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Research Article

Integrating Socioeconomic and Ecological Perspectives: A Bibliometric Study on Sustainability and Resource Management

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ABSTRACT

This study performs a detailed bibliometric analysis to trace the evolution of sustainability and livelihood research, mapping key ideas, interdisciplinary connections, and the thematic shift from purely economic models to integrated frameworks encompassing social and ecological resilience, adaptive governance, and institutional dynamics. Using a structured approach with Scopus data, co-citation and co-word analyses were performed via VOSviewer and Bibliometrix. This process, guided by strict criteria, generated citation networks and keyword co occurrence visualizations to map the field's intellectual and thematic structure. Findings confirm the enduring influence of foundational frameworks, notably the Sustainable Livelihoods Framework (SLF) and Ostrom's Institutional Analysis and Development (IAD) framework. Results indicate an accelerating trend toward interdisciplinary teamwork, sustainability education, entrepreneurship, and the role of digital technologies in enhancing livelihood resilience.These findings offer useful insights for policymakers, educators, and industry players. They highlight the need for adaptive governance, technological innovation, and community-led sustainability projects. Additionally, the study points out important research areas, including climate adaptation strategies, gender-inclusive sustainability policies, and digital changes in livelihood systems. By connecting theoretical and practical views, this study helps deepen our understanding of the changing landscape of sustainability and resource management. It suggests strategic directions for promoting global sustainable development.

Keywords: *Bibliometric analysis, Sustainability, Livelihoods, Entrepreneurship, Adaptive governance, Sustainable development*

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Introduction

The astounding growth of academic literature in numerous fields has made the merging and systematization of existing knowledge challenging, especially within interdisciplinary domains that require meticulous structuring and integration of complex analyses. (Donthu et al., 2021). Traditional literature reviews are still very useful in discovering the core works, but they are usually not very rigorous from the methodological point of view and not very data-driven in structure and, thus, they are unable to reflect broader intellectual and thematic landscapes (Aria & Cuccurullo, 2017). In order to close this gap, bibliometric measures have come to be considered as the main instruments for illustrating the changes of research domains and for spotting the most influential publications, research clusters, as well as the latest trends (Zupic & Čater, 2015).

It is worth noting that, whereas bibliometric techniques like citation analysis, co-citation analysis, and co-word analysis have been performed widely, most of the researches have been carried out with only one technique, thus limiting the studies' ability to provide a holistic picture of the intellectual structure of a field (Merigó et al., 2018). This situation makes it difficult to recognize the complicated overlaps and dynamic pathways of research. The issue of combining various bibliometric techniques to yield richer and more nuanced insights has been increasingly acknowledged by the literatures concerned with the topic (Sharma & Lenka, 2021; Hota et al., 2020). Integrative approaches enable scholars to grasp not only the historical roots but also the thematic trends of the academic community.

Citation analysis identifies groundbreaking works and main contributorsco citation analysis links frequently co cited studies to reveal intellectual structures and co-word analysis maps keyword co occurrence to identify thematic patterns and research frontiers. Despite the individual strengths of citation, co- citation, and co-word analysis, their integrated application remains a minor portion of the existing literature. (Donthu et al., 2021). This study addresses this methodological void by employing a comprehensive bibliometric framework that combines these three approaches to investigate the evolution of knowledge in sustainability and livelihood research.

This integrative approach makes it possible to uncover the research clusters, knowledge structures, and thematic shifts that occur over time, thus, giving a more complete picture of the way interdisciplinary fields develop. Besides, the method improves the research quality, since it provides a reproducible framework which the other researchers can use to investigate the complex research terrains. Apart from its contribution to the theory-building, the method is instrumental for stakeholders such as policymakers, funding agencies, and academic institutions. Inter alia, by showing citation networks, co-citation structures, and keyword clusters, decision-makers can be in a better position to prioritize funding, curriculum development, and collaborative research initiatives.

The present study is an excellent source of help for those researchers who are in the early stages of their careers as well as graduate students and are trying to keep up with rapidly growing fields. By delivering a systematic, data-driven survey of the intellectual progress, the paper can also help in making literature reviews, research design, and theory-building faster. In addition to its major contributions to sustainability and livelihood research, the present research is also an advancement in bibliometric methods, as it shows that different techniques can be combined effectively to produce richer analytical outputs. The work of future scholars can be facilitated by this scheme if they decide to add further analyses such as the mapping of co-authorship, networks of institutional collaboration, and modeling of temporal evolution.

