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ADVANCES IN SOCIAL HUMANITIES RESEARCH

Penta Helix-Based Collaborative Governance in Community Empowerment through Urban Farming in Central Jakarta Administrative City

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Abstract

The number of urban farming sites in Central Jakarta Administrative City fluctuated between 44 and 68 from 2017 to 2026 despite supportive provincial policies, suggesting that policy support alone was insufficient to ensure program sustainability. This study examined collaborative governance in urban farming through the five dimensions of Ansell and Gash's collaborative governance framework, the roles of Penta Helix stakeholders, and community empowerment based on Suharto's 5P model. It also sought to formulate a conceptual model explaining the mechanisms underlying urban farming sustainability. A qualitative single-case study was conducted from August to September 2026 using semi-structured interviews with Penta Helix stakeholders, field observations, and document analysis, supplemented by secondary data covering 57 hydroponic urban farming sites in 2024. Data were analyzed using the interactive analysis model of Miles et al., while methodological trustworthiness was enhanced through data triangulation and member checking. The findings revealed a hybrid governance structure in which vertical administrative coordination operated alongside horizontal stakeholder collaboration, with subdistrict and urban village heads serving as facilitators and intermediaries. However, stakeholder participation remained uneven across the five sectors. Community empowerment was most evident in the strengthening and supporting dimensions, whereas the protection dimension remained comparatively underdeveloped. Drawing on evidence from a densely developed national administrative center facing substantial land-use pressures, the study proposed the Collaborative Empowerment Toward Urban Farming Self-Reliance (PK-MKU) model. The proposed model emphasized that long-term sustainability depended on transforming external institutional support into independent community capabilities rather than merely increasing the volume of assistance. The study contributed an integrated analytical framework combining collaborative governance, the Penta Helix approach, and Suharto's 5P empowerment model. The findings suggested that local governments should strengthen the facilitative roles of subdistrict and urban village heads, improve community protection mechanisms, and adopt context-specific empowerment strategies to promote sustainable urban farming initiatives.

INTRODUCTION

Urban farming has increasingly emerged as a strategy for improving urban food availability, encouraging community participation, and optimizing the productive use of limited urban land (Delshad, 2022; Lucertini & Di Giustino, 2021; Senthamizh & Anbarasan, 2025). In Central Jakarta Administrative City, provincial policies supporting urban agriculture have established an administrative foundation for program implementation. However, regulatory support alone has not necessarily ensured the continuity and sustainability of community-based urban farming initiatives. The number of urban farming sites reportedly fluctuated between 44 and

68 from 2017 to 2026, with 57 hydroponic farming locations recorded in 2024, comprising 36 community-managed sites and 21 institutionally managed sites. These fluctuations highlight the challenges of maintaining urban agricultural activities and raise important questions regarding the mechanisms through which external institutional support can be transformed into sustainable community capabilities. Such challenges are particularly relevant in Central Jakarta, where high population density, competing land uses, and limited cultivation space create substantial constraints on long-term urban farming development (Gandharum et al., 2024).

Understanding the sustainability of community-based urban farming requires an integrated analytical perspective that considers governance arrangements, stakeholder participation, and community empowerment. Ansell and Gash's (2008) collaborative governance framework provides a basis for examining institutional arrangements, facilitative leadership, initial conditions, and collaborative processes among participating stakeholders. The Penta Helix approach complements this perspective by identifying the respective contributions of government institutions, academic organizations, businesses, communities, and media organizations to collaborative initiatives. Meanwhile, Suharto's (2010) 5P community empowerment framework encompasses five dimensions: enabling, strengthening, protecting, supporting, and maintaining community capabilities. Integrating these three perspectives allows the analysis to distinguish between the formal involvement of multiple stakeholders, their substantive participation in collaborative decision-making, and the development of community capacities necessary for sustaining urban farming activities. Importantly, the Penta Helix approach employed in this study differs conceptually from the environmentally oriented Quintuple Helix innovation framework, which explicitly incorporates the natural environment as an additional subsystem (Carayannis & Campbell, 2022; Donati et al., 2023).

