

Environmental Economics Research From 1972 – 2022: Trends and Implications for The Future

Andi Mulyadi¹, Budiman Rusli², Entang Adhy Muhtar³ and Nina Karlina⁴

Abstract

This research is a qualitative study based on systematic analysis of the articles on environmental economics via the bibliometric analysis using the R programming language. Thus, this study analyzed articles using environmental economics in journals in scopus database. 384 articles, which was published in 1972 – 2022 and included 'environmental economics research' in the article title were analyzed as a whole. This analysis was the bibliometric analysis using the R programming language. At the same time, content analysis was used to show the relationships between the subdomains of the studies using environmental economics and the development of network, author collaboration. The study results in a discussion about the use of environmental economics on the part of future studies.

Keywords: *Environmental, Economics, Scopus.*

INTRODUCTION

When the bibliometric analysis used in the study is examined, scientific researches should be in communication in order to be effective in scientific sense. In this century, scientists have been in contact with books and scientific journals in order to be in touch. In this sense, scientists should use citation and references to ensure communication, to determine the importance of their research, or to demonstrate the authenticity of their contributions (Merton, 1957). Citation and references have many functions such as getting the approval of the premises, following the origin on a new idea and distinguishing new from references and citations of scientific studies (De Bellis, 2014). According to Crane (1972) by applying bibliometric analysis to the magnitude of new knowledge, national progress and data, it is possible to present trends of time, to explore themes, to identify changes in disciplines, to identify productive researchers and organizations, and to give a large picture of the current study.

This article discusses the discourse environmental economics from 1972 to 2022. The discourse understanding is inseparable from bibliometric analysis (Mifrah et al., 2020; Lee, 2020; Omoregbe et al., 2020; Saravanan & Dominic, 2014), referring to the incorporation of various frameworks and methods to analyze citations from scientific publications. Such attempt leads to the development of different metrics to gain insight into the intellectual structure of a broad academic discipline and to evaluate the impact of a particular field of study (Akhavan et al., 2016; Putera, Suryanto, et al., 2020).

The analysis focused on describing the keywords, authors, journals, and characteristics of articles on environmental economics from scopus database. Papers on this topic are interesting to discuss considering the importance of scientific research for generating ideas and innovations in response to environmental economics problems.

METHODS

This study did not involve human subjects, so neither approval by the institutional review board nor obtainment of informed consent was required. This was literature-based descriptive study involving a bibliometric analysis.

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The literature was searched from the scopus database. The search term was “Environmental Economics” in the subject field. The search results were TITLE ("Environmental Economics"). The number results was 384 document. Data in plain text format were downloaded for analysis. There was no need for data cleaning. The downloaded plain text format data were converted to the R data format by the Biblioshiny app. Descriptive data are presented as numbers, percentages, and rankings. Decriptive statistical analyses were carried out to present the timeline and distribution of the articles.

RESULTS

Based on a search with the keyword “Environmental Economics”, the result showed approximately 384 documents, with a total of 618 authors. When the data set was examined in a broad sense, 618 authors use 555 different keywords to group or categorize their articles. In addition, the number of citations per article is 11.61. This indicated that the work is strongly citation and the weight of the work in many these areas. When the distribution of the authors in the data was examined, there were 180 single authors. There were 1.86 authors per article in the field environmental economics, which meant that the work in this field was generally the product of collaborative work.

