

Bibliometric Analysis of Local Food Security Research in Southeast Asia with a Focus on Research Issues, Collaboration, and Future Agenda

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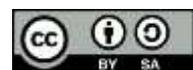
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ABSTRACT

This study aims to map and analyze the development of local food security research in Southeast Asia through a bibliometric approach, with a focus on identifying dominant research issues, collaboration patterns, and future research directions. Using data extracted from the Scopus database and analyzed with VOSviewer, the study examines publication trends, keyword co-occurrence networks, overlay visualization, and density mapping. The findings indicate that food security research in Southeast Asia is strongly centered on themes such as food supply, climate change, sustainable development, and agricultural production. Over time, the research focus has shifted from macro-level production and economic perspectives toward resilience-based and sustainability-oriented frameworks, particularly emphasizing smallholder vulnerability, crop yield under climate stress, and adaptive agricultural strategies. The density analysis further reveals that while core themes are well established, topics related to localized governance, protein diversification, urban food systems, and digital innovation remain less explored. Collaboration patterns suggest regional anchoring with connections to broader developing-country discourse, highlighting the importance of strengthening intra-regional research networks. The study provides a structured overview of the intellectual landscape of local food security research in Southeast Asia and offers a forward-looking agenda emphasizing climate resilience, sustainability integration, and inclusive regional collaboration.

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1. INTRODUCTION

Food security has become one of the most pressing global challenges in the twenty-first century, particularly in regions that are highly vulnerable to climate change, population growth, and economic disparities. Southeast Asia represents a strategic and dynamic region in this context [1], [2]. With its diverse agroecological systems, rapidly urbanizing populations, and heavy

dependence on agriculture for livelihoods, the region faces complex food security challenges. Issues such as land degradation, climate variability, supply chain disruptions, and unequal access to food continue to threaten the stability of local food systems [3]. At the same time, Southeast Asia possesses rich local knowledge, traditional farming practices, and community-based food systems that offer significant potential for strengthening local

food resilience. Understanding how research on local food security in Southeast Asia has evolved is therefore critical for informing evidence-based policy and sustainable development strategies [4].

Local food security refers not only to the availability of food at the national level but also to the capacity of local communities to produce, access, and utilize food in a sustainable and culturally appropriate manner. In Southeast Asia, local food systems are shaped by smallholder farmers, coastal fisheries, indigenous communities, and informal markets [5]. These systems are increasingly influenced by global trade dynamics, technological transformation, and environmental pressures. Recent events such as the COVID-19 pandemic further exposed vulnerabilities in regional food supply chains and highlighted the importance of strengthening local resilience. Consequently, scholarly attention toward local food security in Southeast Asia has expanded, encompassing themes such as climate-smart agriculture, agroecology, urban farming, food sovereignty, nutrition security, and digital transformation in agriculture [4], [6].

Over the past two decades, research on food security has grown significantly worldwide. However, the distribution of knowledge production, thematic priorities, and collaborative networks often varies across regions. Southeast Asia presents unique socio-political and environmental characteristics that distinguish it from other parts of the world. Countries such as Indonesia, Vietnam, Thailand, the Philippines, and Malaysia have each developed specific research trajectories shaped by national development agendas, agricultural modernization policies, and regional cooperation frameworks such as ASEAN. Despite the increasing number of publications related to food security, there remains limited systematic mapping of how research on local food security in Southeast Asia has developed over time, what dominant themes have emerged, which countries and institutions lead collaboration, and where knowledge gaps persist.

Bibliometric analysis offers a powerful methodological approach to address

this need. By quantitatively examining publication trends, citation networks, keyword co-occurrence patterns, and co-authorship structures, bibliometric studies enable researchers to identify intellectual structures, emerging research fronts, and influential actors within a specific field [7]. Unlike traditional narrative literature reviews, bibliometric mapping provides a structured and visual representation of scientific development. It allows scholars to uncover clusters of research topics, detect shifts in thematic emphasis, and analyze patterns of international collaboration. In the context of Southeast Asia, such analysis can reveal whether research is dominated by certain countries, how strong intra-regional collaboration is compared to partnerships with global North institutions, and which issues receive greater scholarly attention.

