

THE DYNAMICS OF REGIONAL RESILIENCE. AN ANALYSIS OF TRENDS AND INFLUENCES IN THE LITERATURE

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Abstract

This study aims to discuss the concept of regional resilience by analysing the literature, the contributions of renowned authors and the most cited publications, thus the evolution of this concept. The bibliometric analysis is important for understanding how the idea of regional resilience has evolved and why it has become increasingly important in economic and sustainable development studies. Using VOSviewer, academic collaboration networks and publication trends of Web of Science indexed articles are mapped, providing a clear picture of the relevance of this concept in current economics and sustainable development policies.

One of the main objectives of this paper is to develop an approach that will open new avenues of study, contribute to the consolidation of knowledge in the field of regional resilience and support the evolution of regional development capable of coping with any type of shock. The study highlights the importance of regional resilience as a key element in the development of policies that support economic balance, social inclusion and environmental protection. This article will contribute to enriching the literature, filling their gaps and even to the formulation of policies underpinning the sustainable development of the economy in the face of the shock.

Keywords: Regional resilience; bibliometric analysis; adaptability; economic shocks; academic collaboratin

Clasificare JEL : F63, Q01, R11

1. Introduction and context of the study

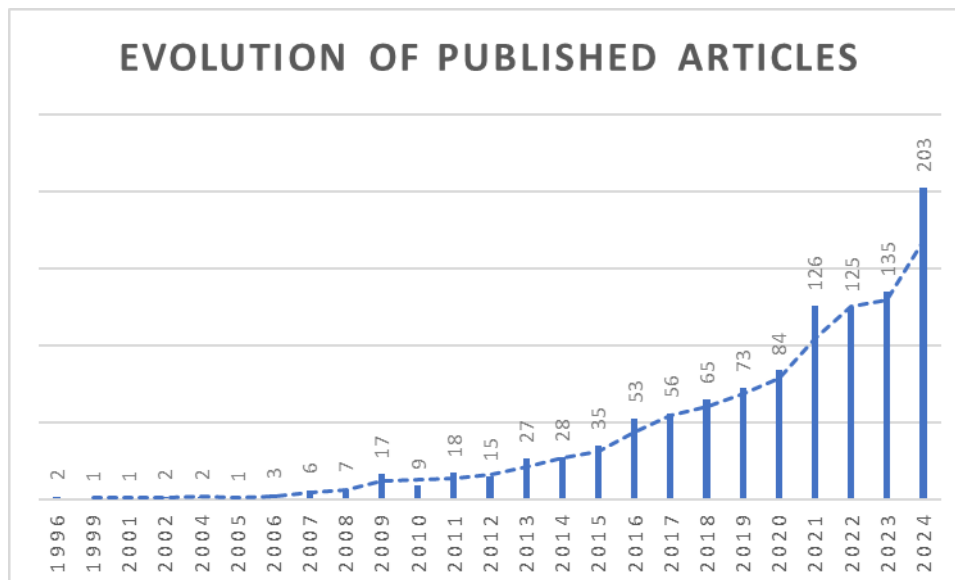
In the current global context, characterised by economic, social and environmental changes, the concept of regional resilience has gained momentum in the literature. In the literature, regional resilience is seen as a central component of sustainable economic development, as resilient regions can help to maintain economic equilibrium, support local communities and promote resource efficiency. Moreover, they can facilitate the transition towards green and socially inclusive economies, thus ensuring long-term sustainability.

As argued in their work Ron Martin and Peter Sunley the notion of resilience has rapidly become part of the conceptual and analytical lexicon of regional and local economic studies: there is increasing interest in the resilience of regional, local and urban economies. Yet, despite its increasing adoption and influence, the notion of regional economic resilience still needs to be consolidated from an economic geography perspective. There is still substantial vagueness regarding what exactly is meant by regional economic resilience, how it should be conceptualized

and measured, what its drivers are, and how it links to patterns of long-run regional growth. (Handbook on Regional Economic Resilience)

Research on regional resilience has had a sharp increase during the period 2016-2024, this can be seen by analyzing the 1094 articles written on this topic in ISI indexed journals, data collected from Web of Science sources and analyzed in VoSviewer.

