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The Impact of Brazilian Scientific Production on Public Policies: A Scientometric Analysis

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Introduction

The integration of scientific knowledge into public policies is a critical pathway for addressing complex societal challenges, such as health crises, environmental sustainability, and economic inequality. Understanding how science contributes to policymaking is essential for assessing the societal impact of research and enhancing evidence-based decision-making processes (Bozeman & Youtie, 2017; Dorta-González et al., 2024). However, evaluating the direct influence of scientific outputs on policy remains challenging, particularly in countries of the Global South, where geographic and linguistic biases often limit visibility in international databases.

In Brazil, despite significant challenges in funding and conducting research, the country has developed a robust scientific infrastructure, producing a high volume of publications across diverse disciplines. This study investigates the extent to which Brazilian scientific output is cited in public policy documents globally, leveraging the Web of Science (WoS) to identify relevant publications and the Overton database to track their impact on policies.

Building on methodologies explored in prior studies (Cristofoletti et al., 2024) this research not only quantifies the use of Brazilian science in policymaking but also identifies the thematic areas where its impact is most prominent. By focusing on the intersection of research and policy, the study contributes to discussions on enhancing the societal relevance of science and addressing methodological challenges in impact evaluation.

Method

We employed bibliometric methods to analyze metadata from research articles authored by Brazilian researchers indexed in the Web of Science (WoS). The records were identified using search strategies in the WoS advanced search mode, applying the field tag CU=Country/Region and selecting only articles associated with "Brazil" or "Brasil." This approach ensures that every article included has at least one Brazilian author. The dataset spans from 1900 to 2023 and was retrieved on

The search resulted in a total of 964,075 articles. We extracted the Digital Object Identifiers (DOIs) of all records for further analysis. These records were imported into data analysis tools for organization and treatment.

The data included metadata fields such as publication year, research areas (subject categories assigned by WoS), journals, author affiliations, funding agencies, and countries of co-authors. To ensure consistency and accuracy, we cleaned and standardized the data on authors' affiliations (from here on, organizations) and funding agencies using text-mining software and manual verification. The DOIs of these publications were then queried in the Overton database, which

indexes public policy documents and their references. Overton's API was used to extract data on mentions of Brazilian publications in policy documents. After retrieval, the data underwent cleaning and verification to ensure consistency and remove duplicates. This process allowed us to link each scientific publication to policy documents that cited it as previously suggested in the literature (Cristofoletti et al., 2024).

Results

This study provides a comprehensive analysis of Brazilian scientific production and its impact on public policy documents. The findings are structured into two subsections: the first explores the profile and characteristics of Brazil's scientific output, while the second examines the extent to which this research is cited and utilized in policymaking contexts globally.

Brazilian scientific production

The temporal analysis of Brazilian scientific production reveals consistent growth over the decades, with an acceleration after 2010. The most productive year was 2021, with 76,884 publications. By 2023, 964,075 publications with at least one Brazilian author were indexed in the Web of Science. In terms of international collaboration, the United States stands out as the most frequent partner, with 111,640 publications, followed by the United Kingdom (43,608), France, Germany, and Spain.

Institutions play a central role in Brazil's research output. The University of São Paulo (USP) leads with 203,238 publications, followed by other major public universities such as the State University of Campinas (UNICAMP) (69,305), the Federal University of Rio de Janeiro (UFRJ) (62,743), and Sao Paulo State University (UNESP) (62,201). Additionally, organizations like the Fundação Oswaldo Cruz (FIOCRUZ) and the Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA) contribute significantly to areas such as health and agriculture.

Research funding is heavily supported by national agencies, particularly the National Council for Scientific and Technological Development (CNPq), which funded 297,840 publications, and the Coordination for the Improvement of Higher Education Personnel (CAPES), which supported 198,333. State-level agencies like the São Paulo Research Foundation (FAPESP) (124,065) and international organizations, such as the National Science Foundation (NSF) (12,998) and National Institutes of Health (NIH) (10,931), also play significant roles. This comprehensive support network highlights the foundation for Brazilian science and its integration into global research initiatives.

Policy impact

The number of policy documents citing articles with at least one researcher affiliated with a Brazilian institution has grown significantly over time, totaling 161,693 documents. While citations were relatively low before 2010, a steady increase is observed, peaking in 2021 with 18,873 documents.

The majority of policy documents citing Brazilian research were written in English (71.8%), followed by Portuguese (9.2%) and Spanish (7.9%). In terms of authorship, governments were responsible for 41% of these citations, while international governmental organizations (IGOs) accounted for 32.9%, and think tanks contributed 18.8%. Figure 1 highlights that intergovernmental organizations (IGO) and major countries like the USA and the UK are among the most frequent citers, with Brazil itself ranking third.

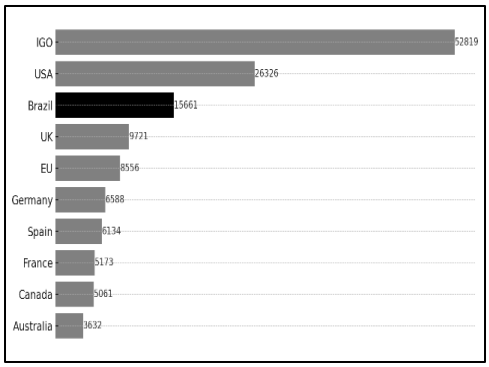

Figure 1. Citations of Brazilian Research in Public Policy Documents by Country.

Figure 2 shows that global institutions such as the World Health Organization (WHO), Food and Agriculture Organization of the United Nations (FAO), and the World Bank are the ones that reference Brazilian research the

most. Brazilian institutions like *Instituto de Pesquisa Econômica Aplicada* (IPEA) and *Fundação Getulio Vargas* (FGV) also contribute substantially, alongside the Brazilian Government.

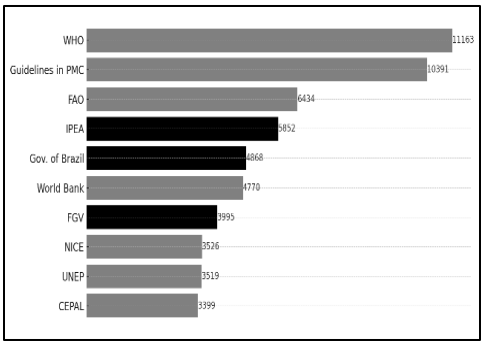

Figure 2. Institutions That Most Cited Brazilian Research in Public Policy Documents.

Conclusion

This study highlights the growing influence of Brazilian scientific research on global policymaking, demonstrating a steady increase in citations within policy documents over time. The findings reveal that Brazilian research is widely referenced, particularly in English-language documents and by international organizations, governments, and think tanks. While major global institutions such as the WHO and World Bank play a significant role in citing Brazilian research, national institutions like IPEA and FGV and the Brazilian Governemnt itself also use Brazilian-made science. These results show how Brazilian science is used for policies, despite challenges in research funding and visibility. Strengthening mechanisms to enhance the accessibility and influence of Brazilian research can further expand its role in global policy debates.

Acknowledgments

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