Understanding the research landscape of local food security is increasingly important in light of global sustainability agendas, including the Sustainable Development Goals, particularly SDG 2 on zero hunger. Policymakers and development practitioners require reliable knowledge to design context-specific interventions that strengthen local production systems, improve nutritional outcomes, and enhance resilience to shocks. However, without a clear mapping of existing research trends and collaboration networks, it is difficult to identify priority areas for future studies or to assess whether current research adequately addresses pressing local challenges. A bibliometric study focusing specifically on Southeast Asia can therefore contribute to bridging the gap between academic production and policy needs, while also highlighting opportunities for regional research integration and interdisciplinary collaboration.

Despite the growing body of literature on food security globally, there is a lack of comprehensive bibliometric analysis that specifically maps the evolution of local food security research in Southeast Asia, identifies dominant research themes, examines collaboration patterns among countries and institutions, and outlines future research agendas tailored to the region's

unique socio-environmental context. Without such systematic mapping, the understanding of research dynamics remains fragmented, limiting the ability of scholars and policymakers to strategically advance knowledge and innovation in strengthening local food resilience. This study aims to conduct a comprehensive bibliometric analysis of research on local food security in Southeast Asia by examining publication trends, identifying major research themes, mapping collaboration networks among countries and institutions, and highlighting emerging issues and future research directions.

2. METHOD

This study employs a quantitative bibliometric approach to systematically map and analyze scientific publications on local food security in Southeast Asia. The data source used in this research is the Scopus database, selected due to its extensive coverage of peer-reviewed international journals, conference proceedings, and high-quality academic publications. Scopus is widely recognized for its reliability and comprehensive indexing, making it suitable

for bibliometric studies that require structured metadata such as authors, affiliations, abstracts, keywords, citations, and references. The data collection process involved the use of relevant keywords related to “local food security,” “community food systems,” “food resilience,” and “Southeast Asia,” combined using Boolean operators to ensure precise retrieval of publications. The search was limited to specific document types such as articles and reviews and confined to publications within a defined time span to capture the development trajectory of the field.

After data retrieval, the bibliographic information was exported from Scopus in CSV format, including essential metadata such as authors, titles, abstracts, keywords, affiliations, publication year, citation counts, and references. The dataset was then screened to remove duplicate records and irrelevant documents that did not directly address local food security in the Southeast Asian context. To visualize and analyze the intellectual structure and collaboration patterns, this study utilized VOSviewer software.

3. RESULT AND DISCUSSION

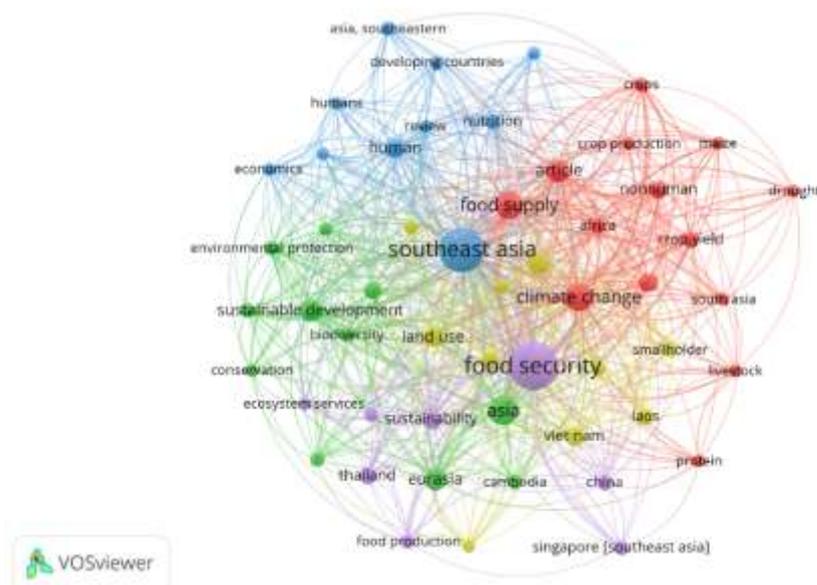


Figure 1. Network Visualization

Source: Data Analysis

Figure 1 reveals that “food security” functions as the central and most dominant keyword within the research landscape of local food security in Southeast Asia. Its

central position and large node size indicate high frequency and strong link strength with other themes. Closely connected terms such as “food supply,” “climate change,” “southeast