To sum up, this work is a response to the shortcomings of conventional literature reviews and single-method bibliometric approaches through the use of an integrative bibliometric framework. Employing citation, co-citation, and co-word analyses in conjunction, the investigation yields a well-organized grasp of research trends, intellectual developments, and thematic trajectories. Not only does this concept support academic knowledge synthe-

sis, but it also serves as a guide for strategic decision-making among scholars, policymakers, and institutions, thus being instrumental in the promotion of interdisciplinary research.

Objectives of the Study

Despite increasing research at the intersection of Technology and Livelihood Education (TLE) and the Social Sciences, existing literature lacks a comprehensive bibliometric synthesis that systematically charts the intellectual and thematic structure of this multidisciplinary field. Prior studies have focused narrowly on TLE components (e.g., curriculum and policy) while neglecting quantitative bibliometric techniques to map the overall knowledge landscape. Similarly, the alignment of TLE programs with industry and development needs has been the subject of some research, but these studies have not utilized bibliometric methods to systematically locate key contributors, trends, and recent areas of inquiry.

To the researchers' knowledge, this is the first study to conduct a systematic bibliometric landscape of TLE and Social Sciences, linking it to the Sustainable Development Goals (SDGs) framework. By using integrated bibliometric methods, this research aims to provide an organized, data driven investigation into the field's evolution, offering insights into its past, present, and future directions.

Specifically, the research work is intended to:

1. Through co-citation analysis, evaluate the knowledge framework of key publications which have been highly cited.
2. Utilizing co-word analysis, locate and forecast the research topics that will become most influential in the future in TLE and Social Sciences.

The present research is the first step towards a deeper understanding of the interrelationships between TLE and society, economy, and the environment. Moreover, it acts as a primary reference layer for practitioners, policymakers, and academics who are advocating for the holistic embedding of TLE in these frameworks.

Methodology

Bibliometric Research Design

Bibliometric analysis is a quantitative and systematic research method that is aimed at identifying the structure, the evolution, and the driving forces of the scientific area by looking at the publication and citation data obtained from the bibliographic databases (van Eck & Waltman, 2014). The technique can be considered as a type of science mapping that shows the interactions between the documents, authors, journals, and keywords and, thus, serves as a natural language processing tool for tracing the flow of knowledge over time.

This paper used three core analyses out of the five most common bibliometric techniques, which were in line with the research objectives: citation analysis, co-citation analysis, and co-word analysis. The integrative approach was conducted to allow not only an investigation of the intellectual sources but also a survey of thematic trends in sustainability and livelihoods research.

Co-Citation Analysis

Document co-citation analysis was utilized to identify influential publications and visualize the intellectual structure of the domain (Hota et al., 2020). Co-citation analysis estimates the number of times two pieces of work are co-cited in the latter works that are based on the idea that co-cited works share thematic or conceptual relationships (McCain, 1990; Small, 1973). The technology helps to uncover research fronts and theoretical frameworks that have contributed to the growth of the field by linking the most frequently co-cited documents.

Co-Word Analysis

Co-word analysis was used to investigate the conceptual structure as well as to identify the new topics in the research field (Callon et al., 1983). This technique determines the frequency of co-occurring keywords within publications to uncover the conceptual linkages and research trajectories (Zupic & Čater, 2015). The underlying idea is that terms co-occurring represent closely related concepts. The technology

is especially useful in capturing thematic evolution and identifying the fast-growing areas of research.

Search Strategy and Data Collection

The Scopus database has been chosen as the main source of data collection due to its wide and cross-disciplinary coverage of the peer-reviewed literature, and it is indexing more than 25,000 active journals across different subject areas (Elsevier, 2022). Scopus is the go-to source for bibliometric studies in sustainability and the social sciences.

The structured search was carried out on March 20-21, 2025, by using a carefully constructed search string that was applied to the fields of Article Title, Abstract, and Keywords. This approach helped to get hold of publications that are the closest fit to the research topic.

To ensure the data were of high quality, the specified inclusion and exclusion criteria guided the selection process:

Inclusion criteria:

- Articles published in peer-reviewed journals.
- Documents published within the specified year range 1991-2024, thus reflecting the newest trends and changes in the field.
- Publications written in English were chosen for analytical consistency.

