

# Developing Methods for Assessing the Social Impact of Scientific Study

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**Abstract:** In many countries, there is a need to introduce new or improved existing methods for evaluating the social impact of scientific study on the environment of scientific institutions and universities. It is necessary to apply complex methodological solutions that should consider using research results by the non-academic world. The results of this evaluation are often crucial for building a university's position in national and international rankings. They may influence decisions regarding the level of financing of scientific institutions and the distribution of public funds for subsidies, scholarships, and financial aid concerning research grants. The paper aims to review existing methodological solutions and identify key trends in developing methods for assessing the social impact of scientific study. In this case, the scope of the research was limited to evaluating the study conducted within the field of social sciences. Running such assessments is more complicated than for the technical domain, for which more easily measurable bibliometric indicators and patents are available. The research used quantitative bibliometric analyzes based on the Scopus citation database, supported by bibliometric network analyzes. The results enable the identification of crucial methodological trends, potential opportunities and directions for developing research conducive to improving methods for assessing the social impact of study. Providing an overview of existing knowledge in this field creates a foundation for continuing further research.

**Keywords:** Social impact of scientific study, Social impact assessment, Methods for assessing the social impact, Bibliometric research, Social sciences

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## 1. Introduction

The quality of diverse scientific studies should be assessed from the point of view of achieved social benefits, contributing to the increase of competitiveness and favoring improvement of positions in international rankings regarding country excellence. It is essential to create bridges between the scientific and societal influences of study that are important for research users who are individual persons, groups of people or organizations experiencing the impact of research findings and thus achieving knowledge-driven objectives (Woolley and Molas-Gallart, 2023). In the past, there was a widespread belief that carrying out such assessments concerned only a selected type of research from the technical domain. Over time, however, a need was noticed to include other scientific disciplines in such analyzes, and to study the impact of academic communities on society and the economy. It is considered particularly important to take into account Social Sciences and Humanities (SSH) specific organizational and epistemic features and difficult to measure outcomes, which are fundamentally different from disciplines classified as the Science, Technology, Engineering, and Mathematics (STEM) (Reale *et al.*, 2018).

Developing methods for assessing the social impact of scientific research can be considered a key challenge, and in many countries public institutions encourage the introduction of new methods or improvement of existing ones as well as evaluation systems. Therefore, both simple and more complex methodological approaches are being improved, intended to support the estimation of the effects of scientific research felt by the non-academic world. The proper functioning and quality of methodological approaches is of great importance because the results of such assessments often have a decisive impact on building the position of universities in national and international rankings, as well as on decisions regarding the level of financing scientific institutions and the distribution of public funds allocated for research. The paper aims to review existing methodological solutions and identify key trends in developing methods for evaluating the social impact of scientific study.

There are significant needs to improve and develop assessment methods for social science disciplines, and therefore the research has not included relatively well-researched methods for STEM disciplines. The study is based on quantitative bibliometric analyzes carried out using the Scopus citation database, which is considered the best for publications in the social sciences. Additionally, some software was used to facilitate bibliometric network analyzes. The implementation of these analyzes allowed for the identification of key methodological trends, potential opportunities and directions of research development leading to the improvement of methods for assessing the social impact of study. Showing these trends and existing research gaps allows for a critical look at the current state of knowledge in this field and creates opportunities to develop further research enabling the improvement of methods for assessing the social impact of scientific study related to social sciences.

## 2. Social Impact of Scientific Study

The social impact of scientific study does not have a universally accepted definition and is understood in many ways. The most important concept associated with it is 'impact', which generally refers to beneficial changes in various socio-economic areas beyond the academic environment and analyzed for various stakeholder groups: policy makers (local, national and international), economy, industry and selected sectors of society (Dwivedi *et al.*, 2024). In practice, the levels of this impact cannot be measured fully objectively using a precise quantitative scale. Positive results of evaluations regarding the impact of research sometimes do not mean real benefits for society, but the preferences of research funders, which may be contrary to the ambitious social goals of the academic community and deepening knowledge of important scientific problems (Power, 2020). Doubts regarding the understanding of social impact result from its different views by various representatives of the academic community, such as academics or university authorities. Surveys conducted among university employees and their leaders show that there is a significant difference of opinion regarding the understanding of social impact, ways of measuring it, ways of improving impact strategies and identifying areas of conflict between academic staff and university management, which is usually less critical of the impact agenda (Newman, 2024).

