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THE CONCEPT OF ECONOMIC EFFICIENCY USING THE BIBLIOMETRIC ANALYSIS

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Abstract:
Economic efficiency is the optimal ratio between the use of resources and the results obtained within an economic system. This implies permanent reference to an ideal of maximizing results through the efficient use of available resources, in a context in which material and social constraints are becoming increasingly pronounced. The research conducted involves a review of the literature on economic efficiency, followed by bibliometric analysis at global and national level. The aim of the paper is to document researchers' interest in economic efficiency. The research methodology involves conducting bibliometric analysis, through the cluster method and citation analysis, thus identifying the research conducted about economic efficiency. The bibliometric analysis was conducted using VOS viewer software, which allowed for the import of data from the Web of Science database over an extended period and the creation of interactive, easily explorable maps. The database query was conducted for the period 1975-2024, having as the main selection criterion the keyword: economic efficiency. The results of the bibliometric analysis (metadata) manage to synthesize the main ideas, precepts, and relevant publications in the field, confirming the growing scientific interest in economic efficiency, both globally and nationally. The careful study of economic efficiency remains indispensable for any rigorous analysis of modern economic dynamics.

Key words: economic efficiency, bibliometric analysis, VOS viewer, scientific publications, citation analysis

JEL classification: B12, D61, Y10

1. INTRODUCTION

Efficiency is an attribute of man, the term being used since ancient times, more in the Nordic countries, coming from the Latin efficere – to perform. It represents the ability to obtain desired results using as few resources as possible, aiming to minimize consumption and maximize the result.

According to the explanatory dictionary of the Romanian language (2009 version), economic efficiency is the ratio between the results obtained in the economic activity and the efforts made.

The specialized literature can be edifying, when the problem of conceptual understanding of some notions and the need to deepen on a certain topic arises. Previous studies can reveal important research directions and methods, leading to shaping one's own perception of the analyzed topic.

To complete the critical analysis, the bibliometric analysis was approached, through the cluster method and citation analysis, thus identifying the main perceptions regarding economic efficiency.

The bibliometric analysis was conducted with the help of the VOS viewer software, thus being able to import data from the Web of Science database, over an extended period, making interactive maps, which can be easily explored.

2. LITERATURE REVIEW

The notion of efficiency appeared as early as the 1700s and 1800s, both Adam Smith, considered the father of modern economics, and Karl Marx, one of the most influential authors in the history of economic, political and philosophical thought, approached the topic of economic efficiency, but from different perspectives (figure 1).