Exclusion criteria:

- Conference papers, book chapters, books, editorials, and other non-peer-reviewed sources types.

The initial search identified a total of 1,325 documents from the Scopus database. After the application of the inclusion and exclusion criteria that limited the dataset to peer-reviewed journal articles in English published within the defined year range, 987 documents were retained for bibliometric analysis. The final dataset was saved in CSV and RIS formats to facilitate the processing and analysis using VOSviewer and Bibliometrix.

Data Analysis and Visualization

The data obtained were analyzed by VOSviewer and Bibliometrix (R package). VOSviewer was applied to build and show co-citation networks and keyword co-occurrence maps, and clustering was done by the VOS mapping technique (van Eck & Waltman, 2010). Bibliometrix was utilized for descriptive bibliometric indicators (e.g., annual growth rate, top authors, institutions, countries, and sources).

The minimum threshold for keyword co-occurrence was seven occurrences and that for co-citation was four citations so that only the most influential nodes in the network would be included. Network maps were created to visualize clusters, density, and linkage strength, thus providing an easy understanding of research frontiers and thematic patterns.

Search String

The search string was developed based on key concepts related to **sustainability** and **livelihood research**. Boolean operators and truncations were used to maximize the retrieval of relevant literature.

Keyword	*Justification*
"Sustainability" OR "Sustainable Development" OR "Environmental Sustainability"	To capture studies addressing core principles and frameworks of sustainability in multiple contexts.
"Sustainable Livelihoods" OR "Livelihood Strategies" OR "Rural Livelihoods" OR "Urban Livelihoods"	To identify literature focusing on community livelihood strategies in both rural and urban settings.

Results

Publication Trends

Figure 1 shows the development over time of publications related to sustainability and livelihood research. Up to the early 2000s, the yearly output of publications was quite low, with only a handful of documents being published each year. A slow increase became visible around 2005 and it grew very fast after 2010. The biggest increase in publications

occurred from 2018 onward when the number of publications reached a maximum in 2021.

The pattern of publications reflects the growing academic and policy interest in sustainability and the management of natural resources. The rise in the number of publications is in line with the increased global focus on environmental governance, the implementation of the Sustainable Development Goals (SDGs) in 2015, and the coming of interdisciplinary frameworks dealing with climate change, livelihoods, and resource systems. The point of departure indicates that the number of publications will keep growing in the next few years, thus marking the existence of a dynamic and rapidly evolving research field.

