

Evaluating the ESI funds' efficiency: A bibliometric review

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Abstract: *The ESI funds are designed to support regional development by providing financial assistance to improve infrastructure, create jobs, and boost economic growth. Although they represent an essential source of investment for the member countries, at the end of the multiannual financial framework 2014-2020, the ESI funds absorption rate is 76%. Therefore, evaluating the ESI funds' efficiency is essential. Based on the bibliometric analysis, this research undertook a comprehensive examination of the literature review in his field. The bibliometric analysis generated 134 references from the Clarivate Analytics Web of Science Core Collection database. Research findings derived from this investigation establish that absorption capacity is the most relevant indicator for evaluating ESI funds' efficiency. The most commonly used method in research is Data envelopment analysis (DEA). The highest number of papers were published in Romania and Italy. Furthermore, the University of Murcia and Bucharest University of Economic Studies represent the most remarkable institutions.*

Keywords: *European Structural and Investment Funds, efficiency, evaluation*

JEL Classification: O52, P48

Introduction

The current crises have strained the national budgets of EU members and revived the debate on the need to manage the common budget effectively and to reduce the differences between the levels of economic, social, and territorial development of the regions. The European Union pursues achieving these objectives by granting financial resources to the member states through the European Structural and Investment Funds (ESI Funds). Being the most critical investment tool for member countries and the second-largest spending category in the Union's budget, the field of ESI funds has become a focus of worldwide academic research and a central element of the evaluations at the level of the European Union.

Starting with the multiannual financial framework 2007-2013, we noticed a significant increase in studies focused on evaluating ESI funds at the European Commission level and in the academic community. To provide a reliable and objective assessment that is accessible to all interested parties, various methodologies and tools are used. Researchers and practitioners propose different macro and microeconomic models, which quantify the impact generated by these funds on multiple indicators. Still, the research on evaluating the efficiency of the administration and implementation of ESI funds needs improvement.

Hoerner and Stephenson (2012) argue that the evaluation in the EU is an under-researched topic, and most of the research focused on the short-term impact of the EU's Structural Funds Programme (Becker et al., 2010). These evaluations, however, do not allow contrasting each country/region/programme against their peers and don't allow identifying the adjustments required

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for the non-efficient country/region/programme to become efficient (Gouveia et al., 2021). For this reason, there is a need for more research focused on understanding the long-term impact and the ESI funds' efficiency determinants.

Considering the aforementioned research gap and the importance of evaluating the ESI funds' efficiency in the context of the new multiannual financial framework 2021-2027, we considered relevant a detailed investigation of the level of knowledge of the specialised literature in this field.

The paper is structured as follows: Section 2 provides an overview of previous research describing the ESI funds' efficiency, Section 3 presents the methodological aspects of performing a bibliometric analysis, Section 4 presents research findings and studies, and Section 5 is dedicated to conclusions.

Literature review

Numerous scholars argue that the European Structural and Investment Funds (ESI Funds) notably affect the development of all communities in the EU member states. (Boc, 2020; Tijanic and Obadic, 2015; Vukašina et al., 2022; Gouveia et al., 2021; Lovrinovic and Nakic, 2016). Although they represent an essential source of investment for the member countries, at the end of the multiannual financial framework 2014-2020, the degree of absorption of ESI funds is 76%, according to European Commission (2023). Several factors caused this suboptimal use of the EU budget, therefore it is essential to evaluate the ESI funds' efficiency in further supporting the decision-makers in the context of the new multiannual financial framework 2021-2027, but also for the future beneficiaries of the ESI funds.

Research highlights different methodological approaches to analyse ESI funds' efficiency, impact, and added value. The first category of studies focuses on evaluating the main achievements of ESI funds, while the second one highlights the factors that influence the efficiency of the administration and implementation of these financial instruments in the member states.

On the one hand, the researchers investigate the effects of ESI funds by using different tools and indicators and find positive impacts in their studies. Scotti et al. (2022) found that the Structural and Cohesion Funds are positively associated with the R&D, Transportation, Energy, and Human Resources sectors at the level of European NUTS 2 over 2007–2014. Confirming the results, Kyriacou and Roca-Sagalés (2012) show that the structural and cohesion funds helped reduce regional disparities within EU members during the programming periods 1994 -99 and 2000-06.

