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Urban Agriculture and Local Food Systems: A Bibliometric Analysis of Research on Sustainable Cities

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ABSTRACT

Urban agriculture and local food systems are pivotal in addressing the challenges of urbanization, food insecurity, and environmental sustainability in modern cities. This study employs a bibliometric analysis to explore the intellectual landscape of research on urban agriculture and its integration into sustainable city frameworks. Using the Scopus database, this study examines publication trends, co-authorship networks, and thematic clusters to identify core research themes, key contributors, and emerging trends. The findings reveal that urban agriculture significantly contributes to food security, climate change mitigation, and community resilience, while also facing challenges such as land scarcity, soil contamination, and economic viability. Policy integration and innovative technologies, including vertical farming and hydroponics, are identified as essential for scaling urban agriculture initiatives. Despite substantial progress, research gaps remain in economic impact analysis, policy frameworks, and digital technology adoption. This study provides valuable insights for researchers, policymakers, and urban planners, emphasizing the interdisciplinary and collaborative efforts required to enhance the role of urban agriculture in sustainable urban development.

Keywords: *Urban Agriculture, Local Food Systems, Sustainable Cities, Food Security, Bibliometric Analysis*

1. INTRODUCTION

The concept of urban agriculture and its integration into local food systems is rapidly gaining attention as cities increasingly grapple with the multifaceted challenges of sustainability, food security, and urbanization. Urban agriculture refers to the practice of cultivating, processing, and distributing food in or around urban areas. This practice serves not only as a strategy to augment food access but also contributes to the environmental and social fabric of urban communities [1]. The relevance of local food systems in urban contexts lies in their capacity to reduce food miles, thus contributing to lower carbon emissions and enhancing the freshness and nutritional value of food available to urban populations [2].

Moreover, the proliferation of urban agriculture is intertwined with the growth of sustainable city initiatives, which prioritize environmental integrity, economic viability, and social equity [3]. These initiatives are instrumental in addressing urban challenges by promoting practices that are environmentally sound and socially responsible. The role of urban agriculture in this context extends beyond food provision to encompass the generation of employment, the revitalization of unused or under-utilized urban spaces, and the fostering of community engagement and cohesion [4].

However, the landscape of urban agriculture is complex, involving a variety of forms and practices ranging from small community gardens and rooftop farms to high-tech vertical farming operations. Each of these practices has distinct implications for urban sustainability, posing unique benefits and challenges [5]. The integration of these agricultural practices into local food systems can

lead to enhanced urban resilience, a reduction in urban heat island effects, and improved biodiversity within city landscapes [6].

Despite these benefits, the practice of urban agriculture is not without its difficulties. Challenges such as land availability, water use, soil contamination, and zoning laws can impede the implementation and expansion of urban agriculture initiatives [7]. Furthermore, the relationship between urban agriculture and broader food systems raises questions about scalability, economic viability, and the potential displacement of conventional agriculture. Thus, urban agriculture exists at the nexus of opportunity and challenge within the sustainable urban development paradigm.

Despite the acknowledged benefits of urban agriculture, there is a notable gap in comprehensive scholarly analysis that integrates the multifaceted aspects of urban agriculture with local food systems in the discourse on sustainable cities. Existing literature often focuses on isolated aspects of urban agriculture without a holistic consideration of how these systems interact with larger urban environments and policies [3]. There is a need for an integrative bibliometric analysis that not only highlights the prevalence and evolution of research in this area but also identifies thematic concentrations, knowledge gaps, and emerging trends. Such analysis is crucial for understanding the trajectory of urban agriculture research and its practical implications for sustainable urban development.

The objective of this study is to conduct a comprehensive bibliometric analysis of the literature on urban agriculture and local food systems within the context of sustainable cities. This analysis aims to map the intellectual landscape of this field, identify core themes and trends, and uncover the interconnections between urban agriculture practices and the sustainability of urban food systems. By achieving this, the study seeks to provide valuable insights for policymakers, urban planners, and researchers, informing future initiatives and studies aimed at enhancing the sustainability and resilience of urban environments.

2. LITERATURE REVIEW

2.1 Urban Agriculture: Definitions and Scope

Urban agriculture encompasses a range of food production practices within urban and peri-urban areas, involving diverse stakeholders and serving multiple socioeconomic functions. As defined by [2], urban agriculture is "an industry located within (intra-urban) or on the fringe (peri-urban) of a town, city, or metropolis, which grows or raises, processes, and distributes a diversity of food and non-food products." This broad definition underscores the integral role of urban agriculture in enhancing urban food security and contributing to the local economy [4]. Studies by [3] further elaborate on how urban agriculture can improve access to fresh produce, thereby supporting public health and reducing urban food deserts.

2.2 Contribution to Sustainable Urban Development

Urban agriculture is increasingly recognized for its contributions to the sustainability and resilience of cities. According to [8], urban agriculture practices contribute to the reduction of urban heat islands, enhancement of urban biodiversity, and mitigation of stormwater runoff. Moreover, urban farms can transform underused urban spaces into productive land, promoting environmental stewardship and community involvement [9]. The study by [9] highlights how urban agriculture

supports sustainable city initiatives by linking environmental, economic, and social sustainability goals through localized food production and reduced transportation emissions.

2.3 Economic and Social Impacts

The economic implications of urban agriculture are significant, encompassing job creation, skill development, and economic empowerment of urban residents, particularly in marginalized communities. [10] detail how urban agriculture can stimulate local economies by creating direct and indirect employment opportunities in cultivation, distribution, and value-added processing. Socially, urban agriculture fosters community engagement and cohesion by providing a communal space for interaction and a sense of ownership and pride among community members [11]. Furthermore, studies have shown that urban agriculture initiatives can enhance community resilience and social capital, playing a crucial role in disaster recovery and social integration.

