

A Bibliometric Analysis of Global Research Trends on Food Security Policy: Insights for Sustainable Governance

*A Bibliometric
Analysis*

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ABSTRACT

Food security is a strategic global issue that involves policy, governance, and sustainable development dimensions. This study examines global research trends on food security policy using a bibliometric approach based on 125 scientific publications published between 2020 and 2025. Utilizing the Scopus database and analytical tools such as RStudio, VOSviewer, and Publish or Perish, the study maps the most influential sources, leading authors, contributing countries, and the most frequently discussed topics. The findings show that "food security," "agricultural policy," and "sustainable development" are the dominant themes in the literature, with the highest contributions from China, Italy, and the United States. The study also highlights the importance of institutional governance, technology adoption, and evidence-based policy in addressing food distribution inequality, climate change, and production constraints. In conclusion, cross-sector collaboration and integrated policy approaches are essential to achieving a resilient and sustainable global food system.

Keywords: Food Security, Public Policy, Sustainable Development, Food Governance

ABSTRAK

Ketahanan pangan merupakan isu strategis global yang melibatkan dimensi kebijakan, tata kelola, dan pembangunan berkelanjutan. Studi ini mengkaji tren riset global mengenai kebijakan ketahanan pangan dengan pendekatan bibliometrik berdasarkan 125 publikasi ilmiah yang diterbitkan antara tahun 2020 hingga 2025. Dengan menggunakan basis data Scopus serta alat analisis seperti RStudio, VOSviewer, dan Publish or Perish, studi ini memetakan sumber paling berpengaruh, penulis terkemuka, negara kontributor, serta topik-topik yang paling sering dibahas. Temuan menunjukkan bahwa "ketahanan pangan," "kebijakan pertanian," dan "pembangunan berkelanjutan" merupakan tema dominan dalam literatur, dengan kontribusi tertinggi berasal dari Tiongkok, Italia, dan Amerika Serikat. Studi ini juga menyoroti pentingnya tata kelola kelembagaan, adopsi teknologi, dan kebijakan berbasis bukti dalam mengatasi ketimpangan distribusi pangan, perubahan iklim, dan kendala produksi. Sebagai kesimpulan, kolaborasi lintas sektor dan pendekatan kebijakan yang terintegrasi sangat penting untuk mewujudkan sistem pangan global yang tangguh dan berkelanjutan.

Kata kunci: Ketahanan Pangan, Kebijakan Publik, Pembangunan Berkelanjutan, Tata Kelola Pangan

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INTRODUCTION

Food security policy represents a cornerstone of sustainable governance, particularly in developing and food-insecure regions (Mayett-Moreno & López Oglesby, 2018). Ensuring access to sufficient, safe, and nutritious food for all populations demands agricultural production and effective governance, policy integration, and institutional coordination across sectors (Qureshi et al., 2015). In the global context, food insecurity remains a multidimensional challenge, shaped by poverty, climate change, political instability, and economic inequality (Tamasiga et al., 2023).

In Indonesia, Law Number 18 of 2012 on Food (*UU Pangan*) provides the foundational legal framework to guide national food security governance (Astriani, 2024). The law emphasizes state responsibility in ensuring the availability, affordability, and adequacy of food for all citizens. However, despite institutional reforms and the establishment of the National Food Agency (*Badan Pangan Nasional*) through Presidential Regulation Number 66 of 2021, significant disparities persist in food distribution, price stability, and local food system resilience particularly in rural and outer island regions (Nurhasan, 2022).

Governance-related constraints such as fragmented coordination between ministries, weak implementation capacity at sub-national levels, and low stakeholder engagement—continue to hinder the effectiveness of food security policies (Jansen & Kalas, 2024). These issues underscore the urgent need for adaptive governance mechanisms and evidence-based policy innovation in the food sector. Moreover, the increasing frequency of climate-induced food supply disruptions and global commodity price shocks necessitate a governance paradigm integrating sustainability, risk management, and resilience (Zeng et al., 2025).

From an organizational and institutional perspective, collaborative leadership, cross-sectoral synergy, and community empowerment are vital in shaping inclusive and adaptive food policy (Marín-González et al., 2022). Studies also emphasize the importance of a responsive food governance culture that promotes transparency, local wisdom, and bottom-up participation in addressing food security at household and community levels (Candel et al., 2014). However, many countries, including Indonesia, still face institutional inertia and political fragmentation, making it difficult to translate policy visions into effective action on the ground (Dalimunthe et al., 2024).

The digital transformation of public administration, including integrating data science and food system monitoring, presents a promising frontier for strengthening food policy governance (Damar et al., 2024). Using digital dashboards, satellite data for agricultural planning, and blockchain for supply chain transparency has shown potential to improve policy responsiveness and food system accountability (Astill et al., 2019). Nonetheless, challenges such as limited digital infrastructure, low data interoperability, and inadequate digital skills among food sector stakeholders must be addressed to realize this potential (Brunetti et al., 2020).