On the other hand, researchers are interested in evaluating ESI funds' efficiency determinants. Rodríguez-Pose and Garcilazo (2015) analysed a total of 169 European regions during the period 1996–2007. They revealed the importance of government quality as a direct determinant of economic growth and a moderator of the efficiency of Structural and Cohesion Funds expenditure. Incaltarau et al. (2020) analysed the 2007–15 implementation period and stated that government effectiveness and public diversion of funds significantly affect the recipient countries' ability to absorb EU funds. In addition, Gómez-Gallego et al. (2022) highlighted the importance of Good Governance, Economic Freedom, and the Gini coefficient of equalised disposable income to improve performance in managing European Structural Funds.

The literature review revealed that ESI funds' efficiency is divided into two categories, and researchers defined the efficiency differently. The first category associated the term with the impact and evaluated the achievements of ESI funds. The second one investigated the determinants of the ESI funds' efficiency in administration and implementation.

Considering this aspect and the increasing number of articles and studies in the field of ESI funds' efficiency, we propose a bibliometric analysis to investigate the level of knowledge in the literature evaluating ESI funds' efficiency.

Methodology and data

This research endeavours to conduct a comprehensive bibliometric analysis of relevant literature within the domain to elucidate the degree of expertise present in the specialised literature concerning the evaluation of ESI funds' efficacy. Adopting appropriate software for visualising and scrutinising data was acknowledged to execute a rigorous empirical investigation that can discern the conceptual framework underlying the specified research field. Consequently, Bibliometrix, an R-based package, was selected as the preferred software instrument for creating and presenting bibliometric networks.

Our research considers data extracted from the Web of Science Core Collection database, the world's oldest, most widely used, and authoritative database of research publications and citations (Birkle et al., 2020). The search strategy included the terms ("European structural funds ") AND ("efficiency"). The generated data sample included 158 documents, which were later limited to those written in English and published in 2007-2023, resulting in 134 scientific works (Figure no.1).

