Journal of Positive Psychology & Wellbeing http://journalppw.com
2023, Vol. 7, No. 1, 1019 – 1028 ISSN 2587-0130

ANALYSIS OF THE EFFECTS OF ENERGY DEMAND ON WEATHER PATTERNS : ANALYSIS FROM WELL-BEING

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Abstract

For the development of this article, a documentary review of the elaboration and production of research works related to the study of Energy Demand and Climate Patterns was carried out at the Latin American level to know, through a bibliometric study, the main characteristics of 305 publications registered in the Scopus database during the period 2017-2021. The results obtained from this database were organized in tables and figures, categorizing the information by variables such as Year of Publication, Country of Origin and Area of Knowledge, allowing to identify the position of different authors through qualitative analysis related to the proposed topic. The main findings were that Brazil stood out for having the highest scientific production, leading the list with 136 publications. Likewise, the area of knowledge that contributed most to the construction of bibliographic material related to the study of variables was environmental sciences, with 138 documents.

Keywords: Climate Change, Energy Demand, Climate Patterns.

1. Introduction

Regardless of the area of knowledge, the study of climate change, its causes and effects have become the central axis of research and projects that seek to determine the best alternatives to mitigate the effects caused by different human activities. Agriculture, industrialization, and the invention and development of means of transportation are examples of human needs that have been satisfied while ignoring the number of greenhouse gases they emit and the irreparable damage they cause to the ecosystem. Such is the case of Energy Demand, which increases disproportionately with new technologies that require it for their operation.

Energy comes from various sources, such as oil, gas or coal, which, because they are found in limited quantities, have been called non-renewable resources. Although energy seemsarmless, "energy uses associated with fossil fuels such as electricity generation, the use of fuels in industry and transportation, is the main source of GHG emissions" (Corredor, 2018). For such reason, countries and non-governmental organizations have uncovered the urgency with which it is required to implement a new clean energy system that guarantees greater sustainability and survival of man on earth.

Generally, a pattern can be defined "as that series of constant, identifiable variables within a larger

data set" (Wikipedia, n.d.). In other words, climate patterns can be considered characteristics that define a given territory, taking into account its shape, location, and proximity to the sea, among other factors that tend to remain stable. However, these patterns have also been altered due to climate change. This is why, in this research article, we seek to describe the main characteristics of the set of publications attached to the Scopus database that is directly related to the variables mentioned above, as well as the description of the position of specific authors affiliated to institutions around the world, during the period between the years 2017 and 2021 at the Latin American level.

2. General Objective

To analyze from a bibliometric and bibliographic perspective, the development of works on the variables Energy Demand and Climate Patterns, at the Latin American level, during the period 2017-2021.

3. Methodology

This article is conducted through a mixed research approach combining quantitative and qualitative methods.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of the scientific production corresponding to the study of Energy Demand and Climate Patterns.

On the other hand, from a qualitative perspective, examples of some research papers published in the area of the study mentioned above are analyzed from a bibliographic approach that allows describing the position of different authors on the proposed topic.

It is important to note that the entire search was carried out through Scopus, establishing the parameters referenced in *Figure 1*.

3.1 Methodological design

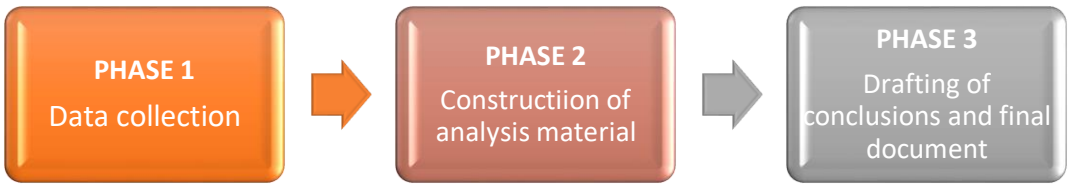

Figure 1. Methodological design

Source: Own elaboration

3.1.1 Phase 1: Data Collection

The data collection was executed from the Search tool on the Scopus web page, where 305 publications were obtained from the choice of the following filters:

the AND effects AND of AND Energy AND demand AND on AND weather AND patterns AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017)) AND (LIMIT-TO (AFFILCOUNTRY , "Brazil") OR LIMIT-TO (AFFILCOUNTRY , "Chile") OR LIMIT-TO (AFFILCOUNTRY , "Mexico") OR LIMIT-TO (AFFILCOUNTRY , "Argentina") OR LIMIT-TO (AFFILCOUNTRY , "Colombia") OR LIMIT-TO (AFFILCOUNTRY , "Ecuador") OR LIMIT-TO (AFFILCOUNTRY , "Peru") OR LIMIT-TO (AFFILCOUNTRY ,