Fig. 1 Evolution of the number of articles published on the topic of regional resilience



Source: Web of Science, personal data processing

Since 2016, regional resilience research has grown greatly, especially because of the growing recognition of economic, social, and climate crises. Global climate change and geopolitical instability have set up a series of academic and political initiatives that brought forward the need for understanding those factors which determine resilience.

Another major boost to the research of this discipline arrived with the COVID-19 pandemic, showing the fragility of regional systems. Since then, a host of studies have been done that test community resilience in response to economic shocks, resource availability, and critical infrastructure operation. Today, research increasingly relies on sophisticated analysis, drawing on complex data, to determine the interdependence between social, economic, and environmental aspects.

Today, regional resilience remains a key issue of research, in the context of sustainable development goals and green economic transition. The focus has changed from the assessment of vulnerabilities to concrete actions aimed at enhancing resilience, as reflected in the sustainable urban planning, digitalization, and development of strong local economic networks. This development demonstrates a trend for developing research, with a greater focus on applicability and collaboration between academics, authorities, and communities.

2. Research methods

Author Nelly Țurcan believes that the bibliometric method "aims at a comprehensive study of documentary flows by identifying their development patterns, compositional characteristics and structure. Bibliometric studies make it possible to synthesize the information contained in a documentary flow, as well as information absent from the document texts" (Țurcan, 2021, pp. 247).

The choice of a bibliometric analysis is justified by the advantages offered by this method in understanding and evaluating the dynamics of scientific research in the respective field. A

bibliometric analysis offers the possibility to systematically and quantitatively analyze the academic literature with clear insights into research trends, influence of authors, institutions and journals, as well as collaboration networks. This will help identify the evolution of the field of interest, research gaps, and future directions.

Another important reason is that bibliometric analysis provides an excellent way to apply some tools and techniques, such as citation analysis, mapping of research networks, and evaluation of impact indicators. These methods offer objective data to support conclusions and recommendations. For instance, keyword mapping and co-citation analysis serve to highlight the emerging topics and links among the concepts that are central to the specialized literature. This information provides an important input to the deep understanding of conceptual structures and relationships among diverse themes.

The bibliometric analysis of the concept of regional resilience provides an insight into its evolution and importance in the literature, revealing a significant upward trend in academic interest (Bănică and Muntele, 2020). Since the late 2000s, the notion of regional economic resilience (RER) has become the new buzzword in economic geography (Martin and Sunley, 2015).

Resilience manifests itself in and affects all sectors of economic activities and of human societal existence in general. From business management to social development (Zolli and Healey, 2012).

From the analysis we observe a significant increase in publications on regional resilience, not only in Europe but worldwide. Authors of interest in this field concretise the need to move from treating regional resilience as a concept to implementing the data collected to help regions, according to their characteristics, to become fit to move towards sustainable development. Thus, through the desire for development, mankind has become more attentive and receptive to the idea of preventing shocks, or, if this is not possible, absorbing them without leading to permanent damage and repercussions.

According to Zupic and Čater (2015), who provided a comprehensive guide on how to use the method in research, a number of steps are necessary for a rigorous bibliometric analysis. These steps include:

Identification of the objective and research questions: Whether the study of the trends in the area, assessment of the authors' productivity and influence, or collaboration networks will form the objective of the analysis. The question that forms this study assists to set the ball rolling with a clear path.

Data Collection: The decision on the bibliometric database to be used is highly decisive, such as Web of Science, Scopus, or Google Scholar. Keywords related to the subject of interest will have to be defined, including selection criteria to assure representativeness. Data Cleaning and Processing: De-duplication will be followed by data organization and preparation for analysis. Metadata accuracy needs verification, such as title, authors, and keywords.