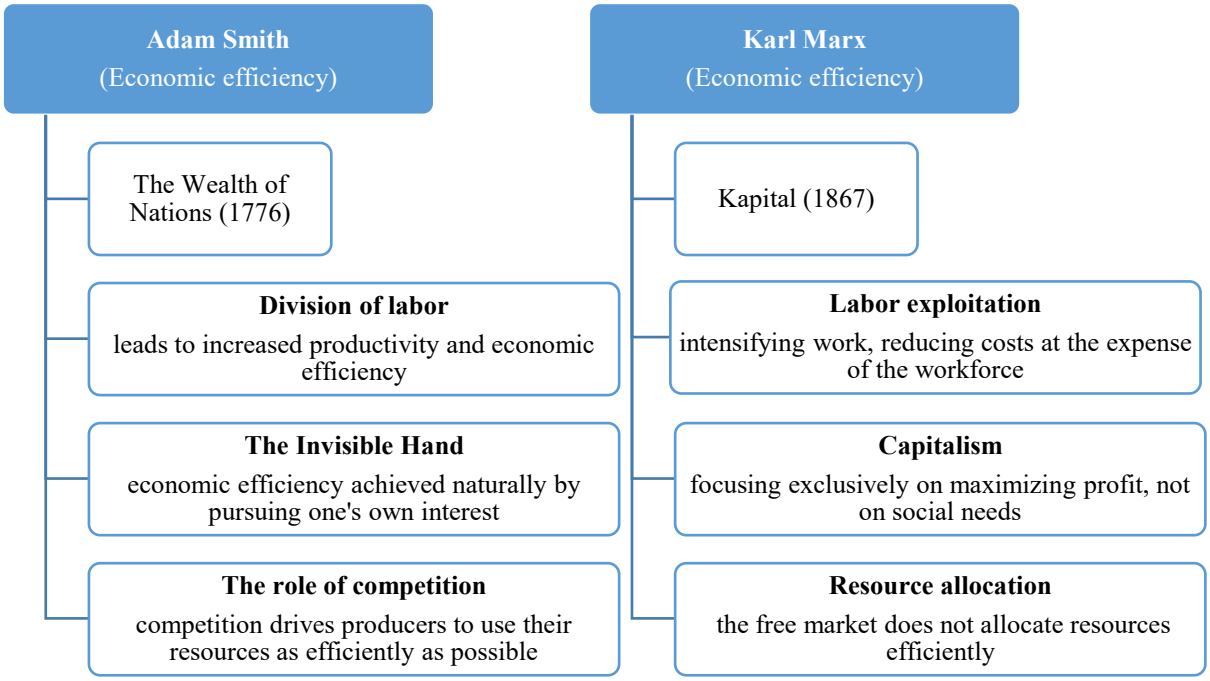

Figure no. 1 Economic efficiency from the perspective of Adam Smith and Karl Marx
Source: authors' elaboration, according to Smith A. (1776) and Marx K. (1867)

Adam Smith believes that economic efficiency is the natural result of the free market, with competition leading to progress (Smith, 2011). On the other hand, Karl Marx sees capitalism only towards profit, without considering the working class (Marx, 2013).

From another perspective, in literature it is considered that the notion of economic efficiency appeared in our century because of the use of mathematics in economic analysis. Economic efficiency is usually linked to the name of the Italian economist Vilfredo Pareto who, through mathematical formalization, defines efficiency as an equilibrium relationship between consumption and the optimum of production (Cristian, 2013). In other words, it refers to the use of available resources in a manner that leads to maximizing the benefits obtained.

The author V.V. Novojilov (1969) defines economic efficiency as "the difference between the useful effects and the other expenses made to obtain them", thus referring to the ratio between the benefits obtained and the costs of economic efficiency.

In recent years, researchers have approached the topic of economic efficiency from perspectives other than the traditional ones. While economic efficiency, rooted in Pareto's theory, and technical efficiency, defined as the ability to obtain the maximum output from a given set of inputs (Popa, 2007), remain foundational concepts in economic analysis, the literature has progressively expanded to incorporate additional dimension, such as (Table 1.):

Table no. 1. Conceptualizations of economic efficiency in literature

Authors	**Type of Efficiency**	**Conceptualization/ Key Insights**
Farell, M.J. (1957)	Technical efficiency	Efficiency is measured as the ability of a firm or production unit to **obtain maximal output from a given set of inputs**; introduces the frontier approach (Farell, 1957).
Coelli, T., Rao, D.S.P., et al. (2005)	Technical & Economic efficiency	Efficiency **is the ratio of observed output to the maximum possible output**; it includes concepts of scale efficiency and allocative efficiency. (Coelli, et al., (2005)

Jorgenson, D.W. (2001)	Economic efficiency	Efficiency is reflected in **optimal allocation of resources across sectors to maximize productivity** and welfare. (Jorgenson, 2001)
Chen, Y. et al. (2024)	Green/ environmental efficiency	**Urban green economic efficiency** can be improved by the smart city pilot, and it can be improved by the smart city by the effect of technology, the structure effect, and the energy effect (Chen, et al., 2024).
Porter, M.E., Linde, C.V.D. (1995)	Environmental & competitiveness	Environmental efficiency can generate economic benefits, through innovation and resource optimization (Porter & Linde, 1995).
Aubakirova, Z. et al. (2023)	Governmental efficiency	The formation of an **effective system of local self-government** in the country requires solving the problem of forming a sufficient financial and economic base for solving local problems (Aubakirova, et al., 2023).
Portuese, A. (2013)	Legal/ regulatory efficiency	The principle of EU proportionality encapsulates a **rationale of efficiency**; I propose the representation **of the principle of proportionality** as a principle of economy. Efficiency (Portuese, 2013).
Kotliar, A., et al. (2020)	Technical/ production efficiency	The determination of the most profitable variant should be conducted based on a system of criteria that allows the most precise determination of the area of **efficient use of technological equipment** (Kotliar, et al., 2020).
Fernandes, L. H. et al. (2021)	Macro-level efficiency	**The Macroeconophysical Indicator of Economic Efficiency** (CEIF) shows how efficient a country is in terms of allocating resources from economic growth to simultaneously convert them into a virtuous cycle in the long term and in this way, maximizing well-being (Fernandes, et al., 2021).
Camanho, A. S. et al. (2024)	Economic efficiency	**The measurement of economic efficiency** considers **the monetary value of the factors of production** to design more cost-effective production plans (Camanho, et al., 2024).
Shodmonovna, F. S. (2022)	Technical/ production efficiency	Another decisive way to **increase efficiency** is industrial production, to accelerate the development of science and technology, **with the support of the state.** (Shodmonovna, 2022).