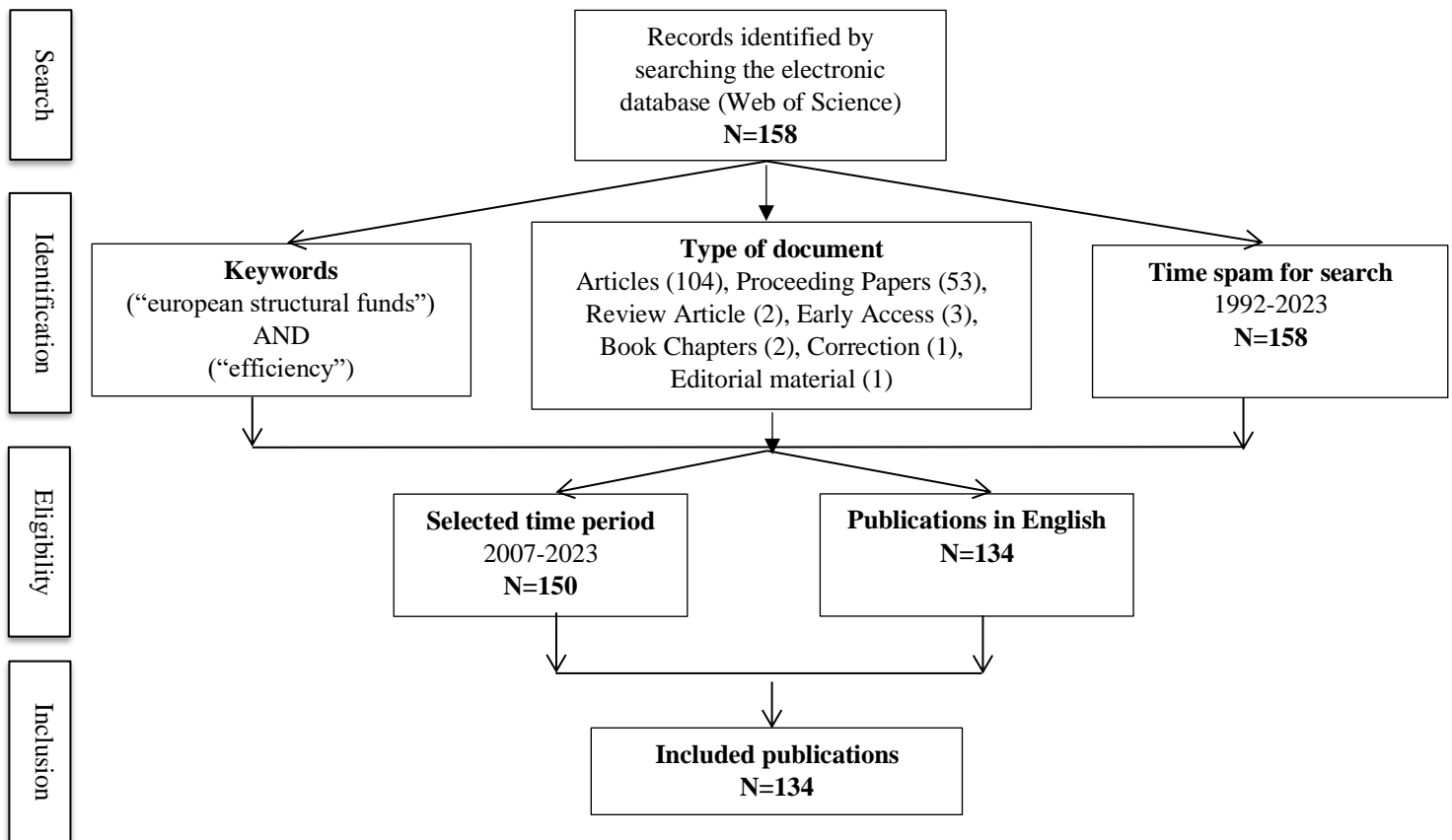


Figure no. 1 Research Strategy
Source: Author's computation

The analysis implies several bibliometric indicators, including the keywords analysis, the spatial distribution of publications about the topic, the collaboration network between authors, and citation analysis.

Empirical results

Co-word Analysis

According to Aria and Cuccurullo (2017), the co-word analysis aims to draw the conceptual structure of a framework using a word co-occurrence network to map and cluster terms extracted from keywords, titles, or abstracts in a bibliographic collection. In a co-word analysis, the relevance of each keyword is indicated by node size, which emphasises the importance degree. In addition, the connections between two nodes, represented graphically by curves, describe the intensity of the connection between the words. The analysis of the 134 documents generated a total number of 488 author keywords. The 22 most relevant keywords are highlighted in the network returned by Bibliometrix (Figure no.2), considering a threshold of two edges. From the list of articles analysed, the top keywords are "structural funds" (with 23 occurrences), "European Union" (with 10 occurrences), "efficiency" (with 9 occurrences), and "cohesion policy" (with 8 occurrences).