Data analysis: This is the use of bibliometric techniques such as citation analysis, co-citation analysis, keyword mapping, and collaboration network analysis. VOSviewer, BibExcel, or CiteSpace software can be used to visualize the data.

Interpretation of results: The results need to be analyzed for trends, influential authors, important journals, and research gaps. At this stage, answers to the initial questions are obtained, and directions for future research are outlined.

Result presentation will involve writing up a paper that will involve the methodologies applied, the results realized, and the conclusion. This helps in effectively disseminating these results.

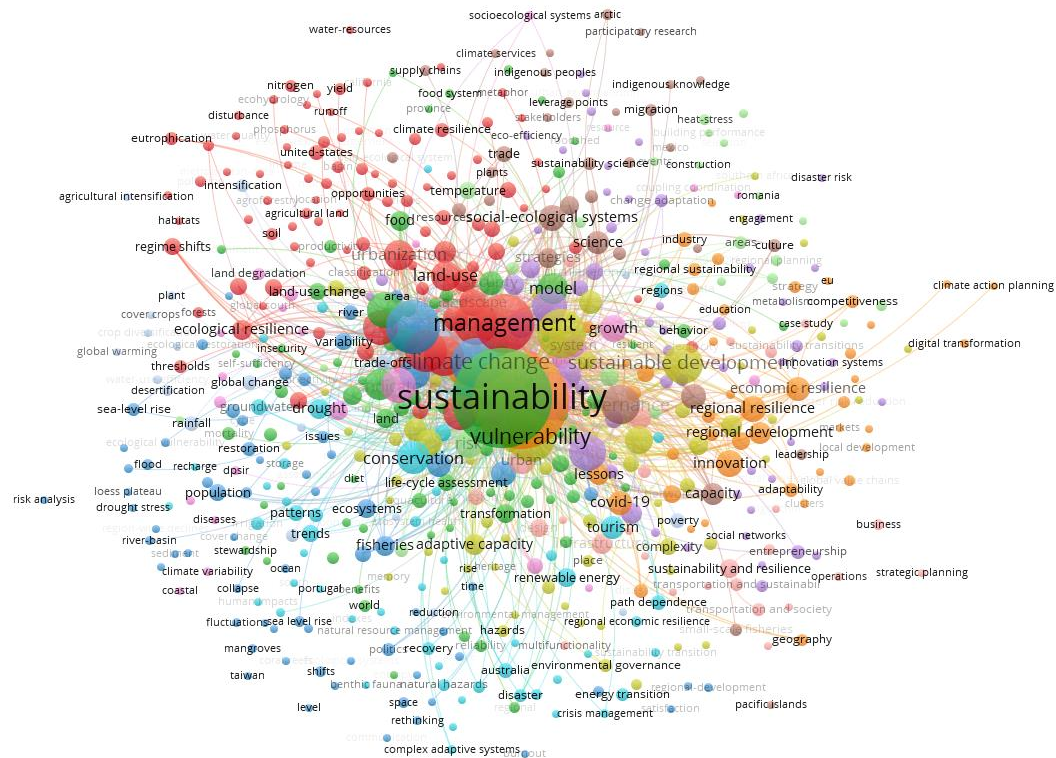
Following this flow, according to Zupic and Čater (2015), makes the whole analysis systematic, reproducible, and adds to obtaining quality results for the scientific community.

3. Results and discussion

I chose to begin with the analysis of keywords, as this is one of the basic ways of deeply understanding conceptual structure and dynamics within a research field. Keyword analysis may allow the identification of the most frequently used concepts and the links between them, thus yielding a clear picture of the main themes and subdomains explored in the literature.

Keyword analysis establishes an objective, quantitative data-based starting point for the rest of the research. The first stage, using visualizations and bibliometric metrics, sets the stage for a more in-depth review of the literature.