2.4 Challenges and Barriers

Despite its benefits, urban agriculture faces numerous challenges that can impede its implementation and effectiveness. Land availability is a critical constraint, with urban space often being scarce and expensive. Soil contamination from industrial pollutants poses health risks that can restrict the use of urban land for food production [12]. Legal and bureaucratic hurdles, such as zoning laws and land-use regulations, also present significant barriers, often reflecting a lack of institutional support for urban agriculture [13]. Water management in urban settings further complicates these practices, as urban farmers must navigate the complexities of securing sustainable and safe water sources [14].

2.5 Integration into Local and Global Food Systems

The integration of urban agriculture into local food systems is essential for maximizing its benefits and sustainability. This integration involves not only the production and supply of food but also the development of local markets and distribution networks that can support the economic viability of urban agriculture [15]. At the global level, urban agriculture can contribute to food security by diversifying food production locations and reducing dependence on distant food sources, thus enhancing food system resilience in the face of global challenges like climate change and economic instability [5].

2.6 Bibliometric Analyses in Urban Agriculture Research

Bibliometric analyses provide a methodological framework to quantitatively assess the breadth and depth of literature on urban agriculture and its role in sustainable urban development. These studies often utilize data from major research databases to map trends, key themes, and gaps in the literature. For instance, [16] utilized bibliometric tools to identify the most influential studies and emerging trends in urban agriculture research, highlighting the growing emphasis on sustainability and technology integration. Such analyses are pivotal in understanding the evolution of the field and guiding future research directions.

3. METHODS

This study employs a bibliometric analysis approach to systematically review the literature on urban agriculture and local food systems within the context of sustainable cities. Utilizing the Scopus database, a comprehensive search was conducted for peer-reviewed articles published from 2000 to 2024. Keywords used in the search included "urban agriculture," "local food systems," "sustainable cities," and related terms, structured in a Boolean search format to capture a broad range of relevant studies. The retrieved documents were then analyzed using the VOSviewer software, which facilitated the examination of publication trends, citation analysis, co-authorship networks, and thematic clusters. This analysis allowed for the mapping of the research landscape, identifying influential authors, institutions, and geographic contributions, as well as emerging trends and thematic developments over time.

4. RESULTS AND DISCUSSION

4.1 Descriptive Analysis

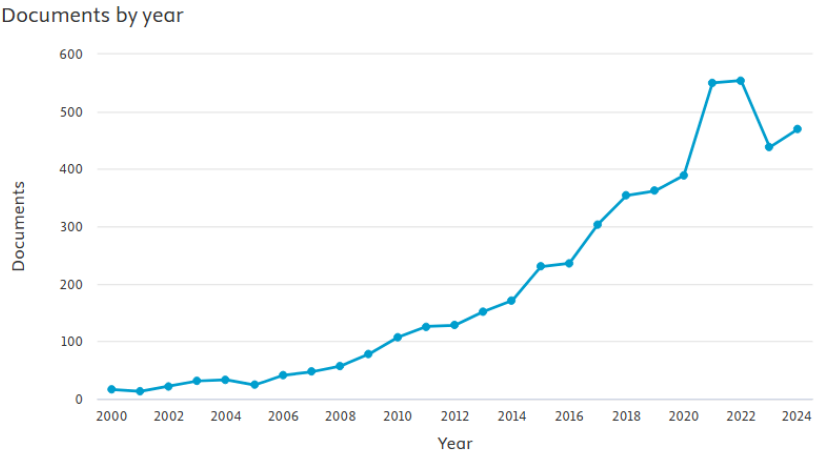

Figure 1. Documents by Year
Source: Scopus, 2024

The graph displays a trend in the number of documents published per year from 2000 to 2023 related to urban agriculture and local food systems within the context of sustainable cities. Initially, the publication volume is quite low, starting from under 100 documents per year in 2000 and showing a gradual increase. This trend continues steadily upward, with more significant growth observed from around 2010 onwards, reflecting a rising interest and perhaps advancements or increased funding in this field. The number of publications peaks dramatically around 2022 with over 500 documents, indicating a peak of academic or practical interest. However, there is a notable dip in 2023, which might suggest a variety of factors such as changes in research funding, shifts in research focus, or external global factors affecting research productivity.

