

FOREIGN DIRECT INVESTMENT AND SUSTAINABILITY: A VISUALIZED BIBLIOMETRIC REVIEW

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Abstract

Extensive research has been conducted on the link between foreign direct investment and sustainability (FDIS). The earliest known document related to FDIS research in SCOPUS databases dates to 1992, indicating nearly three decades of ongoing research. The objective of this article is to conduct a bibliometric analysis of FDIS academic research from various perspectives. A total of 641 documents related to FDIS fields were collected and subjected to a comprehensive bibliometric analysis using state-of-the-art scientometric software. The findings from the analyses allowed us to identify leading researchers, conceptual structure, and thematic evolution of FDIS research.

Keywords: Foreign Direct Investment, Sustainability, Sustainable Development, Research Analytics, Bibliometric Review

JEL Classification:

F21: International Investment; Long-term Capital Movements

F23: Multinational Firms; International Business

C80: Data Collection and Data Estimation Methodology; Computer Programs

C88: Other Computer Software

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1. Introduction

Extensive research has been conducted on the link between foreign direct investment and sustainability. The earliest known document related to such research in Scopus databases dates to 1995. It was a presentation at the 20th Federation Economic Associations Conference, held in Singapore in December 1995, encapsulating nearly three decades of ongoing research (Koh & Wilson, 1995).

The list of review papers addressing the impact of FDI on sustainability is extensive, mainly dealing with environmental issues (Zamir & Mujahid, 2022), green innovation (Tolliver et al., 2021), or focusing on certain geographic regions (Asiedu, 2021; Malefane, 2021; Nguyen & Nurul Amin, 2002). However, only one literature review has approached bibliographic data and metadata quantitatively and qualitatively using state-of-the-art scientometric software, mainly with respect to environmental concerns (Al-Nimer et al., 2022). This paper bridges this gap by providing a comprehensive analysis that incorporates both quantitative and qualitative aspects of related literature using advanced scientometric tools. The aim of this study is to provide a thorough examination of existing literature that links foreign direct investment and sustainability, making significant contributions to the field. To this end, the study employs descriptive and network bibliometric analysis techniques, which enable the authors to make three distinct contributions to related literature. The first contribution of the study is to identify the most notable and influential authors, publications, and journals in the field. By doing so, the authors can shed light on the individuals and sources that have had the greatest impact on the development of this field. The second contribution involves identifying the most frequently used author keywords and terms. This allows the authors to gain a deeper understanding of the key topics and concepts that are currently being studied. Lastly, the third contribution of the study is to identify current research trends and gaps in the literature. The authors intend to promote future research in the field of foreign direct investment and sustainability by identifying gaps that require further investigation and could potentially contribute to its ongoing development. Moreover, performing a literature review facilitates different types of analyses, including content analysis, which is regarded as the most influential form of document analysis, along with co-authorship analysis, citation analysis, and co-citation analysis. The article is organized as follows: Section 2 (Data Collection - Methodology) presents the technique and data extraction procedure employed. The subsequent section highlights the main findings of the bibliometric study, including the identification of influential authors, journals, and institutions. Following the co-author analysis, the paper concludes by addressing limitations, outlining future work, and concluding with general remarks on the research.

2. Data Collection - Methodology

A total of 250 Economics and Business journal articles out of 641 documents related to foreign direct investment and sustainability fields were collected, filtered (McInnes et al., 2018) and subjected to a comprehensive bibliometric analysis using the VOS-viewer (Van Eck & Waltman 2010) and Bibliometrix software (Aria & Cuccurullo 2017; Bitzenis et al. 2023; Bitzenis & Koutsoupias 2023; Thomos et al., 2023). The findings from the analyses allowed us to identify among others, leading researchers, top articles, country production, conceptual structure, and thematic evolution of related research. Here are some noteworthy descriptive findings from the analyzed data: the number of authors surpassed 600, with international co-authorship accounting for 28.4%, and the average number of citations per document was 20.58 (see Fig. 1).