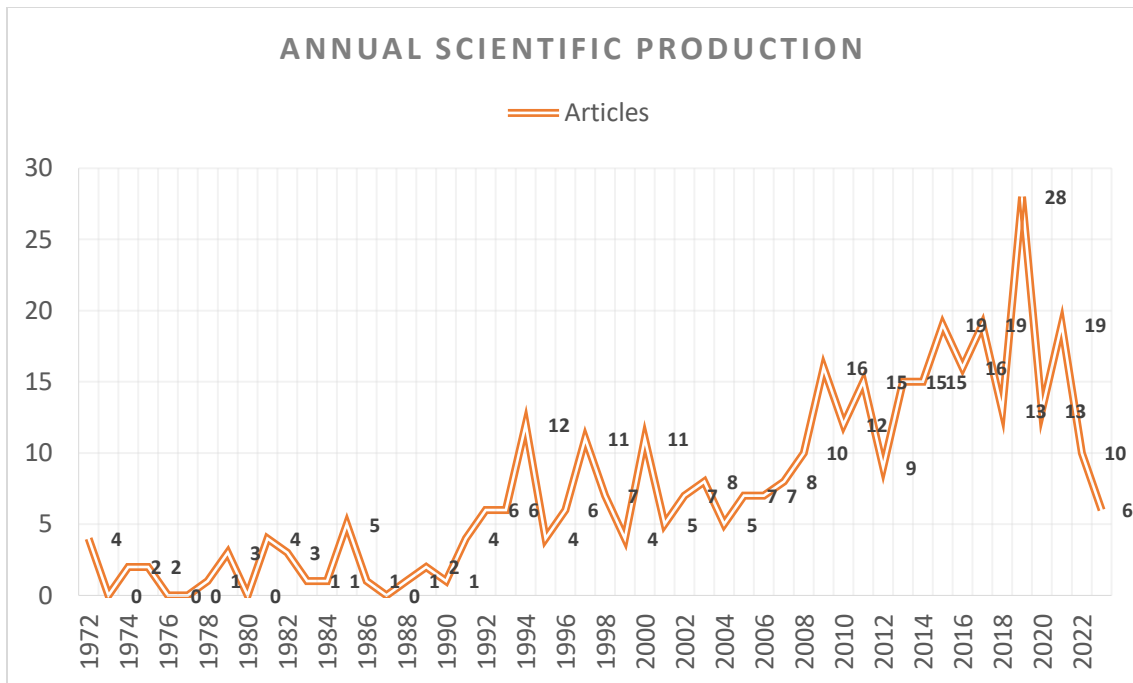


Figure 1. Annual Scientific Production.

The quality of the studies carried out in a field was in line with the number of peer-reviewed publications in that field. As shown in Figure 1, the number of studies in the field of environmental economics has increased since 1972, especially since 2019. In 1972, there was only four publication in environmental economics. However, the number of studies remained limited until 1993 and since 1994, an increasing number of publications have been observed.

Three fields plot

The three fields plot shown below is an illustration fo three elements, consisting of a list of journal names, authors, and topics (Fig. 2). These three elements are plotted with gray linkages that show their relationship with each other, starting from the name of the journal, followed by the author, and each author is then linked to the topic of their publication. The size of each retangle in each list indicates the number of papers associated with that element.

The first element, on the left, is the journal. Eleven journals were indexed in the three fields in the three fields plot as having published papers on the topic of environmental economics, and the top journal that published the most papers on this topic was environmental and resource economics, which is depicted with a scarlet rectangle and connected to several authors, namely Shogren Jf, Johansson Stenman O, Barbier EB, and Bateman IJ.

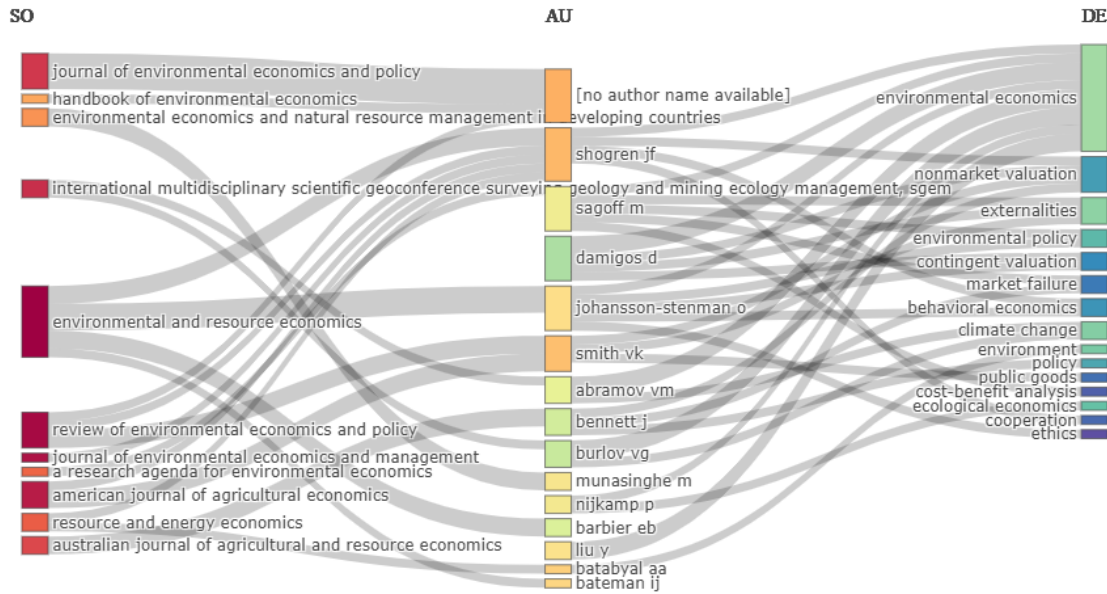


Fig. 2. Illustration of three elements, consisting of a list of journal names, authors, and topics

The second element in the middle contains authors names. Authors who published articles in journal that were recognized are associated with previous elements, such as Smith VK who is linked to Review of Environmental Economics and Policy and American Journal of Agricultural Economics as journal elements. However, some others did not publish in indexed journals, and therefore do not have any connection with any of the journals listed, such as Sagoff M and Damigos D. Each of the authors is also associated with frequently used keyword topics on the right. The 20 top authors are listed in this plot. The size of the rectangle shows the number of papers written by each author. In this plot, Shogren Jf had the largest rectangles.

