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REVIEW

A bibliometric analysis of China's rural revitalization paradox: opportunities for collaboration, social innovation and global development

Isaac Sarfo[1,9] · Jiajun Qiao[1] · Nana Adwoa Anokye Effah[2] · Michael Atuahene Djan[3] · Dzifa Adimle Puplampu[4] · Michael Batame[5] · Rosemary Achentisa Ayelazuno[6] · Emmanuel Yeboah[7] · Michael Kpakpo Allotey[8] · Xiaoyong Zhu[1]

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Abstract
The study synthesizes research advances on China's rural revitalization pathways using datasets generated from the Web of Science core database and visualized with R-studio's Biblioshiny software package. A bibliometric technique was utilized to report on some key actors' performance metrics and contributions between 2017 and 2022. This study puts forth the following points based on evidence generated (1) the rate of change analysis revealed increasing scientific output leads to the advancement of various sectors and overall societal progress (2) the top 5 performing journals, namely; "*Sustainability," "Land Use Policy," "International Journal of Environmental Research and Public Health," "Land," and "Journal of Cleaner Production"* produce and disseminate information that drive innovations, socioeconomic development and policy responses (3) collaborative network analysis revealed a low level of collaboration between (i.e., inter) the top-performing authors in the field, whereas a high degree was observed among (i.e., intra) the dominant authors and their cohorts (4) the proposed thematic map classified "the concept of rural revitalization" into four broad themes: *niche, motor, emerging or declining, and basic* topics. Evidence-based decision-making scenarios and cross-cutting initiatives highlighted in this study foster "*creative placemaking*" and "*smart rural shrinkage"* efforts by informing the decisions of nations within the Global North and South frames to re-evaluate revitalization strategies amid sustainability concerns. Future researchers and donors are presented with the ease and avenues on where to seek appropriate information based on emerging frontiers and contributions of top journals, authors and nations with low scientific output and investments in rural development.

Keywords Biblioshiny · Poverty alleviation · Rural revitalization, Smart rural shrinkage · China

Extended author information available on the last page of the article

1 Introduction

In the current dispensation of the urban age, rural areas are bearing the brunt of rural decline owing to processes of rural depopulation coupled with multiple deprivations of social infrastructure and services accessible to rural dwellers (Li et al., 2016). Although over 50% of the global population now reside in urban areas, the difference in space reveals dynamic trajectories of urbanization using either dual divisions of the Global North and the Global South or regional and national categorizations. Urbanization in the Global North is traced to the 1750s (industrial age) through to the 1950s, which witnessed the growth of urban population from 10 to 52% with regions such as North America (83%) and Europe (75%), having their population residing in urban areas. Within the Global South, urbanization is traced to the 1950s. Increased urbanization has resulted in a decline in rural population and development (Zhang et al., 2022). For instance, more people lived in urban than rural areas in 2020. This trend is expected to continue, and by 2050, it is estimated that 68% of the world's population will live in urban areas (the United Nations Department of Economic and Social Affairs (UNDESA), 2018). Apparently, the global rural population is projected to decline from 60% in 2020 to 40% in 2050 (UNDESA, 2018). Li et al. (2019) opine that rural decline has become an inevitable process as human society transforms from an agrarian to an urban-industrial economy. In spite of the litany of socioeconomic achievements chalked by some rural regions as a result of forces such as rural tourism promotion and counter-urbanization stimulation, other rural areas are locked in a cycle of decline.

The spatial differences (Fig. 1) in urbanization rates account for initial processes such as rural–urban migration and natural increase associated with the Global North, which is currently being sustained by international migration and natural increase. However, urbanization in the Global North according to McGranahan and Satterthwaite (2014) is declining, as opposed to the Global South, which is shaped by rural–urban migration, underpinned by colonial roots of development (Amoako & Inkoom, 2018). This accounts for differences experienced in the Global North in countries such as the Netherlands, Norway and the US through processes of counter-urbanization, which minimized the impacts of urbanization on a few cities (Schilling & Logan, 2008). However, in the Global South, processes of colonialism, globalization and industrialization underpinned by regional development theories of core and periphery have increased urbanization rates at the expense of rural areas (Myers, 2021; Randolph & Storper, 2023). As a result, rural depopulation has gained extensive attention from governments in the Global South. The concept of urbanization has been defined primarily using demography (Henderson, 2003); however, McGranahan and Satterthwaite (2014) argue that factors such as economic, social and environmental (inter) dependence on demography need to be examined to understand the urbanization processes.

The classifications (Fig. 1) were performed using ArcGIS 10.8 based on the Food and Agricultural Organization (FAO) (2021), the European Commission (EU), the United Nations Human Settlements Programme (UN-Habitat), the Organisation for Economic Co-operation and Development (OECD) and the World Bank methodological approach and datasets (accessed via http://www.fao.org/3/cb3675en/cb3675en.pdf). The categorization of spaces as urban and non-urban associated with population growth has been flagged by scholars such as Brenner and Schmid (2015), who argued that spaces are born out of interactions; additionally, spaces are fluid (keeps changing). Hence, if scholars continue to use traditional boundary delineations to identify spaces, this will present

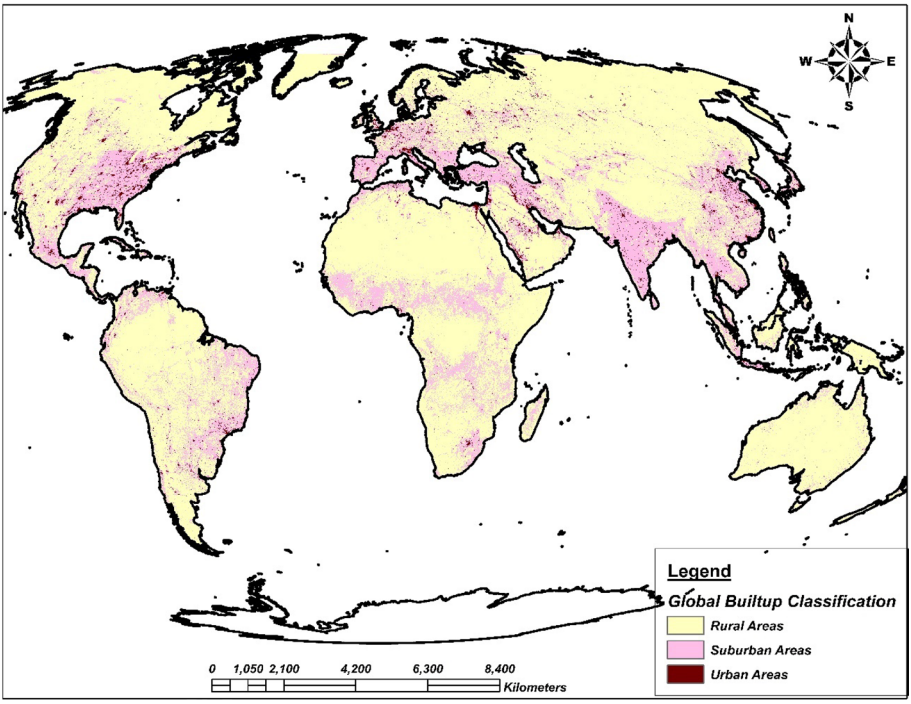

Fig. 1 Global classification of rural, suburban and urban systems

unending challenges for researchers, governments, and developers. In essence, urban, rural, or even peri-urban spaces go beyond physical delineations (Jonas, 2015).

1.1 Underpinning theories

The present study is anchored by "*the system*", "*the dualistic growth*", "stakeholder" and "institutional legitimacy" theories. The system theory first came into existence through Ludwig von Bertalanffy in the 1940s. Bertalanffy strived to create a general theory of systems that could be applied to all fields of science. He believed that all systems, regardless of their size or complexity, share certain common features (Bertalanffy, 1968), which include (1) interdependence of some parts of a system, (2) provides feedback for sustained growth, (3) have equilibrium or balance, and (4) are constantly changing, and these changes can be either gradual or sudden.

The system theory is used to understand the behaviour of complex systems, such as the human body, the economy, and the environment. Within the context of rural revitalization, it can be used to understand the complex interactions between the various factors (economic, social, institutional, technological and environmental) contributing to rural areas' decline (Hodge & Adams, 2019). The theory further suggests that rural revitalization is a complex system that cannot be understood by studying the individual factors in isolation (Cox & Brown, 2019). Instead, it is essential to understand the encompassing nature of these key parameters to formulate effective policies that address the rural revitalization

paradox. This, therefore, drives the urgency and relevance of collaborative efforts within the scope of this subject.

On the other hand, the dualistic growth theory was propounded by Sir Arthur Lewis in the 1950s. Lewis argued that the traditional sector in an economy is a source of surplus labour. This surplus labour can be transferred to the modern sector to stimulate productivity and economic growth. It is a theory of economic development that suggests that there are two distinct sectors in an economy: the traditional (i.e., characterized by low productivity, low wages, and a surplus of labour) and the modern sectors (high productivity, high wages, and a shortage of labour) (Dijkstra et al., 2022; Fernandes & Barreira, 2019). With evidence on different fronts, this theory has been used to explain the economic development of BRICS + nations like China, India, and Brazil. These nations have experienced rapid growth in their modern sectors (urban areas/cities), driven by the transfer of surplus labour from the traditional sectors (rural areas). Nevertheless, some critics argue that the theory is too simplistic, failing to consider the complex interactions between the traditional and modern sectors. Others from a neo-Marxist perspective argue that development is not a "linear evolutionary process"; hence, the theory does not apply to all countries, considering various factors and stages of economic development that come into play. Despite these criticisms, the dualistic growth theory provides a valuable framework for understanding the process of formulating and implementing prudent policies for economic growth (Ives & Silva, 2021).

Contextually, the theory suggests that there is a growing divide between rural and urban areas in China. This divide has been exacerbated by the rapid urbanization of China in recent decades. Additionally, it suggests that the surplus labour in the rural sector can be transferred to the urban sector, where it can be used to increase productivity and economic growth. This has been the case in China, as millions of rural residents have migrated to urban areas in search of better opportunities. However, the migration of rural residents has also led to the depopulation and underdevelopment of rural areas due to the flow of skilled labour, ideas, and so on. Similarly, the theory suggests that the rural revitalization crisis can be addressed by promoting economic development through infrastructure, education, and healthcare investments and by creating green and sustainable livelihoods in deprived regions. Until these concerns based on the abovementioned tenets are addressed and sustained, the disproportionality in the development of rural areas will further worsen the rural revitalization crisis.

Recently, there have been calls (Habib & Mourad, 2023; Habib, 2023a, 2023b) for more focused investigations (Ellili, 2023; Toor et al., 2023) in developing countries that explore unique concerns linked to informed decision-making processes, urbanization/industrialization and rural revitalization. These calls make references to "the stakeholder theory" which posits that addressing the needs of key actors remain an arduous challenge considering the diversity of interests that exist between stakeholders. Habib (2023a) and Habib and Mourad (2023) assert that this bottleneck poses threat to sustainable practices; thus, key players working collectively toward a desired and an acceptable goal. Contextually, the understudied concept is situated on the principles of sustainable development goal (SDG) 11 (i.e., engulfs quality of life in cities and advocates strong rural and urban planning/linkages) and local agenda 21 (i.e., promotion of stakeholders' involvement and participation in all decision-making processes). Habib (2023a, 2023b) further describes the symbiotic relationship that exist between institutions and the society or social groups which further translates into providing desired services to their clients/customers. These underscore the need to assess issues that engulf China's rural revitalization pathway to strengthen collaborations among relevant stakeholders (i.e., decision-makers, individuals influenced by

the decisions/beneficiaries, and interested parties-international donors and the scientific research community).