Previous studies have examined various dimensions of urban agriculture, including rooftop cultivation, smart farming technologies, urban food security, and the social benefits of agricultural activities in densely populated environments (Abdillah et al., 2023; Ambrose et al., 2023; Boukharta et al., 2024a; Hsiao, 2021; Huang & Chang, 2021; Langendahl, 2021; Mihailović et al., 2023; Moghayedi et al., 2022; Poštek et al., 2021). These investigations have contributed to understanding the technical, environmental, and socioeconomic potential of urban farming. In parallel, research on collaborative governance has explored stakeholder roles, institutional coordination, and participatory approaches to urban agricultural development across different geographical and administrative contexts (Ambrose et al., 2022; Boukharta et al., 2023; De Oliveira & Ahmed, 2021; Nielsen et al., 2024; Saebrina et al., 2025; Saint-Ges et al., 2024; Saputra et al., 2024; Ulibarri et al., 2023; Zambrano-Gutiérrez et al., 2023). Nevertheless, agricultural productivity, stakeholder participation, and organizational sustainability represent distinct dimensions that should not be interpreted as interchangeable indicators of program success. For example, participation in promotional activities, technical training, or the distribution of agricultural equipment does not necessarily demonstrate equitable involvement in decision-making or the establishment of independent community management capabilities. Consequently, examining the quality of stakeholder collaboration and the extent to which external assistance contributes to sustained community empowerment remains essential for understanding the long-term viability of urban farming initiatives.

Despite the growing literature on urban agriculture and collaborative governance, limited attention has been directed toward explaining how vertical administrative coordination and horizontal collaboration among Penta Helix stakeholders interact to transform external assistance into sustainable community capabilities. This gap is particularly relevant in densely populated administrative centers, where urban farming initiatives operate within complex institutional structures and face substantial competition for limited land resources. Central Jakarta Administrative City provides a distinctive context for examining these relationships because urban farming activities are coordinated through multiple administrative levels while community groups differ in their access to cultivation spaces, technical expertise, organizational leadership, production practices, and market opportunities. These variations may influence how community groups respond to institutional support and maintain their activities over time. An integrated examination of governance arrangements, stakeholder relationships, and empowerment processes can therefore provide insights into why urban farming initiatives operating under similar policy frameworks may experience different patterns of continuity and organizational development.

The urgency of this research arises from the continuing challenges of sustaining urban farming initiatives beyond their initial establishment. Fluctuations in the number of operating sites suggest that program initiation and long-term continuity require different forms of institutional support and community engagement. Sustainable urban farming depends not only on the availability of cultivation equipment and technical assistance but also on secure access to suitable spaces, practical agricultural knowledge, effective organizational coordination, and reliable mechanisms for distributing or marketing agricultural products. Programs that prioritize initial infrastructure provision without strengthening community management capabilities, protecting cultivation arrangements, and establishing sustainable operational practices may remain dependent on repeated external assistance. Accordingly, examining collaborative governance mechanisms is important for identifying institutional arrangements and empowerment strategies that can strengthen community self-reliance. Such an examination may also inform more targeted government facilitation, improve coordination among participating stakeholders, and support the continuity of productive community groups. However, because the available evidence is qualitative, the study does not seek to quantify the economic effects of urban farming interventions or establish causal relationships between governance arrangements and program sustainability.

The contextual novelty of this study lies in its integrated examination of collaborative governance processes, the distribution and substantive involvement of Penta Helix stakeholders, and the five dimensions of community empowerment within a single analytical framework. Rather than examining stakeholder participation or agricultural activities independently, the research investigates how institutional facilitation, resource exchange, collaborative decision-making, and community capacity development interact within urban farming initiatives. Based on these relationships, the study develops the Collaborative Empowerment Toward Urban Farming Self-Reliance (PK-MKU) model, which conceptually connects government facilitation, stakeholder resource exchange, the transformation of external assistance into internal community capabilities, and the circulation of economic and social benefits. This model offers a context-specific explanation of the processes through which

collaborative governance may contribute to community self-reliance and program continuity. Nevertheless, the proposed model represents a conceptual contribution derived from qualitative case study evidence rather than an empirically validated predictive framework. Its applicability to other geographical and institutional contexts therefore requires further comparative investigation and empirical testing.