asia," and "sustainable development" suggest that food security research in the region is strongly embedded within broader discussions of environmental change, agricultural production, and sustainability transitions. This confirms that food security is not treated as an isolated concept but as part of an interconnected socio-ecological system. The red cluster highlights themes related to agricultural production and climate vulnerability, including keywords such as "climate change," "crop production," "crop yield," "drought," "maize," and "smallholder." This cluster reflects a strong scientific focus on production-based approaches to food security, particularly in relation to climate risks and agricultural resilience. The prominence of "smallholder" indicates that research frequently emphasizes rural farming systems and vulnerable producer groups. This suggests that food security in Southeast Asia is often framed through the lens of agricultural productivity and adaptation to environmental stressors.

The green cluster represents sustainability and environmental governance dimensions, including terms such as "sustainable development," "environmental protection," "ecosystem services," "biodiversity," "conservation," and "land use." This cluster demonstrates a shift toward ecological and long-term sustainability considerations in food security discourse.

Rather than focusing solely on food availability, researchers increasingly integrate environmental conservation and ecosystem management into food system discussions. This indicates a growing recognition that food security must be aligned with sustainable resource management and ecological resilience. The blue cluster emphasizes human and socio-economic dimensions, with keywords such as "humans," "nutrition," "developing countries," "economics," and "review." The inclusion of "nutrition" highlights that food security research is expanding beyond agricultural output to include dietary quality and public health outcomes. Meanwhile, terms like "economics" and "developing countries" reflect structural and developmental perspectives, suggesting that food security is closely tied to income distribution, poverty alleviation, and regional development dynamics. The presence of country-specific keywords such as "Viet Nam," "Thailand," "Cambodia," "Laos," "China," and "Singapore (Southeast Asia)" indicates a geographically differentiated research focus within the region. While several Southeast Asian countries appear, the network also shows linkages beyond ASEAN, suggesting transnational collaboration and comparative studies.

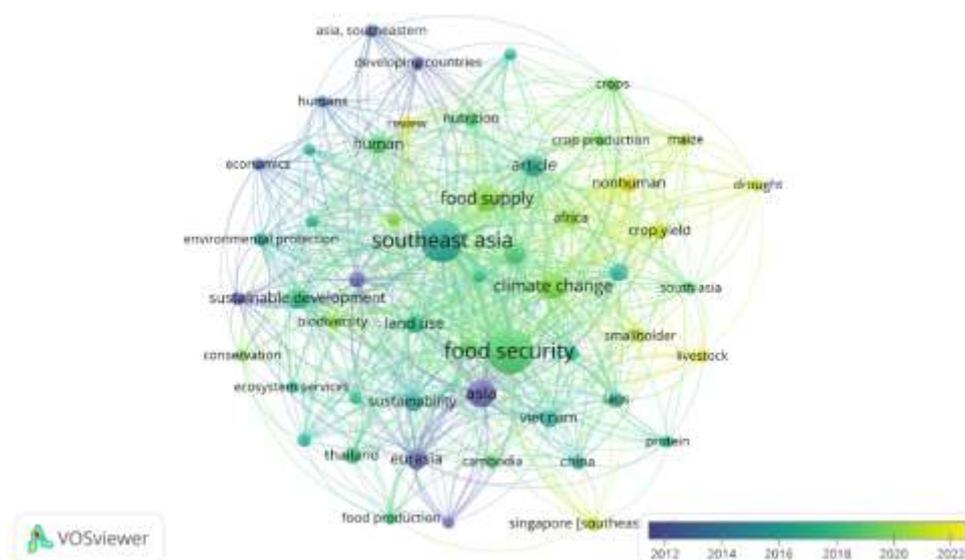


Figure 2. Overlay Visualization
Source: Data Analysis

Figure 2 illustrates the temporal evolution of research themes in local food security studies in Southeast Asia from 2012 to 2022. The color gradient, ranging from blue (earlier years) to yellow (more recent years), shows how research attention has shifted over time. Earlier studies, indicated in darker blue tones, concentrated on foundational themes such as “food production,” “developing countries,” “economics,” and general regional descriptors like “Asia” and “Eurasia.” These early works primarily framed food security within macro-level development and production-oriented perspectives, focusing on availability and economic dimensions. As the research field progressed into the mid-period (green tones), attention expanded toward integrative themes such as “food security,” “food supply,” “climate change,” “land use,” and “sustainable development.” The prominence of these green nodes suggests