2 Literature review

In a developed country like the US, the process of counter-urbanization championed by wealthy urbanites who are influenced to escape the city and the conscious effort by their government to provide basic amenities has been used to revive rural areas. Some countries that experience this trend include the Netherlands (Bijker & Haartsen, 2012) and Norway (Grimsrud, 2011). However, compared to China which is still undergoing rapid urbanization, cities that are still developing are underpinned by the principles of agglomeration to maximize economic returns (Li et al., 2016). Even though there were pockets of suburbanization traced to the late 1990s in China, its efficiency was short-lived as its effects were only reflected in suburban villages (peri-urban) (Zhou & Ma, 2000). Additionally, Li (2011) argues that the motivation to move to suburban areas was offered to middle-class citizens on the conditionality of retaining their jobs, businesses and social connections. However, it still did not benefit rural areas in the countryside, and they continue to suffer decline on all fronts (infrastructure and services). Given the above, Li et al. (2016) argue (conclude) that to date, no real *"rural revitalization"* or counter-urbanization has been experienced in China.

Continuous urbanization and rural decline have been attributed to Hirschman's exit voice dichotomy (Hirschman, 1970), which expands on core-periphery interactions and is traced to regional development theorists Myrdal (1957) and Friedmann (1966). They explain that the development of core areas has an attractive force that influences people to move to offer labour and benefit of services. Other factors that explain rural decline have been attributed to the transformation of rural areas through a process called rural gentrification (Nelson et al., 2010; Phillips, 1993). Through rural gentrification, wealthy urbanites who migrate to rural areas introduce urban culture and practices to make up for differences experienced between the urban and rural areas. Again, other factors that inform rural decline include globalization and industrialization (the introduction of machines to replace farm labourers), which provide rural people with options to sell lands and migrate to the cities (Hirschman, 1970). Alternatively, in recent times, there have been pockets of push backs observed through the implementation of economic policies (tourism), which presents rural areas as low-cost coupled with improved roads and internet to an extent helping to influence people's preference for a rural life (Li et al., 2019).

In an attempt to revive rural areas, scholars such as Yan et al. (2021) and Tsui et al. (2019) identify rural reforms traced to the 1960s (the post-Mao reform), where the redistribution of land influenced young people to stay and work in rural areas. Under the leadership of Deng Xiaoping in 1979, household rights to land ownership were increased for those who supported rural economic recovery (Tsui et al., 2019). Hence, rural reform began during Deng Xiaoping's era, when he re-established a household-based production/economy. However, the success of the household-based production was short-lived as a new crisis was experienced under the reign of Zemin's era. Later, a "new socialist countryside" was developed by Hu Jingtao's administration aimed at connecting urban and rural areas from 2002 to 2012 with projects such as "multi-function agriculture in 2006 and an inclusive and sustainable growth" in 2009 and lately a program of rural revitalization such as amazing China in 2012 (Tsui et al., 2019:8). In the present administration of President

Xi Jinping, a "*rural vitalisation*" project, initiated in 2017 was introduced to facilitate the land rights of rural households (Tsui et al., 2019:8). Yan et al. (2021) assert that rural reforms in China are a reflection of political and economic influence which has created a lot of problems for the rural folks.

Nevertheless, there is a scholarly consensus on the role that rural areas have played in the stability, economic progress and promotion of Chinese traditions over the decades/centuries (Li et al., 2016; Tsui et al., 2019; Yan et al., 2021). Presently, 60% of the rural population in China own properties, which can be attributed to the reforms developed in the agrarian sector known as the "*sannong"* (which has the elements of peasants, rural society and agriculture) instituted over the years amidst challenges of industrialization and globalization (Tsui et al., 2019). An example of effective rural revitalization is seen in the rural area of "*Xiaoguan,"* which experienced rapid depopulation and adopted bottom-up initiatives championed by locals. Specifically, the locals developed a share-based cooperative system for sheep guided by equity principles, generating over 4.1 million Yuan (Li et al., 2016). Guided by the above principles, greenhouses were constructed to cultivate vegetables. In addition, part of the profit was set aside for public welfare and the construction of social amenities. These bottom-up initiatives have not only increased the incomes of the households in the village but have also facilitated the return of some migrants. Again, the success of the village has also brought about economic stability and development.

"*Rural revitalization*" in this study, is termed as all-inclusive, strategic, actionable and comprehensive efforts and processes, aimed at reversing decline and ensuring the sustainable development of rural areas. It encompasses various strategies, policies, and initiatives implemented to address the economic stagnation, social hardships, and depopulation commonly experienced in rural regions. From infrastructure improvements to the diversification of economic sectors, investing in education and technology to promote innovation, and enhancing community empowerment/engagement to retain and attract talent, it endeavours to create vibrant and resilient rural communities that cannot only survive but thrive in a rapidly changing global economy. By stimulating economic growth and preserving the unique cultural, historical, and environmental assets of rural areas, this interdisciplinary concept seeks to foster a positive and lasting impact on the future trajectory of rural regions.

There has been increasing academic interest and growing popularity in rural revitalization, social innovation (Dionisio et al., 2023) and policy-related studies within the frame of sustainable development (Ali & Ali, 2023; Zárate-Rueda et al., 2023), strong urban–rural linkages (Bagheri et al., 2023) and an all-inclusive governance system. While previous rural revitalization studies overlooked developing countries' areas of interest and have attempted to explore these topics on varying scales, the broader conceptualization of these intertwining and interdisciplinary subjects, amid the creation of opportunities, collaborations and global development, make the present study unique using the largest developing country in the world's pathway (i.e., The People's Republic of China) as a scenario. This bibliometric study aims to toughen the emergence of a new body of multidisciplinary social science research that combines "*rural revitalization*" and "*social innovation*" to enhance global development, practical and theoretical understanding of *"creative placemaking or self-revitalization"* strategies. Few studies (Table 1) have attempted to carry out extant literature reviews and studies on the subject with different horizons and time spans. In spite of these developments, the choice of keywords and standpoints in existing works of literature give room for wider and diversified reviews that draw on the tenets of rural revitalization, social innovation, policy-mixes and global development. Also, with the progressive nature of these novel concepts, there could still be a plethora of studies and areas that

Table 1 Some major rural revitalization studies and policy-driven initiatives conducted in recent periods

Title	Author(s)	Keyword	Definition	Focus	Method	Main Findings	Direction and policy implications
Research Progress in Land Consolidation and Rural Revitalization: Current Status, Characteristics, Regional Differences, and Evolution Laws	Li and Song (2023)	bibliometrics; Bibliometrix; land consolidation; rural revitalization; review	"*Rural revitalization*" is seen as improving living conditions and public services, as well as deeply reviving thriving industries, distinctive cultures, and a well-functioning political system	*Systematically analyzed land consolidation related articles, published in Web of Science (WoS) core collection database from 1950 to 2021 using R's Bibliometrix and Biblioshiny	Bibliometric and interactive analyses	*Publications on land consolidation and rural revitalization have increased over a given period, with distinct stages: initial (1950–2000), mid-(2001–2012), and high-production (2013–2021). *A total of 1715 authors contributed from 1950 to 2021, spanning 89 countries or regions, with China, the USA, and Poland as major contributors. China and the USA have been pivotal in international collaboration. *Research focus evolved from management to broader regional consolidation and land use concepts	*Future research on land consolidation and rural revitalization should prioritize establishing a feedback mechanism, addressing farmland encroachment, implementing government strategies to protect land owners' rights, and achieving an effective coupling of social, economic, ecological, and policy factors to enhance the role of land consolidation in rural revitalization

Table 1 (continued)

Title	Author(s)	Keyword	Definition	Focus	Method	Main Findings	Direction and policy implications
Rural creativity for community revitalization in Bishan Village, China: The nexus of creative practices, cultural revival, and social resilience	Lu and Qian (2023)	Rural revitalization, Rural creativity, Post-productivism, Cultural revival, Communal solidarity, Bishan Project	–	*Focused on an art-oriented community revitalization initiative in Bishan Village, Anhui Province, China, known as the Bishan Project. It expounds how this project contributes to rural revitalization through creative innovations	*Primary data (interviews with creative workers, locals, and tourists) *Secondary data (publicity, documents, published materials)	*Explores an art-driven rural revitalization initiative in Bishan Village, China, emphasizing the essence of diversifying rural economies through cultural and creative innovations. It highlights the pivotal role of rural innovation in restoring local culture and social ties. *Asserted creative initiatives contribute to cultural and social restoration, thereby enhancing rural resilience, despite occasional tensions between artists and villagers. *Balancing local economic development goals with artists' concerns about preserving rural creativity presents a notable challenge	*Encourage artistic practices for rural revival and prioritize community-centered creativity. *Foster balance between cultural preservation and economic progress. *Expand rural revitalization to encompass diverse innovations *Recognize villagers' role in reshaping local cultures and be prepared to mediate conflicts of interest; hence, need for innovative collaborative frameworks

Table 1 (continued)

Title	Author(s)	Keyword	Definition	Focus	Method	Main Findings	Direction and policy implications
Bibliometric analysis in the Field of Rural Revitalization: Current Status, Progress, and Prospects	Liu et al. (2023)	Bibliometrix software package; bibliometrics; rural revitalization; urban and rural development	–	*Utilized the Bibliometrix series to analyze and visualize the literature related to rural revitalization included in the WoS between 1991 and 2021. *Future development direction was proposed, with the overall aim of providing a theoretical reference for the development and implementation of rural revitalization	Adopted Coupling and Co-Citation Analyses, H-Index, G- Index and the Multiple Correspondence analyses strategies	*Over the past three decades, rural revitalization publications surged. *Classified into initial (1991–2004), development (2005–2016), and high-yield (2017–2021) stages *Global research spanned 60 countries, with China, the USA, and Canada leading	*Key themes include migration, management, and urbanization, emphasizing sustainable urban–rural dynamics and policy influence *To advance rural revitalization, focus on strengthening theoretical research and modern governance, leveraging "Internet + rural revitalization," emphasizing regional characteristics, and fostering cross-field and cross-regional research for global impact

Table 1 (continued)

Title	Author(s)	Keyword	Definition	Focus	Method	Main Findings	Direction and policy implications
Future matters: Unpacking villagers' willingness to withdraw from rural homesteads in China	Gao et al. (2023a)	Community remediation, multi-level model, Multifunctionality, Land use transition, Rural revitalization	*Defines rural revitalization as a comprehensive strategy covering almost every conceivable aspect of rural development, from industrial development and increasing farmers' income to spatial governance, social security for villagers and so forth	*Adds to growing works on land use transition by integrating the contested concept of multifunctionality in the Western discourse into the institutional analysis with Chinese characteristic *It further explored the impetus underlying villagers' withdrawal from rural homesteads	Application of binary logistic regression (BLR)	*17.86% of respondents are willing to withdraw from rural homesteads, with even lower odds (42.24%) for underutilized ones *Residents' attachment to place amplifies with homestead age	*Transition from state-controlled land redistribution to future-oriented development, balancing rural–urban dynamics and homestead adjustments *Implement equalized development rights to stabilize land values, deter speculation, and provide certainty for villagers and urbanites. *Align rural land consolidation with regional industrial plans for synchronized development

Table 1 (continued)

Title	Author(s)	Keyword	Definition	Focus	Method	Main Findings	Direction and policy implications
From "forsaken site" to "model village": Unraveling the multi-scalar process of rural revitalization in China	Gao et al. (2023b)	Rural transformation, Exogenous/endogenous, Neo-endogenous, Rescaling, Empowerment	–	*Introduces a new panacea for revitalizing traditional rural regions based on the transformation of a mountainous village in southern Jiangsu Province in China	Brief review of the village's scenario; field survey and detailed examination on how the understudied domain was revitalized, with specific attention to strategies of stakeholders at different levels and their behavioral logics, as well as the multi-scalar process	*The economic decline in traditional rural communities often stems from a misalignment between local resources and chosen development strategies. *Effective rural development strategies must strike a balance between local engagement and external promotion to engage non-local consumers and policymakers. Here, third-party organizations serve as advocates during community decline and as mediators when communities expand their outreach. This dual role is crucial in navigating the complexities of rural development	*The examination of China's rural communities focuses on their post-rural project era sustainability which entails assessing their self-sufficiency without heavy government backing *Replication of niche innovations across regions while preserving their integrity and effectiveness. *Furthermore, it scrutinizes how localities navigate conflicting interests with higher-level government administrations and the ensuing repercussions on decision-making processes