"Costa Rica") OR LIMIT-TO (AFFILCOUNTRY , "Panama") OR LIMIT-TO (AFFILCOUNTRY , "Cuba") OR LIMIT-TO (AFFILCOUNTRY , "Bolivia") OR LIMIT-TO (AFFILCOUNTRY , "Uruguay") OR LIMIT-TO (AFFILCOUNTRY , "Venezuela"))

- ❖ Published papers whose study variables are related to the study of Energy Demand and Climate Patterns.
- ❖ Limited to the years 2017-2021.
- ❖ Limited to Latin American countries.
- ❖ Without distinction of area of knowledge.
- ❖ Without distinction of type of publication.

3.1.2 Phase 2: Construction of analysis material

The information collected in Scopus during the previous phase is organized and subsequently classified employing graphs, figures and tables as follows:

- ❖ Word Co-occurrence.
- ❖ Year of publication.
- ❖ Country of origin of the publication.
- ❖ Knowledge area.
- ❖ Type of Publication.

3.1.3 Phase 3: Drafting conclusions and final document

In this phase, the study analyzes the results previously obtained, resulting in the determination of conclusions and, consequently, the final document.

4. Results

4.1 Co-occurrence of words

Figure 2 shows the Co-occurrence of keywords found in the publications identified in the Scopus database.

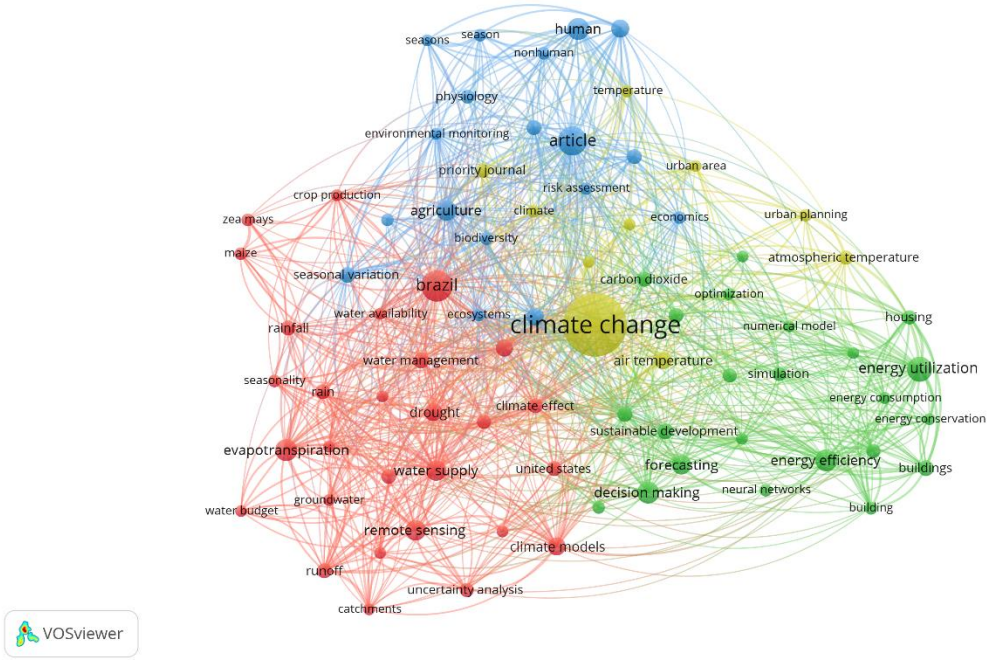

Figure 2. Co-occurrence of words

Source: Own elaboration (2022); based on data exported from Scopus.