To respond to the growing complexity of food security governance, there is a pressing need to synthesize global research trends and identify key themes, thought leaders, and collaborative networks (Larsson et al., 2022). Bibliometric analysis provides a valuable tool to map the intellectual structure of food policy research and guide future policy and academic agendas (Luo et al., 2022). Accordingly, this study seeks to conduct a comprehensive bibliometric analysis to capture the evolution and emerging themes in food security policy research over the past two decades. The following questions guide the research:

- RQ1: What are the most relevant food security and public policy publications?
- RQ2: Who are the most prolific authors in food security policy research?
- RQ3: Which countries have the highest volume of publications?
- RQ4: Who are the most cited authors in food security governance literature?
- RQ5: What are the most frequently occurring keywords in food policy research?
- RQ6: What are the emerging and trending food security policy research topics?

LITERATURE REVIEW

The Role of Food Security in Sustainable Development

Food security is increasingly recognized as a central pillar in achieving the Sustainable Development Goals (SDGs), particularly SDG 2: Zero Hunger. According to the Food and Agriculture Organization (FAO), food security exists when all people have physical, social, and economic access to sufficient, safe, and nutritious food (Pérez-Escamilla, 2017). However, food security is not merely an agricultural issue it also encompasses governance, policy-making, and systemic coordination across sectors (Candel, 2014.). This multidimensional nature makes food security research an interdisciplinary concern in global policy discourse.

Theoretical Foundations of Food Security Policy

Food security policy has evolved from production-focused frameworks to more holistic and integrated models. Early approaches emphasized increasing agricultural output, but recent literature has shifted to include sustainability, nutrition, environmental impact, and resilience (Galli et al., 2020). Several studies emphasize the significance of institutional structures and regulatory systems in shaping effective food policies (Garske et al., 2020; Nasrullah et al., 2021). Governance quality, political commitment, and institutional capacity are key variables influencing food outcomes (Coluccia et al., 2020).

Climate Change, Resource Efficiency, and Policy Innovation

The literature underscores the impact of climate change on food systems, particularly in vulnerable regions (Adom & Adams, 2020; Aryal et al., 2021). These disruptions demand adaptive policy frameworks that are data-driven and evidence-based. Innovations in food governance such as satellite monitoring, digital dashboards, and policy modeling are increasingly employed to anticipate risk and guide resource allocation (Perdana et al., 2020; Cadillo-Benalcazar et al., 2020). The use of models like Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism (MuSIASEM) provides tools for analyzing the relationship between policy, environmental sustainability, and food consumption (Galli et al., 2020).

Institutional and Regional Policy Dynamics

Institutional arrangements vary significantly between countries, affecting the coherence and implementation of food security strategies. In Europe, reforms to the Common Agricultural Policy (CAP) have attempted to align economic competitiveness with environmental goals, yet tensions remain between policy objectives (Dos Santos & Ahmad, 2020). In South Asia, smallholder farmers face barriers such as limited access to mechanization, insufficient financial support, and weak infrastructure (Aryal et al., 2021). These findings reinforce the importance of designing region-specific, adaptive policies rather than one-size-fits-all solutions.

Bibliometric Insights and Gaps in Literature

Bibliometric studies provide a meta-perspective on the evolution of food security research. Recent analyses show a concentration of research outputs in high-income countries, with China, Italy, and the United States dominating publication volume (Coluccia et al., 2020). Keyword trends reveal a growing interest in “sustainability,” “agricultural policy,” and “climate change,” while terms like “resilience” and “food systems” indicate a shift toward systems thinking. However, few bibliometric reviews explicitly link food security with governance frameworks, leaving a gap this study seeks to fill

METHODS

This section explains the steps the writer took in the research, and provides a brief justification for the method used. In this section the writer must present enough

information to enable the reader to be able to evaluate the suitability of the method, the reliability and the validity of your findings. It would be better if the information presented could be replicated by other researchers in the future. The methodology section usually has several sub-sections:

1. Sampling (description of target population, research context and unit of analysis; examples; and profile of respondents)
2. Data collection
3. Measures (Alternatively, Measurement)

RESULTS

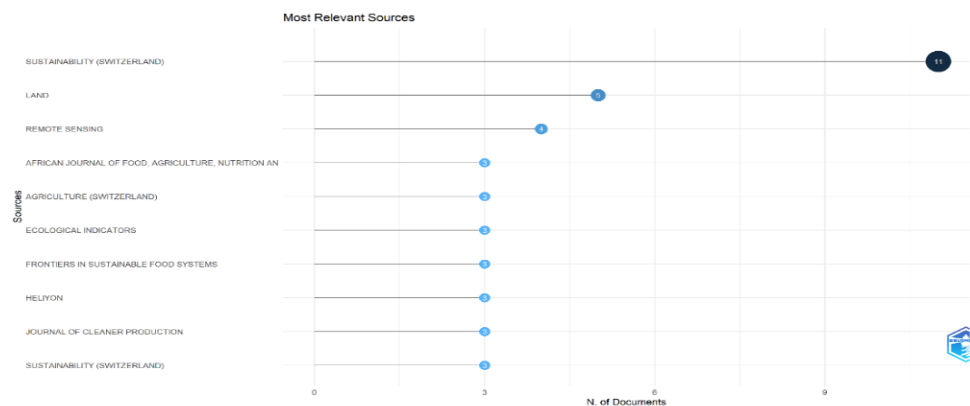
This study employs a bibliometric approach to map global trends in scientific publications related to food security policy from 2020 to 2025. The findings are presented across several key sections highlighting publication characteristics, the most influential sources, leading contributors, geographic distribution, and trending topics and keywords.