Table 1 (continued)

Title	Author(s)	Keyword	Definition	Focus	Method	Main Findings	Direction and policy implications
Transitions in rural settlements and implications for rural revitalization in Guangdong Province	Gong et al. (2022)	Transition in rural settlements, Rural revitalization, Southern Cantonese culture, Spatial heterogeneity, Guangdong Province	*Rural revitalization is termed as making comprehensive developmental efforts to reduce regional differences, by offering opportunities both for economic development in coastal areas and rural areas	*Analyzed transformations in rural communities and the drivers of rural evolution in Guangdong Province. It utilized land-use datasets spanning from 1980 to 2015, alongside a digital elevation model and information on transportation networks and physical attributes	*Employed the Kernel density analysis *Analyzed the fluctuating rates of rural settlement transitions, hot-spot analysis and logistic regression	*The dynamics and shifts in rural settlements exhibited the most pronounced connections with water sources and transportation networks Nonetheless, certain physical factors such as terrain, precipitation, and temperature also exhibited notable correlations with the likelihood of rural settlement occurrence	*Promote sustainable rural growth by leveraging favorable conditions and balanced urban expansion. Address regional disparities, enhance infrastructure, and preserve cultural heritage *Need to foster regional cooperation to ensure comprehensive rural development

Table 1 (continued)

Title	Author(s)	Keyword	Definition	Focus	Method	Main Findings	Direction and policy implications
Rural innovation system: Revitalize the countryside for a sustainable development	Yin et al. (2022)	Rural revitalization, Rural innovation system, National innovation system, Anti-poverty, Sustainability, China	*Rural revitalization requires holistic innovation policies, in order to promote the overall capability of rural innovation through agricultural technological innovation, institutional and management innovation, community-based network and intermediary platform innovation	*Compares the rural and urban innovation system, introduces a theoretical structural model of the rural innovation system, including (a) technological innovation, (b) institutional and management innovation, and (c) community-based network and intermediary platform innovation	Exploratory research with implicit search feature	*Development does not come to a halt once the economy or unit does not run out of ideas	*To drive rural revitalization, it is imperative to focus on technology-driven innovation policies. Concurrently, enhancing rural governance structures is crucial in providing a conducive environment for innovation. This involves identifying effective organizational models and incentivizing public officers. *Additionally, fostering dynamic networks and intermediaries is essential to bridge the gap between rural and urban innovation systems. By doing so, we can reduce barriers and ensure a balanced regional innovation landscape, enabling both rural and urban communities to reap the benefits of innovation

Table 1 (continued)

Title	Author(s)	Keyword	Definition	Focus	Method	Main Findings	Direction and policy implications
Poverty alleviation in rural China: policy changes, future challenges and policy implications	Liu et al. (2017)	China, Future challenges, Policy changes, Rural reform, Targeted poverty alleviation strategy	–	*Examined China's anti-poverty policy history *Identifies future challenges for targeted poverty alleviation, and provides a foundation for future policy formulation, with the prospect of guiding poverty alleviation efforts in other developing countries	*Utilization of historical literature regarding China's efforts in combating poverty and exploring innovative mechanisms within the targeted poverty alleviation strategy	*With the rural reform's progression, China's poverty alleviation and development have evolved through six stages. This transformation shifted from relief-focused to development-centered poverty alleviation *The scope of poverty alleviation now encompasses villages and households, thereby enhancing its effectiveness. Yet, challenges arise from growing anti-poverty complexity, ecological fragility, rapid aging, and rural decline	*China's poverty alleviation model, focusing on tailored strategies for deep poverty areas, balances rural and urban prosperity efforts *Labor service exports are pivotal, and research in poverty, human, rural, economic/regional geographies and policy impact assessment aligns with the UN's 2030 sustainable development goal

may have been overlooked in early studies. As a result, voluminous amounts of data pertaining to latest advancements in this field are synthesised through this bibliometric study.

Similarly, previous bibliometric studies (Huang et al., 2021; Li & Song, 2023; Liu et al., 2016, 2023) dwelt on few themes and overlooked developing countries' areas of interest. The present study expands this horizon to entail multidimensional aspects of the understudied concept—including smart rural shrinkage, creative placemaking, social innovations, multifaceted aspects of poverty and rural innovation. Prashar et al. (2023) report that despite a lack of emphasis on the effectiveness of the understudied concept across different nations, several initiatives have emerged or been applied with positive outcomes that could serve as references for other developed or developing nations. To this end, this review study uniquely utilizes broader search criteria, covering the most recent period (2017–2022) and advances in the field using this standardized technique. It further introduces a thematic map that presents niche, motor, emerging/transient, and basic themes that engulf the understudied concept. It is anticipated that the study's outcome provides thorough insights that drive economic growth and development, information dissemination, sustenance and innovations, based on evidence-based decision-making scenarios and opportunities identified through other studies and cross-cutting initiatives. The present study sought to:

1. Assess the performance metrics of different authors, journals and nations about the concept of rural revitalization.
2. Ascertain the degree of research collaboration, impact, and co-occurrence analyses that drive policies and emerging frontiers.
3. Highlight evidence-based scenarios on how the concept of rural revitalization can create opportunities for collaboration and facilitate social innovation and global development.

Subsequent sections, thus the "Methodology," capture data source, analysis and evaluation techniques employed for the bibliometric analysis. The "Results and Discussion" sections present and discuss findings based on the specific objectives and innovative topics and highlight case scenarios of "rural revitalization" and/or "rural development." The study is concluded by summarizing key findings, highlighting some study gaps/limitations, emerging trends, and practical recommendations that could propel further studies, inform decisions and create alternative futures.

3 Methodology

3.1 Data source

Given the retrospective account of recent developments and extant literature, this study adopted a bibliometric approach as a standardized innovative review technique to analyze the specific research objectives outlined in the introductory section. Table 2 presents data retrieved from the WoS database, providing information about the field(s), duration, search terms, number of papers and document/type of article applicable to this study. The Web of Science (WoS) is considered as a standardized and an established bibliographic and citation database, archived in a well-structured format. Scientific production before the 1990s is non-uniformly sparse pertaining to the understudied concept, while WoS coverage gets worse going back in time. Hence, this study considered the period (2017–2022) due to China's rural revitalization strategic plan being initiated in 2017. Also, it uniquely explores

Table 2 Bibliometric analysis procedures based on WoS core database between 2017 and 2022

Steps/duration	Field (s)	Search terms	Refined by/document type	No. of documents
*Step 1 (2017–2022)	*All	"rural revitalization" or "rural development strateg*" or "social innovation" or "land use reforms" (Topic) and "sustainable development" (Topic) or "poverty alleviation" (Topic) and "China"	*Overall output	1184
*Step 2			*Constitute solely original or review articles, and excluding editorials, notes, and letters	1168
*Step 3			*Solely papers written in English	1145
*Step 4	*Urban Studies, Geography, Physical or Social Sciences, Interdisciplinary, Management, Engineering, Business, Development Studies, Energy Fuels, Public and Occupational Health, Regional Urban Planning, Economics, Green Sustainable Science, Technology, Environmental Sciences, Environmental Studies, Biodiversity Conservation, Engineering Multidisciplinary, Forestry, Social Issues, Demography or Humanities or Health Policy Services, Asian Studies, Agricultural Engineering, Anthropology and Communication		*Web of Science Categories for the given disciplines (Science Citation Index Expanded (SCIE); Social Science Citation Index (SSCI); Arts and Humanities Citation Index (A & HCI); Emerging Sources Citation Index (ESCI) original research articles and reviews)	864

broader search criteria across different disciplines, covering the most recent period and advances in the field which may have been overlooked in early studies. In addition, previous bibliometric studies/overviews overlooked developing nations' areas of interest which the current study attempts to narrow such knowledge gap. The study restricted the choice of language to "English" mainly to ensure uniform data coverage; thus, by using one standardized format, the authors do not have to deal with over or under representation of local languages or specific disciplines due to the utilization of a specialized database.

3.2 Bibliometric analysis using R Studio's Biblioshiny software

The bibliometric technique utilizes a hybrid approach to assess published academic literature, which tracks the research progress of some specific disciplines over an extended period (Aria & Cuccurullo, 2017; Mishra et al., 2023; Pritchard, 1969). This concept was propounded by Pritchard, who attempted to showcase some key details to researchers on performance-related metrics for certain key actors such as authors, nations, institutions, journals, and corresponding authors, among other analyses. Lately, this technique has been extensively used to report on the progress and prospects of rural revitalization across the globe (Liu et al., 2023). Li and Song (2023) assessed the attributes, regional divides and some legislative instruments in land consolidation and rural revitalization by applying Bibliometrix and Biblioshiny software packages. Similarly, Effah et al. (2023) accentuated the advancement of the sustainability reporting domain using these packages.

According to Aria and Cuccurullo (2017), Bibioshiny is a Java software that synergises the bibliometrix package functions with the ease of utilizing web-based applications through a Shiny package environment. Figure 2 depicts the flowchart for the analysis procedures performed using the bibliometric analysis. Ideally, the performance metrics or productivity of authors, journals, institutions, nations, citations, H-index and so on can be synthesized by accessing WoS's virtual literature reports. The "*H-index*" denotes an individual's scientific research productivity and measure of citation impact. However, the Bibliometrix package offers other avenues for advanced analysis of graphic visualization,

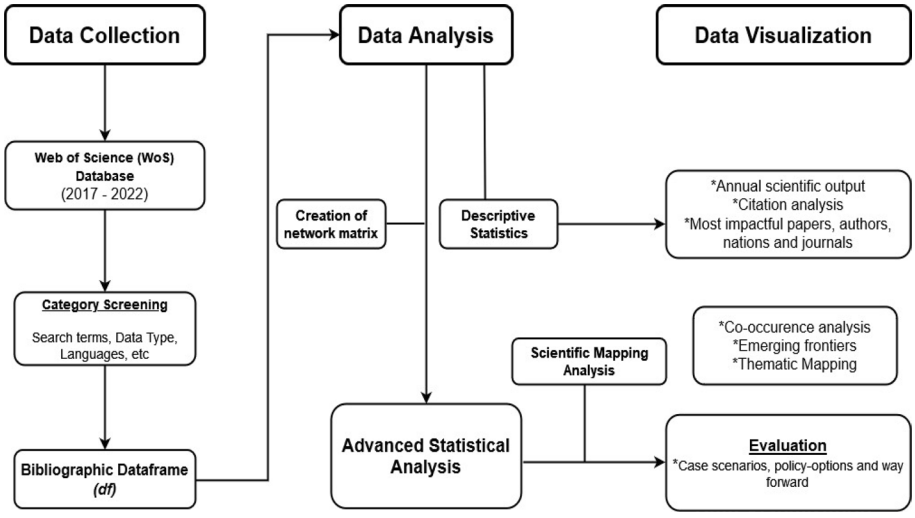

Fig. 2 Workflow of bibliometric analysis procedures employed for the study

network, factor and thematic mapping, as well as developing data matrices for collaboration, co-citation, coupling and co-word analyses (Radha & Arumugam, 2021).