Source: authors' elaboration

- **Environmental (green) efficiency**, a contemporary perspective that integrates economic objectives with environmental protection by minimizing the ecological impact of economic activities.
- **Financial efficiency,** which reflects the optimal use of financial capital to generate superior economic outcomes.
- **Governmental efficiency** – institutional and governance-related dimensions have gained increasing attention. Governmental efficiency refers to the effectiveness of public administration and governance systems, as reflected in regulatory quality, institutional capacity, and the interaction between authorities, citizens, and the economic environment.
- **The principle of proportionality – legal (legislative) efficiency**, concerns the ability of legal norms and judicial systems to achieve regulatory objectives through adequate, proportional, and predictable measures, thereby ensuring legal certainty and the proper functioning of the rule of law.
- At the macro-institutional level, **political efficiency**, or the efficiency of public policies, evaluates the extent to which state policies achieve their intended economic and social objectives, highlighting the role of the state as a key macroeconomic an institutional actor.

- At the microeconomic level, **corporate governance** is increasingly recognized as a determinant of efficiency, encompassing the institutional and managerial mechanisms that influence firm performance at the intersection of economic and managerial efficiency.

Efficiency has a significant role in the economy, making the connection between the resources allocated for conducting an action and the results obtained from it (Cristian, 2013). Thus, the aim is to dose resources towards activities that lead to rational development.

3. RESEARCH METHODOLOGY

The research methodology involves conducting bibliometric analysis, through the cluster method and citation analysis, thus identifying the research conducted about economic efficiency.

The bibliometric analysis was conducted with the help of VOS viewer software, thus being able to import data from the Web of Science database, over an extended period, making interactive maps, which can be easily explored.

The database query was conducted for the period 1975-2024, having as a selection criterion the keyword: economic efficiency.

Bibliometric analysis includes quantitative methods for studying literature, some of these methods being the cluster method and citation analysis, which help to understand the relationships between publications, authors, and research fields.

The cluster method is used to identify similar groups of documents, authors, or concepts, according to their common characteristics, such as keywords or citations and citation analysis analyzes the relationships of influence between articles, authors, and journals, evaluating the impact and connections of the research.

The bibliometric analysis was conducted starting from the collection of data from the Web of Science, being one of the most important databases in the world (Kamble, et al., 2018), ending with the bibliometric analysis itself. Figure 2 shows the steps followed in the bibliometric analysis.