There is no specific universal set of recommended methods for measuring the impact of study, and simplified measures are often used based on, e.g., bibliometric indicators such as the number of citations and impact factor of selected journals. Such indicators do not reflect the complex and subjective nature of assessments, which should enable consideration of multifaceted social benefits for various stakeholder groups. In some countries, more or less complex assessment systems are developed, which are sometimes improved over many years. Among such systems supporting the measurement of social benefits of study beyond academia, there are two leading solutions: the Research Excellence Framework (REF) from the United Kingdom and the similar Australia's Engagement and Impact Assessment. Impact assessments are carried out within various scientific fields and disciplines, including those relating to individual disciplines distinguished in the social sciences, e.g. as part of the sub-panel on business and management studies (Blackburn *et al.*, 2024).

Methods and tools for assessing the social impact of research primarily support the decision-making processes of those managing public funds intended for financing research, who not only distribute the available funds among scientific institutions, but assign them to various categories that determine the scientific position on the market. Higher-rated research means more funds for further research for the institution, as well as the awarding of a higher category resulting in opportunities for granting academic degrees, greater prestige, employing better scientists and recruiting students with better academic achievements. The results of assessments may influence not only their perception on the educational and scientific market, but also force internal changes in individual organizations, e.g. regarding organizational structures and employment in various positions, including managerial ones. The achieved values of bibliometric indicators reflecting institutional research performance are often related to administrative-structural changes, and the introduction of a network-like flexible structure instead of classic departmental structures. These radical modifications stimulate the emergence of new mechanisms of cooperation between researchers and changes within the nature of the results obtained, important from the scientometric perspective (Jiménez-Andrade *et al.*, 2024).

Assessment results regarding the social impact of scientific study are helpful when planning and implementing research because they often justify the need to conduct study that benefits the environment of scientific institutions and society. These results can support making informed decisions regarding the identification of scientific priorities and strategies and, as a result, the proper allocation of increasingly scarce resources. This is undoubtedly important for the implementation of current research projects and for attracting talent for future strategic plans. A higher evaluation of scientific institutions usually means greater recognition of the quality of study conducted and its results. It may mean measurable financial effects in the form of increased opportunities to finance grants, cooperation with other renowned institutions, as well as immeasurable benefits perceived in the long term in the form of an improved competitive position resulting from a better reputation. Clear and transparent consideration of the social impact of scientific study in decision-making processes helps to build a positive image of scientific institutions making a positive contribution to society, which are centers of creating valuable knowledge for achieving socially beneficial progress and development.

Assessment of the social impact of scientific study should involve the application of appropriate procedures, approaches and methods. It usually consists of using only expert opinion, which needs support with evaluation methods that can help consider the comprehensive nature of research impact assessment, which is essential. These methods include bibliometric analysis, based on examining citations, the network of co-authors, and the

scope of research results. Alternative indicators also available to evaluators may include measures of social media presence, press articles, policy documents, and other variables of research effects observed outside academic circles. Such indicators may involve estimating impact based on economic benefits related to creating new jobs, introduced innovations, patent applications and emerging opportunities for commercialization of research results.

During evaluation, it is worth trying to combine quantitative and qualitative methods, which in many cases may make it easier to consider the multifaceted nature of research impact. Additionally, it is essential to remember to ensure interdisciplinary aspects and transparency of evaluation criteria to achieve credibility of the obtained evaluation results. Qualitative analysis methods and case studies of in-depth analyzes of selected research projects and programs aimed at understanding their particular impact on various stakeholders, communities, or industries are therefore helpful. In assessing the social impact of scientific study one can use the results of consultations with multiple stakeholder groups, including industry representatives and selected community members who can present various points of view on the impact of research and its importance for social needs.