that around 2016–2019, scholars increasingly adopted a systems perspective, linking agricultural production with environmental sustainability and climate resilience. The strong connectivity between “climate change” and “food security” indicates a growing recognition that environmental stressors are central determinants of regional food stability. In the most recent period (yellow tones), emerging topics such as “crop yield,” “maize,” “drought,” “livestock,” “smallholder,” and “protein” appear more prominently. This indicates a shift toward more specific, impact-driven, and resilience-focused research. Rather than discussing food security in broad conceptual terms, recent studies increasingly address vulnerability, adaptation strategies, and production efficiency under climate stress.

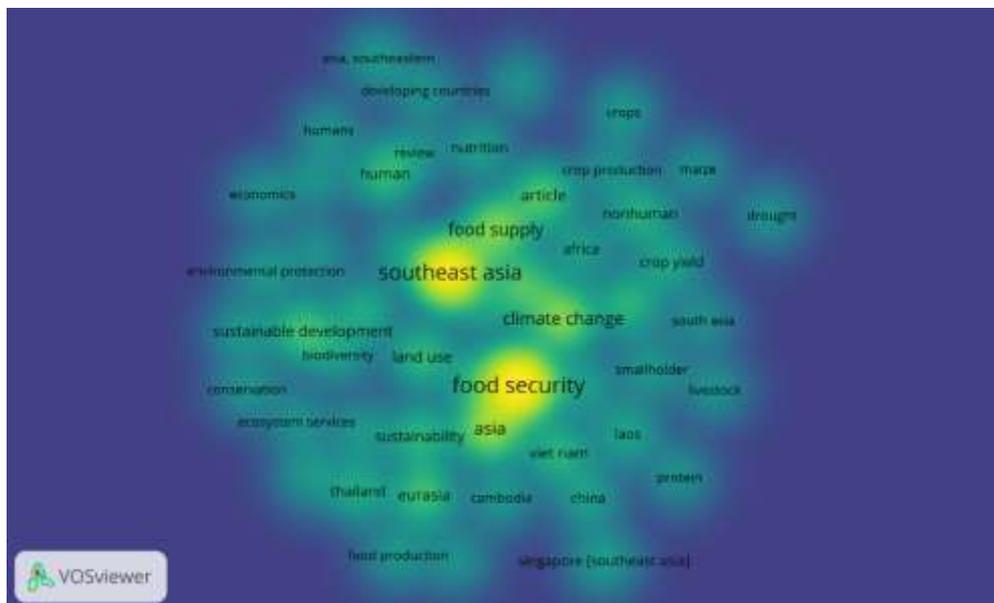


Figure 3. Density Visualization

Source: Data Analysis

Figure 3 highlights the most intensively researched themes in local food security studies in Southeast Asia. The brightest (yellow) areas concentrate around “food security,” “southeast asia,” and “food supply,” indicating that these keywords represent the core focus of the literature. Their central position and high density suggest strong interconnections with multiple related themes, confirming that research in this

region primarily frames food security within broader regional and supply system contexts. Surrounding these core nodes are moderately dense terms such as “climate change,” “sustainable development,” “land use,” and “asia,” reflecting the integration of environmental sustainability and climate considerations into mainstream food security discourse. In contrast, more peripheral and lower-density areas (green to blue shades)

include specific agricultural and localized themes such as “maize,” “drought,” “livestock,” “protein,” “Singapore,” and some country-level references. While these topics are present, their lower intensity indicates that they are either more specialized or less frequently studied compared to the central themes. This pattern suggests that although the literature strongly emphasizes macro-

level regional and sustainability frameworks, there remains space for deeper exploration of commodity-specific studies, localized adaptation strategies, and urban or country-specific food system dynamics within Southeast Asia.