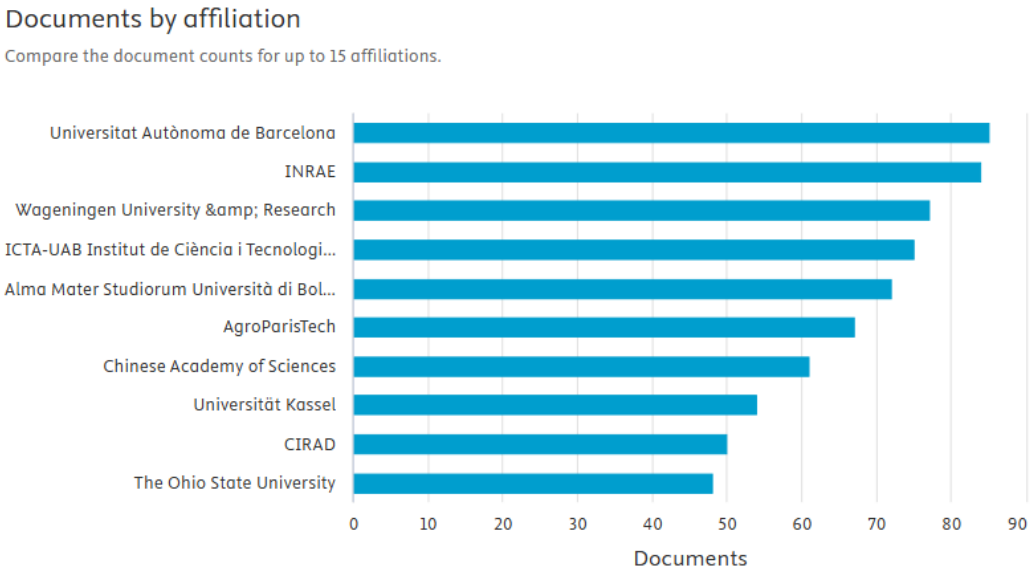

Figure 2. Documents by Affiliation
Source: Scopus, 2024

The bar chart illustrates the number of documents published by various academic and research institutions on urban agriculture and local food systems. The Universitat Autònoma de Barcelona leads with the highest number of publications, followed closely by INRAE and Wageningen University & Research, all exceeding 70 documents. Other notable contributors include ICTA-UAB Institut de Ciència i Tecnologia Ambientals, Alma Mater Studiorum Università di Bologna, and AgroParisTech, each with significant contributions in the range of 50–60 documents. Institutions like the Chinese Academy of Sciences, Universität Kassel, CIRAD, and The Ohio State University contribute between 40 and 50 documents, showing strong involvement in the research field. This distribution reflects a geographically diverse research interest, with significant contributions from European institutions, as well as notable input from organizations in Asia and North America.

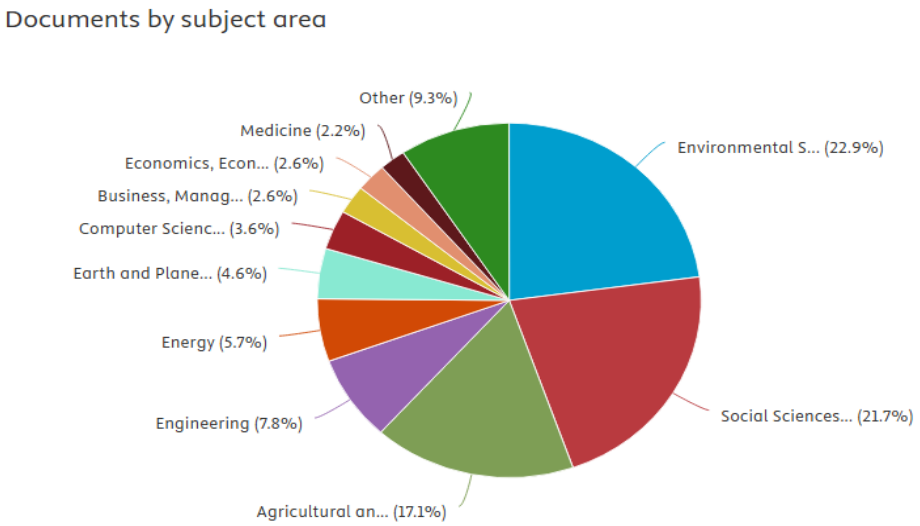

Figure 3. Documents by Subject
Source: Scopus, 2024

The pie chart illustrates the distribution of documents by subject area, highlighting the interdisciplinary nature of research in urban agriculture and local food systems. The largest proportion of publications falls under Environmental Science (22.9%), indicating the strong emphasis on sustainability and ecological aspects. This is closely followed by Social Sciences (21.7%), reflecting the socio-economic and community-related dimensions of the research. Agricultural and Biological Sciences account for 17.1%, underscoring the agricultural techniques and biological impacts studied in this context. Engineering (7.8%) and Energy (5.7%) further highlight the role of technology and resource efficiency in these studies. Contributions from Earth and Planetary Sciences (4.6%) and Computer Science (3.6%) suggest an interest in geospatial analysis and digital tools for urban agriculture. Smaller shares from fields like Business, Management, and Economics (each 2.6%) and Medicine (2.2%) indicate a focus on economic sustainability and health implications, respectively. The "Other" category (9.3%) reflects a wide range of additional interdisciplinary inputs. This distribution demonstrates the multifaceted nature of research in urban agriculture, integrating environmental, social, and technological domains.

4.2 Keyword Co-Occurrence Network Visualization

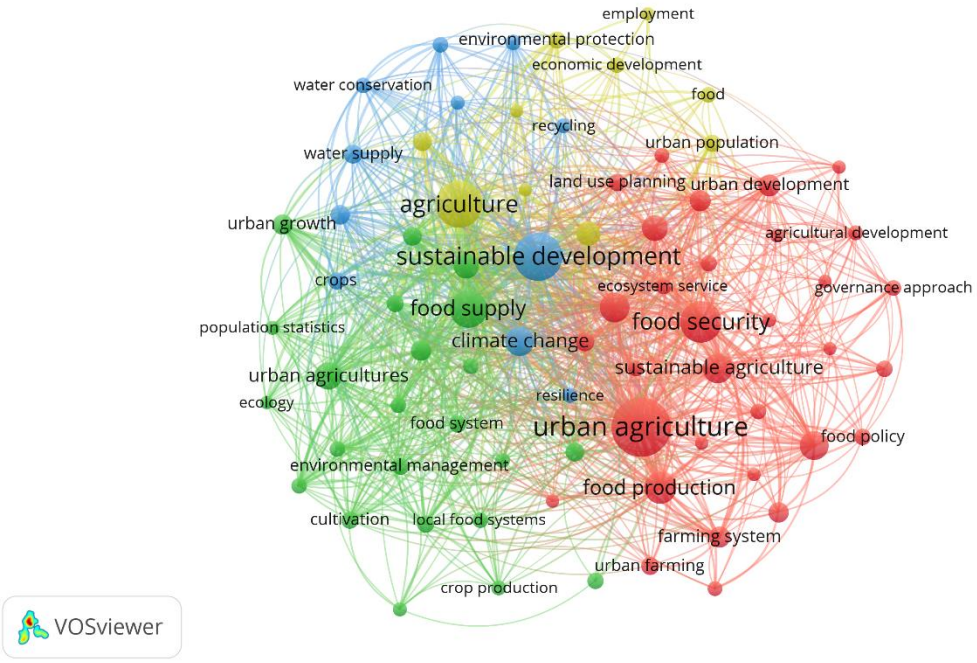

Figure 4. Network Visualization
Source: Data Analysis Result, 2024

The network visualization illustrates the co-occurrence of key terms in research related to urban agriculture, local food systems, and sustainable cities. The densely connected network highlights the interdisciplinary nature of this field, where core themes such as "sustainable development," "urban agriculture," "food security," and "agriculture" dominate the discourse. These terms, represented by larger nodes, indicate their centrality in the research domain, suggesting that they are frequently discussed together and form the foundation of scholarly discussions in this area. The clusters, differentiated by colors, represent thematic groupings within the research. For instance, the green cluster focuses on environmental aspects, including terms such as "water conservation," "climate change," "local food systems," and "ecology." This cluster underscores the importance of environmental management and the ecological benefits of integrating urban agriculture into

sustainable urban planning. It also reflects how urban agriculture contributes to addressing climate challenges through improved resource utilization and ecosystem resilience.