3.3 Rate of change analysis for the research output

The present study introduces research output rate of change (ROC) analysis, magnitude of change (MOC) and annual growth rates, which have not been applied in other bibliometric analysis or review studies. These parameters were computed using the following expressions (Eqs. 1, 2 and 3).

$$\text{Rate of Change (ROC)}(\%) = \frac{V_{\text{Present year}} - V_{\text{Previous/past year}}}{V_{\text{previous/past year}}} \times 100 \tag{1}$$

where $V_{\text{Present year}}$ indicates the value or output of the present or current year of study; $V_{\text{Previous/past year}}$ denotes the value or output of the past or base year understudy. Similarly, the magnitude of change and the annual rate of change for both publications and citations were quantified using:

$$\text{Magnitude of change(MOC)} = \left(V_{\text{Present year}} - V_{\text{previous year}}\right) \tag{2}$$

$$\text{Annual rate of change}(\%) = \left[\frac{V_{\text{Present year}} - V_{\text{Previous/past year}}}{V_{\text{previous/past year}}} \times 100\right] \div N_{\text{Year(s)}} \tag{3}$$

here $N_{\text{Year(s)}}$ denotes the duration or year interval, thus the difference between the current and the base years. In this case, 2022 is the current year, while 2017 serves as the base year. Hence, N is five years.

4 Results

4.1 Annual distribution of publications and citations

Figure 3 presents the latest advancement and growth in research output on China's "rural revitalization" studies between 2017 and 2022 (i.e., the timespan). Despite the least number (27) of publications and citations (18) recorded in 2017 (refer to Table 1A), productivity for both publications and citations amplified exponentially on a year-to-year basis.

Overall, given the distribution (Table 3), publications and citations spiked at a rate of 1062.96% (i.e., observed an annual increment of + 212.59%) and 24,777.78% (i.e., at an annual rate of 4955.56%), respectively, based on the research output rate of change analysis. Among the basic information on scientific publications used in this study, the average annual growth rate and the average citations per document were 8.06% and 14.04, respectively.

4.2 The scientific output of the various academic journals

The piecemeal of evidence provided in Table 2, given the 864 articles from our keyword search in the WoS core database, was published in 242 journals. The documents used had an average age of 2.24. A total of 42,665 references were recorded for the given study

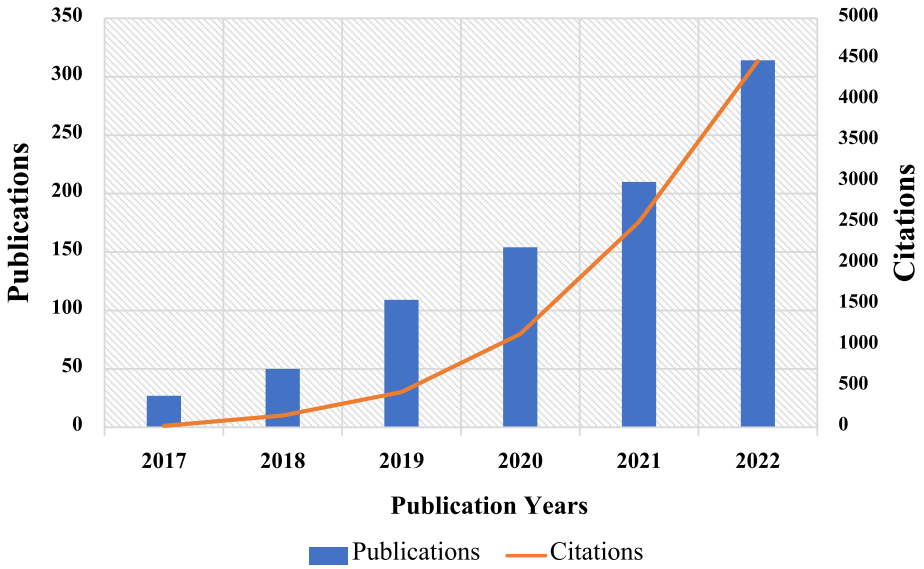

Fig. 3 Research output trend on China's rural revitalization between 2017 and 2022

sample. In Fig. 4, it can be observed that the top 15 journals that published articles concerning the search items contained about 427 articles, constituting 49.42% of the total output. Out of this number, the top 5 productive journals had published 302 articles (70.73%) out of the given sample. "*Sustainability," "Land Use Policy," "International Journal of Environmental Research and Public Health," "Land," "Journal of Cleaner Production," "Journal of Geographical Science," "Habitat International," "Journal of Rural Studies," "Energy," and "Energy Policy"* journals constituted the top 10 most productive journals in the field contributing more than 43% to the total number of papers.

4.3 Rural revitalization studies citation analysis

4.3.1 Authors' research productivity and impact analysis

Figure 5 expounds on the top 20 performing local authors making outstanding contributions to rural revitalization and its related fields in China. The degree of productivity and impact is mainly based on the total number of publications based on the year the article was indexed and/or published in the WoS database and the number of citations received. Evidence presented indicates Liu Yansui, over the past five years, received the highest number of citations (392) based on the WoS database, followed by Zhou Yang with 357.

In the same vein, Liu Yansui dominates the total number of articles published in the field based on the piece of evidence presented in Table 4 with 21 articles (with an *H-index* of 17), followed by Yang Zhou and Li Jizhen with 18 articles each and an *H-index* of 14 and 9, respectively. It is evident that the top 10 authors have at least more than ten (10) research articles published within the scope of this study with an *H-index* of 6 and above.

Table 3 Rate of change and annual growth rate (%) statistics over the given period (2017–2022)

Period	Publications	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022	2017–2022	Magnitude of change	Annual Rate of Δ (%)
Publications									
2017	27	+85.19	+118	+41.28	+36.36	+49.52	+1062.96	–	+212.59
2018	50							23	
2019	109							59	
2020	154							45	
2021	210							56	
2022	314							104	
Citations									
2017	18	+700	+199.31	+164.97	+120.14	+78.12	+24,777.78	–	+4955.56
2018	144							126	
2019	431							287	
2020	1142							711	
2021	2514							1372	
2022	4478							1964	

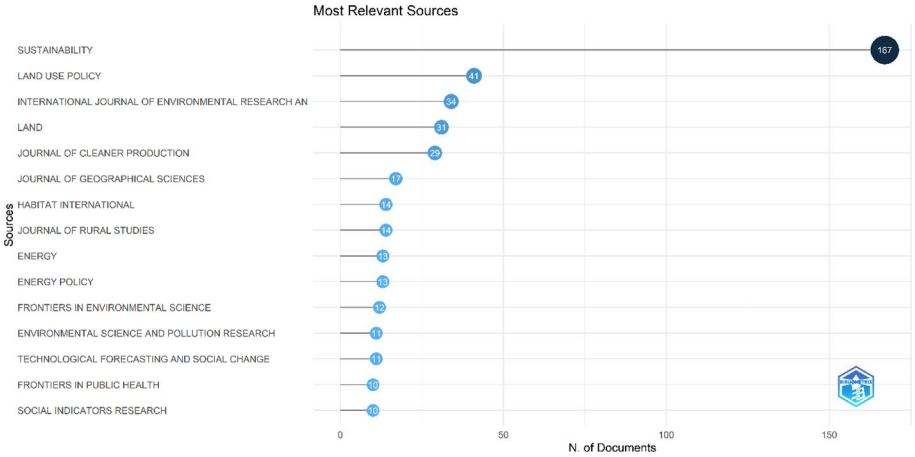

Fig. 4 Most relevant sources pertaining to bibliometric analysis of "China's rural revitalization pathway" based on WoS database (2017–2022)

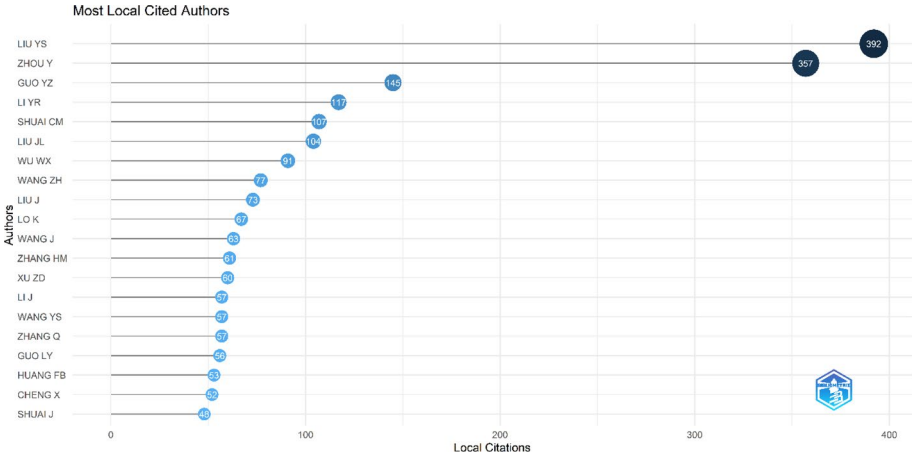

Fig. 5 Top 20 most locally cited authors based on WoS database or research output between 2017 and 2022

Similarly, Table 5 presents the ten most cited papers between 2017 and 2022. The most cited paper, dubbed *"Spatio-temporal patterns of rural poverty in China and targeted poverty alleviation strategies"* authored by Liu et al. (2017), received over 250 citations, while the least cited paper received 132.

4.3.2 Authorship and country-based collaborative network analyses

Collaborative network analysis demonstrates the degree of collaboration between/among authors and nations in a particular discipline. In this study, the collaborative network (i.e., inter) between the dominant authors and nations within the field is subtly low, given the mappings illustrated in Figs. 6 and 7. A total of 2518 authors, based on the 864 articles

Table 4 Local authors' research productivity and impact based on H-index from WoS database

Authors	Articles	H-index	Authors' Overall H-index	Source
LIU YS	21	17	75	https://www.webofscience.com/wos/author/record/24001
LI J	18	9	18	https://www.webofscience.com/wos/author/record/1293219
ZHOU Y	18	14	31	https://www.webofscience.com/wos/author/record/47419622
SHUAI CM	17	10	15	https://www.webofscience.com/wos/author/record/16091196
LIU Y	14	8	23	https://www.webofscience.com/wos/author/record/47164118
LI YR	13	8	34	https://www.webofscience.com/wos/author/record/2130437
WANG Y	13	6	25	https://www.webofscience.com/wos/author/record/1729090
WANG YS	12	7	23	https://www.webofscience.com/wos/author/record/39718825
LI J	13	8	13	https://www.webofscience.com/wos/author/record/2365435
WANG ZH	11	8	8	https://www.webofscience.com/wos/author/record/49135309
CHENG X	10	7	10	https://www.webofscience.com/wos/author/record/596776
HUANG FB	10	8	10	https://www.webofscience.com/wos/author/record/31792208
LIU J	10	7	7	https://www.webofscience.com/wos/author/record/38480557
LI C	9	7	14	https://www.webofscience.com/wos/author/record/42918052
WANG JY	9	6	18	https://www.webofscience.com/wos/author/record/36137148
WANG J	9	7	12	https://www.webofscience.com/wos/author/record/2254126
YANG Y	9	6	6	https://www.webofscience.com/wos/author/record/18314453
ZHANG L	9	6	14	https://www.webofscience.com/wos/author/record/847939
ZANG Y	9	6	8	https://www.webofscience.com/wos/author/record/46327246
CHEN J	8	6	14	https://www.webofscience.com/wos/author/record/19625017

used, had collaborated to advance research in the field. Forty-eight (48) out of this total surprisingly constituted authors of single-authored documents. However, the level of collaboration (i.e., intra) among some lead authors and their cohorts/institutions was high. It is worth noting that the assessment of collaborative networks between and among authors and nations is vital in advancing the latest developments and knowledge in *"rural and social innovation," "rural revitalization," "sustainable development," "targeted poverty alleviation," and "land-use reforms."* Here, the size of the author's name and mapping

