environmental aspect. This is justified because publications with scientific impact are located in these countries. In countries such as Brazil, it is also expressed in the three strands mentioned above, in which the *co-occurrences* of networks on the themes and the most relevant affiliations between universities were identified, but the impact of the publications occurs in a localized way, not reaching international journals.

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