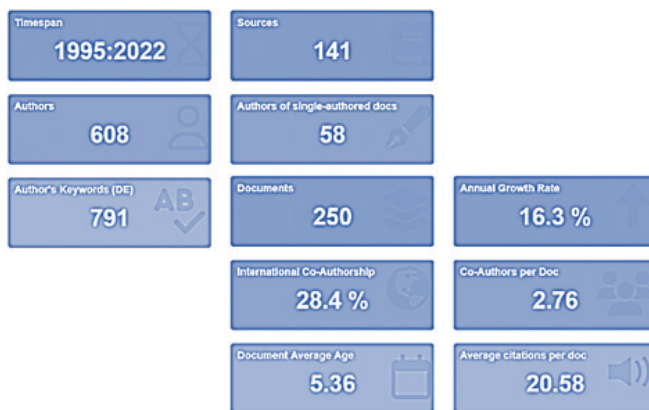


Figure 1: Main data descriptives

As shown in Fig. 2, there is a notable increase in the yearly interest on foreign direct investment and sustainability research. It is particularly significant that almost 80% of the articles were published since 2015, indicating a significant surge in research output during that year. The present study focuses on Economics and Business-related sources based on Scopus indexing.

3. Main Findings

Well over 40 documents, and 1800 citations were contributed by the top three journals: *Journal of Cleaner Production*, *Resources Policy*, and *Environment, Development and Sustainability*.

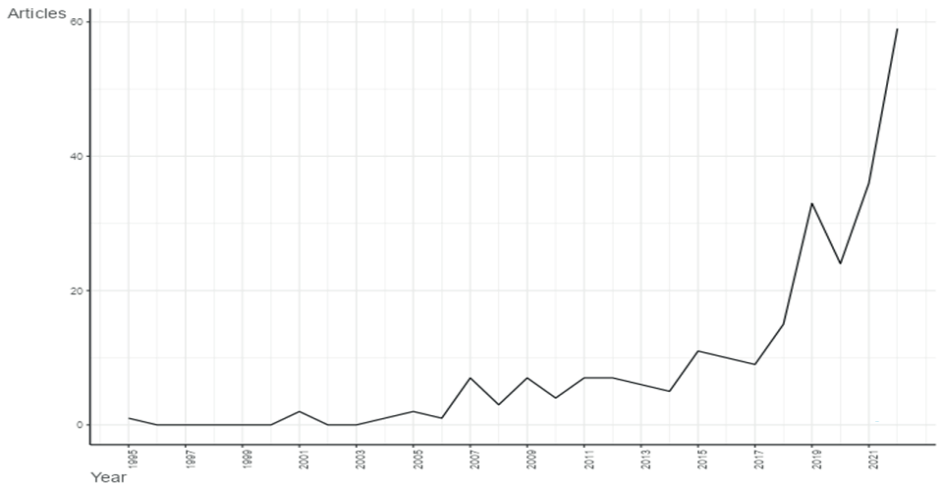


Figure 2: Annual scientific production of FDIS research

The fact that very recent FDIS articles published in the first half of 2022, such as one on future sustainability by Weimin et al. (2022) and one on renewable electricity by Mushred at al. (2022), have already garnered more than 50 citations each, is highly impressive and indicative of current scientific interest in these topics. The full list of FDIS papers can be found in the respective repository (Koutsoupias & Bitzenis, 2023a).