Based on these considerations, this study aimed to examine collaborative governance in community empowerment through urban farming in Central Jakarta Administrative City. Specifically, the research sought to identify enabling and constraining factors affecting urban farming collaboration, analyze the roles and interactions of Penta Helix stakeholders, assess community empowerment using Suharto's 5P framework, and formulate a context-sensitive conceptual model explaining the development of community self-reliance. From a practical perspective, the findings were expected to inform local government strategies for strengthening facilitative leadership, improving cross-sector coordination, protecting community cultivation arrangements, and supporting sustainable organizational and production practices. The study also sought to provide guidance for developing collaborative mechanisms that enhance community participation and reduce excessive dependence on external institutional assistance. Academically, the research contributes an integrated analytical perspective linking collaborative governance, multi-stakeholder participation, and community empowerment, thereby providing a foundation for comparative studies and subsequent empirical assessments of organizational capacity, agricultural production and distribution, and long-term program sustainability.

METHOD

This study employed a qualitative single-case study design to examine collaborative governance in urban farming initiatives in Central Jakarta Administrative City. The unit of analysis comprised interactions among Penta Helix stakeholders and the processes through which institutional support was transformed into community capabilities. The study involved stakeholders representing five sectors: government, academia, business, community organizations, and media. A total of 14 informants were recruited through purposive sampling (eight informants) and snowball sampling (six informants). The participants comprised seven government representatives, one academic representative, one business representative, four community representatives, and one media representative. Data were collected from August to September 2026. Informant selection emphasized the relevance and diversity of stakeholder perspectives to obtain an in-depth understanding of collaborative governance practices rather than achieve statistical representativeness (Hennink & Kaiser, 2022; Yin, 2018).

Table 1. Distribution of Informants by Penta Helix Element

Penta Helix Elements	Number (people)	In-script code	Information focus
Government	7	P1–P7	Program policies, coordination, and mentoring

Penta Helix Elements	Number (people)	In-script code	Information focus
Academics	1	A1	Technical assistance and knowledge transfer
Business world	1	U1	Resource and partnership support
Society	4	M1–M4	Group cultivation and management practices
Media	1	D1	Dissemination and publication of the program
Total	14		

Source: primary data of the study, 2026.

Primary data were collected through semi-structured interviews and field observations at urban farming sites, supplemented by policy documents, operational records, and publicly available materials. The research instruments included interview guides, observation checklists, and documentation records. Secondary data covering 57 hydroponic urban farming sites in 2024 were used to provide institutional and contextual information. Informant identities were anonymized using identification codes, and informed consent was obtained before data collection. The trustworthiness of the qualitative findings was strengthened through source, method, and time triangulation, member checking, peer debriefing, thick description, and the maintenance of an audit trail, consistent with established qualitative research standards (Lincoln & Guba, 1985; Younas et al., 2023).

Data were analyzed using the interactive qualitative analysis model developed by Miles et al. (2014), which involved data condensation, data display, and conclusion drawing and verification. NVivo software was used to facilitate data coding, thematic categorization, and the organization of qualitative evidence. The analytical framework integrated Ansell and Gash's collaborative governance dimensions, the roles of Penta Helix stakeholders, and Suharto's 5P community empowerment framework. Analytical matrices were developed to compare findings from interviews, field observations, and documentary sources, identify recurring themes, and formulate the Collaborative Empowerment Toward Urban Farming Self-Reliance (PK-MKU) conceptual model. Stakeholder participation levels were interpreted qualitatively rather than as statistically representative measures. Furthermore, limitations in the availability of production, pricing, and market data restricted the assessment of measurable economic outcomes associated with urban farming initiatives.