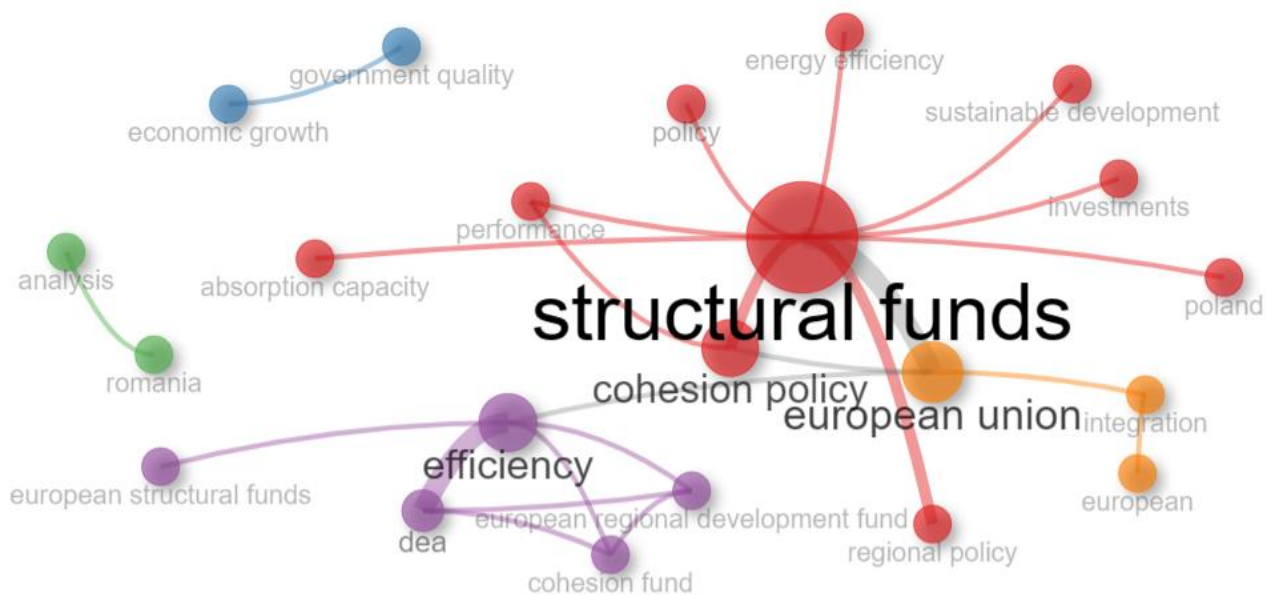


Figure no.2 Co-occurrence Network of Keywords
Source: Author's computation through Bibliometrix

The network also illustrates 5 clusters, highlighted by different colours. The first cluster (red) comprises 10 keywords with a strong relationship between "structural funds", "cohesion policy", "performance", and "policy". The next one is the orange, which contains only three words related to European integration: "European Union", "European", and "integration". The 3rd cluster consists of five words having a tight connection between "efficiency", "DEA", "cohesion fund", and "European regional development fund". The green cluster comprises two words, "analysis" and "Romania". The last cluster (blue) also includes two terms, "economic growth" and "government quality".

This analysis emphasises that the most relevant indicator for evaluating the efficiency of ESI funds is absorption capacity, and the most common used research method is Data envelopment analysis (DEA).

Authors, Affiliations, and Countries Analysis

The second part of the bibliometric analysis focuses on authors, affiliations, and countries analysis. This approach emphasises the relationships between researchers, the most relevant affiliations, and the most productive countries.

The collaboration network (Figure no.3) illustrates the spatial distribution of the 433 authors and their links regarding research cooperation in a specific area of scientific interest.

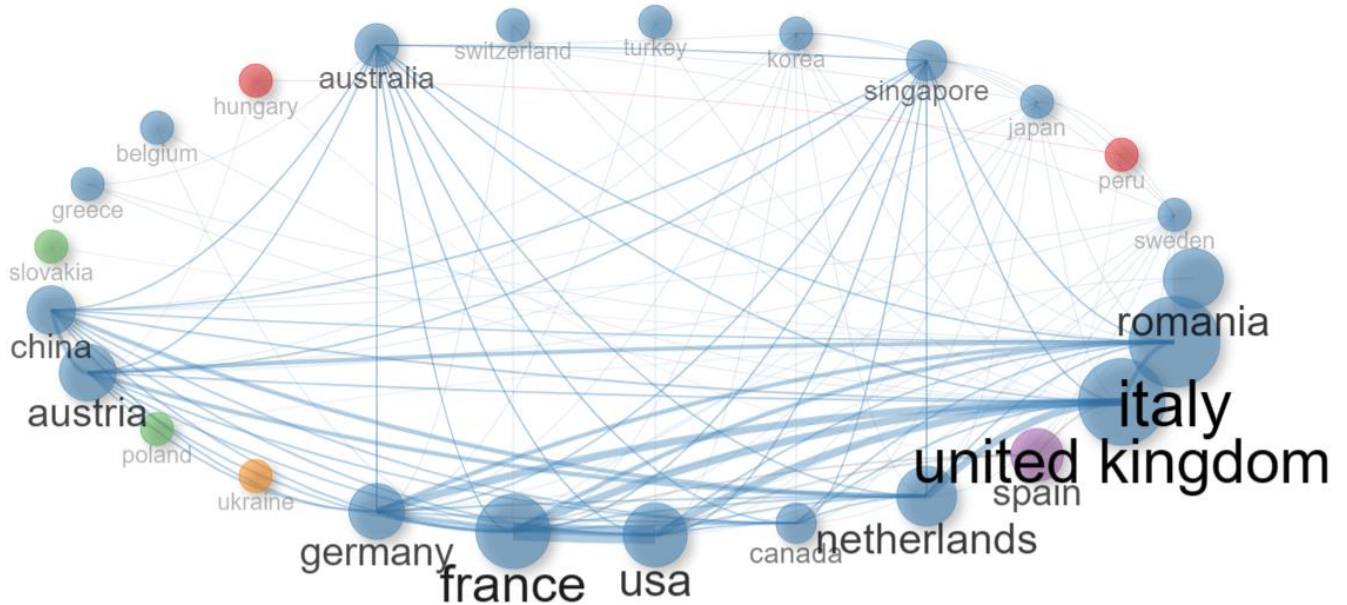


Figure no. 3 Collaboration network between authors
 Source: Author’s computation through Bibliometrix