Fig.2 Map of visualization of keywords



Source: Web of Science, personal data processing

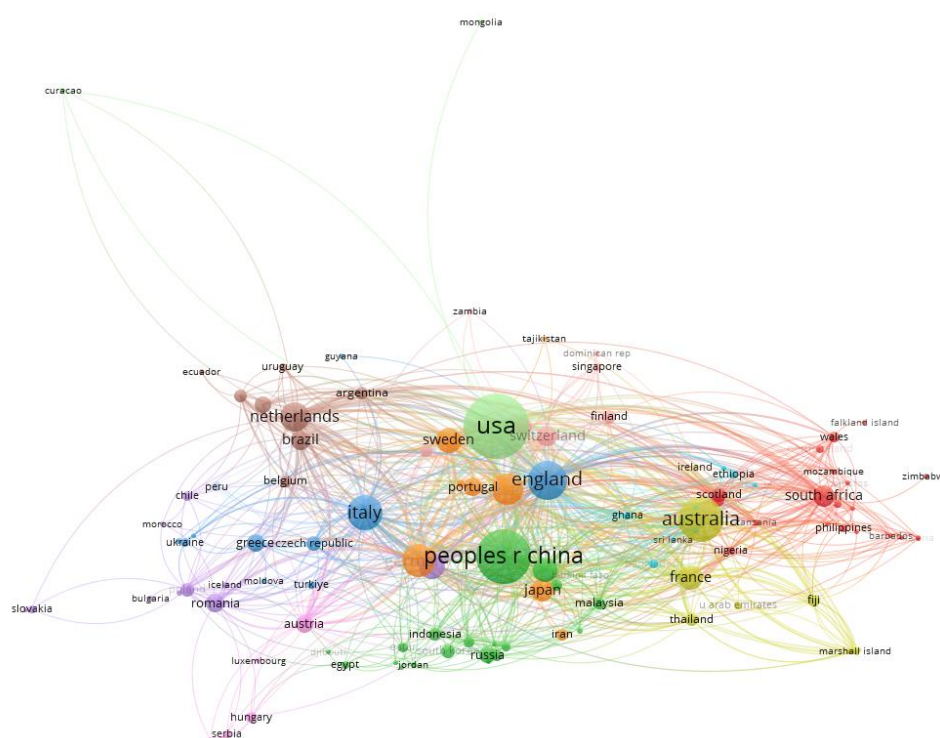
From an economic perspective, the keyword map provides a valuable basis for understanding the interconnections between sustainability, resilience and economic development. Core terms such as “sustainability” and “management” suggest that sustainability is a priority for economic policies and business models, indicating an increased concern for integrating sustainable development principles into economic decisions, reducing carbon footprints, resource efficiency and circular production models. Moreover, the terms "innovation" and "regional development" point to the significance of innovative strategies and regional policies in supporting the local economy and economic disparities as priority areas for further investment and research. The concept of economic resilience has been illustrated by terms such as "economic resilience" and "regional resilience"; the concern here is to determine the capacity of regions in handling the aftermath of economic and climate shocks.

Digitalization and innovation also emerge as central drivers of economic transition, underlined by terms such as "digital transformation" in relation to "regional development" and "sustainable development", reflecting the central role of digitalization in modernizing regional economies, increasing efficiency in production, and supporting resilience by reducing dependence

on traditional resources. Meanwhile, the terms "innovation" and "adaptive capacity" simultaneously underscore the ability of economies to adapt to rapid change—a key driver of encouraging investment in education, research, and development for global competitiveness. The interlinkage of terms like "regional resilience," "strategic planning," and "governance" shows the emphasis on integrated economic strategies at the regional level, crucial for the reduction of economic disparities and the creation of strong local economies able to absorb economic and social shocks. The link between "tourism," "sustainability," and "regional resilience" may also be interpreted as an opportunity for sustainable tourism to drive regional economic growth.