Table 5 Top 10 most locally cited papers within the field of rural revitalization in WoS Database (2017–2022)

No	Title (Doi)	Author (s)	Publication year	Total citations
1	Spatio-temporal patterns of rural poverty in China and targeted poverty alleviation strategies (https://doi.org/10.1016/j.jrurstud.2017.04.002)	Liu, Yansui; Liu, Jilai; Zhou, Yang	2017	250
2	Don't call me resilient again: the New Urban Agenda as immunology … or … what happens when communities refuse to be vaccinated with smart cities and indicators (https://doi.org/10.1177/0956247816684763)	Kaika, Maria	2017	227
3	Revitalizing traditional villages through rural tourism: A case study of Yuanjia Village, Shaanxi Province, China (https://doi.org/10.1016/j.tourman.2017.04.003)	Gao, Jing; Wu, Bihu	2017	219
4	Land consolidation boosting poverty alleviation in China: Theory and practice (https://doi.org/10.1016/j.landusepol.2018.12.024)	Zhou, Yang; Guo, Liying; Liu, Yansui	2019	180
5	Karst landscapes of China: patterns, ecosystem processes and services (https://doi.org/10.1007/s10980-019-00912-w)	Wang, Kelin; Zhang, Chunhua; Chen, Hongsong; Yue, Yueming; Zhang, Wei; Zhang, et al	2019	178
6	Targeted poverty alleviation and land policy innovation: Some practice and policy implications from China (https://doi.org/https://doi.org/10.1016/j.landusepol.2017.04.037)	Zhou, Yang; Guo, Yuanzhi; Liu, Yansui; Wu, Wenxiang; Li, Yurui	2018	170
7	Rural land system reforms in China: History, issues, measures and prospects (https://doi.org/https://doi.org/10.1016/j.landusepol.2019.104330)	Zhou, Yang; Li, Xunhuan; Liu, Yansui	2020	161
8	'Shaken, but not stirred': Sixty years of defining social innovation (https://doi.org/https://doi.org/10.1016/j.techfore.2017.03.012)	Edwards-Schachter, Monica; Wallace, Matthew L	2017	140
9	Coupling coordination analysis of rural production-living-ecological space in the Beijing-Tianjin-Hebei region (https://doi.org/https://doi.org/10.1016/j.ecolind.2020.106512)	Yang, Yuanyuan; Bao, Wenkai; Liu, Yansui	2020	136
10	Land consolidation and rural revitalization in China: Mechanisms and paths (https://doi.org/https://doi.org/10.1016/j.landusepol.2019.104379)	Zhou, Yang; Li, Yamei; Xu, Chenchen	2020	132

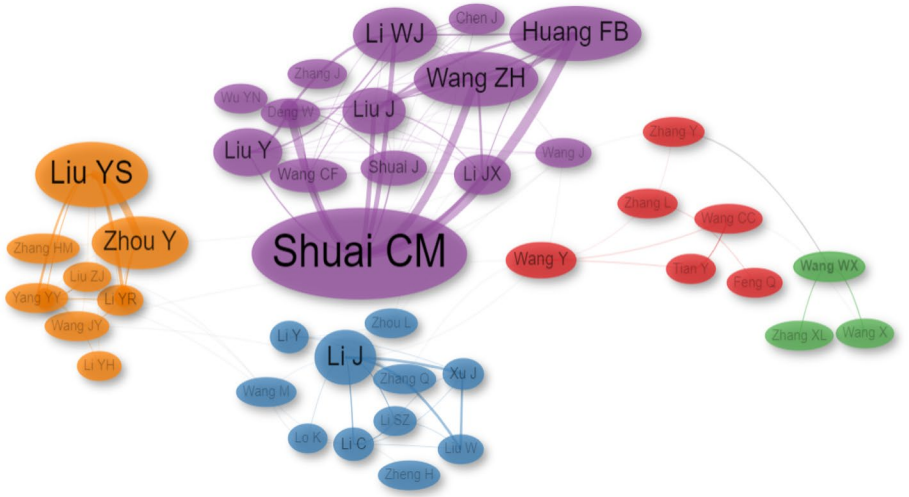

Fig. 6 Degree of collaboration (inter and intra) between/among China's lead authors within the field of rural revitalization based on WoS database (2017–2022)

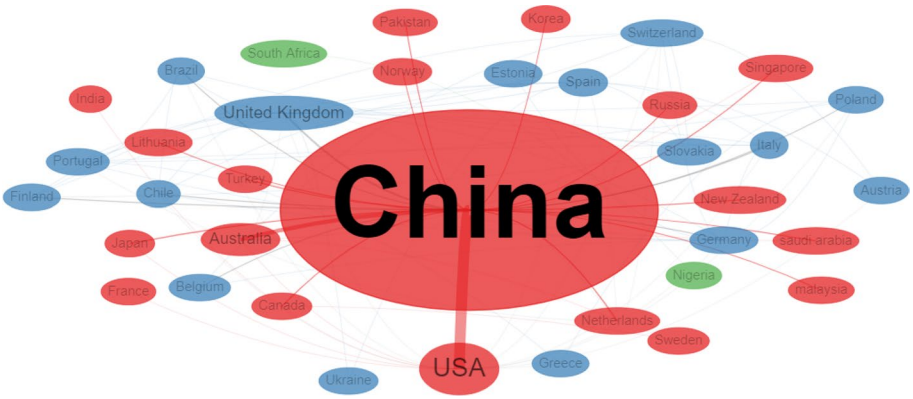

Fig. 7 Research collaboration between/among the most productive nations within the field of rural revitalization based on WoS database (2017–2022)

width/thickness level depict the collaboration degree. Therefore, the larger/thicker/closer the name and width, the higher or stronger the degree of collaboration and vice versa.

International co-authorship constituted 28.36%. Co-authors per the 864 documents used for this study's analysis was an average of about 3.96 per document.

4.3.3 Country contribution (CC)

The single country (SC) and multiple country (MC) publications revealed China has etched its name among the top 15 nations with the largest scientific productivity toward advancing the field in both SCP and MCP, with over 600 and 100 publications, respectively. This

is followed by *Australia, the USA, Spain, Italy, Germany, the UK, Canada, Brazil and the Netherlands* as the nations where leading corresponding authors making major contributions originate (Fig. 8). China's dominancy is due to its conscious socioeconomic and environmental efforts toward "*rural revitalization and innovation*," "*sustainable development*," "*poverty alleviation*" *and* "*land reforms*" in recent decades. This has grown in tandem with the various lead authors (Fig. 5) roles and scientific productivity/impact in the understudied field.

4.4 Keyword co-occurrence analysis

The commonly used keywords and their co-occurrences in Fig. 9 showcase the scientific advances in the field. Here, the networks or links indicate the proximity of keywords used frequently. The close-fitting relationship and the size of keywords primarily explain the centrality of what most studies conducted within the field entail or frequently used words. The illustration indicates the commonly used terms paired in most rural revitalization-related studies: "*China-poverty reduction*," "*China-Rural Revitalization*," "*China-Rural Development*," "*Sustainable Development-Social Innovation*," "*Sustainable Development-Rural revitalization*," *and* "*Sustainable Development-Corporate Social Responsibility (CSR)*." These commonly used pairs are intertwined due to their complexity, multidisciplinary, and encompassing nature, which draws on socio-cultural, political, environmental and economic tenets.

In effect, the frequently used keywords project the multifaceted nature of the rural revitalization concept, which dwells on other economic and social paradigms like the system and dualistic growth theories, multidimensional poverty, corporate social responsibility, energy transitions, and land use reforms/consolidation which are key for production, assetization and ecological functions. Figure 10 exhibits twenty widely used keywords in descending order. There is clear evidence that "*China*" was listed among the keywords 149 times, followed by poverty alleviation (109), sustainable development (87), social innovation (71) and rural revitalization (57).

Fig. 8 Corresponding authors' country of affiliation within the field of rural revitalization based on WoS database (2017–2022)

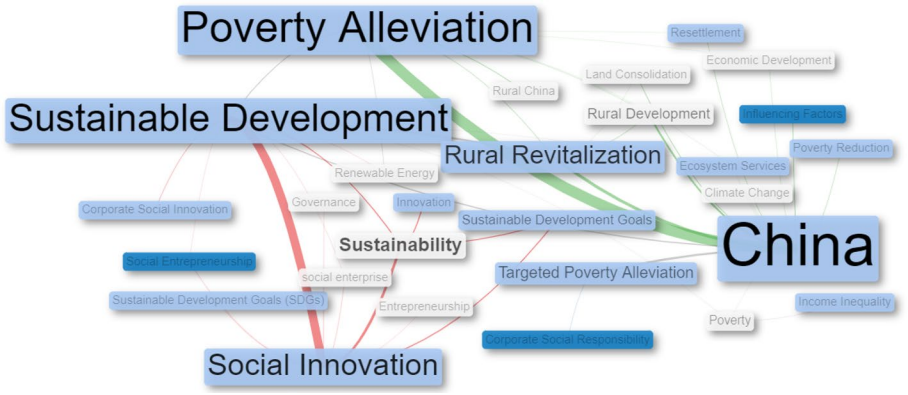

Fig. 9 Visualization of keyword co-occurrence analysis within the field of rural revitalization based on WoS database (2017–2022)

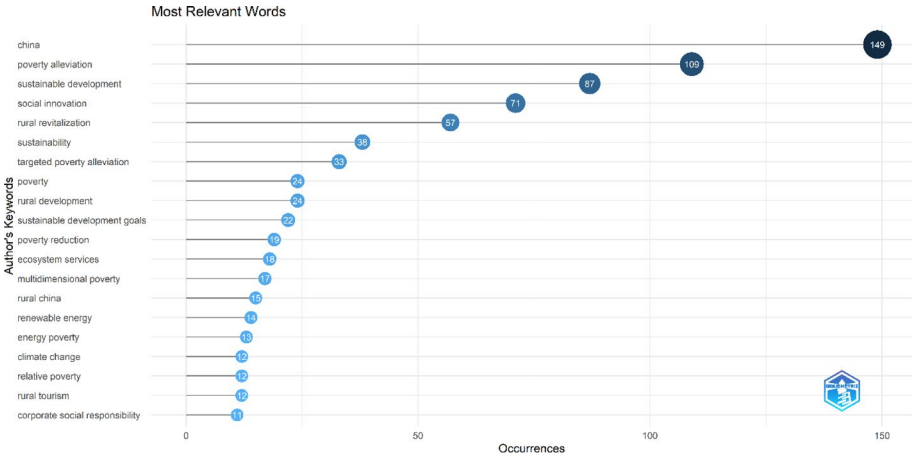

Fig. 10 Map of commonly used keywords within the field of rural revitalization based on WoS database (2017–2022)

4.5 Keywords timeline classification and transience

Figure 11 illustrates the timeline classifications and transience of some keywords that gained tremendous weight and international relevance/audience within some specified timeframes. The size and length of the nodes depict the frequency and timespan of keyword usage/relevance in the field. A close observation shows between 2017 and 2019, the trending topic or keyword dwelt on "*livelihood assets*" and "*rural China,*" mainly due to the various policy options or directives geared toward economic development or poverty alleviation and rural–urban linkages. The 2019–2021 era had a proliferation of topics like "*poverty alleviation,*" "*China,*" "*sustainable development,*" "*social innovation,*" "*rural revitalization,*" "*renewable energy,*" "*poverty,*" "*rural China,*" "*rural development,*" *and* "*stakeholder engagement.*"