The network illustrates four clusters, which grouped authors from 25 countries. The most significant of them is the first cluster (blue) which contains the following countries: Romania, Italy, United Kingdom, Netherlands, Canada, USA, France, Germany, Austria, China, Greece, Belgium, Australia, Switzerland, Turkey, Korea, Singapore, Japan, and Sweden. At the same time, our study reveals that this group is the most significant, with the greatest ties between the countries represented. The next cluster is the red one, which includes Hungary and Peru. Slovakia and Poland form the 3rd. And the last one contains only one country - Ukraine. From this analysis, we can notice that researchers worldwide are interested in structural funds, not only in the EU member states.

The focus of the second co-authorship analysis is the identification of the most relevant affiliations. According to the details reviewed in Table no. 1, the most influential institution is represented by the University of Murcia with 13 published documents, followed by Bucharest University of Economic Studies, which has assigned 12 articles, and the University of Calgary with 8 articles. Also, the Maastricht University, the University of Edinburgh, and the University of Toronto are other remarkable institutions regarding their interest in ESI funds.

Table no. 1 Most Relevant Affiliations

Ranking	Affiliation	Number of Articles
1	University of Murcia	13
2	Bucharest University of Economic Studies	12
3	University of Calgary	8
4	Maastricht University	7
5	University of Edinburgh	7
6	University of Toronto	7
7	Alexandru Ioan Cuza University	6
8	University of Bologna	5

9	University of Coimbra	5
10	University of Craiova	5

Source: Author's computation through Bibliometrix

Regarding the most influential countries, the data comprised in Table no.2 indicates that the highest number of papers on the ESI funds efficiency subject was published in Romania (50 documents), followed by Italy (46 documents), the United Kingdom (45 articles), Spain (42 papers) and the Netherlands (27 documents).

Table no. 2 Countries' Scientific Production

Ranking	Country	Number of publication	Average Document Citations
1	Romania	50	2,30
2	Italy	46	13,30
3	United Kingdom	45	55,10
4	Spain	42	3,80
5	Netherlands	27	172,80
6	Canada	24	51
7	USA	22	5
8	France	20	15,30
9	Germany	18	4
10	Portugal	17	11,80

Source: Author's computation through Bibliometrix

Although Romania is the most productive country in this area of scientific interest, the most cited country is the Netherlands (with an average of 172,80 citations per publication), followed by the United Kingdom (with an average of 55,10 citations per publication) and France (with an average of 15,20 citations per publication).

Citation Analysis

The final section of the bibliometric study highlights the most important publications on the topic in terms of citations (Table no.3).

Table no. 3 Most Local Cited Documents

Title	Authors and year	Publication	Number of citation
The case for regional development intervention: place-based versus place-neutral approaches	Barca, F., McCann, P., and Rodríguez-Pose, A. (2012)	Journal of regional science	690
Quality of government and the returns of investment: Examining the impact of cohesion expenditure in European regions	Rodríguez-Pose, A., and Garcilazo, E. (2015)	Regional Studies	174

Cohesion policy in the European Union: growth, geography, institutions.	Farole, T., Rodríguez-Pose, A., and Storper, M. (2011)	JCMS: Journal of Common Market Studies	174
Too much of a good thing? On the growth effects of the EU's regional policy	Becker, S. O., Egger, P. H., and Von Ehrlich, M. (2012)	European Economic Review	118
European integration, productivity growth, and real convergence	Kutan, A. M., and Yigit, T. M. (2007)	European Economic Review	60

Source: Author's computation through Bibliometrix

Barca et al., (2012) used the European Union case to highlight that the financial interventions to support regional development should be focused on efficiency and social inclusion at the expense of an emphasis on territorial convergence.