The map underlines economic priorities for the future, such as: integrating sustainability into strategic planning, fostering innovation, and adaptation to climate change. Hence, these links suggest that the economies of the future will be more sustainable if they adopt participative governance models and innovative strategies integrated into a local and global economy. This first analysis underlined the need to align sustainability with resilience and innovation in such a way that economic development is sustainable.

Fig. 3 Map of author distribution by country in research



Source: Web of Science, personal data processing

The graph of contributors to the topic investigated shows striking global disparities and remarkable patterns of scientific work, underscoring the contributions of international collaborations: major research poles are those of the United States and China, the dimensions of whose nodes indicate this fact. These two countries further reinforce the leading position by substantial contributions that provide the overarching tenor for international research activities.

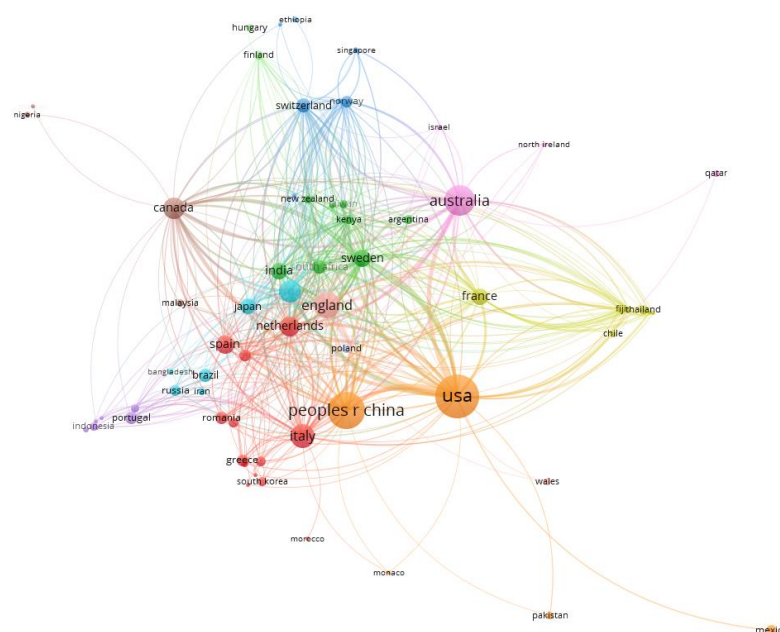
The complex interrelationships reflected between the countries on the map reflect a high level of international collaboration, marked by strong partnerships between the developed world, such as the United States, China, England, Australia, Italy, and France. This kind of collaboration is crucial for the advancement of research; this shows that transnational collaboration is very vital in enabling knowledge sharing and promoting the growth of new ideas. But even Europe holds a strong presence, while major nations include the Netherlands, Italy, and England contribute a lot

through their respective policies for research support in addition to European funding initiatives such as Horizon Europe.

The participation of developing nations like Brazil, South Africa, and India is significant, signifying a rise in scientific contributions originating from these areas. This phenomenon highlights the escalating acknowledgment of the necessity to tackle worldwide issues, including climate change and sustainability, by considering regional particularities. At the same time, regional partnerships are enhanced through geographic proximity and common interests, as in the case of countries in Central and Eastern Europe such as Romania, Hungary, and Bulgaria, and also between countries in South-East Asia.

This map shows just how much global collaborations drive knowledge output. The leading countries that set the global scientific agenda; developing regions are catching up, though, as this map shows: Encouraging more international collaboration and facilitating collaboration from developed to emerging areas could build a more equitable distribution and cohesive approach to solving global challenges.