As mentioned above, the data in Figure 2 were exported from Scopus, which shows variables and their relationship with other terms, which will be explained below.

Climate change refers to environmental modifications due to multiple human activities and some naturally occurring events. These changes can be in temperature, generating what is known as global warming, or in weather patterns. One of the practices that produce the most negative environmental effects is agriculture due to the mismanagement of the land and its resources in crop production.

Energy demand depends entirely on the use of Energy, which in excess is considered harmful to the planet, which is why we are currently looking for ways to promote energy conservation through efficient urban planning that takes into account real climate models to carry out environmentally sustainable construction and the optimization of resources.

4.2 Distribution of scientific production by year of publication

Figure 3 shows the distribution of scientific production according to the year of publication.

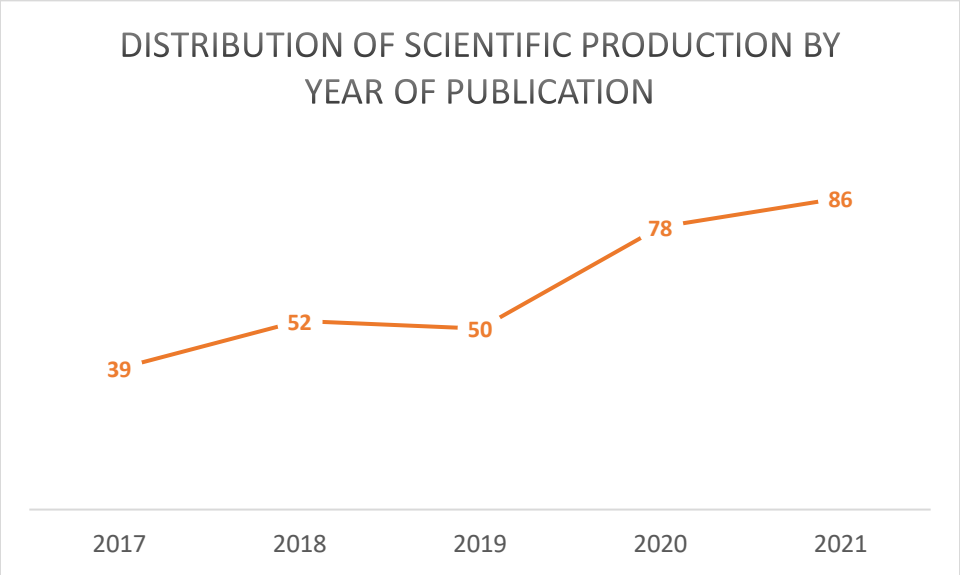

Figure 3. Distribution of scientific production by year of publication.

Source: Own elaboration (2022); based on data exported from Scopus

Figure 3 shows that the scientific production concerning the variables Energy Demand and Climate Patterns, at the Latin American level, from 2017 to 2021 resulted in the publication of 305 documents in the Scopus database containing the keywords. Likewise, throughout the period, several changes were experienced. It started with the year 2017, in which one of the lowest numbers of documents published during the period is observed, a number that increases the following year. Although 2019 shows a slight decrease in the number of texts, in the following two years, the figure increased again with the publication of 78 and 86 documents in 2020 and 2021, respectively.

In 2021, the article entitled "Dynamics of changes in climatic zones and energy demand of buildings. a case study in Spain" is highlighted (Carpio et al., 2021), in which a study is carried out based on the need to design buildings that can withstand climatic changes over time, demonstrating that "the current climatic zones of buildings in peninsular Spain do not represent the current climatic reality and are not adapted to climate change and the impact on the energy demand of buildings" (Carpio et al., 2021). For this reason, it is suggested to update the data of different climatic zones, classified by region, to consider the current reality of all the buildings constructed and those that are about to be constructed.

4.3 Distribution of scientific production by country of origin.

Figure 4 shows the distribution of scientific production according to the nationality of the authors.