Rodríguez-Pose and Garcilazo (2015) aim to examine the relationship between the quality of local and regional governments and regional economic performance, linking government quality to the returns of European Union Structural and Cohesion Funds. The analysis results for 169 European regions during 1996–2007 underline the importance of government quality as a direct determinant of economic growth and a moderator of the efficiency of Structural and Cohesion Funds expenditure.

Farole et al., (2011) revisit the rationale of cohesion policy, with particular attention to the geographical dynamics of economic development. They conclude that mechanisms such as peer-to-peer mentoring systems, random project monitoring, and random audits of performance could help improve the delivery and effectiveness of Cohesion Policy intervention.

By conducting an analysis of two multiannual financial frameworks (1994–1999 and 2000–2006), Becker et al. (2012) find that EU transfers enable faster annual GDP per-capita growth in the recipient regions. The results lead to the conclusion that there is significant scope for greater efficiency at the level of Structural and Cohesion Funds transfers regarding their growth-maximizing allocation for the Union as a whole as well as its poorest regions.

Kutan and Yigit (2007) conclude that European Union (EU) integration is beneficial for member countries, especially from a long-run perspective, and Cohesion and Structural funds help the new members catch up with the core-EU members' standard of living.

Conclusions

This paper aims to investigate the extent of scholarly understanding derived from the domain-specific literature in evaluating ESI funds' efficiency. The authors performed a bibliometric analysis involving the keywords analysis, the spatial distribution of publications on the topic, the collaboration network between authors, and citation analysis.

Firstly, the co-word analysis maps the most relevant keywords identified in the 134 selected papers. According to the results, the most frequent keywords are "structural funds" (with 23 occurrences), "European Union" (with 10 occurrences), "efficiency" (with 9 occurrences), and "cohesion policy" (with 8 occurrences). Furthermore, the network indicates that absorption capacity is the most significant metric for evaluating the efficiency of European structural funds, and data envelopment analysis (DEA) is the most common research approach.

Secondly, the co-author analysis yields four clusters of authors and revealed that researchers from all across the world, not just EU member states, are interested in the issue of ESI funds. This analysis also identified the most influential institution that researched the studied fields. The University of Murcia, Bucharest University of Economic Studies, and the University of Calgary represent the most remarkable institutions.

Thirdly, the spatial distribution of total production in the field shows that the highest number of papers on the efficiency of ESI funds was published in Romania (50 documents), followed by Italy (46 documents), the United Kingdom (45 articles), Spain (42 documents) and the Netherlands (27 documents). In addition, European Commission (2023) centralized around 1800 evaluations of 2014-2020 operational programmes and found that Poland and Italy had produced the largest number of evaluations, followed by Germany, Czechia, Spain, and France. These results underline that the topic of ESI funds is of increased interest both for the academic community and for other stakeholders in these countries compared to others.

Also, these differences between countries' scientific production and the number of evaluations illustrate that the level of interest reflects Member States' reliance on ESI funds to support their regional and economic development objectives. As a result, it is rather essential to address regional disparities in the allocation and use of ESI funds, and policymakers need to ensure that ESI funds are distributed fairly and equitably across regions to promote balanced regional development.

Our analysis revealed that there is a significant body of literature on the evaluation of ESI funds, reflecting the importance of these funds for promoting regional development and economic growth in the EU. Therefore, we consider that the results obtained can provide valuable insights for political decision-makers involved in designing and implementing the new multiannual financial framework for 2021-2027. Moreover, the findings may also be helpful for future beneficiaries of ESI funds, as by understanding the existing literature on the evaluation of these funds, beneficiaries can gain insight into the potential benefits and limitations of ESI funding and how to use these funds to promote growth and economic development effectively.

Furthermore, the results of this research may have significant implications for the academic community. For example, the co-word and co-author analysis can help establish new collaborations and ideas for future research projects. In addition, identifying data envelopment analysis (DEA) as the most common research approach may encourage future researchers to consider this methodology in evaluating ESI funds. Finally, the spatial distribution of research results could inform the academic community about allocating resources for future research projects and highlight areas where further investigation is needed. Overall, this study makes a valuable contribution to the existing literature on evaluating ESI funds and could provide a starting point for future research and policy initiatives in this area.

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