The red cluster centers around "urban agriculture" and "food production," closely linked with terms like "farming system," "food policy," and "urban development." This thematic grouping highlights the operational and governance-related dimensions of urban agriculture, emphasizing the need for effective policies and planning to ensure the scalability and integration of urban agriculture within local and regional food systems. It also points to the role of governance approaches in supporting sustainable agricultural practices in urban settings. The blue and yellow clusters delve into broader social and economic dimensions, encompassing terms such as "employment," "economic development," "recycling," and "land use planning." These clusters reflect the socioeconomic benefits of urban agriculture, including job creation, community development, and the efficient use of urban land. Together, the visualization reveals a holistic picture of urban agriculture research, where environmental, social, and governance aspects are deeply interconnected, reinforcing the idea that urban agriculture is a vital component of sustainable urban development.

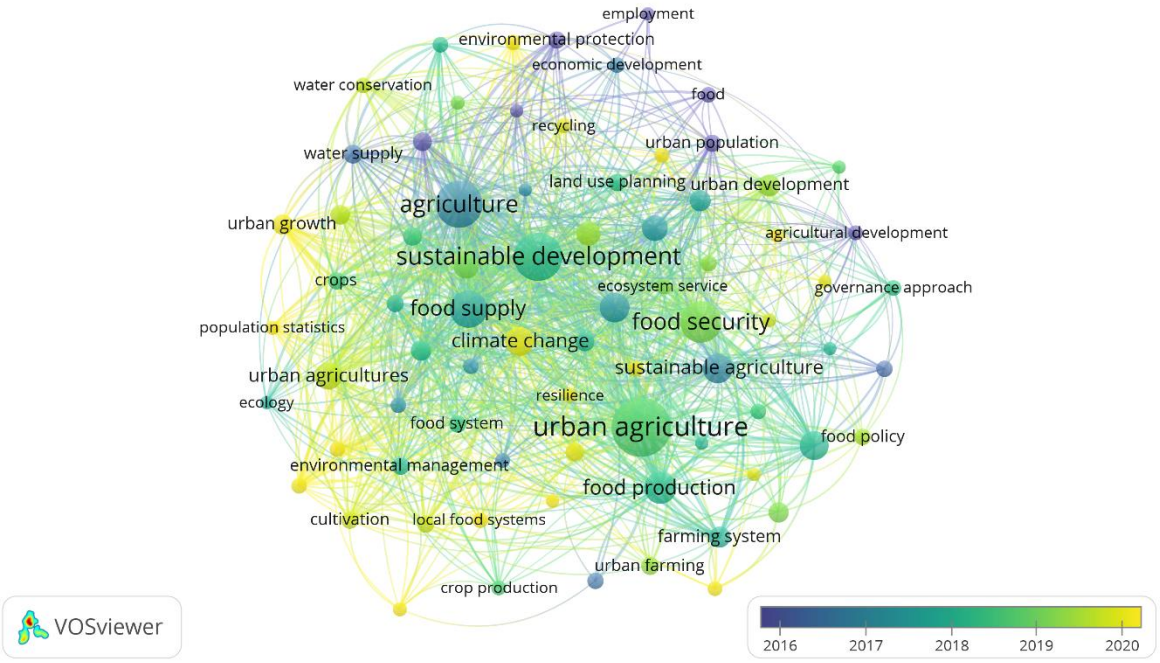

Figure 5. Overlay Visualization
Source: Data Analysis Result, 2024

The overlay visualization highlights the temporal progression of research themes related to urban agriculture, local food systems, and sustainable development between 2016 and 2020. The color gradient represents the average publication year for keywords, with older terms shaded in blue and more recent terms appearing in yellow. This temporal mapping indicates the evolving focus of research over the years, with earlier studies concentrating on foundational topics like "sustainable development," "climate change," and "agriculture," as shown in blue and green hues. These terms reflect the foundational research that established the importance of urban agriculture within the broader context of environmental sustainability and food systems.

As research progressed toward 2020, newer terms such as "food policy," "urban farming," and "farming system," which are highlighted in yellow, gained prominence. This shift indicates an increasing emphasis on governance, policy integration, and the operational aspects of urban

agriculture. The emergence of these terms suggests a growing interest in translating theoretical and environmental benefits into actionable frameworks and strategies that can be implemented within urban settings. It also reflects a shift from broader sustainability discussions toward practical solutions that address the challenges of integrating urban agriculture into city planning and food systems.

Additionally, terms like "resilience," "ecosystem services," and "governance approach," which are more recent, highlight an interdisciplinary focus that connects environmental science, urban planning, and social science. This indicates a move toward systems thinking, where urban agriculture is viewed as part of a larger urban ecosystem that includes socio-economic and ecological dimensions. Overall, the visualization reveals the dynamic and expanding nature of research in this field, with a clear trajectory toward applied, policy-oriented, and integrative studies in recent years.