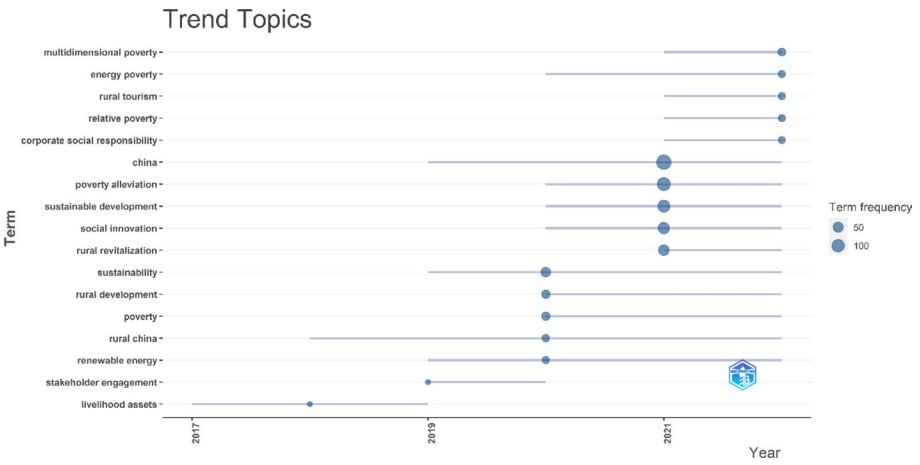

Fig. 11 Visualization of keywords timeline classification and transience within the field of rural revitalization based on WoS database (2017–2022)

These topics gained massive weight and relevance due to the huge economic strides China had made toward its economic development and global recognition. The core objectives and goals for initiatives like the "*40-year Economic Reform and Opening-up Policy*", "*the Rural Revitalization Strategy initiated in 2017*", "*rural household land reforms/consolidation*," "*Belt and Road Initiative*" and "*environmental considerations*," among others were being realized. For instance, 2020 saw the People's Republic of China (PRC) eradicating absolute poverty within its fold, which partly influenced trending topics and concerns for more studies that critically accessed the achievements, bottlenecks and opportunities for growth and sustenance. The post-2021 era has seen the longevity and continuous trends of the 2021 key topics and a surge in new areas such as "*social innovation,*" "*multidimensional poverty,*" "*energy poverty,*" "*rural tourism,*" "*relative poverty,*" *and* "*CSR.*" These trending areas are routed in empowering rural or local areas to make decisions and maximize resource efficiency. This affirms a paradigm shift from the traditional authoritarian approach where the central government solely made decisions to local authorities having their input to foster a sense of ownership/belongingness and acceptance through social innovation/stakeholder consultation and involvement at all levels.

5 Discussion

5.1 Scientific contributions and output

This section examines the results generated from the *Biblioshiny software*, based on research productivity of different authors, journals and nations in relation to the "rural revitalization concept." It further accentuates the degree of research collaboration and co-occurrence analyses that influence policies and cross-cutting initiatives in China and beyond. Similarly, this study sought to highlight some case scenarios of how the understudied concept serves as an avenue to create opportunities for collaboration, and facilitate social innovation and global development. The PRC formally initiated its rural revitalization plan in 2017. In positive light, this strategy plan has yielded several gains which

constitute China eradicating extreme/absolute poverty in 2020 amidst a host of concerns raised. Overall, the ROC analysis (Table 3) presented in this study indicates scientific contributions/output by various authors, journals and nations, based on the search terms/query "rural revitalization" or "rural development strateg*" or "social innovation" or "land use reforms" (Topic) and "sustainable development" (Topic) or "poverty alleviation" (Topic) and "China", have spiked at a rate of 1062.96% (i.e., observed an annual increment of + 212.59%) and 24,777.78% (i.e., at an annual rate of 4955.56%), respectively. The distribution further depicts an average annual growth rate and the average citations per document at 8.06% and 14.04%, respectively. Among the key characteristics of every effective policy in the formulation and implementation cycle constitute "monitoring and feedback" mechanisms. Here, monitoring and feedback mechanisms exist through information dissemination/scientific communication and formal/informal community engagements (i.e., through provincial and village committees in the case of China). Given the study's outcome, it is evident that several authors have contributed immensely through various journal publications to evaluate policies linked to urban and rural governance, land reforms and consolidation, poverty alleviation, rural tourism and innovation. Findings corroborate with the standpoints of Ali and Ali (2023) and Li and Song (2023), who reported that the understudied scope has gradually received significant focus from the scientific community. These contributions have reshaped decision-making processes, policies, plans, programmes and projects (PPPPs) at all levels.

Contextually, the most locally cited author, Liu Yansui, in a study entitled "*Rural Land Engineering and Poverty Alleviation: lessons from typical regions in China*", for instance, reported that innovative land engineering technologies and sustainable land utilization modes have the prospect to offer fundamental theories and reference approaches within the context of rural poverty alleviation (Liu & Wang, 2019). In a more recent study in 2022, co-authored by some authors in Table 4, Guo Y, Zhou Y and Liu Y. systematically analyzed targeted poverty alleviation mechanisms designed by the Chinese central government and explored the mechanism of its practices. The authors discovered that implementing targeted poverty alleviation presents itself as a novel approach applicable to mitigating the phenomenon known as the islanding effect of poverty distribution (Guo et al., 2022). In the same vein, the most influential or locally cited papers (Table 4) within the field of rural revitalization largely focused on *"China's rural poverty alleviation strategies," "smart rural shrinkage," "land consolidation/reforms," "ecological processes and environmental considerations," and "social innovation."* These areas underscore relevant themes of various policy frameworks initiated by the government in ensuring strong urban–rural linkages and sustainable development. It is worth noting that the propositions in the most locally cited papers and contributions of top performing authors in different journals have reshaped governance processes and socioeconomically and environmentally driven PPPPs. Policy recommendations and theoretical values of these studies have continuously driven scientific community, innovation and sustenance over time through provision of data/information to inform decisions.

China's resurgence and litany of achievements economically in recent decades on all fronts present an ideal and justifiable avenue to be studied by other developing nations, as well as countries with relatively low scientific output and investments, in their attempts to bridge rural–urban development gaps. Similarly, the top 10 performing countries based on SCP and MCP and corresponding authors' countries include China, Australia, the USA, Spain, Italy, Germany, the UK, Canada, Brazil and the Netherlands. China's dominance based on research output in the field is in tandem with the productivity of its top 5 lead authors (Fig. 5) based on their research publications, citations, and H-index. Zárate-Rueda

et al. (2023) and Ali and Ali (2023) revealed successful outcomes of initiatives could be institutionalized by other nations who strive to emulate such development path. Findings further provide additional elaboration on the top 15 highly effective journals in advancing scientific knowledge (Fig. 4). Recent developments prove that "*Sustainability,*" "*Land Use Policy,*" *International Journal of Environmental Research and Public Health,*" "*Land,*" *and* "*Journal of Cleaner Production*" remain the most relevant sources based on their research output. These journals serve as sources of reference for policy options, new information and novel approaches that drive innovations, socioeconomic development, and collaboration among key actors/proponents at all levels in China and beyond.

Evidence presented in Fig. 10 based on the current study's search terms between 2017 and 2022 revealed "China," "poverty alleviation," "sustainable development," "social innovation" and "rural revitalization," according to WoS database appeared 149, 109, 87, 71 and 57 times, respectively. Among other keywords, the study's search terms were the most relevant or frequently used keywords. These topics are synonymous to the realization of the goals of "China's *40-year Economic Reform and Opening-up Policy*", "*the 2017–2022 Rural Revitalization Strategy*", "*rural household land reforms/consolidation*," "*Belt and Road Initiative*" and "*environmental considerations* across different provinces, counties and villages." The outcomes are congruent to the standpoints of Li and Song (2023) and Liu and Li (2017) who explored the current status, progress and prospects of rural revitalization efforts, and its applicability in different fronts.

5.2 Thematic map and emerging frontiers

In this study, some keywords for the "rural revitalization" thematic map, which covers four broad areas: niche, motor, emerging/declining, and basic themes are proposed. The development degree (density) and centrality of keywords concerning the utilization of these themes in policy (Liu et al., 2016, 2017), research articles (Li & Song, 2023; Liu & Li, 2017; Liu et al., 2023), and cross-cutting initiatives (Chen et al., 2022a, 2022b; Huang et al., 2021; Špaček et al., 2022) are visualized in Fig. 12. The size and degree of centrality of each term under each theme show the degree of cognisance or relevance of "rural revitalization" and "sustainable development" studies. Indicatively, niche themes dwell on intricacies, complexities, or speciality of topics/subjects within a broader domain which are often overlooked. These themes mostly appeal to a limited audience of experts or enthusiasts who possess deeper insights and interests in the dynamics of the subject in context. *Niche themes* identified in this study entail land use transitions, geographic detectors, case studies, rural restructuring, etc. These themes will facilitate the investigation and progression of specific issues, providing an unparalleled viewpoint and adding to the existing pool of knowledge in this particular domain.

Poverty, income inequality/disparities, economic growth and data envelopment analysis (DEA), among others, were captured under *motor themes*. These topics highlight a particular trend, status, or a behaviour that anchors various actions initiated by an individual, unit, or group. Thoroughly examining these based on certain criteria/ frameworks or models can aid key proponents in unraveling the complexities and encompassing nature of "rural revitalization" crises based on feedback mechanisms. These parameters are situated within the "system and dualistic growth theories"; hence, they will facilitate the development of interventions for different regions, villages and counties, thereby enhancing the overall quality of life. *Emerging or declining themes* constitute food security, ecological security patterns (ESP), land use, rural resident land, relative/

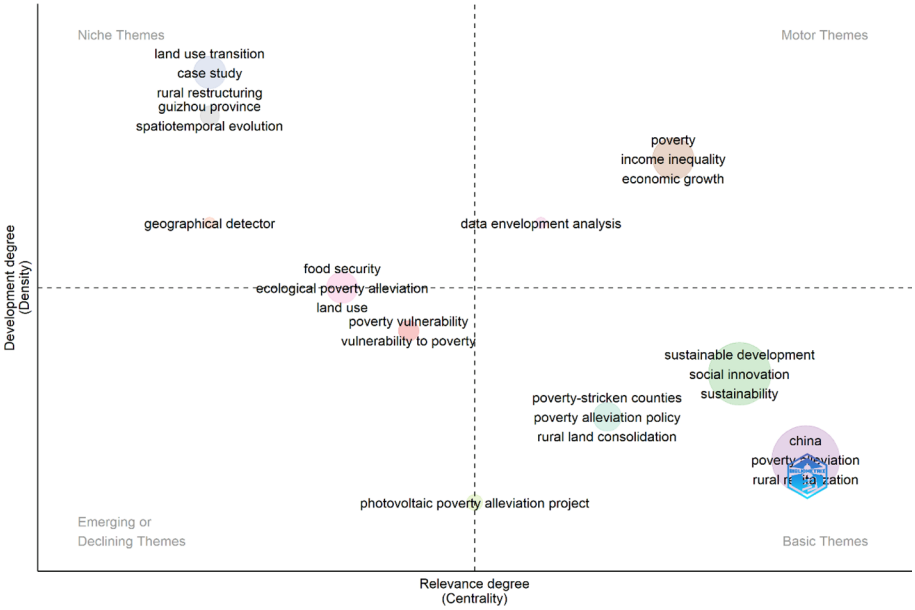

Fig. 12 Proposed keyword thematic map based on four broad themes within the field of rural revitalization based on WoS database (2017–2022)

multidimensional poverty, vulnerability, etc. They hold significant meaning in the realm of analysis and understanding of various subjects. An emerging theme refers to a concept or idea gaining prominence and attention within a particular field or discourse. It signifies an area of interest that is evolving, often due to new research, cultural shifts, or changing perspectives. Conversely, a declining theme alludes to a concept or notion that is losing relevance and becoming less significant in a given context. Identifying these patterns is crucial for researchers and scholars as it allows for a comprehensive understanding of the ongoing developments, the direction of current discourse, and potential future directions. These trends aid relevant stakeholders in staying abreast of emerging frontiers, critically evaluating the value of certain themes, and contributing to knowledge in their respective fields.