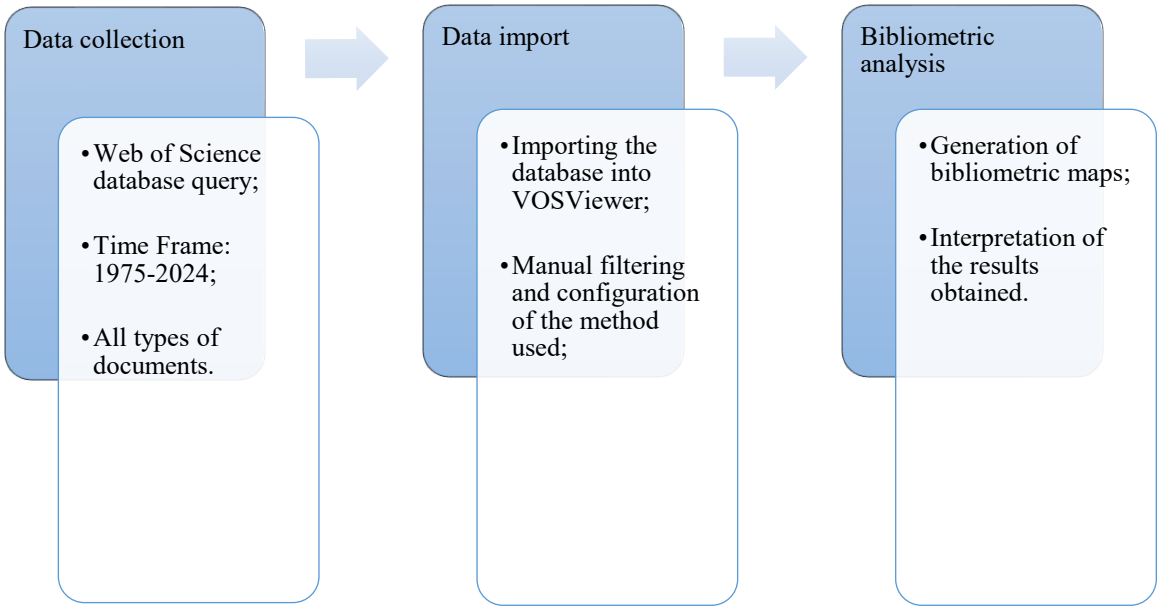

Figure no. 2. Stages of bibliometric analysis
Source: authors' elaboration

The results of the bibliometric analysis (metadata) provide an overview of the research field (Milian, et al., 2019), thus being able, from a large database, to synthesize the main ideas, precepts, and relevant publications in the field.

4. RESULTS AND DISCUSSIONS

BIBLIOMETRIC ANALYSIS – ANALYSIS OF CITATIONS GLOBALLY

To conduct bibliometric analysis, in terms of economic efficiency, the Web of Science database was queried, according to the keyword: "economic efficiency", resulting in 153,121 scientific documents published between 1975 and 2024. The Web of Science database contains information since 1975.

Most publications on the topic of economic efficiency were produced in 2024, reaching the number of 14,659 documents, in the period 2019 – 2024 being an average of 13,042 publications/year. These figures show us an increased interest in research in the last 6 years on the topic of economic efficiency, even about twelve times higher than in the period 2001-2006, when the average number of publications per year was 1092 documents, according to table no. 2.

Table no. 2. Publications on economic efficiency

Period	Annual average
2019 - 2024	13048
2013 - 2018	6966
2007 - 2012	3173
2001 - 2006	1092
1995 - 2000	737
1989 - 1994	316
1983 - 1988	92
1975 - 1982	71

Source: authors' elaboration, according to the Web of Science database

Before two thousand, the number of publications per year on economic efficiency was below the threshold of 1000 publications/years, a cause being the focus on other dominant topics such as globalization, economic transitions, or inflation, as well as limited access to resources and technologies for research.

To continue the bibliometric analysis, we proceeded to exclude scientific documents prior to 2019, thus resulting in a number of 78,289 scientific documents. Of the 78,289 publications, most of them, with a share of 19.13%, are in the field of "Energy Fuels", the field of "Economics", "Management" and "Business" together having a share of 18.07%, according to figure 3.