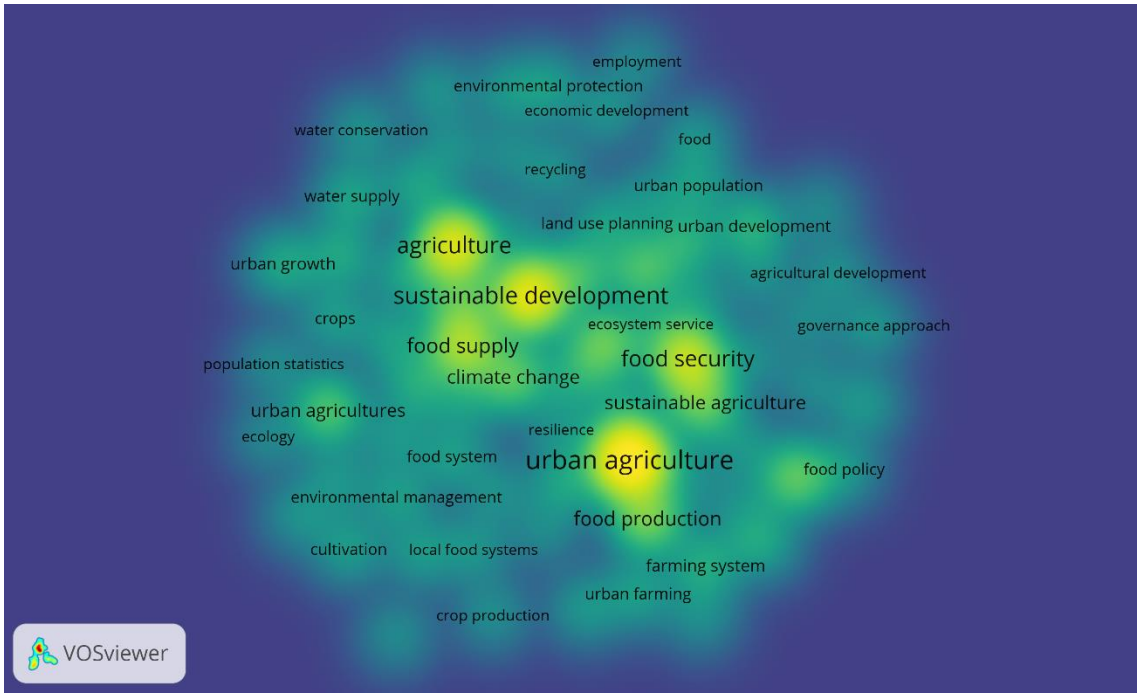

Figure 6. Density Visualization

Source: Data Analysis Result, 2024

The heatmap visualization represents the density of research activity associated with keywords in the field of urban agriculture and sustainable development. Brighter areas, such as those surrounding "sustainable development," "urban agriculture," "food security," and "agriculture," indicate a high frequency of these terms in the literature, reflecting their central role in the discourse. These keywords are pivotal as they capture the primary focus of studies on integrating urban agriculture with broader sustainability goals, food systems, and agricultural practices. Less prominent, yet significant terms like "food system," "farming system," "climate change," and "governance approach," appear in areas with moderate density, suggesting a growing but less concentrated interest in operational and policy-related aspects of urban agriculture. Peripheral terms such as "water conservation," "urban population," and "employment" are less densely connected but highlight niche areas of exploration within the broader research landscape. This visualization underscores the multidisciplinary nature of the field, with core themes attracting substantial research attention while supporting themes contribute to expanding its scope. The prominence of sustainability-related terms suggests that the field's growth is driven by increasing global emphasis on sustainable urban planning and food systems.

4.3 Co-Authorship

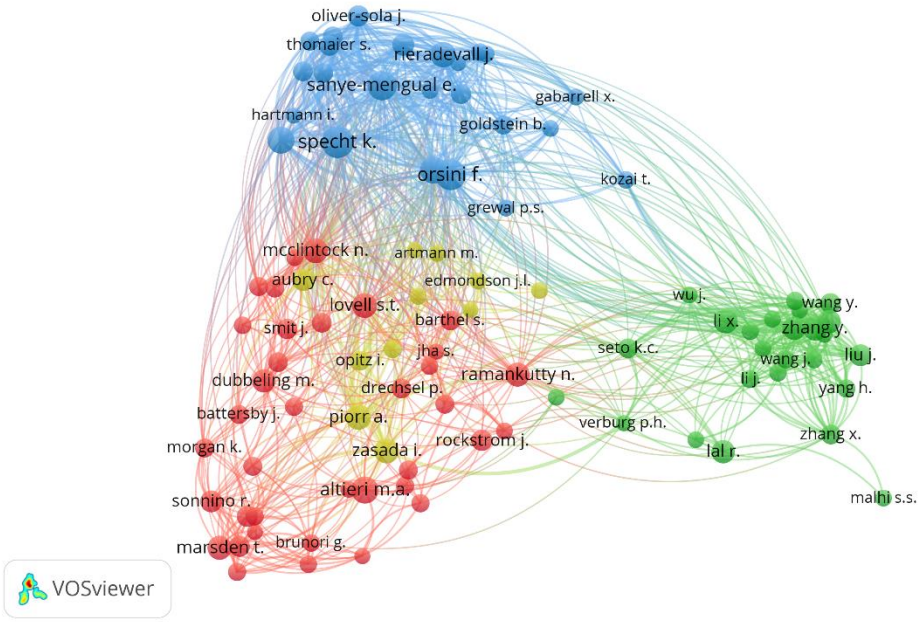

Figure 7. Co-Authorship Visualization
Source: Data Analysis Result, 2024

The co-authorship network visualization illustrates the collaboration patterns among researchers in the field of urban agriculture and sustainable development. The network is divided into distinct clusters, each represented by a different color, signifying groups of closely collaborating authors. The red cluster features prominent contributors like McClintock N., Lovell S., and Altieri M.A., who are influential in studies related to socio-ecological dimensions of urban agriculture. The blue cluster, led by authors such as Specht K. and Orsini F., focuses on technical and innovation-driven aspects of urban farming, including urban integration and resource efficiency. The green cluster, with authors like Wang Y. and Zhang X., highlights research with a strong focus on sustainable agricultural practices and food security in Asian contexts. The interconnectivity between clusters indicates interdisciplinary collaboration, where researchers from different fields contribute to the broader discourse on urban agriculture and sustainability. The dense connections within and between clusters suggest a high level of academic interaction, enhancing knowledge sharing and cross-pollination of ideas. This network underscores the global and collaborative nature of research in this field, with contributions from various geographic regions and thematic focuses driving advancements in urban agriculture.