Finally, *basic themes* refer to the core idea or underlying concepts that drive different socio-political, economic and environmental discourses, practices and models. This paper identified sustainable development, social innovation, China, poverty alleviation, rural revitalization, rural land consolidation, and poverty-stricken counties as the basic themes in this "*rural revitalization"* study. They allow the reader or audience to decipher or delve into the deeper layers of these concepts and their broader significance. This concept is paramount in literary analysis as it enables a comprehensive understanding of the work's central focus and the author's intentions. A basic theme often transcends the surface-level plot, characters, and events, allowing for a more nuanced interpretation and exploration of global concepts that seek to sustain the quality of life and ecology across different regions. Therefore, identifying and analyzing these basic themes in this study enriches basic datasets, synthesizes literature and the latest advancements in the field, and present feasible alternatives to address rural revitalization issues through transformative/collaborative governance, equity, and equality based on the principles and tenets of sustainable development.

5.3 Rural China

The evolution of rural areas (Fig. 13a, b) in China has been influenced by various economic, socio-political and environmental factors. China underwent rapid industrialization and urbanization in the late 20th and early twenty-first centuries. This led to a significant shift in the population from rural to urban areas, leaving behind ageing and shrinking rural communities (Fan et al., 2019). Economic reforms initiated in the late 1970s aimed to modernize agriculture and improve rural productivity. While these reforms brought economic growth, they also introduced new challenges, such as income disparities between rural and urban areas (Long et al., 2019).

Figure 13a presents global built-up classification systems. Similarly, Fig. 13b depicts the categorization or proportion of the PRC's rural (36.44%), suburban (47.15%) and urban areas (16.41%). The classifications (Fig. 13) were performed based on the FAO (2021), European Commission (EU), the United Nations Human Settlements Programme (UN-Habitat), the Organisation for Economic Co-operation and Development (OECD) and the World Bank methodological approach and datasets (accessed via http://www.fao.org/3/cb3675en/cb3675en.pdf) (see Table 2A for other details). In rural economic development, land fragmentation occurred as rural land was divided among family members, reducing the efficiency of farming and hampering agricultural productivity (Huang & Song, 2018). Traditional rural industries, such as agriculture and handicrafts, faced competition from modern industrial and urban sectors, resulting in declining employment opportunities and income sources in rural areas. The lure of better job opportunities and city living conditions led to large-scale rural-to-urban migration. This trend resulted in a labour shortage in

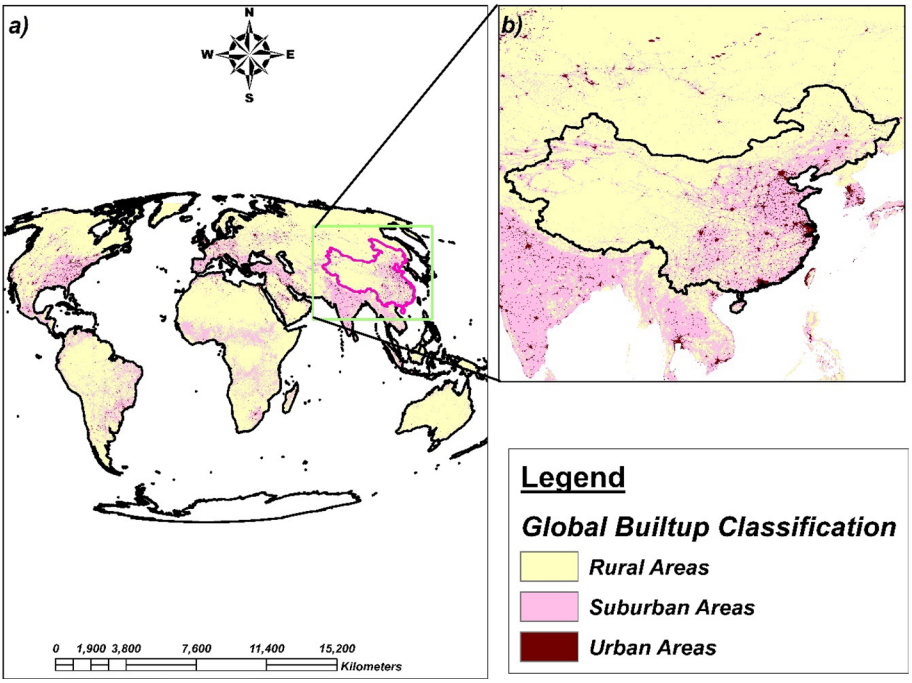

Fig. 13 Rural, suburban and urban classification systems of the People's Republic of China (PRC)

rural areas, affecting agricultural production and rural economies (Huang & Song, 2018). An ageing population and a lack of incentives for the youth to remain in rural areas have led to a decline in the rural workforce and overall rural vitality (Fan et al., 2019). Rural areas often face the challenge of providing basic services, including education, healthcare, and infrastructure. Limited access to essential services further contributed to rural decline (Zhang & Zhang, 2021). Historically, the central government's focus and investment were directed toward urban growth and development, leaving rural areas with fewer resources and attention (Fan et al., 2019). In response to these crises faced by rural areas, the Chinese government launched the "*Rural Revitalization Strategy*" in 2017, which sought to address these challenges and promote sustainable rural development (State Council of the People's Republic of China, 2018).

5.4 Evidence-based scenarios: opportunities for collaboration, social innovation and global development

Opportunities for collaboration, social innovations and global development exist in fostering "self-revitalization or creative placemaking." Creative placemaking in rural areas can be factored into planning to harness local assets, traditions, and cultural heritage to regenerate economic opportunities, enhance community cohesion, and attract external investment. By activating underutilized resources and encouraging bottom-up approaches, creative placemaking facilitate the emergence of vibrant cultural spaces that cater for the needs of locals and visitors alike (Zárate-Rueda et al., 2023; Dionisio et al., 2023). Some schools of thoughts have raised concerns over China's rapid urbanization and industrialization rate, which has subtly influenced its rural–urban divide and revitalization efforts. The intertwining nature of the system (Hodge & Adams, 2019), dualistic (Dijkstra et al., 2022), stakeholder and institutional legitimacy theories (Habib, 2023a, 2023b) substantiate causal factors and brain drain in the planning and management of rural areas. Nevertheless, the "*resilience theorists*" (Brown & Schucksmith, 2016; Van Breda, 2018) view rural shrinkage or depopulation as an avenue to adapt and transform rural communities smartly. "Smart shrinkage" is critical to the success of China's rural revitalization and sustainable development. In view of this, this study attempts to outline some successful "smart rural shrinkage" and "creative placemaking" efforts (Table 6) in China and beyond that could enhance collaboration, social innovations and global development. Successful revitalization scenarios and cross-cutting initiatives presented under this section do not completely present a "*perfect"* creative revitalization or strong urban–rural linkage avenues due to differences in regional geographies, social cognition and cultural values, and the level of talent in rural areas. However, it triggers the optimization of underutilized resources, revitalizes ecological processes and traditional or cultural heritage, improves sustainable land management and agricultural practices, enhances connectivity and digital infrastructure, rural innovation, recreation and security.

5.4.1 Social innovation

Chen et al. (2022a, 2022b) investigated the prospect of social innovation (SI) in rural revitalization by elucidating the roles of actors in Taiwan's social innovation processes. For instance, Neumeier's model of social innovation presents two analytical frameworks: Actor-network theory (ANT) and Actor-oriented approach-based framework, which were utilized comparatively to untangle the roles of actors in rural social innovation. Neumeier's

Table 6 Some successful creative placemaking or self-revitalization scenarios in China

Location	Initiative (s)	Description
1. Xiaogang Village, Fengyang, Anhui	Household contract responsibility	Transformed old management systems in the countryside, liberated rural productive forces, and aroused the enthusiasm of the farmers in production
2. Nanjie Village in Henan Province, Huaxi Village in Jiangsu Province	Specialized-villages/collective economy	By developing a collective economy, digital infrastructure (i.e., extension of digital rural governance 'internet plus' in rural areas) and opening-up factories, some villages have improved farmers' income and living standards, driving regional economic development
3. Suzhou-Wuxi, Changzhou	*'Sunan Model'* initially proposed by sociologist Fei Xiaotong in the early 1980s	Farmers in Suzhou, Wuxi, Changzhou, Nantong and other places in southern Jiangsu Province revolutionized and relied on their strength to develop township enterprises, aimed to develop their communities/regions
4. Minning Town, Ningxia	Regional balance initiative (eastern and western parts of China)	Cooperation and investments within the eastern and the western regions to foster economic and educational conditions
5. Lubu Town, Zhejiang Province	New Village Sage Council, Xiang Xian	The new Xiang Xian Council plays an important role in participatory processes in villages, the amendment of village rules and regulations, the assessment of projects benefiting the locals and the practical dynamics of people's livelihoods
6. Shaodong Village, Hunan Province	Targeted poverty alleviation (TPA)	Precise poverty alleviation is the symmetry of extensive poverty alleviation which refers to precise identification, accurate assistance and management of poverty alleviation objects through scientific and effective procedures for different poverty-stricken regional environments and farmers

Table 6 (continued)

Location	Initiative (s)	Description
7. Zhejiang Province	The 1999 Agricultural science and technology special commissioner system	The special agent system has transformed agricultural science and innovative talents, originally belonging to different systems into a unified rural science and technology system. It created conditions for the realization of the "trinity" agricultural technology extension system of education, scientific research and promotion. These enhanced the conditions of market economy, and opened up the "*last kilometer*" of agricultural, scientific and technological achievements transformation. Since its establishment in 1999, the system of science and technology commissioners has played an important role in alleviating the technical shortcomings of "three rural areas and the plight of farmers" thereby promoting the development of rural industries
8. China's rural revitalization strategy	Rural homestead system reform; Link Policy; Township economy	Promotes essential factors such as digital or critical infrastructure, labor, land, industries and capital to flow and integrate quickly Makes greater breakthroughs on the free flow of usage rights, use conversion of rural homestead, space replacement of homestead qualification rights, and effective cohesion for qualification identifying and compensating use

model posits that social innovation within the context of rural revitalization protrudes several gains in terms of its effects, addresses marginalization concerns, and is promising in terms of its external, non-geographic connections. Though rural social innovation does not absolutely eliminate the causes of rural marginalization, it presents a strategy that weaves a future in which rural areas have more self-organized initiators, actors, more external partners and connections, driven by the need to address common societal issues without geographical boundaries (Chen et al., 2022a, 2022b). Again, the implementation of "Internet Plus Agriculture (IPA)" in Ningyuan Country, Hunan Province by the Chinese government through the local authorities presents a unique avenue that facilitates engagement and social cohesion/capital. The IPA was initiated to inject new vitality into agricultural production and rural development through digital/critical infrastructure or Internet Technology. A series of measures which were implemented composed of intelligent agriculture, e-commerce poverty alleviation, and industrial chain integration, which have attained remarkable results. The said model made it more convenient for farmers to locate volunteers who were willing to assist them with their farming activities during the planting season (Li & Song, 2023).

Recently, Špaček et al. (2022) investigated the impact of knowledge on the restoration of traditional farming techniques in impoverished rural vicinities. They strived to determine (1) how knowledge co-production in SI projects for traditional agricultural rehabilitation may impact its economic growth route and (2) how the interactions between community members and other parties promote intellectual collaboration and drive a shift in civic practises in the direction toward lasting transitions. They used an integrated approach to resolve these concerns, through the exploration of a SI project, thus, the Vlkolnec UNESCO World Heritage Site in Slovakia. They illustrated how knowledge co-production may push the growth of SI by connecting numerous local interested parties, most notably researchers and decision-makers or regulatory bodies. These approaches bolstered the SI's development path, as it sought to initiate innovative efforts needed to encourage individuals to switch back to conventional agricultural practises, advance cultural traditions, create novel environmentally friendly employment and conditions for improving community members' standard of living. Similarly, it sought to build fresh opportunities for nature-based tourism. Their discoveries stress the need for social capital and the establishment of a regional knowledge system consisting of both domestic and international players, in order to encourage SI in rural regions. The findings indicate that multi-actor networks improve information exchange and perform a vital function in the establishment of SI routes.