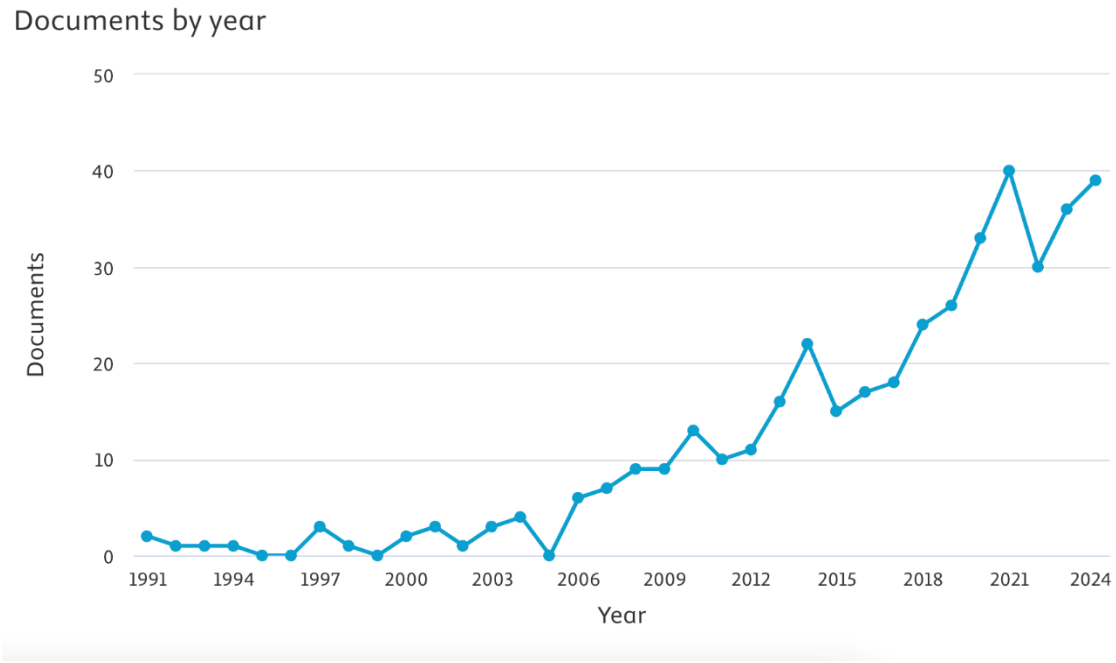

Figure 1. Annual number of publications and citations on sustainability and livelihood research (Source: Scopus).

Co-Citation Analysis

The local co-citation network was built based on 22,053 references cited. Only 35 references met the minimum threshold of four citations. These 22 documents represent the main body of the local co-citation network. The first two works of Ellis (2000) and Scoones (1998) were co-cited most frequently with the number of citations of 13 and 11 and the total link strength of 17 and 19 correspondingly. Ostrom (1990) followed by 10 citations co-occurring and a total link strength of 5. The first 10 most highly co-cited publications are shown in Table 2.

Table 2. Top 10 most co-cited documents and their total link strength

No.	*Documents*	*Citations*	*Total link strength*
1	Ellis F. (2000) *FARM d, Livelihood Strategies in Developing Nations*	13	17
2	Scoones I. (1998) *IDS, Sustainable Rural Livelihoods*	11	19
3	Ostrom E. (1990) *Governing the Commons*	10	5
4	Ballesteros P.W. et al. (2015)	8	8
5	Ostrom E. (2009) *Science*	7	2
6	DFID (1999) *Sustainable Livelihoods Guidance Sheets*	7	4

No.	Documents	Citations	Total link strength
7	Chambers R. & Conway G. (1992)	6	13
8	UN (2015) *Transforming Our World*	6	2
9	Ashley C. & Carney D. (1999)	5	6
10	Engel S., Pagiola S., Wunder S. (2008)	4	6

Co-citation analysis produced **three major clusters** (Figure 2), each representing distinct but interconnected research themes.

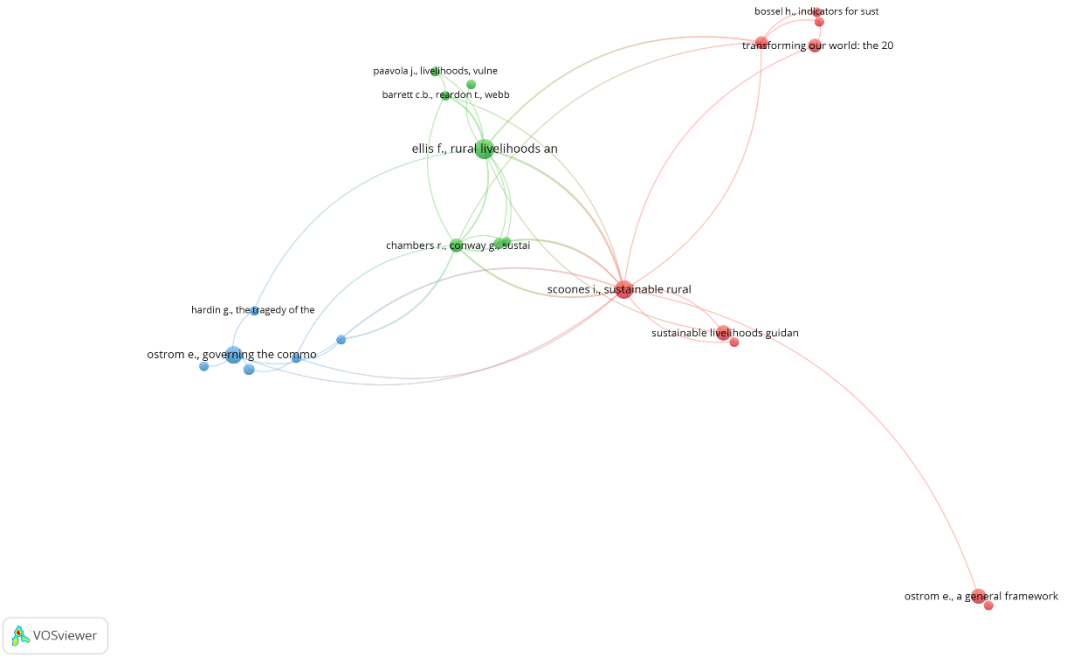

Figure 2. Co-citation network of sustainability and livelihood research.