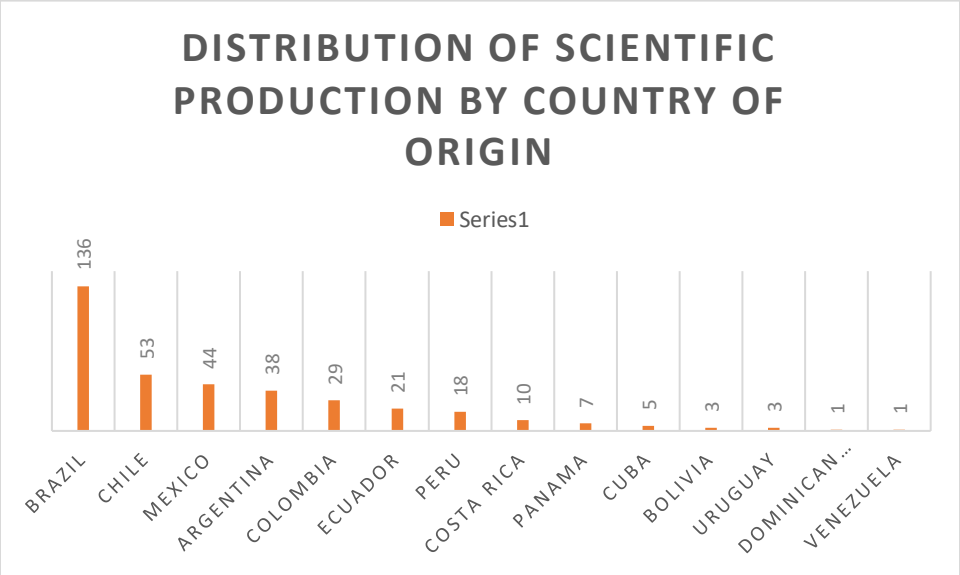

Figure 4. Distribution of scientific production by country of origin.

Source: Own elaboration (2022); based on data provided by Scopus.

In the Energy Demand and Climate Patterns study, Brazil leads the list of published papers with a total of 136 records in the Scopus database during the period of 2017-2021, followed by Chile and Mexico, with 53 and 44 texts, respectively.

The article titled "Consumption export: lifestyle migration and energy use" (Matarrita-Cascante & Winkler, 2020) seeks to demonstrate that the movement of people from a developed country to a less developed country influences the consumption habits of that territory and, therefore, can positively or negatively impact the environment. The study was conducted in Costa Rica, where data resulting from the 2011 Census was analyzed in detail "to test the relationships between lifestyle migration and consumption of energy-intensive goods using multilevel models that nest household-level consumption within communities" (Matarrita-Cascante & Winkler, 2020), proving that there is a close relationship between migration and consumption levels, i.e., that such consumerist habits can spread rampantly around the world.

At this point, it is important to note that the elaboration of scientific publications, in many cases, is based on collaborations that may involve private and public institutions from one or several countries. Therefore, the same publication may be linked to one or more authors with different nationalities and thus to more than one country simultaneously, making part of each of the total number of articles or publications in the final sum. *Figure 5* below shows in greater detail the flow of collaborative work carried out by several countries.