RESULTS AND DISCUSSION

Central Jakarta Urban Farming Ecosystem

Data from the Central Jakarta KPKP Sub-Directorate for 2024 recorded 57 hydroponic urban farming points in eight sub-districts, the most in Kemayoran (9). A total of 36 points (63.2%) were citizen-based and 21 points (36.8%) were sectoral institutional, 79% of which were in education units. This composition shows formal and informal networks that

complement each other, with schools as educational spaces. The next findings are sourced from 14 informants (Table 1) coded P1–P7 (government), A1 (academics), U1 (business), M1–M4 (community), and D1 (media), as well as observations (O) and documents (Doc).

Hybrid Collaborative Governance

Ansell and Gash (2008) five-dimensional analysis shows two layers of relationships: vertical administrative coordination (provincial KPKP Office, city sub-district, sub-district satlak, sub-district, sub-district) and horizontal collaboration with communities, academics, the business world, and the media (Table 2). This configuration is in line with urban agriculture studies that emphasize the role of diverse stakeholders (Stoeva, 2025) and coordination between levels of government in a polycentric framework (Boukharta et al., 2024b). Sub-district heads, village heads, and heads of state play the role of facilitative liaison (P5; O): bridging the two layers without replacing the social capital of citizens. The strength of tiered regulation lies in the clarity of roles, while the risk is dependence on government structures, so institutions need to shift from distributing inputs to strengthening business capacity. The business world is present through partnerships in the arrangement of location and the use of office rooftops (U1; Dok), while academics provide seeds, fertilizers, technical assistance, and group administrative assistance by professional program students (A1). However, CSR support, media publications, and knowledge transfer do not necessarily mean involvement in decision-making, so collaboration is judged by evidence of resource exchange and joint actions, not the presence of actors.

Table 2. Empirical Evidence on the Five Dimensions of Collaborative Governance

Dimensions	Empirical evidence	Source	Analytical notes
Initial conditions	Legitimacy of the governor's policy; running institutions; social capital from repeated interactions of farmer groups with sub-district officials	P1, P2; Doc	Resource asymmetry is relatively managed because there are repetitive relationships
Institutional design	Chain of Offices–Sudin–Satlak–Villages; Monthly Meetings at the Sudin level	P2, P3; Doc	It has not been proven that all relationships are supported by decrees, SOPs, or MoU specifically for urban farming
Facilitative leadership	Regular assistance and coordination; paguyuban, Dasawisma, Jumantik mobilize residents	P5; M1, M2; O	Leaders work within existing social ecosystems, not replace them
Collaboration process	Regular dialogue and mentoring, periodic monitoring, joint harvesting; news partnerships	P3, P4; O	Dialogue and trust are visible, but involvement in decisions is not equal
Results	Food saving, additional income, supply of SPPG to certain groups	M1, M2; O	Evidence in the form of informant information; volume and price data are not uniform

Source: primary data, 2026.

Collaboration Results and Independence Path

The most obvious result was reduced household food expenditure and, in certain groups, additional income, in line with the potential of urban agriculture for urban food security (Zulfiqar et al., 2021), although evidence from informal settlements in South Africa did not show a significant contribution (Swanepoel et al., 2021), so the results appear to be context-dependent. A community informant (M1) stated that his frozen catfish business had been marketed in the surrounding neighborhood, while another informant (M2) reported the supply to the Nutrition Fulfillment Service Unit (SPPG) for the Free Nutritious Meal program. On the rooftop of a mosque in Menteng, the harvest flowed in three directions: self-consumed, sold to finance the maintenance of the garden, and distributed to residents (O; P5). This circulation seems to explain why some points survive without new funding. The relationship with the SPPG cannot be called complete co-creation because evidence of joint planning, quality standards, volume, and price is not yet available; co-creation in food partnerships itself was studied in 52 case studies in Europe (de Vries et al., 2024), and the linkage of urban agriculture with public food policy was the focus of studies in France (Saint-Ges et al., 2024). The path to independence differs between sub-districts (Table 3): social capital in Cempaka Putih, land and institutional optimization in Menteng, food security in Kemayoran, CSR partnerships in Sawah Besar, and narrow-space innovation in Tanah Abang (P2; O). The assessment that the first three sub-districts lead the most to independence is the assessor's assessment, not evidence that the entire group is independent.