Source: Processed by Researcher (2025)

Figure 1. Main Information

This bibliometric analysis covers publications from 2020 to 2025, with 125 documents sourced from 88 different journals (Figure 1). Over this period, there was an average annual decline in publication volume of 13.99%. Five hundred nine authors contributed to these publications, but only 10 wrote documents individually. On average, each document was authored by 4.18 researchers, indicating a relatively high level of collaboration. International collaboration is also evident, with 33.6% of documents involving authors from multiple countries. Researchers used a total of 515 keywords to describe their study topics. Altogether, the documents referenced 7,720 sources, reflecting the depth of the literature reviewed. These documents are relatively recent, with an average publication age of 2.35 years. Additionally, each document has received an average of 12.22 citations, suggesting a meaningful scientific impact despite the downward trend in publication volume.



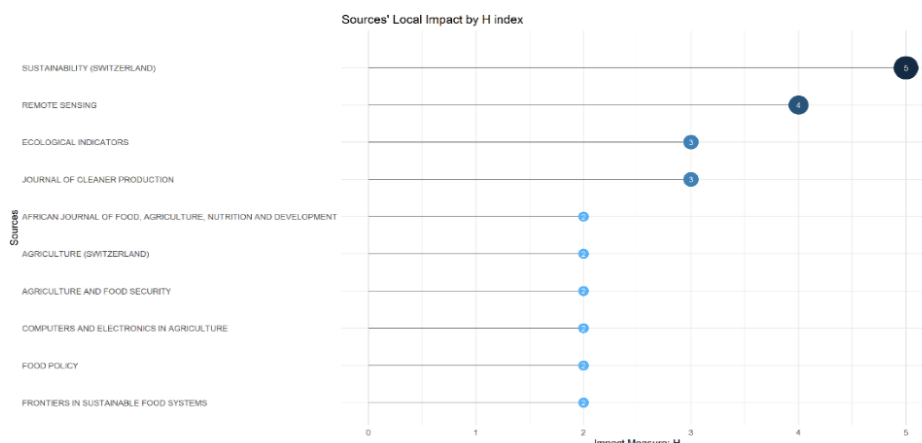
Source: Processed by Researcher (2025)

Figure 2. Most Relevant Sources

Figure 2 displays the ten most relevant sources (journals) based on the number of documents published related to the analyzed topic. *Sustainability (Switzerland)* ranks first

with the highest contribution—11 documents—making it the most dominant source. It is followed by *Land* with 5 documents and *Remote Sensing* with 4. Other sources like *African Journal of Food, Agriculture, Nutrition and Development*, *Agriculture (Switzerland)*, *Ecological Indicators*, *Frontiers in Sustainable Food Systems*, *Heliyon*, and *Journal of Cleaner Production* each contributed 3 documents.

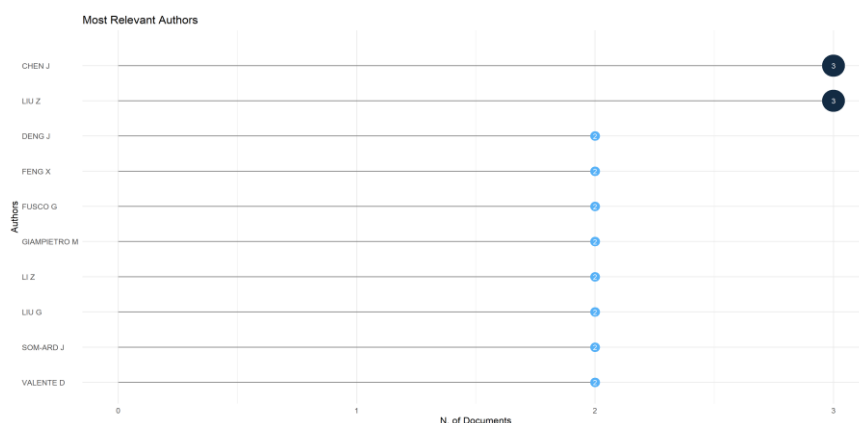
The dominance of *Sustainability (Switzerland)* indicates its status as a key reference in related publications, likely due to its thematic alignment with sustainability issues. The presence of several journals focusing on the environment, agriculture, and sustainable food systems further suggests that the analyzed topic sits at the intersection of environmental and development concerns.