5.4.2 Collaboration

Public–private partnerships (PPPs) have been widely suggested in most rural revitalization studies in China. Zhang et al. (2019) examined the role of PPPs in rural governance and their potential to revitalize rural areas. They reported that PPPs can foster the efficiency of public services, attract private investment to rural areas, and promote innovation. In their study, they admitted the implementation of PPPs can be complex, time-consuming and create avenues for corruption. For instance, the creation of specialized villages in Hao Tang village in Xinyang had local authorities partnering international donors and other state agencies to promote the construction of beautiful villages that make considerations for ecological protection and rural tourism development (Lazar & Chithra, 2022; Diéguez-Castrillón et al., 2022). However, it serves as a valuable tool for rural revitalization in China, but it must be carefully implemented to succeed. They advocated for the

central government to provide financial and technical assistance and create an enabling environment for effective PPPs. China Development Research Foundation (2019) posited that collaboration between government, businesses, and civil society is vital in averting rural revitalization bottlenecks. Similarly, the Chinese Academy of Social Sciences (2018) opined that university-industry-government collaboration can drive the development of new technologies and businesses in rural areas, create employment opportunities, improve productivity, and attract investment to rural areas. World Bank (2017) deems collaborations and support for social enterprises to mitigate some social and economic challenges in rural areas. They reported that social enterprises tend to provide essential services, create employment opportunities, and empower rural communities in various ways.

In their investigations, Li et al. (2022) and Liu et al. (2017) explored a viable and innovative route for alleviating hunger in rural regions based on the actor-network paradigm (ANP). By adopting the ANP approach, the researchers explored the Shengzhou bamboo weaving business, a traditional Chinese handcraft, to expound the vital connections and characteristics associated with longevity, such as the functions, benefits, and interaction of numerous actors in this industry. Despite the fact that the poverty alleviation design (DPA) can be challenging for countryside artisans to accomplish basic modifications to their liberties and desires, the researchers discovered that partnership is critical to the advancement of industrial targets, social and economic gains, which are critical to rural SI. The ANP approach tackles issues that engulf separation and diverse interests among interested parties/players. It establishes a novel foundation for rural SI by enabling the selection of viable efforts and procedures that maximise the rights and interests of many parties.

5.4.3 Global development

As part of the global effort to facilitate sustainable development in rural areas, it is imperative that rural revitalization concerns are addressed. As depopulation and marginalization of the rural regions linger, accessibility to essential services becomes arduous, thereby driving economic stagnation. Global development agencies like the World Bank, the International Monetary Fund (IMF), and other philanthropic/donor agencies can play pivotal roles by allocating funds and resources to support rural development projects in various countries. Funding or allocating resources to avert rural revitalization crisis require collaborative efforts, care and technical assistance or scientific knowledge to inform decisions or prevent the incidence of "maladaptation or unintended consequences." Aids could be granted in the form of financial assistance, grants, concessional loans and leveraging resources for development (with a win–win policy option), and technical or enhancing human resource capacity base, among others, to improve rural infrastructure, agricultural productivity, and capacity-building components to empower rural communities with essential skills, knowledge, and training. By promoting entrepreneurship, vocational training, and sustainable agricultural practices, rural residents can better address local challenges and participate in income-generating activities (World Food Programme, 2019). These efforts emphasize inclusive growth, aiming to reduce poverty and inequality in rural areas. By creating economic opportunities and supporting vulnerable groups, such as women and marginalized populations, rural revitalization can address the root causes of poverty and improve the overall well-being of communities (United Nations, 2015). Global development initiatives promote digital innovation and technology transfer in rural areas. By leveraging information and communication technologies (ICTs) and e-commerce platforms, rural communities can access markets, financial services, and essential information,

stimulating economic growth and enhancing the quality of life (United Nations Development Programme, 2021).

Contextually, rural revitalization must make room for environmental considerations in order to adhere to the concept of sustainable development. Supporting eco-friendly agricultural practices, promoting renewable energy solutions, and enhancing natural resource management contribute to a sustainable rural future (FAO, 2021). Conversely, global development networks and platforms facilitate the exchange of knowledge and experiences and promote sustainable practices among countries faced with similar rural revitalization challenges. According to Bardhan (2019), taking notes or queues from successful rural development models in different regions could guide the design and implementation of context-specific interventions that improve the livelihoods of rural communities.

6 Conclusions

The contextualization of rural revitalization through bibliometric studies is a crucial step toward contributing to the development of sustainable strategies and policies that reinvigorate rural communities, improve livelihoods, and facilitate rural–urban transcendence from dichotomy to integration (i.e., strong urban–rural linkages). This bibliometric study uniquely utilizes broader search criteria, covering the most recent period (2017–2022) and advances in the field. The choice and development of keywords and standpoints in previous studies give room for wider, continuous and diversified reviews that enrich and grow this body of knowledge. With the progressive surge and nature of sustainable development, transformative governance, rural and poverty-striven studies and concepts, respectively, some critical areas may have been neglected or overlooked in previous studies. The present study employs R-studio's biblioshiny software package to illustrate and expound the scientific contributions made by some influential authors, nations and academic journals in China's rural revitalisation agenda between 2017 and 2022. It further analyzes recent scientific advances based on extant literature acquired from the WoS core database collection. Other bibliometric analyses performed included collaborative mappings, co-occurrence analyses, and the introduction of a thematic map that culminates niche, motor, emerging/transient, and basic themes that engulf the concept. To this end, evidence-based decision-making scenarios presented in this study draw on the tenets of the understudied concept, demonstrating how they create opportunities for collaboration, social innovation and global development.

Through this study, the rate of change analysis revealed research publications and citations on "China's rural revitalization paradox" have spiked by 1062.96% and 24,777.78%, respectively, in recent years. Increasing scientific output influences global development through information dissemination, provision of new ideas (e.g., proposition of "rural resident land," need for strong urban–rural transformation, discourses in modernization and rural civilization, among others), policy evaluation and responses and advancement of various sectors (e.g., extension of "*Internet Plus*" digital infrastructure or rural governance policy in rural areas for enhanced connectivity, and a balanced rural–urban work network, coupled with the revival or assistance of rural industries to trickle direct and indirect benefits) at different levels. The top 5 performing journals, namely; "*Sustainability,*" "*Land Use Policy*," "*International Journal of Environmental Research and Public Health*," "*Land*," *and* "*Journal of Cleaner Production*" have contributed about 34.95% (i.e., 302 articles), representing more than a quarter of the total sample size present policy-options

and discourses/debates (e.g., depopulation centered debates arguments for smart rural shrinkages), new information and novel approaches that drive innovations (i.e., through land reforms, application of geographic detection models, multidimensional aspects of poverty calls for empowerment or devolution of powers to rural authorities in managing local affairs, etc.), socioeconomic growth through consciously driven and targeted efforts to promote "rural innovation, reduction of poverty in rural areas, creation of homestead communities, and rural eco-tourism development for vitality and culture preservation," and the development of the "Link Policy" in some provinces, districts, counties or villages in China, and collaboration among key players at all levels in China and beyond.

Although strong collaborative mapping was observed among (i.e., intra) the dominant authors and their cohorts, the level of collaboration between (i.e., inter) the top performers in the field was low. This in effect, drives the need for more innovation between the top performing authors for critical assessment of emerging frontiers and policy-frameworks. The thematic map proposes four major themes, thus, niche (e.g., land use transitions, geographical detector, rural restructuring and spatiotemporal evolution of rural resident land), motor (e.g., poverty, economic growth, income inequality and data envelopment analysis) emerging and declining (e.g., vulnerability to poverty, land use, food security, etc.), and basic areas (e.g., sustainable development, social innovation, poverty alleviation policies, rural land consolidation, rural revitalization, etc.) that engulf the concept of rural revitalization and sustainability. Evidence-based decision-making scenarios and cross-cutting initiatives present feasible efforts that facilitate *"creative placemaking or self-revitalization"* and *"smart rural shrinkage"* in rural areas which are critical to the success of China's revitalization and sustainable development agenda.

6.1 Theoretical and policy implications

This study synthesizes how other nations could reference China's rural revitalization pathway and scientific contributions in the Global North and South to enhance their rural revitalization strategies amid sustainability concerns. Through this study, development partners and the international scientific community are provided with basic datasets on recent advancements, proof, emerging frontiers, and cross-cutting "*rural revitalization*" initiatives. In addition, emerging frontiers and top-performing journals, institutions/nations and authors present ease/avenues for other researchers, including young and upcoming scientists and scholars, to know where to seek appropriate information and/or whom to collaborate on subjects that engulf the understudied discipline. Standpoints presented in this study toughen the highlighted theories which encompass rural vitality or development.

6.2 Limitations and future research perspectives

Limitations and research opportunities that allay the present study entail the challenge of bibliometric techniques, dwelling solely on outputs instead of content analysis inclusion, which this study attempted to capture as part of the study's discussions. Despite the level of validity and reliability in WoS data, there could be some element of bias. Future studies could culminate more sources from Google Scholar and the SCOPUS database for broader perspectives. Similarly, further studies could go beyond using solely English language related articles but consider other locally relevant articles, published in different languages.

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Data availability Links to some datasets used have been provided in the main text. Other forms of data will be provided upon reasonable request.

Code availability Software and links to all database are provided in the Methodology section.

Declarations

Conflict of interest The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Authors and Affiliations

Isaac Sarfo[1,9] · Jiajun Qiao[1] · Nana Adwoa Anokye Effah[2] · Michael Atuahene Djan[3] · Dzifa Adimle Puplampu[4] · Michael Batame[5] · Rosemary Achentisa Ayelazuno[6] · Emmanuel Yeboah[7] · Michael Kpakpo Allotey[8] · Xiaoyong Zhu[1]

✉ Jiajun Qiao
jjqiao@henu.edu.cn

Isaac Sarfo
isaacsarfo@163.com

Nana Adwoa Anokye Effah
effahnanaadwoa@gmail.com

Michael Atuahene Djan
michaelatuahenedjan@gmail.com

Dzifa Adimle Puplampu
sayahjifa@gmail.com

Michael Batame
Michael.Batame@uga.edu

Rosemary Achentisa Ayelazuno
rayelazuno@gmail.com

Emmanuel Yeboah
emmanuelyeboah@nuist.edu.cn

Michael Kpakpo Allotey
mkallotey@st.ug.edu.gh

Xiaoyong Zhu
15236385780@henu.edu.cn

[1] College of Geography and Environmental Science, Henan University, Kaifeng 475004, Henan Province, China

[2] School of Accounting, Zhongnan University of Economics and Law, Wuhan, Hubei, China

[3] Department of Geography, University of Nebraska, Lincoln, USA

[4] School of Environmental Sciences, University of Hull, Hull, UK

[5] Warnell School of Forestry and Natural Resources, University of Georgia, Athens, USA

[6] Department of Geography and Sustainability, University of Tennessee, Knoxville, USA

[7] School of Remote Sensing and Geomatics Engineering, Nanjing University of Information Science and Technology, Nanjing 210044, Jiangsu, China

[8] Department of Geography and Resource Development, University of Ghana, Legon, Accra, Ghana

[9] Organization of African Academic Doctors (OAAD), Off Kamiti Road, P.O. Box 25305000100, Nairobi, Kenya