Citation Analysis

Table 1. Top Cited Literature

Citations	Authors and Year	Title
919	[8]	Creation of a high spatio-temporal resolution global database of continuous mangrove forest cover for the 21st century (CGMFC-21)
346	[9]	Farming and the geography of nutrient production for human use: A transdisciplinary analysis
244	[10]	Swidden transformations and rural livelihoods in Southeast Asia
183	[11]	Carbon outcomes of major land-cover transitions in SE Asia: Great uncertainties and REDD+ policy implications
174	[12]	Diet change – A solution to reduce water use?
151	[13]	Edible Insects Farming: Efficiency and Impact on Family Livelihood, Food Security, and Environment Compared With Livestock and Crops
129	[14]	Node and regime: Interdisciplinary analysis of water-energy-food nexus in the Mekong region
117	[15]	Are mangroves worth replanting? The direct economic benefits of a community-based reforestation project
116	[16]	The draft genomes of five agriculturally important African orphan crops
113	[17]	Yield gaps in rice-based farming systems: Insights from local studies and prospects for future analysis

Source: Scopus, 2026

Discussion

The bibliometric findings reveal that research on local food security in Southeast Asia has developed into a multidimensional and interconnected field, yet remains strongly anchored in foundational production-oriented perspectives. The dominance of keywords such as “food security,” “food supply,” and “Southeast Asia” indicates that the regional framing is central to scholarly discourse. This suggests that food security is frequently analyzed at macro and meso levels, emphasizing regional patterns, policy implications, and structural determinants. However, the strong linkage between food security and food supply also signals that availability remains a primary concern, reflecting persistent production and distribution challenges across Southeast Asian countries.

The clustering patterns further demonstrate that climate change has become a critical integrating theme in recent years. The co-occurrence of terms such as “crop production,” “crop yield,” “drought,” and “smallholder” with climate-related keywords reflects a shift from static food availability models toward resilience-based frameworks. This evolution aligns with the region’s vulnerability to climate variability, including extreme weather events and shifting rainfall patterns. The overlay visualization confirms that climate-adaptive agriculture and yield optimization under stress conditions are emerging as priority research areas. Thus, the discourse has moved beyond simply ensuring food availability to enhancing adaptive capacity and long-term sustainability.

Another important finding is the increasing integration of sustainability and environmental governance into food security

research. The prominence of terms such as “sustainable development,” “land use,” “biodiversity,” and “ecosystem services” indicates that scholars are recognizing the ecological limits of agricultural intensification. This suggests a conceptual transition from productivity-driven paradigms toward more holistic food system approaches. Food security is no longer framed solely as a matter of output maximization but as part of a broader socio-ecological system that requires conservation, responsible land management, and sustainable resource governance. This shift is particularly relevant in Southeast Asia, where rapid land-use change and biodiversity loss pose significant threats to long-term food system resilience.

Despite these advances, the density visualization reveals that certain themes remain underexplored. Topics such as protein diversification, livestock systems, urban food systems, and specific country-level analyses appear less dominant compared to broader regional discussions. This suggests that while macro-level frameworks are well established, more granular, community-based, and commodity-specific studies may be needed. Additionally, digital transformation, local governance mechanisms, and indigenous food systems appear less prominent in the network, indicating potential research gaps that could enrich future investigations. Collaboration patterns suggest that research on Southeast Asian food security is embedded within broader global networks, often linked to developing country narratives and international comparative studies. While this enhances global visibility, it also raises

questions about intra-regional collaboration intensity among ASEAN institutions. Strengthening cross-country research partnerships within Southeast Asia could improve context-sensitive policy design and promote shared resilience strategies. Overall, the findings suggest that the future research agenda should emphasize climate-resilient local food systems, sustainability integration, smallholder empowerment, and deeper regional collaboration to address the evolving food security challenges in Southeast Asia.

4. CONCLUSION

This bibliometric analysis demonstrates that research on local food security in Southeast Asia has evolved from production- and availability-centered discussions toward more integrated frameworks that incorporate climate change, sustainability, and socio-economic resilience. The dominance of core themes such as food security, food supply, and Southeast Asia reflects strong regional anchoring, while emerging topics such as drought, crop yield, and smallholder resilience indicate a growing focus on climate-adaptive and vulnerability-oriented approaches. At the same time, density patterns reveal opportunities for deeper exploration of localized, commodity-specific, and governance-related dimensions of food systems. The study highlights the need for more context-sensitive, collaborative, and sustainability-driven research agendas to strengthen resilient and inclusive food security strategies across Southeast Asia.

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