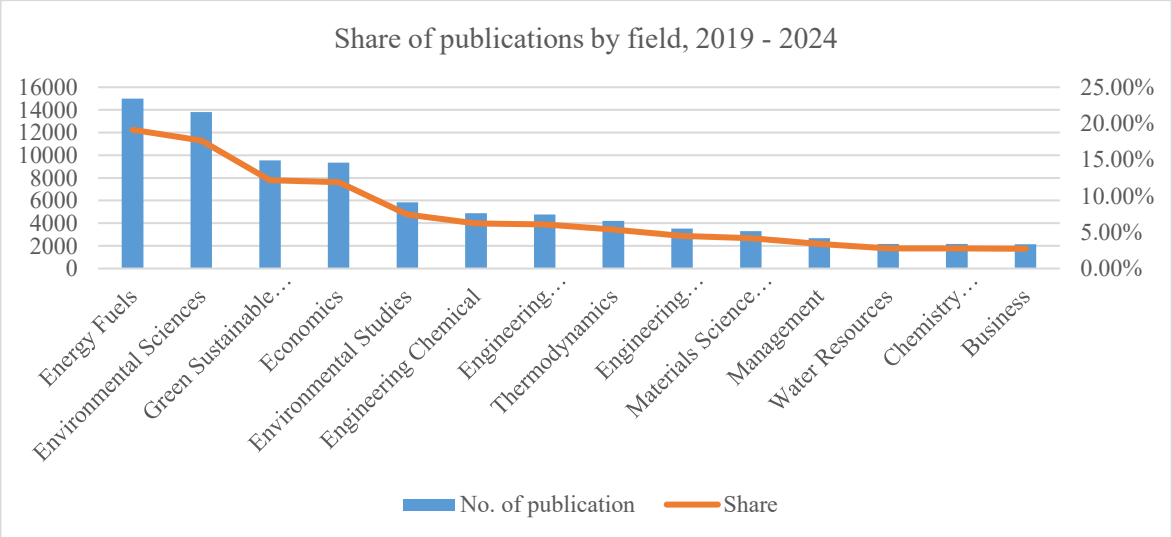

Figure no. 3. Publications on economic efficiency, by fields, 2019 - 2024

Source: authors' elaboration, according to the Web of Science database

Considering the theme of the research report, we applied new selections to result only in publications in the fields: economics, management, and business, resulting in a number of 11,635 scientific documents.

Another filter applied to the database was the selection of documents only in English, resulting in a number of 11,264 scientific documents. The database of 11,264 scientific documents was exported from the Web of Science for import into the VOS viewer software.

A first bibliometric analysis performed is according to the citation analysis method, selecting as the unit analyzed: "countries". Only countries with at least thirty citations were selected for bibliometric analysis, out of 143 countries, leaving only sixty-six countries that were considered. In the resulting bibliometric map (figure 4), the most highlighted are the research conducted in China and the USA, which shows us the significant role they play globally, with ample resources being used for research and advanced technologies, thus becoming attractive for collaborations.