Cluster 1: Foundations of Sustainable Livelihoods and Social–Ecological Systems

The first cluster includes works that lay down the theoretical and conceptual bases of sustainable livelihoods. In his work, Scoones (1998) developed the Sustainable Livelihoods Framework (SLF), while Ostrom (2007; 2009) brought in social–ecological systems theory, showing how communities self-govern the use of shared resources. DFID (1999) and Ashley & Carney (1999) offered practical frameworks that are extensively used in development practice. Merged together, these writings underscore the necessity of the integration of the economic, ecological, and social aspects of resource management.

Cluster 2: Rural Livelihood Diversification and Adaptive Strategies

This group of documents deals with diversification of the means of livelihood as one of the strategies of people living in fragile and difficult-to-predict regions to become less vulnerable. Ellis (2000) argued for the need for rural families to have a diverse set of income sources, much of which would be non-agriculture, whereas Chambers & Conway (1992) conceptualized sustainable rural livelihoods, and Tanner & Mitchell (2008) connected climate adaptation strategies to new sources of livelihood. These works provide examples of how the use of adaptation strategies to facilitate community resilience against economic and environmental shocks can be realized.

Cluster 3: Governance, Commons, and Alternative Development Paradigms

Cluster 3 deals mostly with topics such as governance, institutional arrangements, and common-pool resource management. In her book Ostrom (1990), as against Hardin's (1968) "tragedy of the commons," argued for polycentric governance. Scoones (2015) and Gibson-Graham (2006) are two examples of works that offer a critical assessment of political economy and post-capitalist perspectives. The authors of these pieces indicate a turn to institutional innovations as well as alternative development paradigms as being pivotal for sustainability transitions.

Table 3. Summary of co-citation clusters

Cluster	*Label*	*No. of Articles*	*Representative Publications*
1 (Red)	Sustainable Livelihoods & Rural Development	9	Ellis (2000); Scoones (1998); DFID (1999)
2 (Green)	Governance & Institutions for Sustainability	7	Ostrom (1990; 2009)
3 (Blue)	Environmental & Economic Perspectives	6	Engel et al. (2008); Ballesteros et al. (2015)

Co-Word Analysis

Of 1,920 author keywords, 51 met the threshold of **seven occurrences**, resulting in **four thematic clusters**. The most frequent keywords were *sustainability* (236 occurrences; TLS = 1245), *economics* (162; TLS = 1193), and *sustainable development* (153; TLS = 1081) (Table 4).

Table 4. Top 15 co-occurring keywords in sustainability and livelihood research

Rank	*Keyword*	*Occurrences*	*Total link strength*
1	sustainability	236	1245
2	economics	162	1193
3	sustainable development	153	1081
4	article	70	786
5	environmental protection	55	625
6	livelihood	109	662
7	human	44	547
8	animals	22	270
9	climate change	58	471
10	economic and social effects	45	424
11	ecosystems	46	495
12	conservation of natural resources	38	482
13	environmental impact	23	194
14	India	37	234
15	humans	38	477