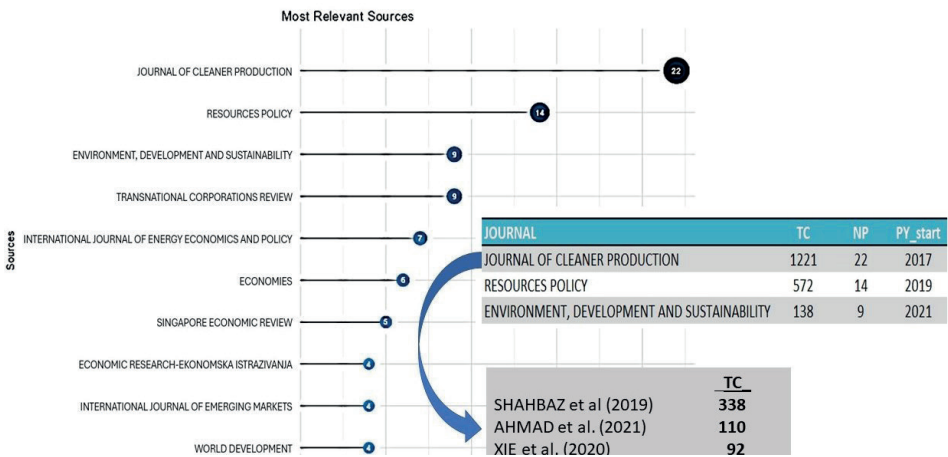


Figure 3: Most relevant sources

These journals have the highest number of related research papers, as shown in Figure 3. The *Journal of Cleaner Production* has been the most impactful, with a ratio of Total Citations (TotCit) to Articles of 55,5. Its three most popular FDIS research articles by Shahbaz et al. (2019), Ahmad et. al. (2021) and Xie et al. (2020) have accumulated over 500 references. The complete catalogue of journals with h Index > 2 that published FDIS works can be found in the corresponding repository (Koutsoupias & Bitzenis, 2023b).

Table 1: Author's impact by H index

Element	h_index	TC	NP	PY_start
ZAMAN K	8	282	10	2017
NASSANI AA	7	218	9	2018
ALDAKHIL AM	6	189	6	2018
ABRO MMQ	4	141	4	2018
ANSER MK	3	31	3	2020
QAZI ABRO MM	3	61	3	2019
RIDZUAN AR	3	48	3	2017
SAUVANT KP	3	23	5	2015
SHAHBAZ M	3	414	3	2019
SUN Y	3	21	3	2010

Table 1 lists the most prolific authors with h-index of 3 or higher each, indicating their total number of citations (TotCit), the number of Papers (NP) and the year in which their first article was published (PY_start). Zaman has been recognized as the author/co-author with the greatest number of published articles in the dataset, and one of his most cited co-authored works in the *Journal of Cleaner Production* has received 64 references (Qureshi et al., 2017).