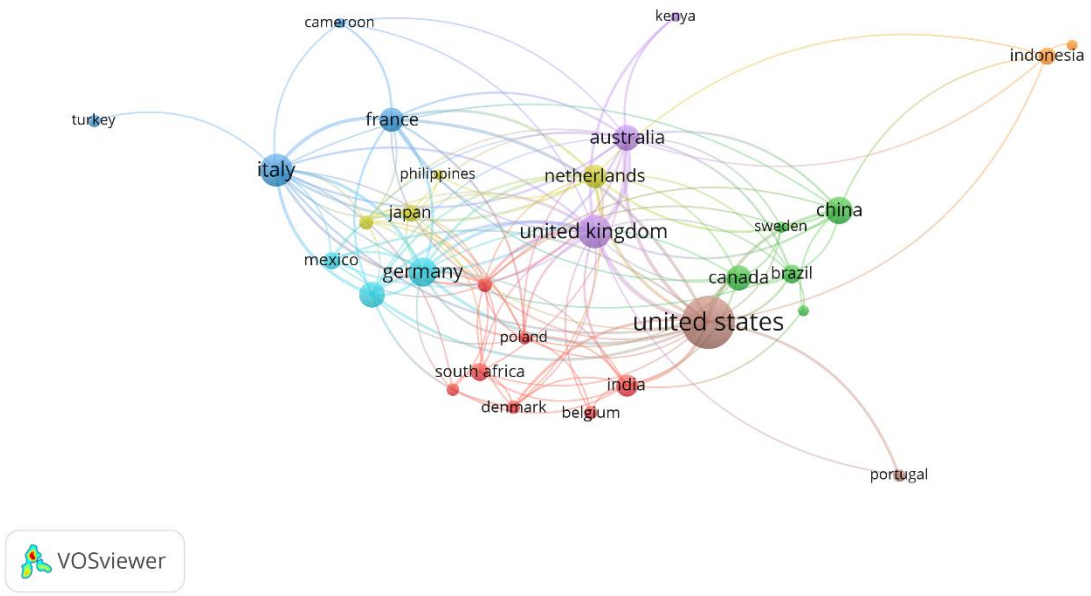

Figure 8. Country Visualization
Source: Data Analysis Result, 2024

The visualization illustrates the international collaboration network in research on urban agriculture and sustainable development, with countries represented as nodes and their collaborations as connecting lines. The United States emerges as a central hub, indicating its dominant role and extensive collaborations with other countries, such as the United Kingdom, China, and Canada. The United Kingdom also plays a significant role, connecting with European nations like Germany, Italy, and Netherlands, as well as non-European countries like Australia. Clusters in the network highlight regional collaborations. For instance, the blue cluster, including Italy, France, and Germany, suggests strong European research ties. The green cluster, featuring China, Canada, and Brazil, indicates a mix of Asian and Americas-focused collaborations, emphasizing diverse geographical contributions. Meanwhile, Indonesia appears on the periphery but maintains notable connections to larger hubs like China and Australia, reflecting its emerging presence in this research domain.

4.4 Citation Analysis

Table 1. The Most Impactful Literatures

Citations	Authors and year	Title	Contributions
707	[17]	The agroecological revolution in Latin America: Rescuing nature, ensuring food sovereignty and empowering peasants	Highlights agroecological practices in Latin America that support food sovereignty, empower small-scale farmers, and restore ecological balance.
492	[18]	Shifting plates in the agrifood landscape: The tectonics of alternative agrifood initiatives in California	Examines alternative agrifood initiatives in California, analyzing their transformative potential and the socio-political dynamics involved in food system shifts.

Citations	Authors and year	Title	Contributions
470	[3]	Multifunctional urban agriculture for sustainable land use planning in the United States	Explores urban agriculture as a multifunctional tool for sustainable land use planning, integrating ecological, social, and economic benefits in urban contexts.
307	[19]	Urban vegetable for food security in cities. A review	Reviews the role of urban vegetable production in enhancing food security in cities, addressing sustainability and resilience in urban food systems.
275	[20]	Beyond agricultural innovation systems? Exploring an agricultural innovation ecosystems approach for niche design and development in sustainability transitions	Proposes an agricultural innovation ecosystem approach to facilitate sustainability transitions and foster niche agricultural innovations.
209	[21].	Food access in crisis: Food security and COVID-19	Analyzes the impact of the COVID-19 pandemic on food security and access, highlighting vulnerabilities and proposing pathways to resilience.
206	[4]	The greening of the barrios: Urban agriculture for food security in Cuba	Discusses urban agriculture practices in Cuba as a response to food insecurity, emphasizing community-driven solutions and ecological sustainability.
196	[2]	Reducing greenhouse gas emissions with urban agriculture: A Life Cycle Assessment perspective	Investigates urban agriculture's potential to reduce greenhouse gas emissions using a life cycle assessment framework.
192	[22]	Interactions of Nitrogen with Other Nutrients and Water: Effect on Crop Yield and Quality, Nutrient Use Efficiency, Carbon Sequestration, and Environmental Pollution	Examines the interplay between nitrogen, nutrients, and water in crop production, highlighting implications for yield, efficiency, and environmental sustainability.
190	[1]	The second green revolution: Innovative urban agriculture's contribution to food security and sustainability – A review	Reviews the role of innovative urban agriculture practices in advancing food security and sustainability, proposing a "second green revolution."