Table 3. Independence Pathway by District

Districts	Dominant pathway	Evidence
Cempaka Putih	Social capital and competition between citizens	Community informants (M1, M2)
Menteng	Land and institutional optimization	Rooftop mosques and offices; reinvestment of revenue (P5; O)
Kemayoran	Food security orientation	Unproductive land conversion (P2; O)
Sawah Besar	CSR Partnerships	Business interview (U1); document review
Tanah Abang	Innovation in space is very limited	Field observation (O)

Source: primary data, 2026.

Role and Depth of Actor Involvement

Table 4. Depth of Penta Helix Actor Involvement

Actors	I1	I2	I3	I4	Total	Categories	Evidence base
Government	3	3	3	3	12	Height	Policy, chain of coordination, monthly meetings (P1–P7; Doc)

Actors	I1	I2	I3	I4	Total	Categories	Evidence base
Society	3	3	3	2	11	Height	Managing land, marketing, supplying SPPGs (M1–M4; O)
Academics	2	2	2	2	8	Intermediate	KKN, technical assistance; yet co-creation (A1)
Business world	1	2	2	2	7	Intermediate	CSR facilities and partnership assistance (U1; Doc)
Media	1	1	2	2	6	Light-Medium	Dissemination and publication; informal news partnerships (D1, P4)

Source: researcher assessment, 2026.

The five actors bring different resources: the government as policy orchestrator and mentoring; the community as producers and value creators; six universities through KKN and technical assistance; a number of companies through CSR and production facilities; and the media through dissemination. Regional Kominfo is structurally part of the government, so its role is read as government public communication, while independent media performs a purer publication function. In order to ensure that the depth of involvement is not subjective, four indicators on a scale of 1–3 are used, which refer to Ansell and Gash's (2008) emphasis on involvement in the process and the attention of the literature on who participates in collaborative forums (Angst et al., 2022): involvement in decisions (I1), exchange of resources (I2), frequency of interaction (I3), and formalization of relationships (I4). The total score was 4–5 = light, 6 = mild-medium, 7–9 = medium, and 10–12 = high (Table 4). The score is a structured qualitative assessment, not a statistical measurement. The results show high depth in government and society, medium in academics and the business world, and light-medium in the media, so that Penta Helix is more accurately read as a map of function and depth of roles, rather than a checklist.

Supporting and Inhibiting Factors

The main supporters are policy legitimacy, clarity of coordination chains, and active local leadership (P2, P5); constraints on land limitations, non-uniform group capacity, unequal market access, and reliance on external support (P2; M1, M2). This combination is in line with a review that places institutional policies and infrastructure, social capital, and land as key conditions for urban agriculture (Lee et al., 2023). Land constraints are not always pure

barriers: hydroponics, rooftop farming, verticulture, and the use of used materials show that spatial constraints can be drivers of innovation when supported by knowledge and networks (O).

Community Empowerment 5P Perspective

Evidence for each 5P dimension (Suharto, 2010) is presented in Table 5. Possibilities can be seen in the opening of access to land and facilities, strengthening of training and mentoring, support for production inputs, and maintenance of monitoring and reinvestment of results. The strongest evidence is in strengthening and supporting, the weakest in protection. The latest review emphasizes that in order for urban agriculture to be scalable, resilient, and legally protected, a comprehensive policy and governance framework is needed (Senthamizh & Anbarasan, 2025), in line with the weak protection dimension.