Source: Processed by Researcher (2025)
Figure 3. Sources' local by H index

Figure 3 presents the local impact of sources based on their H-index, which measures both the productivity and citation impact of documents published in the respective journals on this specific topic. *Sustainability (Switzerland)* leads with an H-index of 5, meaning at least five articles have been cited five times or more making it the most influential source in this context. *Remote Sensing* follows with an H-index of 4, while *Ecological Indicators* and *Journal of Cleaner Production* scored 3. Other journals, such as *the African Journal of Food, Agriculture, Nutrition and Development*, *Agriculture (Switzerland)*, *Agriculture and Food Security*, and *Computers and Electronics in Agriculture*, show an H-index of 2. At the same time, *Food Policy* and *Frontiers in Sustainable Food Systems* hold an H-index of 1.

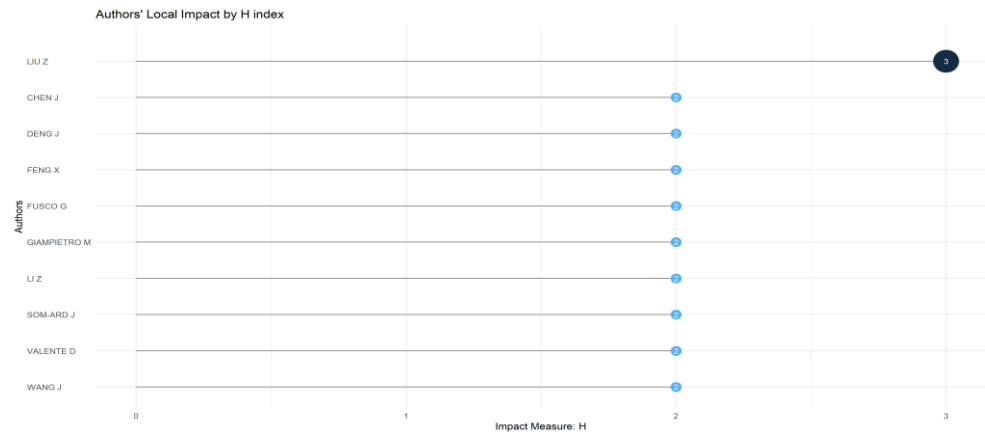
The chart confirms that even though some journals may not contribute the largest number of articles, they still have significant influence in terms of citations highlighting the quality and relevance of the articles published within them.



Source: Processed by Researcher (2025)
Figure 4. Most Relevant Author

Figure 4 displays the most relevant authors based on the number of documents they have contributed to the subject area. The top two authors are Chen J and Liu Z, each of whom contributed to three documents, making them the most prolific authors in this field. Below are several authors with two documents, including Deng J, Feng X, Fusco G, Giampietro M, Li Z, Liu G, Som-Ard J, and Valente D.

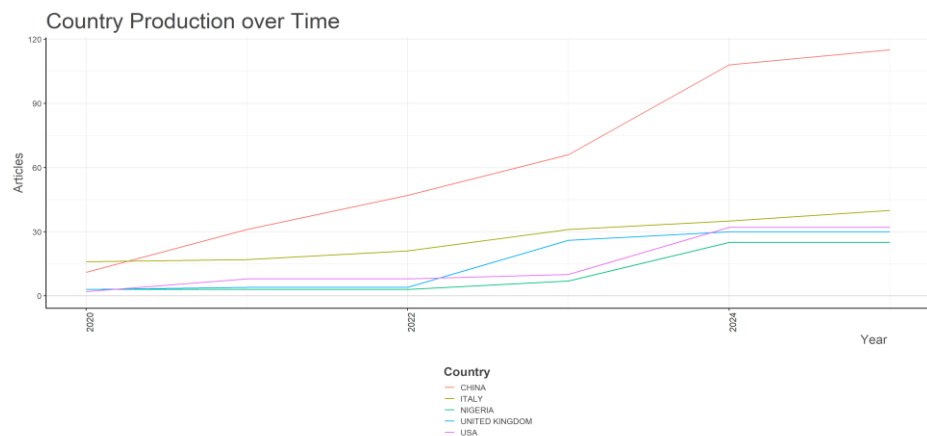
Although the differences in contribution are not substantial, the presence of two authors with three publications suggests that they may be key figures or actively engaged in advancing research in this area. Meanwhile, many authors with two documents indicate a research community that consistently contributes to this topic without being dominated by any single individual or group.



Source: Processed by Researcher (2025)

Figure 5. Authors' local impact by H index

Figure 5 shows the local impact of authors based on the H-index, a metric that combines both productivity and the number of citations received by an author's work within the context of the studied topic. Liu Z is the most impactful author, with an H-index of 3, meaning that at least three publications have been cited three times or more. This makes him the most influential author in this collection of publications. Meanwhile, other authors such as Chen J, Deng J, Feng X, Fusco G, Giampietro M, Li Z, Som-Ard J, Valente D, and Wang J each have an H-index of 2, indicating that they are also active and have made significant contributions, though not to the same extent as Liu Z. Interestingly, Chen J and Liu Z appear as the authors with the highest number of documents (3 each) and show strong citation impact. This indicates that their contributions are not only quantitative but also high in quality and relevant to the scientific community in this field.