The third element contains the topic-related keywords that appeared most frequently in the papers. Each topic is associated with authors who published extensively on that topic. Fifteen keyword topics are listed, and the keyword that appeared most frequently was “Environmental Economics”, as indicated by the size of the light green rectangle, which dominated the other rectangles. It also appeared that the topic of Environmental Economics was used by Shogren JF of the registered authors, which aligns with the focus of this research on scientific papers related to environmental economics. In addition to environmental economics, this plot also shows several other keyword that were widely used, such as “non market valuation”, “externalities”, and “environmental policy”.

Source Impact

In addition to the quantity and relevance of publications, this study also analyzed the impact of each journal that published papers on the topic of environmental policy by calculating the journal h-index, which is depicted in the bar chart shown in Fig. 3. Along with a numerical representation of the h-index value of each journal, this diagram also shows the impact of each journal through the shade of blue, with a darker color indicating higher-impact journals.

Environmental and Resource Economics occupied the top position in terms of impact, with an h-index of 8 and a black bar on the chart. Two other journals had h-index of 2 and are colored light blue on the diagram, indicating their relatively low impact.



Fig. 3 h-index value of each journal.

Thematic Map

A thematic map was also generated based on density and centrality, divided into four topological regions (Fig. 4). This result was obtained from a semi-automatic algorithm by reviewing the titles of all references analyzed in this study and additional relevant keywords to capture deeper variations. The upper right quadrant shows “motor” or “driving” topics, indicated by high density and centrality; these topics, which included “environment”, “fuels” article, and “humans” should be developed further given their importance for future research.

The quadrant in the top left shows specific and under-represented topics that nonetheless are areas of rapid development, as indicated by high density but low centrality, including “market conditions”, “empirical analysis”, and “industrial economics”. The lower left quadrant contains topics that have been used but have experienced a downward trend, indicated by low centrality and density; this region included “economic aspect”, “short survey”, and “ecosystem”.

Finally, the lower right quadrant contains basic topics, indicated by high centrality but low density; these topics are important for research as general topics, and included “environmental protection”.