Source: Publish or Perish Output, 2024

Discussion

1. Urban Agriculture and its Multidimensional Role

Urban agriculture represents more than just a method of food production; it is a multidimensional practice that contributes to environmental sustainability, social inclusion, and economic empowerment. Studies such as [3] and [23] emphasize its multifunctional benefits, including the reduction of urban heat islands, enhancement of biodiversity, and improved access to fresh, nutritious food. These findings align with the bibliometric analysis, where "urban agriculture," "sustainable development," and "food security" emerged as core themes. Moreover, urban agriculture offers significant social benefits by fostering community cohesion and resilience. Initiatives such as community gardens and rooftop farms provide spaces for social interaction, skill development, and cultural exchange. This is particularly evident in cases like Cuba's urban

agriculture revolution [24], where community-driven approaches addressed food shortages while promoting ecological sustainability. The bibliometric data confirms the increasing focus on such practices, as evidenced by the prominence of keywords like "resilience," "community," and "social inclusion."

2. Contributions to Food Security and Sustainability

Food security remains a central concern in urban agriculture research. As highlighted by [25], the COVID-19 pandemic underscored the vulnerability of global food systems and the critical need for localized, resilient food production methods. Urban agriculture addresses this need by reducing reliance on distant supply chains and mitigating the risks of food scarcity during crises. The bibliometric analysis reflects this priority, with terms like "food supply," "food security," and "local food systems" showing strong co-occurrence. In addition to food security, urban agriculture contributes to sustainability transitions by reducing greenhouse gas emissions and promoting resource efficiency. [2] demonstrate that urban farming practices, when managed effectively, can significantly lower carbon footprints compared to conventional agricultural systems. The adoption of innovative technologies such as hydroponics, aquaponics, and vertical farming further enhances the environmental benefits of urban agriculture. These innovations, increasingly represented in the literature, offer scalable solutions for integrating food production into dense urban environments.

3. Policy and Governance Implications

The integration of urban agriculture into local and national policies is crucial for its success and scalability. The analysis highlights the growing discourse around "food policy," "land use planning," and "governance approaches." Effective policy frameworks can address challenges such as land availability, water management, and regulatory barriers. For instance, [20] advocate for an agricultural innovation ecosystem approach that fosters collaboration among stakeholders, including policymakers, researchers, and practitioners. Governance plays a critical role in ensuring the equitable distribution of the benefits of urban agriculture. Without proper regulation, there is a risk of marginalizing vulnerable populations or prioritizing commercial interests over community needs. Policies that promote inclusivity and prioritize social equity are essential for maximizing the societal impact of urban agriculture. Case studies from countries like Cuba and initiatives in California [18] provide valuable lessons on how governance can shape the outcomes of urban agriculture initiatives.

4. Challenges in Implementation

Despite its potential, urban agriculture faces several implementation challenges. One of the most pressing issues is land availability, particularly in densely populated urban areas where competing land uses often take precedence. Soil contamination and water scarcity further complicate efforts to expand urban farming. The bibliometric analysis underscores these challenges through the frequent co-occurrence of terms like "land use," "water management," and "environmental protection." Another significant challenge is economic viability. While urban agriculture can generate income and create jobs, it often struggles to compete with conventional agricultural systems due to higher production costs and limited economies of scale. [2] highlight the need for subsidies, incentives, and innovative business models to support urban farmers and ensure the economic sustainability of their operations. Technological adoption, while offering numerous benefits, also presents challenges related to accessibility and cost. Advanced systems like vertical farming and hydroponics require substantial initial investment and technical expertise, which may be beyond the reach of small-scale urban farmers. Bridging this gap requires targeted support, capacity building, and the development of low-cost, user-friendly technologies.

5. Emerging Trends and Research Gaps

The bibliometric analysis reveals several emerging trends in urban agriculture research. The increasing focus on climate change mitigation, resource efficiency, and technological innovation reflects the evolving priorities of the field. However, there are notable gaps that require further exploration. For instance, while much attention has been given to environmental and social dimensions, the economic impacts of urban agriculture remain underexplored. Comprehensive cost-benefit analyses are needed to evaluate its long-term viability and identify strategies for scaling successful models.

Another gap lies in the integration of urban agriculture into broader urban planning frameworks. While studies such as [3] discuss its potential for sustainable land use, more research is needed on how to effectively incorporate urban agriculture into city master plans and zoning policies. This includes addressing conflicts with other land uses and ensuring alignment with broader sustainability goals.

Additionally, the role of digital technologies in urban agriculture is an emerging area of interest. Smart farming solutions, data analytics, and Internet of Things (IoT) technologies offer significant opportunities for optimizing resource use and improving productivity. However, their adoption remains limited, particularly in low- and middle-income countries. Research should focus on developing scalable, affordable, and context-specific digital solutions**.**

6. Future Direction

The findings of this study highlight several directions for future research and practice. First, there is a need for interdisciplinary approaches that integrate environmental, social, and economic perspectives. Urban agriculture research should move beyond siloed studies to develop holistic frameworks that address the interconnected challenges of sustainability, food security, and urbanization. Second, fostering international collaboration is crucial for advancing the field. The co-authorship and geographic networks identified in the bibliometric analysis underscore the importance of knowledge sharing across regions. Collaborative initiatives can facilitate the transfer of best practices, technologies, and policy innovations, particularly between developed and developing countries. Third, urban agriculture should be positioned as a key component of climate adaptation and mitigation strategies. Policymakers and practitioners should explore how urban farming can contribute to reducing urban heat islands, enhancing green infrastructure, and building resilient food systems. Integrating these efforts into global climate action frameworks can amplify their impact.