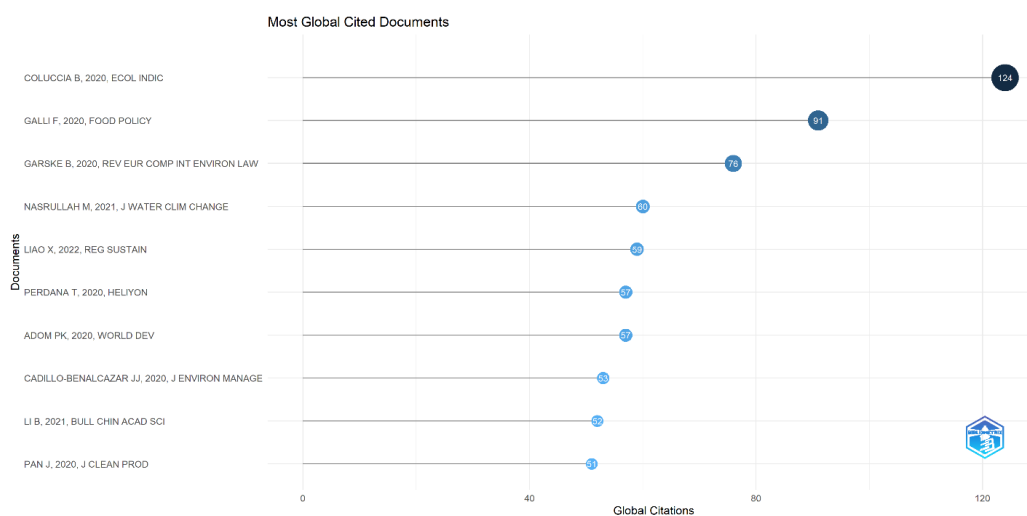


Source: Processed by Researcher (2025)

Figure 6. Country production over time

Figure 6 illustrates the trend in scientific article production from five leading countries (China, Italy, Nigeria, the United Kingdom, and the United States) from 2020 to 2025. China consistently produced the highest number of publications, showing a sharp increase from around 15 articles in 2020 to nearly 120 by 2025. This trend highlights China's dominance in the researched topic in terms of quantity and sustained commitment. Italy ranks second, with a steadily increasing trend, although not as rapid as China's. Its article output grew from approximately 20 in 2020 to over 35 in 2025.

Other countries, such as Nigeria, the UK, and the US, grew slower. However, the UK and Nigeria experienced a noticeable spike in article production in 2023, which stabilized through 2025. The US saw a steady increase, though it remained behind the other countries in terms of total publications. The chart indicates that China dominates scientific publishing on this topic, with Italy as the next major contributor. Other countries remain active but contribute less in quantitative terms.

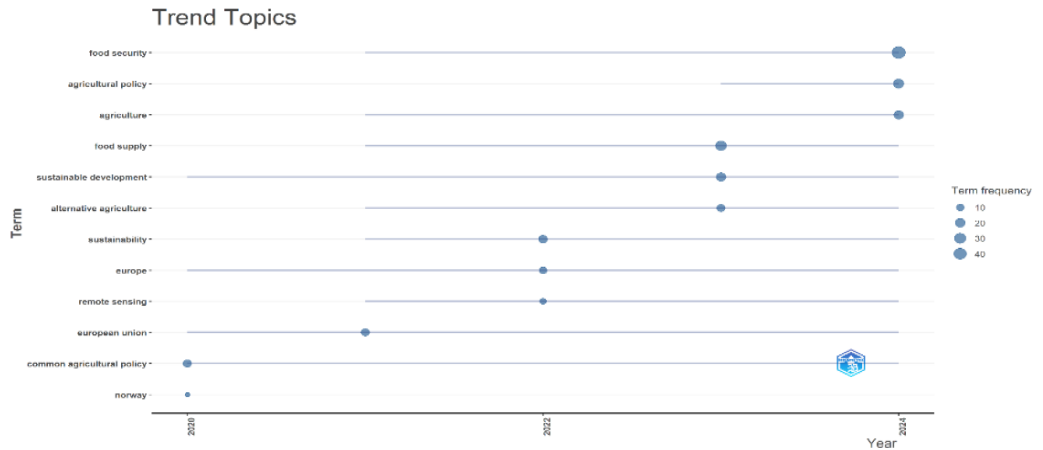


Source: Processed by Researcher (2025)

Figure 7. Most Cited Countries

The most globally cited document in this study is a work by Coluccia et al. (2020), published in the journal *Ecological Indicators*, with a total of 124 citations, making it the most influential publication in this field. It is followed by Galli F (2020) in *Food Policy* with 91 citations and Garske B (2020) in the *Review of European Community & International Environmental Law*, which received 76 citations. Other key documents come from journals such as *the Journal of Water and Climate Change*, *Regional Sustainability*, and *World Development*, each receiving 57 and 60 citations (Figure 7).

Most of these documents were published between 2020 and 2021, indicating that although they are relatively recent, they have significantly contributed to the global scientific discourse in this area. The high number of citations reflects the quality and strong relevance of the research conducted and the importance of the topics addressed by these authors in the global context.