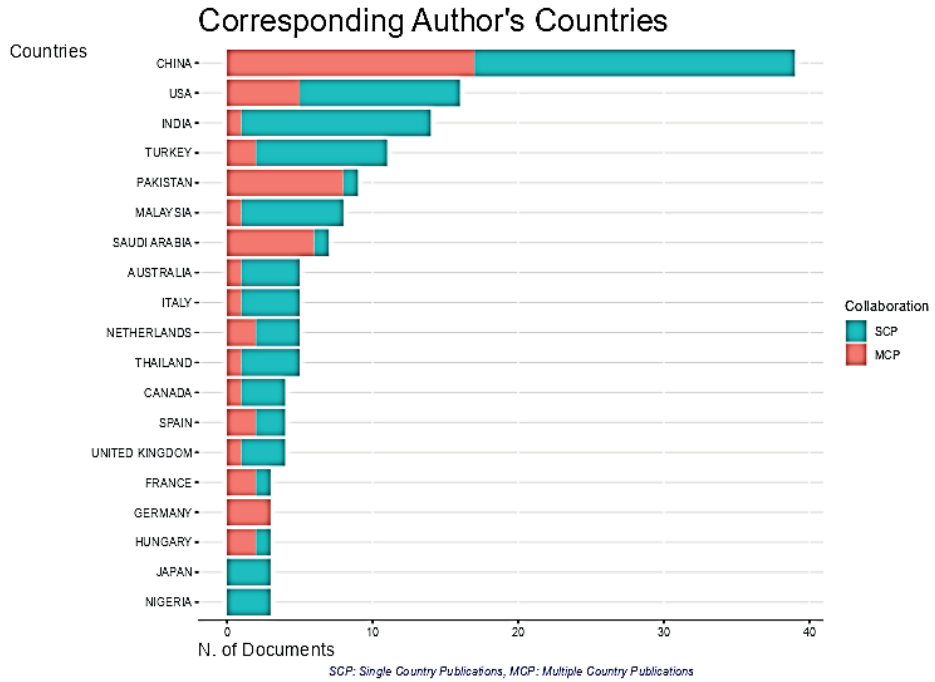


Figure 4: Corresponding author country

Nassani ranks second in terms of recognition. His most cited co-authored paper on Greek logistics in BRICS countries (Aldakhil et al. 2018) receiving 61 references. Aldakhil is third on the list, and Abro fourth, completing the catalogue of authors with more than one hundred citations of FDIS papers.

As depicted in Figure 4, China emerges as the country with the highest number of collaborative partnerships in the same publication, outnumbering other countries by a significant margin. In contrast, the United States has less than half the number of collaborating authors compared to China. In the horizontal bars, the blue color represents articles authored by individuals from the same country, while the red color signifies articles involving collaboration among multiple countries. The top five countries in terms of collaborative publications also include India, Turkey, and Pakistan. The comprehensive list of the top 30 corresponding FDIS author countries can be accessed and found published in the associated repository (Koutsoupas & Bitzenis, 2023c).

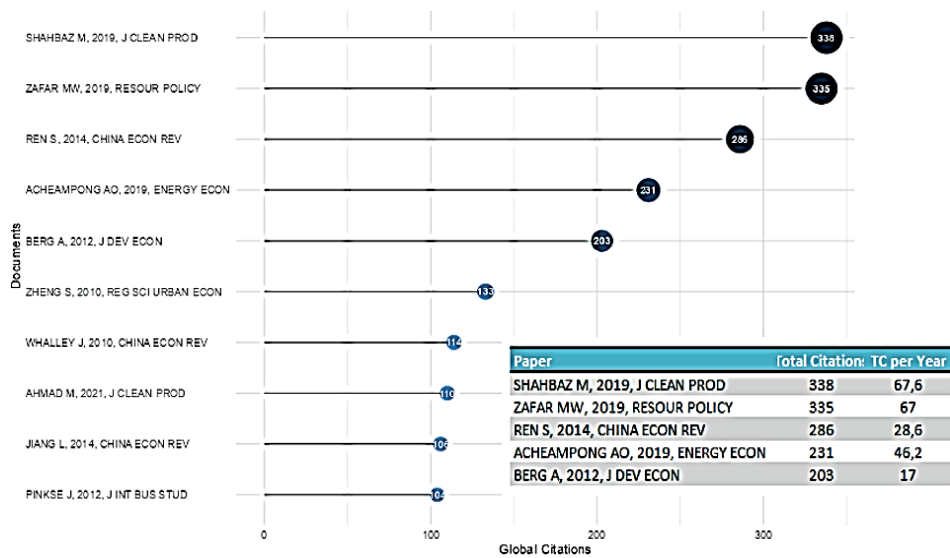


Figure 5: Most cited documents

Figure 5 displays a compilation of papers with the highest citation count on foreign direct investment and sustainability, providing information on the total number of citations they have received and the citations per year ratio. Among these papers, more than 300 citations received one article focusing on FDI and carbon dioxide emissions (Shahbaz et al., 2019), published in the *Journal of Cleaner Production*, and one more, published in the *Resources Policy* focusing on the impact of natural resources, human capital, and FDI on the U.S. ecological footprint (Zafar et al., 2019). Well above two hundred citations in the Scopus database were received by Ren et al. (2014) for a case study on Chinese carbon dioxide emissions from industrial sectors, while Acheampong’s (2019) article on environmental quality received 231 citations. Berg et al. (2012) published research on growth sustainability shown as the 5th article in the FDIS list with more than 200 citations. The complete compilation of the most cited articles related to FDIS can be accessed in the associated repository (Koutsoupias & Bitzenis, 2023c), which contains a comprehensive catalog of these influential works.