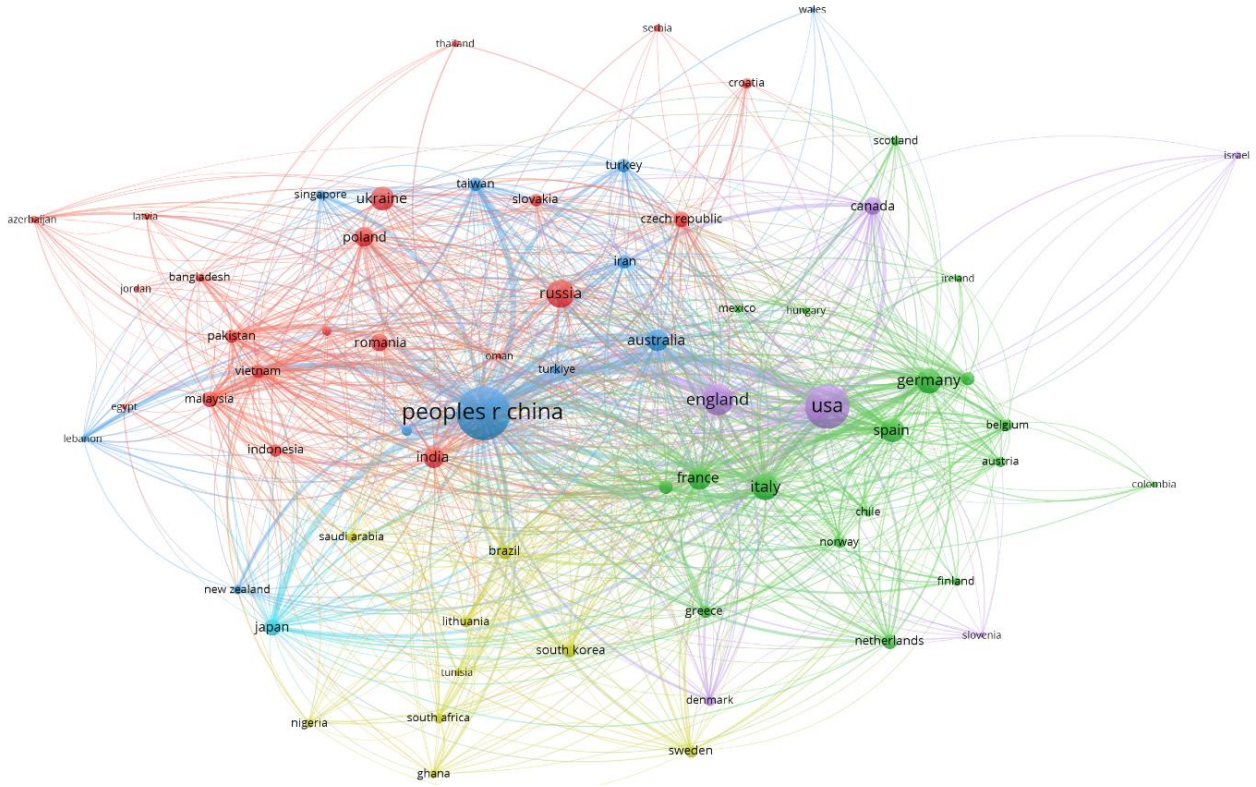

Figure no. 4 Bibliometric map by country according to the number of citations

Source: authors' elaboration in the VOS viewer software, with data extracted from the Web of Science

Researchers with an interest in the topic of economic efficiency are also in countries such as Germany, England and India, countries highlighted in the bibliometric map, highlighting the contributions made in scientific publications. As a result of the data processing in the VOS viewer software, six clusters have resulted, these being created according to the collaborative relations between countries, in scientific publications.

Romania belongs to the red cluster, along with Eastern European countries, such as Poland, Ukraine, Serbia, Russia, being grouped regionally, but also with Asian countries such as: China and India, thus resulting in an openness to international collaborations on topics of common interest. Romania is part of a dynamic network, which is of interest for economic efficiency, economic development, sustainability, and regional issues. In Romania, the number of publications on the topic of economic efficiency is 277 scientific documents with 809 related citations. This number ranks Romania, globally, on the 13th place, according to the number of scientific publications, after countries such as Poland, India, and Australia (figure 5).

Figure no. 5 Global ranking by number of publications

Source: authors' elaboration, according to the Web of Science database

By the number of citations, Romania no longer occupies the same position in the ranking, dropping to 32nd place, the first places being occupied by countries such as China, the USA and England, which have about thirty-three times more citations than Romania. China, the USA, and England maintain their top three positions in the ranking, both according to the number of scientific papers published and according to the number of citations, highlighting the increased interest of researchers on the topic of economic efficiency in these countries.

Table no. 3 Status of publications and citations globally

Country	No. of publications	No. of citations
China	2517	46631
USA	1719	21446
England	862	11963
Germany	574	6847
Italy	591	6505
Australia	435	6212
France	462	5540
Japan	256	4035
Spain	500	3948
India	405	3361
Canada	270	3105

Source: authors' elaboration, according to the Web of Science database

BIBLIOMETRIC ANALYSIS – ANALYSIS OF CITATIONS AT NATIONAL LEVEL

Another bibliometric approach to the literature is focused on Romania, from the 11,264 scientific documents selected from the Web of Science database, applying selection only for documents from Romania, thus obtaining 277 scientific documents containing the word: "economic efficiency", from 2019 to 2024. By importing the data into the VOS viewer software, the bibliometric

map in figure 6 was obtained, using as a type of analysis: "co-authorship", where the links between the universities in Romania are highlighted, only 10 meeting the condition of having a minimum of 5 publications on the topic of economic efficiency.

Figure no. 6 Bibliometric map of Romanian universities with publications on economic efficiency

Source: authors' elaboration in the VOS viewer software, with data extracted from the Web of Science

The central institutions in the network are ASE Bucharest and the Romanian Academy, which have a strong influence at national level being connected to many institutions in the country. ASE Bucharest has the most publications on the topic of economic efficiency, 139 documents with 332 related citations, followed by the Romanian Academy with thirty-one publications and ninety-six citations and the West University of Timisoara with twenty publications and 162 related citations.