Fig. 4 Map of citations by country in research



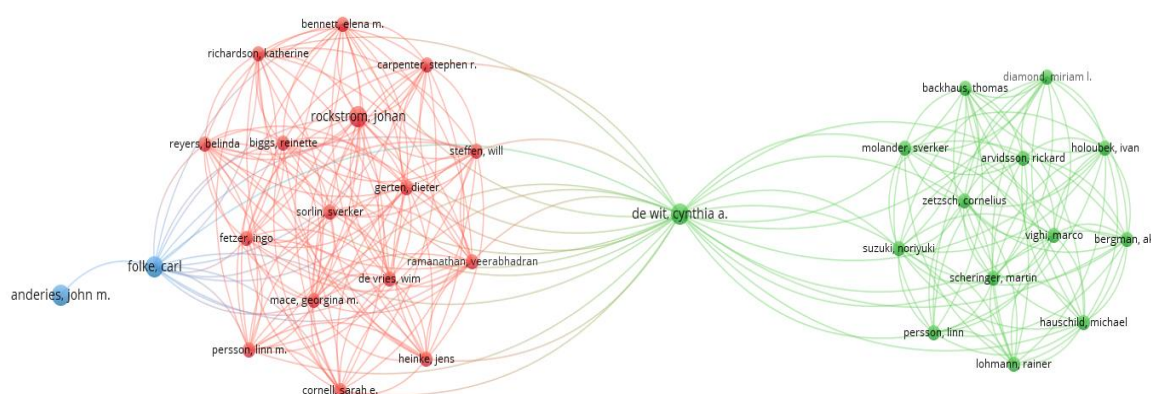
Source: Web of Science, personal data processing

This series is also reflected in the country citation map, which suggests a distribution observed for academic contributors; when volume translates to global impact, both become a real phenomenon, whereas, in the case of contributions, it was at author and institutional levels. The USA and China are still pre-eminent leaders, having the most authors and the greatest numbers of citations, both pointing out its vital role in the dissemination of knowledge creation. European countries, such as England, the Netherlands, and Germany, act as academic brokers, not only as producers of research but also as frequently cited sources that enable connectivity within the global network.

Countries such as India and Brazil, although having fewer authors compared to the major countries, have started to receive recognition in the world citation network. This new status reflects their growing influence, which demonstrates a more significant scientific importance at an international level. The global map thus suggests that the volume of publications as well as their impact are key to gaining visibility within the world of science, education, and research,

strengthening the earlier findings on the role that international collaboration plays in increasing recognition for local research.

Fig. 5 Map of author and their collaborations



Source: Web of Science, personal data processing

The comprehensive map showing the different authors and their collaborations gives a very clear and informative picture of the complex research networks and the strong links among researchers in the field analyzed. One cluster is very dense and is clearly led by the prominent figure of Johan Rockström, with an incredibly high number of collaborators, including well-known names like Will Steffen, Reinette Biggs, and Dieter Gerten. Such a remarkable concentration of researchers strongly suggests that this particular group is oriented toward dealing with high-impact topics of considerable relevance, such as the pressing issues of climate change and sustainability that are so crucial in today's world. The high density of the connections here referred to acts as an indicator of a strong and able academic leader who has acquired the necessary skills and authority to coordinate and even influence various research directions.

Another cluster, much more obviously centered around the work of Cynthia A. de Wit, depicts a very organized collaboration network, predominantly focused on themes that are complementary to those pursued by the group of Rockström. The researchers involved in this particular cluster, like Rickard Arvidsson and Noriyuki Suzuki, propose a different line of specialization that is at least as important in its own right. The striking internal density of this group speaks of a high degree of interdisciplinary collaboration, which is a critical player in making substantial contributions to research diversification within this very field.

Carl Folke and John M. Anderies form a smaller and less interconnected network compared to the other clusters present, which means that they make more focused and deliberate contributions specifically to certain niche subfields or specialized areas of study. The relative isolation that they experience may very well reflect a significant degree of strong specialization in their work and research pursuits but at the same time, this represents an invaluable opportunity for much greater integration and collaboration with other groups in the field in order to foster meaningful partnerships and enrich the shared perspectives that can emerge from such collaborative work. It is clear from the map that collaborations are distributed asymmetrically among different groups, meaning that whereas some groups are highly interconnected and collaborative with each other—for example, the group led by Rockström—others are isolated and disconnected. Key thought leaders in the context of thematic diversity across groups emphasize the critical importance of embracing interdisciplinarity, illustrating how greater integration between different clusters could significantly

foster the development of innovative perspectives and lead to the creation of complex solutions addressing pressing global problems.