Moving to a qualitative view of the research content examined, a total of 791 author keywords were analyzed. The 30 most frequent are shown here. There are over 20 occurrences of the keywords “FDI”, “foreign direct investment”, “sustainable development”, “economic growth”, and more than 10 occurrences of the following: “sustainability”, “China”, “CO2 emissions”, “financial development” (Fig. 6).

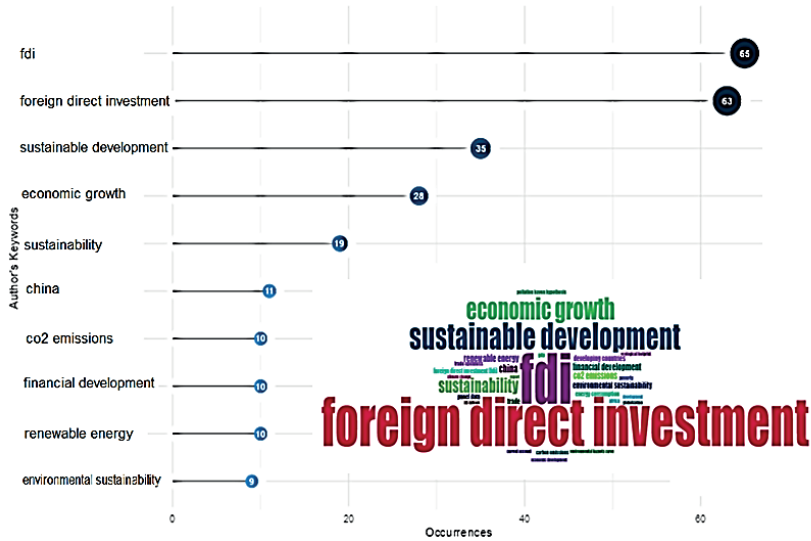


Figure 6: Most relevant keywords

As a result, it appears that, apart from the terms in focus (“FDI” and “sustainability”), studies in the examined set evolved mainly on growth and development issues.