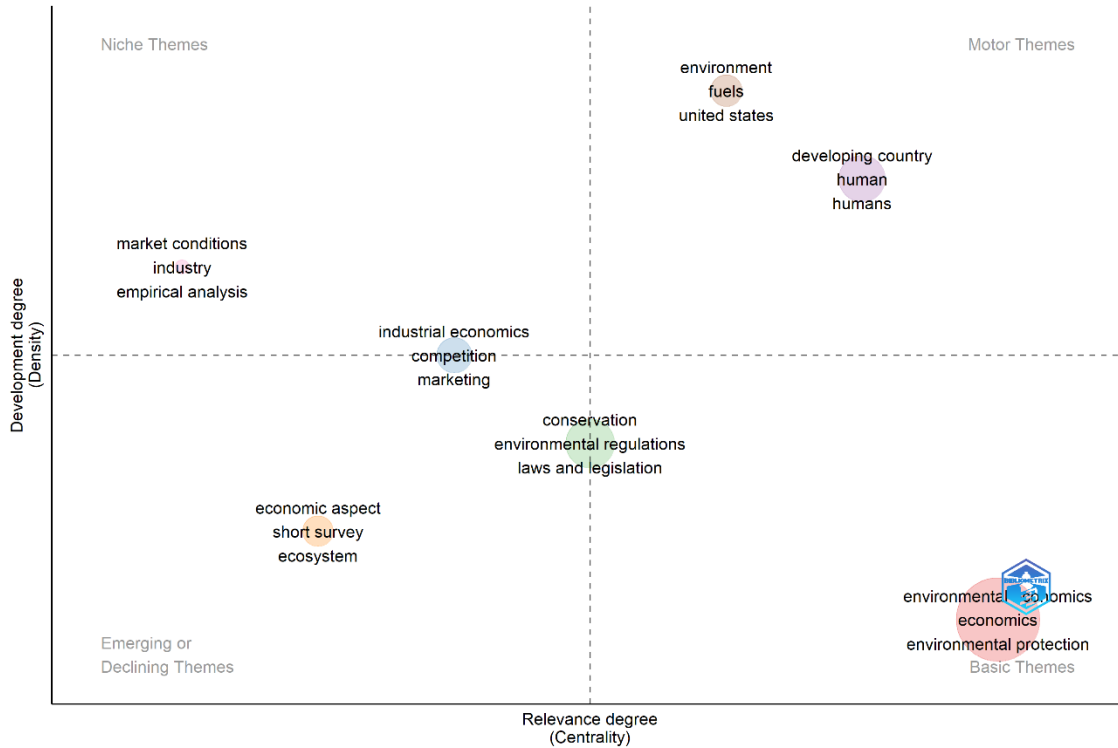


Fig. 4 Thematic map of environmental economics articles published globally in the Scopus database

Corresponding Authors Country

Participation of researchers from different countries in a study indicated that the study was in strong cooperation. In the field of environmental economics research, twenty studies were multinational. On the other hand, it showed that an area with many co-authors worked collaboratively and would provide opportunities for future studies.

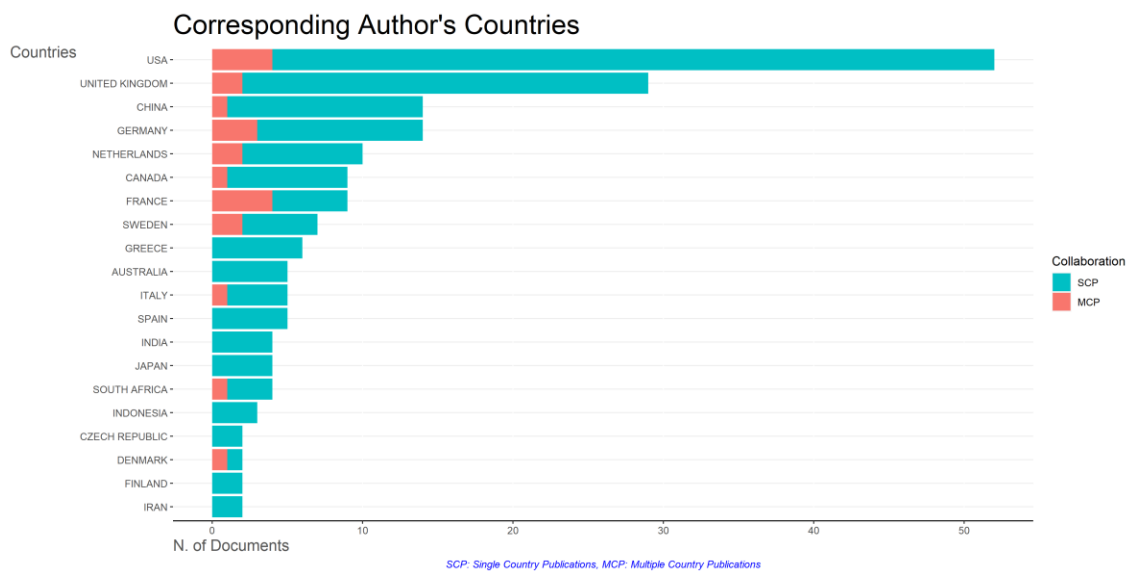


Fig. 5 Corresponding Authors Country

The cooperation pattern (i.e.co-authorship) of the authors publishing on environmental economics research was analyzed. Evaluation of single country publications (SCP), multiple country publications (MCP) according

to the countries by corresponding authors was done in Figure 5. According to the countries where the corresponding authors published, 4 of the 52 studies in the USA were published in MCP. Greece, Australia, Spain, India, Japan, Indonesia, Czech Republic, Finland, and Iran 0 publications as MCP and was the lowest in the 20 corresponding author's country list.

Keyword Analysis

Statistical analysis of keywords plus can be used to identify new trends in science, also show how effective the field is in understanding and advancing the boundaries. On the other hand, keywords plus show interdisciplinary power among all articles co-cited (Garfield & Sher, 1993). The bibliometric analysis technique is used in order to understand the tendency of the field by analyzing in the keywords plus in the studies published at different times (Wang, Liu, Jia, & Zhang, 2015). In this sense, keywords plus was researched in 384 articles. In keywords plus, 611 most commonly used words were found and 50 of them are visualized by the tree map in figure 6. Environmental Economics, Economics, Environmental Protection, Sustainable Development, and Decision Making words were most frequently used after Environmental Economics which was the most frequently used according to the table. When word tree map was examined, it can be said that Environmental Economics studies were done in almost all areas, especially in the fields of Economics, Environmental Protection, Sustainable Development, and Decision Making.