The "Stefan cel Mare" University of Suceava ranks sixth, nationally, in terms of the number of citations for published scientific papers addressing economic efficiency, having a number of eight publications with forty-nine related citations (figure 7).

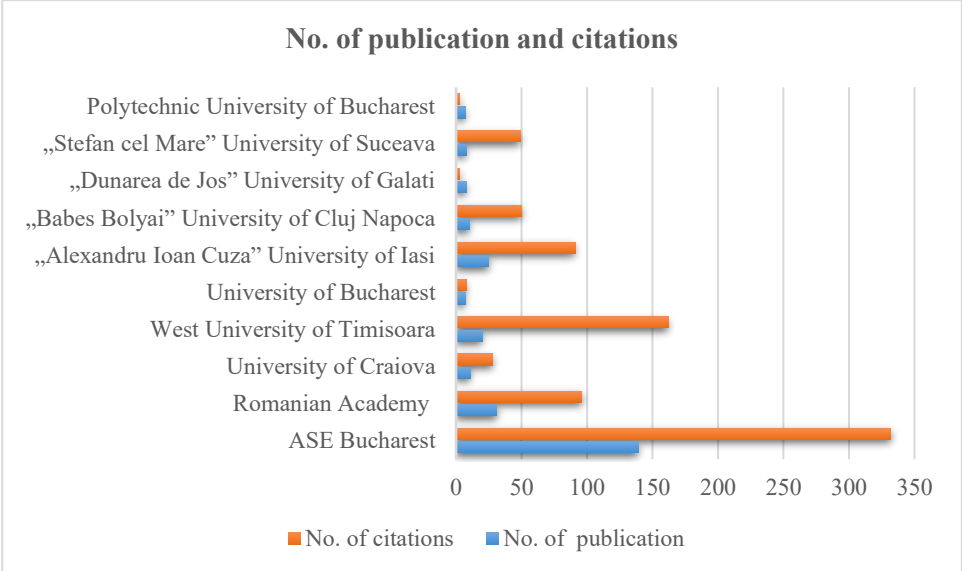

Figure no. 7 Universities in Romania with research on economic efficiency

Source: authors' elaboration, according to the Web of Science database

The number of citations much higher than the number of publications reflects an increased visibility both nationally and internationally, as is the case of ASE Bucharest, and in the case of universities that have a large number of publications but low citations, it shows us a limited impact of the research carried out (Polytechnic University of Bucharest).

Economic efficiency is a central element in the evaluation of the performance of organizations, its study allowing the identification of ways to optimize the economic process.

The bibliometric analysis conducted at national level offers a perspective on the development of research on economic efficiency, highlighting the strong centers as well as certain gaps in research. With the help of bibliometric analysis, relevant trends can be identified, creating a basis for future research.

5. CONCLUSIONS

According to the bibliometric analysis conducted, we found that the topic of economic efficiency is topical, presenting increased interest for researchers. The considerable number of publications, the relations between institutions, authors and countries lead us to the desire for collaboration at the national and international level of researchers, producing publications of a high degree of academic quality.

Starting from the concept of economic efficiency, by approaching the specialized literature and carrying out a bibliometric analysis at global and national level, we found that this theme has been approached since the 1700s – 1800s, by the great economists Adam Smith and Karl Marx, reaching the year 2024, the year in which a number of 14,659 scientific documents on this theme were published, at a global level. The bibliometric analysis made it possible to highlight the trends in research, ranking Romanian researchers on the 13th place, globally, according to the number of scientific publications.

The bibliometric analysis conducted at national level, with the theme of economic efficiency, highlights the significant role of academic institutions in the field of research, among the most influential being those such as ASE Bucharest and the Romanian Academy, due to the high impact of publications.

The positioning of the "Stefan cel Mare" University of Suceava on the sixth place at national level, depending on the number of citations of publications, confirms its contribution to the consolidation of research in Romania.

In conclusion, the research conducted up to this point provides a solid basis for deepening the research in future reports and will focus on the analysis of economic efficiency in the tourism sector through empirical methods and relevant case studies.

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