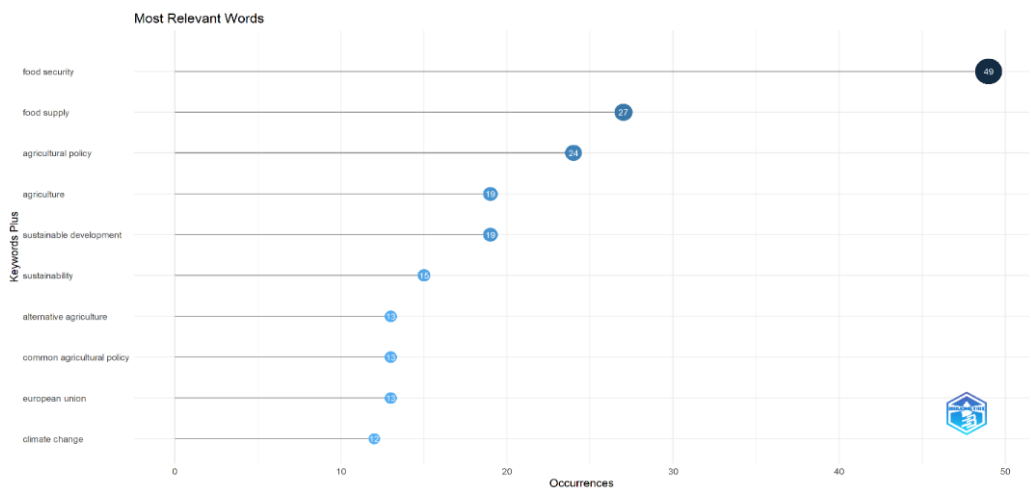
Source: Processed by Researcher (2025)
Figure 8. Trend topics

Figure 8 illustrates trending topics in scientific publications based on their frequency of occurrence from 2020 to 2024. The most frequently appearing term is “food security,” which emerged as the dominant topic, particularly in 2024, with the highest frequency among all terms. It is followed by “agricultural policy” and “agriculture,” which have shown significant growth in recent years.

Other prominent topics include “food supply,” “sustainable development,” and “alternative agriculture,” which began gaining traction in 2022, reflecting a growing focus on sustainability and food security issues. Meanwhile, terms such as “sustainability,” “remote sensing,” and “Europe” began to appear in 2021 and have continued to be relevant, indicating a technological and geographical context in current research.

Some terms, like “European Union,” “common agricultural policy,” and “Norway,” appeared only in the early part of the period (2020–2021), suggesting that while they were once relevant, they are no longer central to recent publications.

The chart reveals a shift in research focus toward food security, agricultural policy, and sustainable development, reflecting the scientific community’s response to emerging global challenges in recent years.



Source: Processed by Researcher (2025)
Figure 9. Most Relevant Word

Figure 9 presents the most relevant keywords used in scientific documents based on their frequency of occurrence. The keyword “food security” is the most dominant, appearing 49 times, reinforcing its position as the central issue in the analyzed publications. It is followed by “food supply” (27 occurrences) and “agricultural policy” (24 occurrences), which also highlight a strong focus on food production and policy.

Next, keywords such as “agriculture” and “sustainable development” each appear 19 times, followed by “sustainability” with 15 occurrences, indicating growing attention to agricultural and environmental sustainability. Other frequently used keywords include “alternative agriculture,” “common agricultural policy,” and “European Union,” each appearing 13 times. Meanwhile, “climate change” appears 12 times, reflecting the close connection between climate change and food security issues. This data supports earlier findings that topics related to food security, agricultural policy, and sustainability are the primary focus of current scientific discourse.



Source: Processed by Researcher (2025)

Figure 10. Word Cloud

Figure 10 is a word cloud illustrating the most frequently occurring keywords in the analyzed scientific publications. The larger the word appears, the higher its frequency, reflecting the importance of that topic in the research discourse. The keyword “food security” visually dominates the cloud, indicating that food security is the central focus of these studies. It is followed by “agricultural policy,” “food supply,” “agriculture,” and “sustainable development,” all of which appear prominently. This aligns with the trending topics and relevant keywords previously shown in the charts.

Other terms such as “sustainability,” “alternative agriculture,” “climate change,” “land use,” and “European Union” also appear in relatively large sizes, suggesting that although they may not be as dominant as the top five, these issues still play a significant role in the research narrative. This word cloud reinforces the conclusion that the main focus of publications during the analysis period centers on the interconnection between food security, agricultural policy, and sustainable development and how these issues intersect with climate change, land use, and regional dynamics such as European Union policy.

DISCUSSION

Issues pertaining to food security policy are discussed in several journals each year. These periodicals employ a range of methodologies, including mixed, qualitative, and quantitative approaches. This indicates that studies on food security policy have remained relevant in recent years. Liao et al. (2022), their research in Surin Province, Thailand, underscores the significance of socio-environmental factors in determining farmers' knowledge and practices regarding sustainable agriculture. They find that environmental degradation, including soil erosion and water scarcity, significantly impacts farming practices. The study highlights how a lack of awareness of government policies, especially in more rural areas, hampers the adoption of sustainable farming practices. In this context,

Liao et al., suggest that enhanced learning environments for farmers, improved scientific knowledge dissemination, and policy adaptation tailored to local conditions are key to promoting sustainable farming behaviors.