Table 5. Empirical Evidence on the Five Dimensions of Empowerment

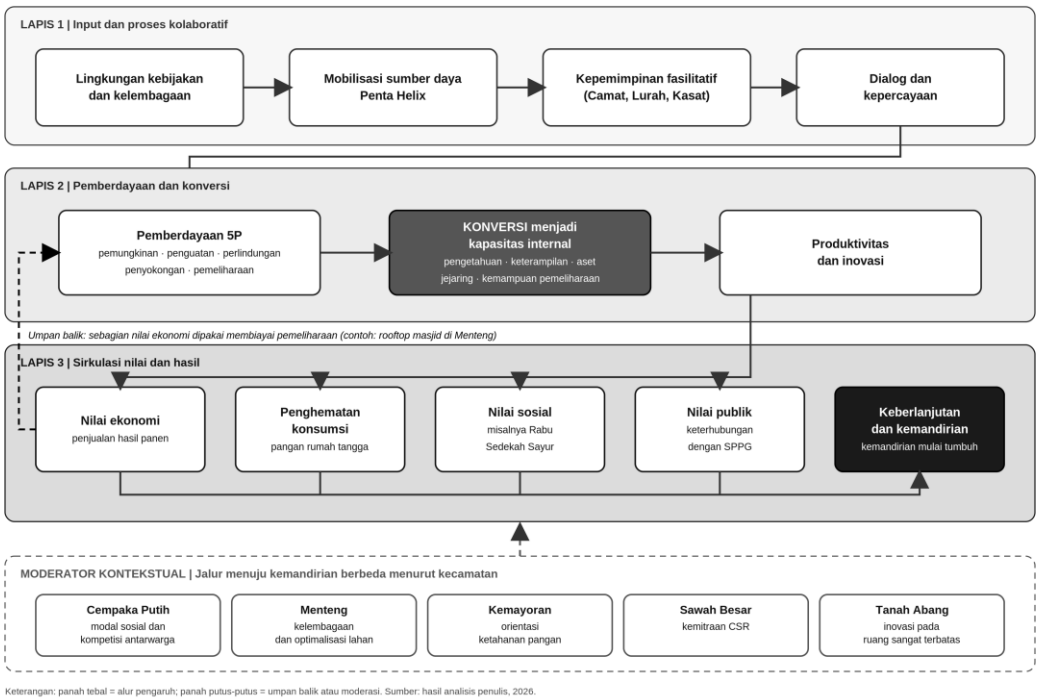
5P Dimensions	Field evidence	Source	Strength
Possibilities	Conversion of unproductive land and rooftop into productive space; Governor's Policy	P2, P5; O; Doc	Strong
Reinforcement	Training, technical assistance, learning by doing	P3; A1; M1, M2	Strong
Protection	Institutional development; there is no land certainty and food safety standards	P2	Weak
Support	Production facilities and inputs from the government and CSR	P2; U1	Strong
Maintenance	Regular monitoring, coordination forums, reinvestment of sales results	P3, P5; O	Medium-strong

Source: primary data, 2026.

Model PK-MKU

Why do groups with relatively equal policy and support environments develop differently? External support does not automatically result in independence; it must be converted into internal capacity in the form of knowledge, skills, assets, networks, and maintenance capabilities. The PK-MKU model (Figure 1) illustrates the flow from policy and facilitative leadership, through 5P empowerment and capacity conversion, to value circulation and independence, with the sub-district pathway as the moderator. Independence is understood not to be the disconnection of external support, but the ability to manage it while remaining connected to the market and the SPPG.

Gambar 1. Model Pemberdayaan Kolaboratif Menuju Kemandirian Urban Farming (PK-MKU)



Source: results of the author's analysis, 2026.