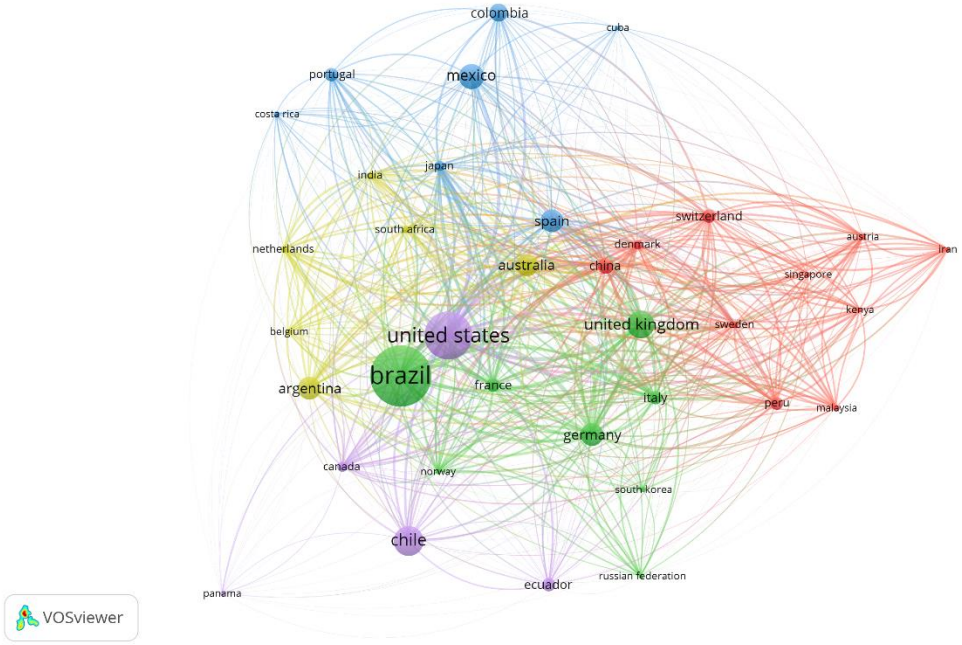

Figure 5. Co-citations between countries.

Source: Own elaboration (2022); based on data provided by Scopus.

Figure 5 shows the research grouping according to the collaboration between authors from different international institutions. Outstanding participation is evidenced between authors affiliated with institutions from Latin American countries such as Brazil, Chile, Mexico, and Colombia and countries from other regions such as the United States, United Kingdom, Germany, Canada, and Spain, to mention a few. United Kingdom, Germany, Canada, and Spain, to mention a few.

4.4 Distribution of scientific production by area of knowledge

Figure 6 shows the distribution of the production of scientific publications according to the area of knowledge through which the different research methodologies are implemented.

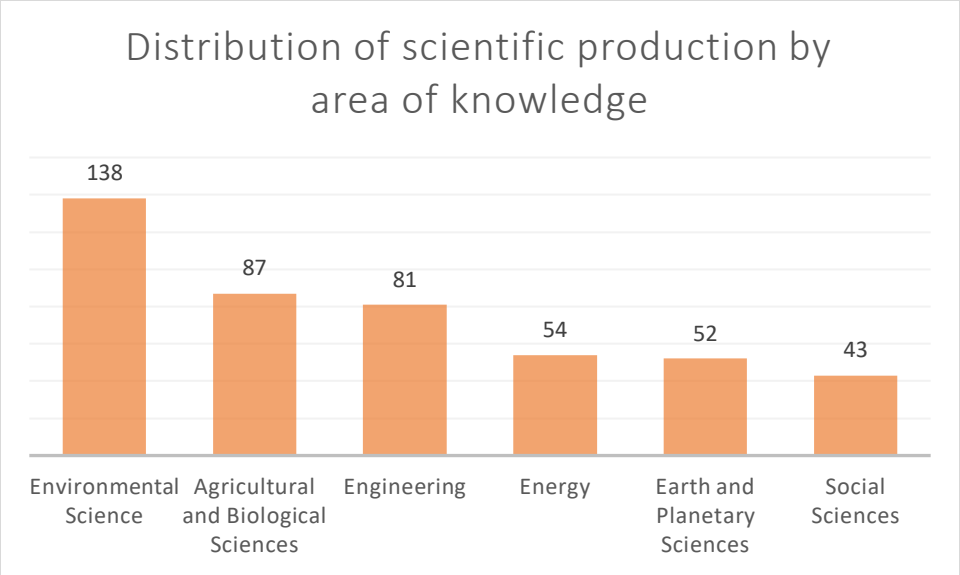

Figure 6. Distribution of scientific production by area of knowledge.

Source: Own elaboration (2022); based on data provided by Scopus.

Due to the influence exerted by Energy Demand on Climate Patterns, it is not surprising that most of the publications found in the Scopus database on the variables are from environmental science, occupying the main position in the publication of documents. However, other areas, such as agricultural and biological science and engineering, have contributed to the study of these variables, publishing 87 and 81 papers, respectively.

As seen in *Figure 6*, the variables that are the subject of this study are relevant in various areas of knowledge since each activity or practice contributes to climate change. Therefore, scholars seek ways to carry out their work more responsibly and sustainably, protecting human life and the environment.