This theme of socio-environmental context influencing agricultural practices is further explored by Aryal et al. (2021), who examine farm mechanisation in the Indo-Gangetic Plains of South Asia, covering India, Bangladesh, and Nepal. They note that smallholder farmers face significant barriers to adopting modern farming technologies, primarily due to financial constraints and labor shortages during peak seasons. The adoption of farm mechanisation, they argue, can significantly enhance food production efficiency. However, its success hinges on policy support, such as subsidies for farm machinery and training programs that enable farmers to utilize new technologies effectively. Aryal et al., emphasize that these measures are essential to overcoming the barriers posed by small farm sizes and labor shortages.

Transitioning to the impact of climate change, Nasrullah et al. (2021) focus on rice production in South Korea, where climate change has shown both positive and negative effects. While increased CO₂ emissions have been found to enhance rice growth through improved photosynthesis, rising temperatures and unpredictable rainfall patterns create significant challenges. The study finds that the reduction in agricultural subsidies, particularly for fertilizers, has further exacerbated the decline in rice production. In response, the researchers advocate for improved weather forecasting, better irrigation systems, and the reinstatement of agricultural subsidies to ensure sustainable rice production and food security.

In Sub-Saharan Africa, Adom & Adams (2020) delve into the technical inefficiencies that plague agricultural production across 49 countries in the region. Their analysis reveals that persistent inefficiencies, such as underutilization of inputs and poor organizational practices, continue to limit agricultural productivity. The study highlights the link between inefficient practices and food insecurity, noting that African countries often fall behind in agricultural output compared to other regions. To address these inefficiencies, Adom & Adams (2020) call for comprehensive policy reforms that focus on improving human capital, investing in agricultural research, and providing subsidies to ensure the efficient use of agricultural inputs.

The importance of policy integration is evident in Cadillo-Benalcazar et al. (2020), who study food systems in the European Union. They introduce the MuSIASEM framework, which integrates biophysical, economic, and social data to assess the sustainability of food systems. Their findings point to the environmental degradation caused by agricultural practices, such as deforestation in feed-producing countries, and the EU's heavy reliance on food imports. They suggest that policy reforms need to reduce dependency on imports, enhance local food production, and promote sustainability through the integration of environmental and economic factors. This approach underscores the complex challenges faced by the EU, where balancing food security with environmental sustainability remains a significant policy concern.

Similarly, Coluccia et al. (2020) provide an in-depth examination of Italy's agricultural sector, highlighting the eco-efficiency of farming practices across its 21 regions. They identify imbalances between Northern and Southern Italy, with sustainability challenges related to water usage, fertilizer consumption, and land degradation. The study emphasizes the need for policies that integrate eco-efficiency measures to ensure sustainable agricultural development. By advocating for the alignment of EU Common Agricultural Policy (CAP) subsidies with environmentally friendly practices, Coluccia et al., suggest that Italy could better balance economic growth with environmental protection.

Turning to the broader context of European food policies, Galli et al. (2020) discuss the evolution of the Common Agricultural Policy (CAP) in response to environmental and societal challenges. They argue that CAP has historically focused on production with insufficient attention to environmental sustainability and health concerns. Their research suggests that a holistic policy approach, integrating agriculture, health, and

environmental sectors, is essential to create sustainable food systems. By addressing not just food availability but also nutrition security and sustainable diets, Galli et al. (2020) propose significant reforms to CAP to ensure that it contributes more effectively to sustainable food systems.

A critical environmental challenge highlighted in several studies is the issue of phosphorus management, particularly in European agricultural and environmental law. Garske et al. (2020) focus on the overuse of phosphorus in farming, which leads to environmental issues such as water pollution and eutrophication. Their study points to the inefficiency of current phosphorus management practices and proposes stricter regulations to address these concerns. The authors advocate for the adoption of circular economy principles that promote phosphorus recovery and recycling, and they suggest that policy reforms should include mandatory phosphorus management plans and the incentivization of organic farming practices to enhance sustainability.

In the context of West Java, Indonesia, Perdana et al. (2020) tackle the challenges of food security during the COVID-19 pandemic. Their research highlights the inefficiencies in the regional food supply network and suggests that the development of Regional Food Hubs (RFHs) could significantly enhance food security. By optimizing food distribution logistics and handling uncertainties in food demand and production capacity, RFHs can ensure a steady food supply even during crises. Their study emphasizes the importance of local food systems in maintaining food security and proposes cost-reducing strategies and health protocols to manage food handling and distribution more effectively during pandemics.