CONCLUSION

Urban agriculture and local food systems offer transformative potential for sustainable urban development, addressing critical challenges related to food security, environmental sustainability, and social inclusion. However, realizing this potential requires overcoming significant barriers and addressing research gaps. By fostering interdisciplinary collaboration, advancing policy frameworks, and leveraging technological innovations, urban agriculture can become a cornerstone of sustainable cities. This study's findings provide a foundation for future research and practice, contributing to the ongoing evolution of this vital field.

REFERENCES

[1] D. T. Armanda, J. B. Guinée, and A. Tukker, "The second green revolution: Innovative urban agriculture's contribution to food security and sustainability–A review," *Glob. Food Sec.*, vol. 22, pp. 13–24, 2019.

[2] M. Kulak, A. Graves, and J. Chatterton, "Reducing greenhouse gas emissions with urban agriculture: A Life Cycle Assessment perspective," *Landsc. Urban Plan.*, vol. 111, pp. 68–78, 2013.

[3] S. T. Lovell, "Multifunctional urban agriculture for sustainable land use planning in the United States," *Sustainability*, vol. 2, no. 8, pp. 2499–2522, 2010.

[4] M. A. Altieri *et al.*, "The greening of the 'barrios': Urban agriculture for food security in Cuba," *Agric. Human Values*, vol. 16, pp. 131–140, 1999.
[5] A. Kononiuk and A. Magruk, "BUILDING RESILIENCE IN EUROPEAN FOOD SUPPLY CHAINS: RESULTS OF A DELPHI STUDY," *Econ. Environ.*, vol. 87, no. 4, 2023, doi: 10.34659/eis.2023.87.4.758.
[6] A. W. Muhaimin, D. Retnoningsih, and I. I. Pariasa, "The role of women in sustainable agriculture practices: evidence from east java Indonesia," in *IOP Conference Series: Earth and Environmental Science*, IOP Publishing, 2023, p. 12005.
[7] D. Lairon and M. Huber, "Food quality and possible positive health effects of organic products," *Org. Farming, Prototype Sustain. Agric. Prototype Sustain. Agric.*, pp. 295–312, 2014.
[8] N. Varma, H. Wadatkar, R. Salve, and T. V. Kumar, "Advancing Sustainable Agriculture: A Comprehensive Review of Organic Farming Practices and Environmental Impact," *J. Exp. Agric. Int.*, vol. 46, no. 7, pp. 695–703, 2024.
[9] V. B. Hans and R. Rao, "Organic farming for sustainable development in India," *Acta Sci. Agric.*, vol. 2, no. 12, pp. 96–102, 2018.
[10] J. Raj, S. Jat, M. Kumar, and A. Yadav, "The Role of Organic Farming in Sustainable Agriculture," *Adv. Res.*, vol. 25, no. 3, pp. 128–136, 2024.
[11] D. W. Lotter, "Organic agriculture," *J. Sustain. Agric.*, vol. 21, no. 4, pp. 59–128, 2003.
[12] S. B. Aher, S. Bhaveshananda, and B. Sengupta, "Organic agriculture: Way towards sustainable development," *Int. J. Environ. Sci.*, vol. 3, no. 1, pp. 209–216, 2012.
[13] M. F. Ruslan and H. Khalid, "Unpacking Social Capital as A Determinant of Sustainable Agriculture Adoption: A Literature".
[14] R. J. Zendrato, P. H. Telaumbanua, H. P. Zebua, R. V. Nazara, and M. P. Gea, "The IMPLEMENTATION OF ORGANIC FARMING IN REALIZING SUSTAINABLE AGRICULTURE," *J. SAPTA AGRICA*, vol. 3, no. 1, pp. 52–66, 2024.
[15] C. Badgley *et al.*, "Organic agriculture and the global food supply," *Renew. Agric. food Syst.*, vol. 22, no. 2, pp. 86–108, 2007.
[16] C. M. Sterie, L. I. Petre, G.-D. Stoica, and E. A. Dumitru, "Assessing the Impact of Digitisation on Progress in Agriculture: A Bibliometric Analysis," in *Proceedings of the International Conference on Business Excellence*, 2024, pp. 1724–1733.
[17] M. A. Altieri and V. M. Toledo, "The agroecological revolution in Latin America: rescuing nature, ensuring food sovereignty and empowering peasants," *J. Peasant Stud.*, vol. 38, no. 3, pp. 587–612, 2011.
[18] P. Allen, M. FitzSimmons, M. Goodman, and K. Warner, "Shifting plates in the agrifood landscape: the tectonics of alternative agrifood initiatives in California," in *The Rural*, Routledge, 2017, pp. 149–164.
[19] C. Eigenbrod and N. Gruda, "Urban vegetable for food security in cities. A review," *Agron. Sustain. Dev.*, vol. 35, pp. 483–498, 2015.
[20] A.-A. E. Pigford, G. M. Hickey, and L. Klerkx, "Beyond agricultural innovation systems? Exploring an agricultural innovation ecosystems approach for niche design and development in sustainability transitions," *Agric. Syst.*, vol. 164, pp. 116–121, 2018.
[21] S. O'Hara and E. C. Toussaint, "Food access in crisis: Food security and COVID-19," *Ecol. Econ.*, vol. 180, p. 106859, 2021.
[22] M. S. Aulakh and S. S. Malhi, "Interactions of nitrogen with other nutrients and water: Effect on crop yield and quality, nutrient use efficiency, carbon sequestration, and environmental pollution," *Adv. Agron.*, vol. 86, pp. 341–409, 2005.
[23] M. A. Altieri, *Agroecology: the science of sustainable agriculture*. CrC press, 2018.
[24] M. A. Altieri, "The ecological role of biodiversity in agroecosystems," in *Invertebrate biodiversity as bioindicators of sustainable landscapes*, Elsevier, 1999, pp. 19–31.
[25] J. Penuelas, F. Coello, and J. Sardans, "A better use of fertilizers is needed for global food security and environmental sustainability," *Agric. Food Secur.*, vol. 12, no. 1, pp. 1–9, 2023.