The findings confirm Ansell and Gash (2008) that initial conditions, institutional design, and facilitative leadership define the collaborative process, and extend it: horizontal collaboration operates on top of hierarchical vertical coordination, rather than as a stand-alone forum, in line with the notion of polycentric governance (Morrison et al., 2023) and the finding that most potentially involved actors do not participate in the forum (Angst et al., 2022). The asymmetry of resources is seen in the unequal depth of engagement (Table 4): the media and the business world score low on I1 so that they contribute without determining the direction of the program. The helix framework evolves towards a Quintuple Helix that adds elements of the natural environment in line with sustainability demands (Carayannis & Campbell, 2022; Donati et al., 2023). The penta Helix in this study is different because the additional elements are society and the media, so the findings are not read as a Quintuple Helix test. In community programs in other sectors, organizational hierarchies are reported to inhibit citizen involvement (Sjögren Forss et al., 2021), while in Central Jakarta the hierarchy coexists with high citizen involvement due to the presence of facilitative liaison. The role of academics, which is still in the form of knowledge transfer and mentoring, is relevant to the idea of managing city-university partnerships as a cycle (Caughman et al., 2023). Structured forums and co-creation between actors are also emphasized in the setting of urban agriculture in Rome (Sonnino & Zollet, 2025). Penta Helix is thus read as an architecture of resource exchange, rather than a list of actors. On the 5P dimension, the findings confirm that empowerment is not just about providing inputs (Suharto, 2010), but also provides a critical note: without protection, the capacity of strengthening and supporting risks being unsustainable. Studies of urban farming in Indonesia associated with urban resilience are still few (Abdillah et al., 2023); This study

adds to collaborative evidence from national government centers and explains the mechanism of converting support into capacity, which so far has not been the focus of other studies.

CONCLUSION

The findings from the urban farming initiatives in Central Jakarta Administrative City revealed a hybrid collaborative governance structure in which vertical administrative coordination operated alongside horizontal cooperation among Penta Helix stakeholders. Facilitative leadership at the local government level played an important role in connecting institutional networks and supporting stakeholder collaboration. However, stakeholder participation remained uneven, while community empowerment was most evident in the strengthening and supporting dimensions and least developed in the protection dimension. The proposed Collaborative Empowerment Toward Urban Farming Self-Reliance (PK-MKU) model illustrated how external assistance, including agricultural equipment, technical mentoring, social networks, and institutional support, could be transformed into internally managed knowledge, skills, resources, and sustainable productive activities. These findings highlighted the importance of converting external institutional assistance into community capabilities to support long-term urban farming sustainability. Nevertheless, the PK-MKU model represented a context-specific explanatory framework derived from qualitative case study evidence rather than a statistically validated predictive model or a quantitative assessment of economic impacts.

Future research should incorporate longitudinal assessments of agricultural production volumes, operating costs, market accessibility, organizational continuity, and community resource management to examine whether external institutional support contributes to sustained community self-reliance. Comparative studies across administrative districts and cities are also recommended to assess the applicability of the PK-MKU model under different institutional, socioeconomic, and geographical conditions. Particular attention should be directed toward examining the security of cultivation sites, the effectiveness of community protection mechanisms, and the formalization of collaborative decision-making processes. From a policy perspective, local governments should prioritize continuous stakeholder facilitation, practical capacity-building programs, stronger institutional and land-use protection arrangements, and systematic monitoring of community empowerment outcomes. Establishing mechanisms for evaluating how urban farming groups utilize, distribute, and reinvest their agricultural outputs may further support organizational independence, strengthen cross-sector collaboration, and promote the long-term sustainability of community-based urban farming initiatives.

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CONFLICT OF INTEREST

The authors declare that this study was conducted without any commercial or financial relationships that could be interpreted as a potential conflict of interest.

AUTHORS' CONTRIBUTIONS

Author1: research conceptualization, methodology design, experiment execution, data collection, data analysis, manuscript drafting, and manuscript revision. Author2 and Author3: research supervision, validation of research results, provision of scientific input, and manuscript review and revision. All authors have read and approved the final version of the manuscript.

STATEMENT ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE

The authors declare that generative artificial intelligence (AI) was used in the preparation of this manuscript to help improve linguistic clarity, correct grammar, and refine the writing structure. Generative AI was not used to generate, manipulate, or analyze research data. The entire content of the manuscript has been reviewed and verified by the author(s). The author(s) are fully responsible for the accuracy, integrity, and final content of the manuscript.

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