Finally, Santos & Ahmad (2020) provide a comprehensive analysis of agricultural sustainability across 28 EU Member States. They explore the social, economic, environmental, and institutional dimensions of sustainability, focusing on the varying levels of sustainability across different regions. Their study stresses the importance of balancing economic performance with environmental protection and social development. They call for targeted policies that support small and family farms, particularly in Eastern Europe, where these farms contribute significantly to rural development and job creation. Their findings underline the need for a holistic approach to agricultural policy that integrates environmental, social, and economic goals.

The analysis of global research trends on food security policy has provided critical insights into the sustainability of agricultural systems, highlighting the multifaceted nature of food security challenges worldwide. Recent studies on European agricultural sustainability emphasize the significance of agricultural policy frameworks, particularly the Common Agricultural Policy (CAP), in shaping the sustainability of farms across the EU. The research reveals that agricultural sustainability is not uniform across regions, with Central European countries exhibiting high economic sustainability, Mediterranean countries contributing significantly to environmental sustainability, and Eastern European countries leading in social contributions through job creation and rural development (Dos Santos & Ahmad, 2020). Similarly, research focusing on farm mechanization in South Asia, particularly in India, Nepal, and Bangladesh, highlights the impact of technology adoption and socio-economic factors on food security. Mechanization, while improving agricultural efficiency, faces barriers in terms of affordability, especially for smallholder farmers who are unable to invest in modern machinery. Custom hiring services have been suggested as a viable solution for overcoming financial constraints, enabling smallholders to access machinery without the burden of ownership (Aryal et al., 2020).

In South Asia, the influence of climate change on food security is evident, with disruptions in agricultural production due to changing rainfall patterns and extreme weather events. Researchers have used robust optimization models to assess the viability of regional food hubs in mitigating these impacts. The findings suggest that farm mechanization, when combined with effective logistics and distribution systems, can improve food security by reducing dependency on manual labor and increasing production efficiency. The reliance on imported food commodities, especially livestock

feed, further exacerbates food security concerns, underlining the importance of local food production systems that are resilient to climate-induced disruptions (Aryal et al., 2020; Garske et al., 2020).

The agricultural sustainability of European holdings is another area where significant research has emerged, focusing on the integration of social, environmental, economic, and institutional factors in shaping food security policies. Multivariate analysis of agricultural sustainability in the EU has led to the identification of three distinct clusters of farm types across Europe. These clusters reflect the diversity in farm characteristics, from economically efficient Central European farms to environmentally focused Mediterranean ones. The study emphasizes that CAP subsidies play a crucial role in enhancing sustainability, but their effectiveness varies across regions, underscoring the need for more targeted and adaptive policies that account for regional differences in agricultural practices and challenges (Dos Santos & Ahmad, 2020).

Global food security research also highlights the impact of socio-economic factors such as labor availability, technological adoption, and financial access on food production. In regions like Sub-Saharan Africa and South Asia, labor shortages and financial constraints hinder the adoption of modern agricultural practices. Studies suggest that innovative solutions like credit facilities, training programs, and improved access to machinery could play a pivotal role in enhancing agricultural productivity and food security in these regions. Moreover, the adaptation of local food systems to global climate challenges, such as water scarcity and soil degradation, has been identified as crucial for ensuring long-term food security (Adom & Adams, 2020).

Another critical aspect of food security research is the role of institutional governance and policy frameworks in promoting sustainable agriculture. In Europe, agricultural policies aimed at improving environmental sustainability, such as agri-environmental measures and "greening" initiatives, have been shown to influence farm practices positively. However, the research also reveals the limitations of existing policies in addressing the unique challenges faced by different agricultural sectors. There is a growing consensus that policy frameworks need to be more flexible, region-specific, and better integrated to address the complex interrelationships between food security, economic development, and environmental protection (Dos Santos et al., 2020).

In conclusion, the global research trends on food security policy underscore the importance of an integrated approach that considers economic, environmental, social, and institutional factors in ensuring sustainable food systems. The evidence suggests that effective governance in food security requires not only strong policy frameworks but also innovations in technology, finance, and local food systems to address the diverse challenges faced by different regions. The findings from various studies emphasize the need for collaborative efforts across borders to adapt agricultural practices to climate change, reduce dependency on external food sources, and improve rural livelihoods. Moving forward, research must continue to focus on developing adaptive policies that promote sustainable agricultural practices while addressing the increasing demand for food security (Dos Santos & Ahmad, 2020; Adom & Adams, 2020).

CONCLUSION

This study reveals that global food security policy has evolved toward a more holistic and cross-sectoral approach. Through bibliometric analysis, it was found that the dominant focus of scientific literature between 2020 and 2025 centers on food security, agricultural policy, and sustainable development, with major contributions from countries such as China, Italy, and EU member states. Various studies highlight that the effectiveness of food policies is significantly influenced by institutional factors, technology adoption, climate variability, and local socio-economic contexts. Key challenges identified include unequal food distribution, limited access to technology for smallholder farmers, and the impacts of climate change on food production. As such, there is a pressing need for adaptive, evidence-based policy reforms that are responsive to local conditions—including the integration of food, environmental, and rural development

policies. Future global efforts must strengthen cross-border collaboration, promote technological innovation, and enhance local food systems to achieve inclusive and sustainable food security.

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