The processes of assessing the social impact of scientific study are specific to various scientific disciplines and their implementation poses more or less difficulties. Assessments carried out for research conducted in the SSH are often quite difficult and the results obtained are questionable. In these fields of science, there is a need to organize the state of knowledge about available indicators and evaluation criteria, as well as methodological achievements regarding universal and reliable methods and methodological frameworks useful in social impact of study assessment processes. Therefore, SSH research is being developed on the role of universities in society, various measures of academic success, systemic barriers to scientific community engagement, approaches to improving the engagement of scientists in line with social needs, desired changes in policy and the practical operation of higher education conducive to improving the beneficial social impact of scientific research (Kelly and Given, 2024).

The specificity of SSH requires the use of complex approaches in the processes of assessing scientific outputs appropriate to the researched scientific fields. The complexity of these approaches lies, e.g., in the combined use of various research methods and carrying out the assessment in several-stage processes including isolating diverse scientific achievements in a given discipline, organizing panels of experts in this area and qualitative weighing of scientific outputs, taking into account the adopted research objectives and approaches (Ebrahimi Dorcheh *et al.*, 2024). At the levels of individual scientific institutions and public organizations sponsoring research, in most cases only quantitative estimations of the impact of scientific study in SSH using bibliometric indicators are not applied. Assessment processes are based mainly on the subjective results of the work of expert panels, which are often a source of doubts, controversies and sometimes even suspicions of bias (Martin, 2011).

In the SSH scientific community, there are doubts about the possibility of objectively distinguishing the impact related to research that can be clearly attributed to a selected scientific institution. Social impacts of study often result from accumulated knowledge concerning many research processes carried out over the years by various research centers. The creation and accumulation of scientific knowledge for SSH tends to be non-linear and has less obvious, specific and quantitatively measurable impacts (Hyland and Jiang, 2024). It is therefore justified to conduct research and analyzes regarding the development of principles and criteria for conducting effective processes of conceptualization, measurement and assessment of the social impact of SSH study (Grzeszczyk, 2022). In particular, it is important to build a solid methodological basis for conducting effective and reliable assessment of the impact of scientific research. A study aimed at reviewing existing methodological solutions and identifying key trends in developing methods for evaluating the social impact of SSH study seems promising.

### **3. Methodology**

The research is aimed at determining the state of knowledge about methods supporting the assessment of the social impact of scientific study conducted in the social sciences and identifying key trends in the development of this field. Literature research and quantitative bibliometric analysis were provided using the Scopus citation database and the VOS-viewer software tool, which was applied to illustrate the visualization of bibliometric networks. The Web of Science (WoS) database is very useful for conducting bibliometric analysis studies in many scientific fields and disciplines. However, an uneven development of some citation indexes can be noted, e.g. the Social Sciences Citation Index (SSCI) and Arts & Humanities Citation Index (A&HCI) (Liu *et al.*, 2024). WoS is well suited for conducting literature reviews regarding studies carried out in many various areas of sciences (Viana-Lora and Nel-lo-Andreu, 2021). In turn, the Google Scholar database is characterized by significant inaccuracy of bibliographic data and inconsistent parameters describing the indexed publications. For the

purposes of this research, the Scopus database was selected, which contains consistent and reliable data for social science publications.

The research scheme is largely based on the PRISMA method derived from medical science (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Moher *et al.*, 2010; Page *et al.*, 2021). However, this method is increasingly used not only to conduct research involving systematic reviews published in clinical journals. Research schemes based on PRISMA are accepted by the academic community and enable the achievement of research repeatability, but there is a lack of full awareness of the possibilities of applications within various scientific fields and disciplines, e.g. social science, business and management studies (Mishra and Mishra, 2023).