4. Conclusions

Continuing research on regional resilience is of major strategic importance, as this concept lies at the intersection of sustainability, sustainable development, and adaptation to contemporary challenges. Regional resilience provides an essential framework for understanding and developing the capacity of communities and regions to respond to and adapt to disruptions, be they economic, climate, or social.

The direct link between regional resilience and sustainability is that a resilient region is better prepared to protect natural resources, implement sustainable practices, and support the transition to a green economy.

From the perspective of sustainable development, the concept of regional resilience is very important because it plays a central role in reducing economic and social inequalities among different regions. This is even more critical in the face of climate change, which has an uneven impact on already vulnerable and marginalized communities.

Research in this area can help provide solutions for improving regional governance, for the adaptive integration of economic, social, and environmental policies, and for the creation of stronger collaborative networks between regions. For example, resilience strategies developed in a participatory manner, based on community participation and coordination across sectors, may result in stronger social cohesion, helping to support a just transition that leaves no one behind. Furthermore, regional resilience is essential for achieving the Sustainable Development Goals (SDGs), in particular those related to sustainable cities and communities (SDG 11), climate action (SDG 13) and global partnerships (SDG 17). Continued research in this area can support the implementation of practical solutions to improve the resilience of regions to climate change and economic shocks, while promoting well-being and reducing inequalities. Therefore, investing resources and funds into research specifically oriented towards increasing regional resilience will be important in not only fortifying the ability of varied regions to respond and tackle their current challenges effectively, but it will also aid in the development of a better, more equitable, resilient future for all people.

The conclusions emerging from these thorough discussions show a clear, well-supported, and panoramic view of the research directions and the international contributions within the analyzed field. They thus outline the body of work that comes to integrate different dimensions of scientific production—conceptual frameworks, bibliometric analysis, and geographical considerations. The analysis clearly shows the uneven distribution of knowledge and resources across the world, underlining the fact that the United States, China, and Europe are in pivotal positions in this respect. These regions are not only important in producing large amounts of knowledge but also in the dissemination of that knowledge through various means, such as citations and collaborative efforts. This observation underlines the critical importance of consistent and substantial investment in research infrastructure and active support and promotion of international collaborations that can further enhance knowledge sharing and innovation on a global scale. At the same time, there is a rise in nations such as India, Brazil, and South Africa, a slow but important process in the democratization of knowledge that serves as an unmistakable indicator of increasing diversity in academic contributions being made around the world.

From a thematic perspective, the whole field is clearly articulated around some key concepts playing a crucial role in its framework, such as sustainability, resilience, innovation, and regional development. These key ideas are not only underlined in the detailed keyword analysis performed but also underlined in the wide collaborative networks created by the different authors working in this area of study. These terms are closely linked, indicative of a global concern in the development of sustainable and adaptive solutions to economic, social, and climate challenges. Here, opinion

leaders like Johan Rockström and Cynthia A. de Wit embody the potential of interdisciplinary networks in producing valuable knowledge—knowledge that could very well set the course for future research. In the light of the observations made, the paper distinctly positions itself as a comprehensive approach that not only synthesizes existing information but also effectively maps out the complex dynamics of global research and proactively identifies the emerging hot spots along with the potential opportunities for fostering a more extensive and equitable form of collaboration between different regions across the globe. By means of bibliometric and geographical analysis, it aims to highlight how research efforts can be harmonized to address the complexity of global problems but also inspire public and academic policies that accelerate the integration of emerging regions. In essence, the paper proposes a holistic vision of the field with an emphasis on interconnectivity, interdisciplinarity, and global equity in the construction of knowledge.

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