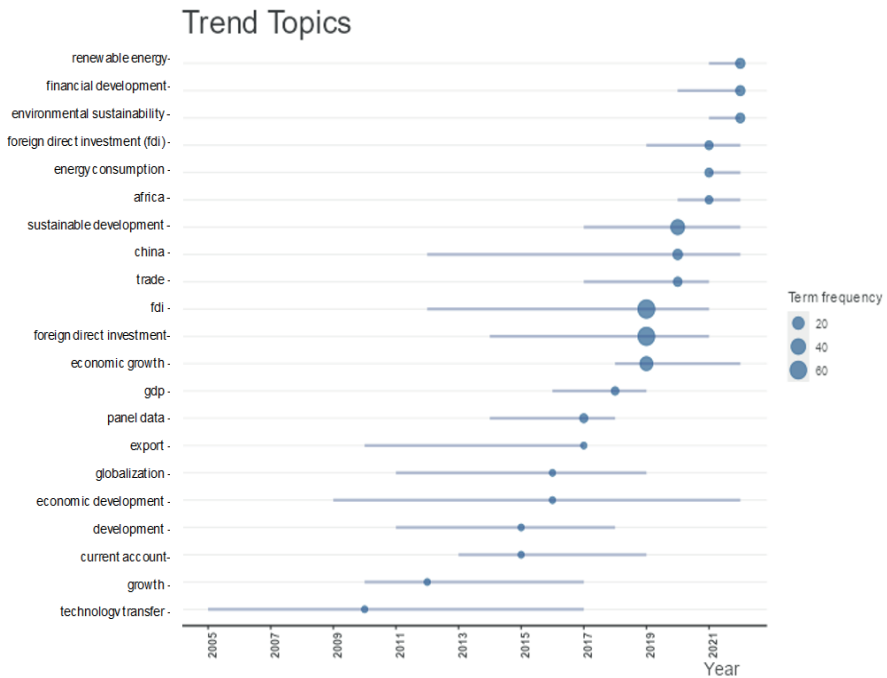


Figure 7: Trend topics

Figure 7 depicts how author keyword trends in foreign direct investment and sustainability research have evolved over time. Initially, focus was on technology transfer and growth but currently there is greater emphasis on financial development, renewable energy, and environmental sustainability. Additionally, the analysis shows that China, trade, energy consumption and Africa have gained importance in recent years. This change in emphasis becomes apparent from the longitudinal study of author keywords across the articles analyzed.

We utilized VOSviewer network data analysis software to extract a depiction of main author collaboration in the analyzed papers; this figure illustrates the collaboration network of key authors (Fig. 8). The minimum number of authors' documents has been four, and authors without connections are not presented to facilitate the interpretation of the network map. The most influential authors identified in the network are Zaman, Nassani and Aldakhil with 5 co-authored papers each, in the period between 2018 and 2022.

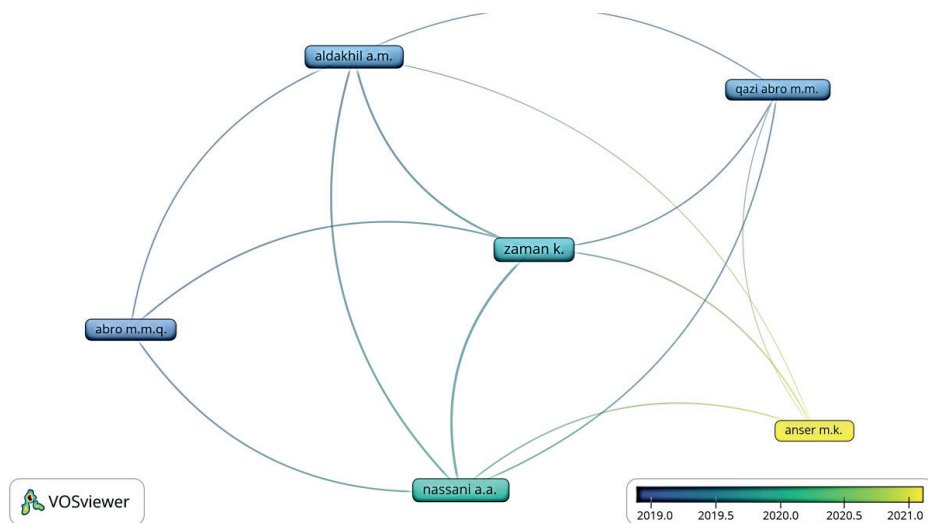


Figure 8: Main co-authorship network

Conclusions

This article helps understand the evolution of FDI-EG research from both bibliometric and review perspectives. This article provides extensive discussions on current research status, future research directions, and pros and cons of the methods employed. By adopting a bibliometric and review approach, this article facilitates better understanding of the evolution of FDIS research. Amongst the findings, a paper on the carbon dioxide emissions and FDI nexus published in the *Journal of Cleaner*

Production Energy is the most influential, while K. Zaman, China and the *Journal of Cleaner Production* are the most influential researcher, country, and journal, respectively. Based on author keywords analysis, twenty years ago, FDIS research centered on growth, technology transfer, and development, while, in the last five years, there has been a focus shift towards renewable energy, environmental sustainability, and financial development. Further discussions explore the current status of research, potential avenues for future research, and the strengths and limitations of the methods employed.

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