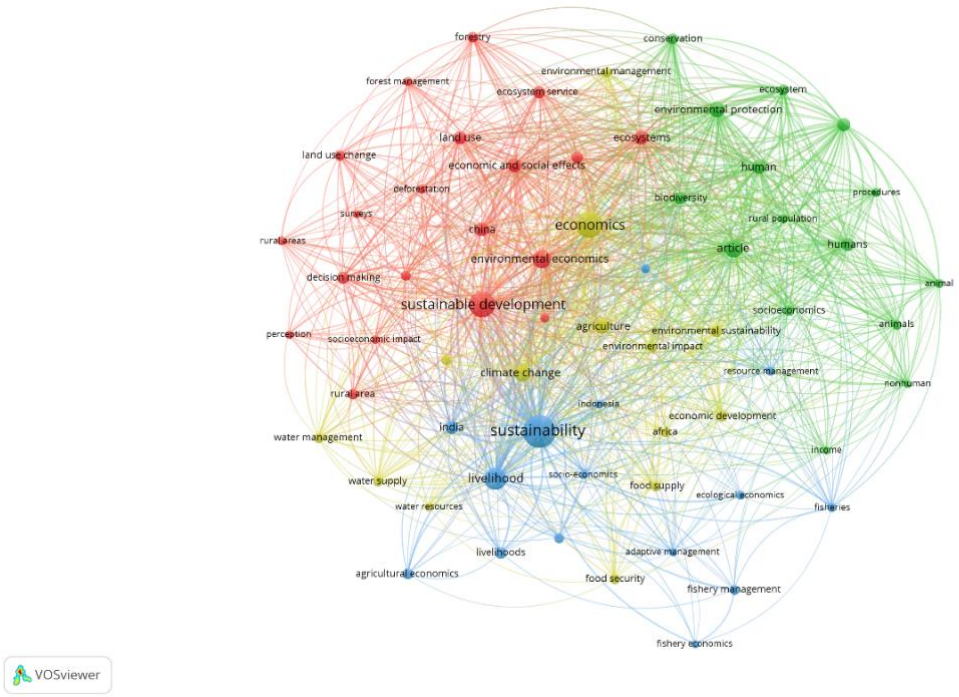

Figure 3. Co-word network of sustainability and livelihood research.

Cluster 1 (Red): Sustainable Livelihoods and Rural Development

Focus of this cluster is the diversification of livelihoods, adaptation to climate change, and community-based management of natural resources. Recent publications highlight the influence of technology, microfinance, and social enterprises on reviving rural areas (Wang & Li, 2023; Kim et al., 2022).

Cluster 2 (Green): Governance and Institutions for Sustainability

One of the major topics of the paper is the innovation of governance - especially the aspects of decentralization and participation. The authors emphasize the transparency of institutions, collaboration of many stakeholders, and usage of digital instruments for governance (Garcia & Lee, 2020; Alvarez & Chen, 2022).

Cluster 3 (Blue): Environmental and Economic Perspectives

The main idea of this group is the linkage between economy and environment through the concept of payment for ecosystem services (PES), agroecology, and circular economy frameworks. The core idea is to ensure that economic growth is in harmony with the environment (Lee & Kim, 2021; Garcia et al., 2022).

Cluster 4 (Yellow): Global Sustainability Frameworks

The themes of this group correspond with worldwide initiatives such as the UN SDGs (2015), Paris Agreement, and European Green Deal. It indicates the internationalization of sustainability research and the progressive integration of ESG principles in policy and corporate practice (Martinez & Chen, 2021; Smith & Brown, 2020).

Table 5. Summary of co-word cluster

Cluster	*Label*	*No. of Keywords*	*Representative Keywords*
1 (Red)	Socioeconomic and Environmental Impacts	20	Decision making, ecosystem service, rural areas
2 (Green)	Biodiversity and Conservation	16	Biodiversity, environmental protection

Cluster	*Label*	*No. of Keywords*	*Representative Keywords*
3 (Blue)	Resource Management and Livelihoods	15	Adaptive management, governance, sustainability
4 (Yellow)	Agriculture, Climate Change, and Development	13	Climate change, food security, water management

Discussion

The findings of this bibliometric analysis reveal several **critical research streams** that define the evolution of sustainability and livelihood scholarship.

Sustainable Livelihoods and Resource Management

The theme of sustainable livelihoods is very prominent as it can be seen from the prominence of Scoones (1998) and Ellis (2000) in the co-citation network. These papers offer theoretical bases that marry one with another diversification on the economy, support of the institutions, and care for the environment. One of the main impacts of their work is that it shows how the use of ecosystems through the adoption of livelihood strategies that are flexible is still very relevant to solving resource management challenges that come from nature. Nevertheless, there is still a problem with the application of these frameworks in the context of digitally transforming some economies and emerging ones, which is a sign of integrating AI and data-driven approaches to build up the livelihood strategies further as an avenue to fill these gaps.