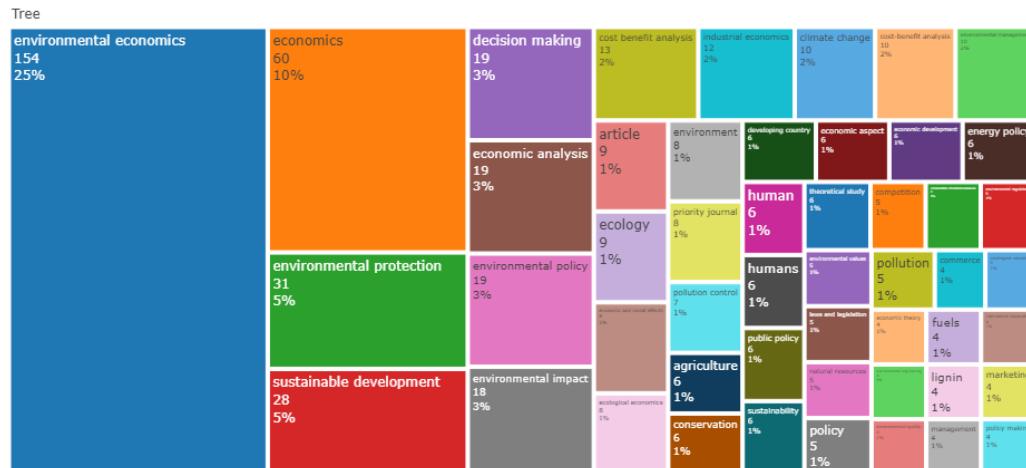


Fig. 6 Word treemap

DISCUSSION

This study presents a bibliometric analysis, conducted using the Biblioshiny app, of journal articles with a digital object identifier on the theme of environmental economics indexed by Scopus database. Based on the results above, it appears that research on environmental economics has been widely published by various journals and numerous authors, with a broad range of specific topics.

Based on the results above, it appears that research on environmental economics has been widely published by various journals and numerous authors. The three fields plot, which visualized three parameters (namely journals, authors, and topics) and allowed their relationships to be analyzed, showed the topics discussed by the authors and the journals in which authors published their research. Environmental and resource economics was shown to be the most productive journal in the three fields plot, as it published articles by many writers on the topic of environmental economics. The most frequently used words in articles on the theme of public health included “environmental economics”, “non market evaluation”, and “externalities”. The topic development shown by the thematic map provides an overview of the position of each topic in a quadrant comparing the

density and centrality of the topic. The upper left quadrant and the lower right quadrant were most extensively populated.

The lower right quadrant, which contains basic topic with low centrality but high density, was occupied by words such as “environmental economics”, “environmental protection”. An interesting finding of the thematic map was that the topic “conservation”, “environmental regulations”, and “laws and legislation” occupied part of the lower right quadrant and part of the lower left quadrant.

Limitation

According to the results of this study, researchers could shape their future research. This research ensures universal view of the understanding of the environmental economics research as well as its sub –domains and their relationships. This study enables researchers to use resources to explore this area. In short, this study will provide insight into modern research through environmental economics in order to provide a detailed understanding of the limited view that exists in the field of environmental economics. However, due to restrictions on resources, there were some limitations. First, only one database was used in this study. In order to ensure academic success in the social sciences, Scopus citation data were taken into consideration in order to evaluate quality studies. Although there are sources as WoS, Google Scholar, etc. Future research may consider working with search criteria from other databases. Second, only articles were selected to generate this study data set. Future research may use additional document types to create a dataset. Statistical and algorithmic quantitative methods are used in bibliometric analysis. Therefore, information such as content and article quality in the articles cannot be revealed by bibliometric analysis (Dunk & Arbon, 2009). In this sense, it would be appropriate to use such analysis except bibliometric.

CONCLUSION

According to Glanzel (2003), recently bibliometric research, current bibliometric issues and their sub areas are examined under three headings. (i) Bibliometrics for bibliometricians, (ii) Bibliometrics for scientific disciplines, (iii) Bibliometrics for science policy and management. In this study, an analysis was made for scientific information. Therefore, bibliometric indicators should be used consciously due to these different situations. As van Raan (2005) points out, sloppy use the miscalculations and bibliometrics can be regarded as negative by the scientific world.

The number of articles on the theme of environmental economics published by digital object identifier equipped journals is quite large. And has the potential to continue growing, given the on going spread of the environmental economics. Several topics and keyword were popularly used in this theme and have the potential for further development, especially specific domains. In addition, some of the most productive journals and authors can also be used as references for researchers working on this topic.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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