The following research scheme was adopted, including quantitative and qualitative (manual) analyses:

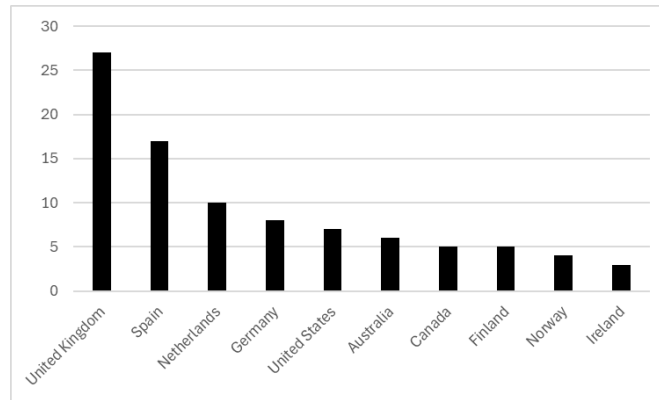
- formulation of the research question: what are the leading methodological solutions and key trends in developing methods for assessing the social impact of scientific research in the field of social sciences?
- narrowing the scope of research to data concerning scientific articles (written in English) in journals related to social science and indexed within the Scopus database (collected in May 2024), timespan 2003-2023,
- determination of search parameters for quantitative analyses,
- identification, selection, and inclusion of publications for qualitative analyses,
- qualitative meta-analysis,
- network literature analysis.

The following keywords were used in the process of identifying scientific articles: “social impact of research”, “societal impact of research”, “societal relevance of research”, “third stream activities”, “social benefits of research”, “social contribution of research”. The search included article title, abstract and keywords.

#### **4. Results and Discussion**

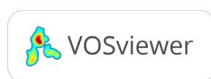
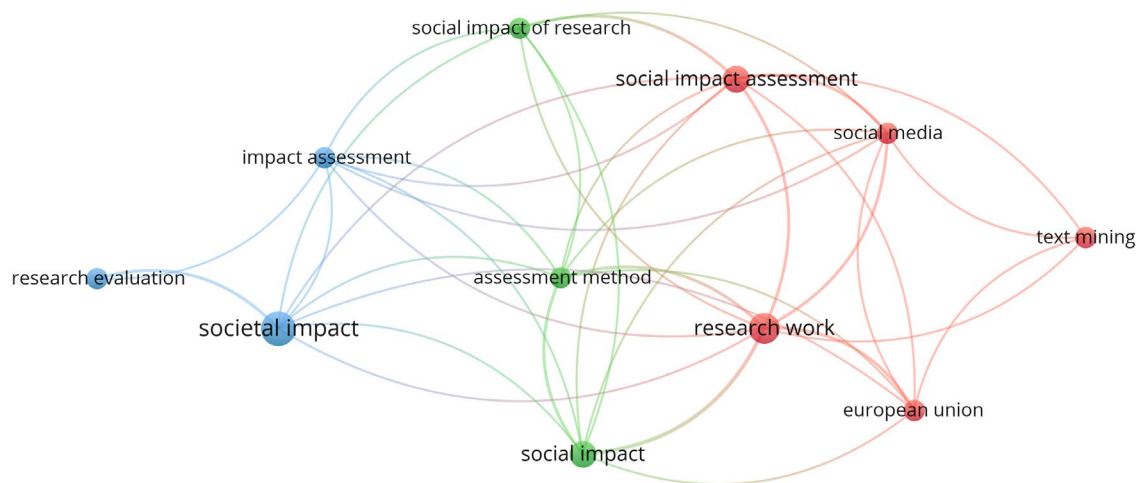
86 publications were identified as a result of a systematic literature search in accordance with the adopted research scheme. The number of indexed articles reflects, to some extent, the intensity of significant research conducted in the analyzed field. The numbers of papers for individual countries may indicate the advancement of research and mastery of the methodological foundations for assessing the social impact of research conducted in social sciences (Figure 1).