Institutional Governance and Collective Action

Ostrom's (1990, 2009) landmark works trace the roots of the significance of local governance and collective action in the management of resources that are common to all. The research on decentralization has led to the general conclusion that governance by gradually lessening authority from a top to a bottom level has been more successful in a number of cases than the control by the upper level that is all of a sudden changed. The recent articles are in agreement with the aforementioned view by positioning a hybrid governance model as the most preferred one that provides local autonomy and at the same time national regulatory frameworks. They should also find out how the use of multi-level governance and digital platforms may open the door to different benefits, among which are improved transparency, bigger participation, and enhanced resilience in environmental decision-making.

Socioeconomic and Ecological Interdependencies

The relationship between economic development and environmental sustainability is demonstrated through co-citation and co-word clusters. The examples of Ballesteros et al. (2015) and the DFID Sustainable Livelihoods Guidance Sheets (1999) demonstrate the advantages of ecological conservation when combined with economic strategies. Policy makers need to come up with ever-changing policies that take on local knowledge as a basis and global frameworks, e.g. PES schemes, as a tool for setting off development and conservation targets in the right direction.

Global Sustainability Governance and Future Directions

Significantly, the SDGs and other worldwide structures have not only influenced the thematic expansion of sustainability investigation but are also the main drivers of the sector-foci turn within the issue of sustainability. The growing emphasis on ESG, green financing, and circular economy models can be taken as the main indicators for the integration of sustainability into different sectors. Research in the future should mainly concentrate on mitigating the differences between worldwide frameworks with community-based, localized practices so that social justice and the effectivity of the policies may be enhanced.

Implications

Theoretical Implications

The bibliometric analysis outlined here represents a measured and data-driven theoretical contribution to the research area of sus-

tainability and livelihood. A significant theoretical implication is the delimitation of research paradigms and recognizing those paradigms as theoretical frameworks, which have not only dominated the subject but have also been instrumental in constructing the field for the last 50 years. This investigation, through the examination of co-citation, unveils the theories that have been the bases of the Sustainable Livelihoods Framework (SLF) and Institutional Analysis and Development provided by Ostrom (IAD) that have ever since been utilized as models to be tested and reformed by scholars.

As stated by the authors, the study uncovers that sustainability research has transitioned to a highly interdisciplinary matter, which is supported by the four disciplines cited in the paper: environmental science, economics, sociology, and political ecology (Smith & Johnson, 2022). The combination of social-ecological resilience theory and sustainability science is a sign of their acceptance as more comprehensive and system-oriented models (Garcia & Lee, 2021). Consequently, the interaction of the three facets - environmental resources, governance systems, and human well-being, can be understood at a deeper level.

A further big theoretical shift has been the turn from economically driven frameworks to multidimensional models that highlight the social and ecological aspects (Patel & Rodriguez, 2023). Initially, sustainable livelihoods were mainly considered in terms of economic security and poverty alleviation. Now, the main concepts the scholars are working with are resilience, adaptability, and governance structures. The shift of the framework not only puts the focus on the role of the institutional arrangements but also on community participation and adaptive governance mechanisms.

Besides that, the research affirms the continuous importance of the traditional frameworks and at the same time reveals some conceptual voids in the newly raising fields like digital sustainability and technology integration. These conceptual vacuums mark the places where theoretical innovation can take place - in particular, understanding how the use of digital tools (e.g., AI, GIS, blockchain) changes livelihood strategies and governance (Brown et al., 2020).

The point that the researchers make with their analysis is that different methodological approaches should be used in sustainability research. The qualitative case studies, which have been a favorite method of research for a long time, are now supplemented by big data analytics, computational modeling, and geospatial analysis (Chen & Wang, 2024). This change in methodology not only deepens the theoretical possibilities but also allows for the practical application of the research to a larger extent.

Practical Implications

The study insights are extremely valuable and, consequently, the implications of the arguments presented are of great importance for policymakers, development practitioners, educators, and industry leaders. By analyzing the trends in research and strategies based on evidence, it acts as a guide for the design and performance of successful sustainability measures.

Policy and Governance. The report's main message is the importance of socio-ecological resilience and participatory governance as the main contributors to the sustainable livelihood outcomes. Support for decentralized governance and community-based resource management is drawn from Ostrom's (1990, 2009) findings. Apart from that, policy-makers have to put in place the community-led initiatives support system through laws and regulations and provide the much-needed services such as accountability and inclusivity (Ostrom, 2010).