4.5 Type of publication

Figure 7 shows the distribution of the bibliographic findings according to the type of publication made by each of the authors in Scopus.

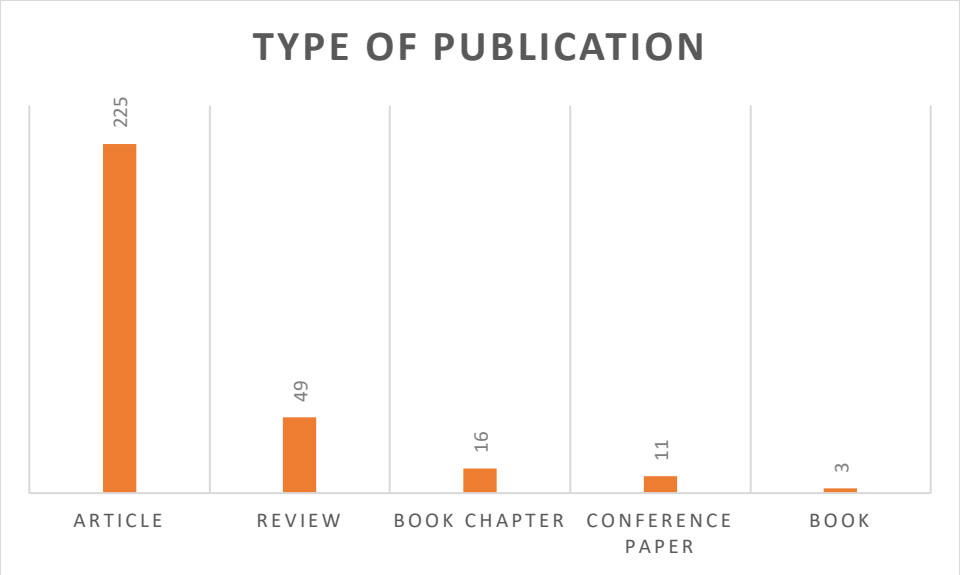

Figure 7. Type of publication.

Source: Own elaboration (2022); based on data provided by Scopus.

Figure 7 shows that the predominant type of publication in the Energy Demand and Climate Pattern study was the journal article with a total of 225 documents. In second place review with 49, followed by book chapters with 16 publications.

One of the most outstanding articles is entitled "Climate Change Impacts on Energy Systems in Global and Regional Scenarios" (Byers et al., 2020), in which the authors refer to the transformations that climate change has produced in everything related to energy systems. One of their global projections is "a potential increase in cooling demand and a decrease in heating demand, in contrast to slight decreases in hydropower and thermal energy capacity" (Byers et al., 2020). However, they assert that this impact is still uncertain and depends solely on using consistent methodologies that facilitate "regional to global scale energy planning" (Byers et al., 2020).

5. Conclusions

Finally, thanks to the bibliometric analysis conducted in this research work, it was possible to establish that Brazil was the country with the highest number of published records facing the variables Energy Demand and Climate Patterns, with a total of 136 publications in the Scopus database during the period 2017-2021 in Latin America.

Additionally, it was determined that there is a negative relationship between Energy Demand and Climate Patterns due to changes in variables that in the past were considered constant. Likewise, both variables maintain a high degree of interdependence so that changes in each affect the other immediately, becoming a vicious circle. As Mónica Santillán states in her article:

By leaving out demand, the influence of consumption on climate change has been overlooked, e.g., an increase in energy demand as an adverse effect of energy efficiency (Jevons paradox); or a probable energy demand so high that it is not feasible to meet it with clean Energy (Santillán-Vera, 2018)

Likewise, it is urgently required to encourage populations to modify their consumption habits to continue implementing an energy transition plan that relies on using clean Energy through renewable resources. For this reason and to

continue generating awareness of the causes and effects of Climate Change in our environment, it is expected that this research article encourages an increase in the participation of scientific communities in the study of Energy Demand and Climate Patterns from any scientific profile and area of knowledge, which allow the Latin American society and the whole world to know accurately the strategies that can be carried out to mitigate the damage caused.

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