The results of bibliometric analyses show a more significant number of publications in countries where the methodological basis for evaluating the social impact of study is well established. The large number of publications affiliated with research centers in the UK and the presence of Australia prove the significant advancement of research and the development of similar national evaluation systems for publicly funded research. In some European countries featured in Figure 1, public institutions sponsoring research also contribute to developing inquiries into systems, methods and tools for assessing research impact. Also, in the USA, the methodological bases for evaluating the social impact of scientific research are constantly being improved. Financing scientific studies from public funds involves awarding grants whose value depends on the results of expert assessments based on multidimensional analyses (Meagher and Martin, 2017). Major challenges for multidimensional analyzes are related to conducting complex and multifaceted assessments for transdisciplinary research fields that include complex analyzes of sustainable development and climate change requiring consideration of interactions between social and natural systems (Kny *et al.*, 2023). Taking into account productive interactions (exchange of useful knowledge between researchers and interested parties) in assessments is one of the basic elements of integrating inter-and multidisciplinary projects that have a positive impact on socio-ecological systems (Díaz Mariño *et al.*, 2021).



**Figure 1: Number of articles for particular countries (source: own study based on Scopus)**

Leading methodological solutions were identified manually after analyzing the selected articles. To assess the social impact of scientific studies, mainly methods known in social sciences are used, including the following ones: peer review, surveys of expert opinion, mixed methods and case studies, observation, interviews, bibliometrics, alternative indicators and metrics (altmetrics), document analysis and assessment reports. In addition to these typical solutions, there are also attempts to use advanced methods, e.g. text mining (Zheng *et al.*, 2021).



**Figure 2: A fragment of a bibliometric map related to assessing the social Impact of research (source: own study)**

The applications of altmetrics and web-based metrics are developed as a result of the search for effective methods of public engagement with scientific study achievements, which would constitute an important complement to classical methods based on expert opinions and bibliometrics. For this type of analysis, data from social media platforms are used. In addition to the disadvantages analogous to traditional bibliometric indicators (the number of citations does not always reflect the value of the publication), altmetrics methods have numerous advantages related to the possibility of taking into account various indicators not related to publications and the ease of conducting quick impact assessments (Bornmann, 2014). An interesting direction in the development of altmetrics is using AI-assisted models (De Winter, 2024).

A separate set of data searched in the Scopus database was prepared for bibliometric network analyses. The keyword "impact assessment" has been added to the previously mentioned search parameters. The identified

bibliometric networks (Figure 2) related to selected research areas and keywords make it possible to discover connections between them and key trends in research on methods for assessing the social impact of research conducted in the social sciences.

The research carried out has significant limitations and requires further investigation. First of all, bibliometric research should include data collected using a larger number of databases. In-depth analyzes are also necessary leading to the formulation of conclusions of key importance for the development of methods and tools for assessing the social impact resulting from conducted scientific research. It is necessary to check whether important publications were not omitted during the analyses, the importance of which results from the specific features and complexity of social research impact assessment processes. Many of this type of scientific investigations cannot be carried out as a result of quantitative analyses, but primarily require long-term and time-consuming manual qualitative analyzes involving careful reading of the content of individual scientific articles.

## 5. Conclusions

Identification of methods supporting the assessment of the social impact of scientific study helps determine critical trends in the development of methodological research. Understanding the state of knowledge creates appropriate conditions and the basis for improving these methods, the skillful use of which is necessary to build the competitive position of scientific institutions competing in application processes for financing scientific and research projects from public funds.

On the one hand, existing methods and tools for assessing the social impact of research are expected to be improved. On the other hand, there is a real need to develop new, advanced methods, but key challenges accompany this. These challenges include, in particular, the significant complexity and uncertainty of the assessment processes, the need to conduct transdisciplinary research and multi-aspect dependencies in R&D projects, taking into account quantitative and difficult-to-measure qualitative criteria, complications in using traditional simple assessment indicators and problems with including diverse groups of stakeholders in scientific projects.

The undertaken research requires continuation and deepening by collecting data from more databases. Improved bibliometric research can help better understand the current state of knowledge. Further improvement of work on research impact assessment methods may also result from supplementing the results of bibliometric analyzes with observations and expert opinions regarding assessment systems operating in leading research centers.

The obtained results constitute a reliable basis for continuing methodological research toward designing and implementing new approaches, methods and assessment tools. Conducting this research should consider the guidelines formulated by public sponsors of research projects and recommendations for national and international systems for evaluating the social impact of research.

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