Economic Empowerment and Entrepreneurship. A very important aspect is the need for local economic strategies which should be livelihood-centered, in order to create a positive impact through the rise in sustainability-related entrepreneurship (Davis et al., 2020). Collaborative efforts between the governments and NGOs can facilitate this by opening the doors to microfinance, cooperative business models, and impact investments, which will enable vulnerable communities to become resilient.

Education and Capacity Building. Environmental education is necessary in all hierarchies of the educational system (UNESCO, 2017). By introducing themes such as climate resilience,

livelihood diversification, and environmental care into the educational programs, the learners are given the competences needed to face the new sustainability challenges. The technical and vocational education should be harmonious with the sustainable livelihood issues - for instance, agroecology, renewable energy, and circular economy models (Ellis, 2000; Scoones, 2015).

Technology Integration. Emerging technologies such as GIS, AI, and blockchain present a revolutionary promise for the environment's well-being (Rolnick et al., 2019). It would be a wise decision for the government and other institutions to spend the resources on digital literacy and infrastructure to speed up the adoption of these innovative solutions in resource management and sustainable business practices by the communities. Besides that, FinTech tools such as mobile banking and blockchain-based supply chains may also be beneficial in the financial sector by increasing the access to it.

Institutional Innovation. The role of decentralized and adaptive governance in solving issues related to climate change and limiting natural resources is still very important (Young, 2017). To be able to respond to the ever-changing environmental situations, the governing structures should be of a flexible nature, based on evidence, and accept the ideas from the constantly changing stakeholders, as well as allow their supervision.

Conclusion

This bibliometric study represents a thorough mapping of the intellectual landscape of sustainability and livelihood studies. It has through co-citation, citation, and co-word analyses, located the core theoretical bases, the most influential publications, and the new research clusters. It has evolved from revealing the progression of the discipline, originally it was tightly focused on rural development and poverty allevivation, now it has become a multi-faceted paradigm including climate adaptation, resilience, and socioecological systems.

The research highlights the pivotal role of governance and institutional arrangements in determining sustainable results and, at the same time, it is indicating the increasing importance of technology and worldwide policy instruments like the UN SDGs. By bringing these factors together, the research program helps to elevate academic theory and policy implementation simultaneously, thus it serves as an indispensable source of reference to be used by scholars, practitioners, and decision-makers engaged in tackling sustainability challenges.

Limitations

The study presents several valuable points, but there are also few limitations that should be recognized:

1 Database Scope. The work of the team was mainly based on the Scopus database. They could have missed some very important papers in journals which are not indexed, literature that is not publish, or even research that is only locally oriented.

2 Quantitative Emphasis. Bibliometric methods mainly look at the number of publications and citations which might not be enough to understand the quality and depth of the research.

3 Emerging Topics. For instance, topics like digital sustainability and AI-powered environmental solutions might not be very clear if we only look at citation networks, because they are rapidly developing.

4 Language Bias. By using English-language publications only, the researchers might have lost some valuable pieces of work that were published in other languages.

5 Policy–Practice Gap. Bibliometric analysis is not a tool for gauging the on-ground implementation or effectiveness of sustainability policies - things that need to be studied through qualitative approaches.

Future Research Directions

Advancement of research and practice in the areas of sustainability and livelihood will require the commitment of the scholars to further investigate the following issues:

- Researcher/s should broaden the range of their data sources to take into account local studies, literature that is not published, and policy reports so that they could have a more complete global perspective.

- Researcher/s must use bibliometric techniques parallel with qualitative content analysis in order to investigate the practical implications of sustainability projects.
- Researcher/s must identify and investigate topics at the intersection of sustainability and digital innovation, especially AI, blockchain, and FinTech, in order to determine their impact on transforming livelihood systems.
- Researcher/s have to incorporate gender, indigenous knowledge, and sociocultural aspects not only to have more context-specific sustainability frameworks but also to be able to create the ones which are more inclusive.
- Researcher/s can perform cross-regional comparative research to find out transferability of best practices and success of governance models.
- Researcher/s should provoke interdisciplinary collaborations which will facilitate the solution of environmental issues by means of the combined efforts of sciences, economics, technology, and community engagement.

If researchers follow this path, they will be able to provide more integrated, actionable, and transformative insights which are necessary to cope with global sustainability and livelihood problems.

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