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The Role of Contract and Corporate Farming in Building Urban Food System Resilience: A Case of Jakarta, Indonesia

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Abstract. Urban food systems in densely populated and import-dependent cities face increasing exposure to supply disruptions, climate stress, and market volatility. This study examines how contract and corporate farming contribute to strengthening urban food system resilience in Jakarta by integrating behavioral and institutional perspectives. Using a qualitative research design, data were collected through field observations and in-depth interviews with farmer groups, PT Food Station Tjipinang Jaya, and government stakeholders across major rice-producing regions. The findings reveal that resilience outcomes cannot be explained by production capacity alone; instead, they arise from the interaction between farmer behavior and institutional arrangements that govern coordination, compliance, and risk management across urban–rural linkages. Drawing on Collective Action Theory, Transaction Cost Economics, Food System Resilience Theory, and Social–Ecological Systems Theory, the study proposes the Behavioral–Institutional Resilience Contract Farming (BIRCF) model. The model demonstrates how institutional capacity, spatial divrsification, and adaptive governance collectively generate robustness, redundancy, flexibility, and adaptability within Jakarta's rice supply system. While productivity gains are modest, institutional strengthening and coordinated procurement emerge as the primary drivers of resilience. The study concludes that urban food security strategies must extend beyond production-focused interventions and prioritize integrated urban–rural governance to safeguard metropolitan food systems against future shocks.

1. INTRODUCTION

The global food crisis has underscored the close interdependence between food security and national stability. The 2008 food price crisis, which saw rice and wheat prices increase by up to 83 percent and 87 percent respectively (FAO, 2008), triggered widespread social unrest across several countries. In Haiti, rising food prices culminated in mass protests that contributed to the collapse of the government led by Prime Minister Jacques-Édouard Alexis. Similar food-related unrest was observed in Jordan, Morocco, Algeria, Lebanon, Syria, Yemen, and Tunisia (McMahon, 2013), demonstrating that food insecurity, particularly involving strategic staples such as rice, can pose tangible threats to political stability and national security. Given rice's role as a primary staple for much of Asia, including Indonesia, disruptions to rice supply chains have implications that extend well beyond household consumption to broader socio-political resilience.

Contemporary conditions indicate that food security challenges have become increasingly severe and complex. *The State of Food Security and Nutrition in the World 2024* reports that approximately 733 million people experienced hunger in 2023, while 2.33 billion faced moderate to severe food insecurity and more than 2.8 billion were unable to afford a healthy diet in 2022. Projections further suggest that Sustainable Development Goal (SDG) 2 (Zero Hunger) is unlikely to be achieved by 2030, with an estimated 582 million people remaining chronically undernourished if current trends persist. These trends highlight the limits of static food security approaches and reinforce the need for resilience-oriented frameworks.

In response, food system resilience has emerged as a central analytical paradigm within national resilience discourse. Rooted in Social–Ecological Systems (SES) theory (Ostrom, 2009), this perspective conceptualizes food systems as complex configurations of interacting resource systems, governance arrangements, and users operating across multiple scales. Food system resilience is defined as the capacity of a system to ensure sufficient, appropriate, and accessible food in the face of shocks and long-term stresses (Rimhanen et al., 2023; Hertel et al., 2021; Bene., 2020; Tendall et al., 2015). Unlike conventional food security concepts, resilience emphasizes dynamic capacities to absorb shocks, adapt to change, and transform when necessary (Mekonnen et al., 2024; Varyoda & Taren, 2022). Walker and Salt (2006) further identify four interrelated dimensions of resilience relevant to food systems, latitude, resistance, precariousness, and panarchy. The concept of panarchy is particularly important, as it captures cross-scale interactions linking local, regional, national, and global processes (Gunderson & Holling, 2002). From this perspective, institutional arrangements such as contract farming and corporate farming play a critical role in enhancing resilience by coordinating supply chains, distributing risk, and aligning production and distribution across scales.

Indonesia's food security context highlights the relevance of this framework. According to the Global Hunger Index (GHI) 2024, Indonesia ranks 77th out of 127 countries, indicating a moderate level of hunger, while approximately 7.2 percent of the population remains food insecure. In the Global Food Security Index (GFSI), Indonesia scored 60.2 out of 100 in 2022, ranking 63rd globally. Despite being the world's third-largest rice producer, Indonesia remains vulnerable to supply shocks, with rice imports accounting for 10–15 percent of national consumption in certain years, particularly during periods of extreme weather or production disruptions. This vulnerability is exacerbated by high dependence on imported complementary commodities, including wheat (95 percent), soybeans (60 percent), and sugar (67%) (Ministry of Agriculture, 2024; DPR RI, 2022). Exposure to global geopolitical shocks, such as the Russia–Ukraine conflict, which disrupted around 30 percent of global wheat supplies further amplifies risks. The Food System Resilience Index 2024 shows that countries with high import dependence require, on average, 2.5 times longer to recover from shocks than those with more diversified domestic production.

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Jakarta, as Indonesia's political and economic center, represents a critical case where these national vulnerabilities are intensified. Although Jakarta recorded a high Food Security Index score of 83.80 in 2023, ranking third nationally (Ministry of Finance, 2024), this performance is driven largely by distribution capacity and stock management rather than local production. Approximately 95 percent of the city's food supply originates from outside the province, with rice accounting for the largest share of food imports (Jakarta Food Security Agency, 2024). Local rice-equivalent production declined sharply from 2,278 tons in 2020 to 1,255 tons in 2024, indicating increasing structural dependence on external supply regions such as Indramayu, Cirebon, Sukabumi, and East Java.

These structural constraints are compounded by extreme demographic pressure in Jakarta. Jakarta's population density reached approximately 16,155 persons per square kilometer in 2025, further intensified by daily commuter inflows of around 3.6 million workers from surrounding metropolitan areas (BPS, 2024). During the COVID-19 pandemic, the number of people living in poverty in Jakarta increased by 36.3 percent between 2019 and 2021, reflecting limited shock-absorption capacity within the urban food system and the potential for food-related stress to translate into broader socio-economic instability. In response, the DKI Jakarta government has pursued resilience-building strategies through institutional innovation, notably the implementation of contract farming and corporate farming as adaptive governance mechanisms. Aligned with SES and adaptive governance frameworks (Folke et al., 2005), these arrangements seek to stabilize supply, distribute risk, and strengthen cross-regional coordination. Jakarta's rice contract farming program currently involves partnerships with 185 farmer groups, cooperatives, and agribusiness entities across 40 regions, particularly in major rice-producing areas.

Against this backdrop, this study examines the role of contract farming and corporate farming in building urban food system resilience in Jakarta. Specifically, it analyzes how these institutional models contribute to shock absorption, supply stabilization, and the mitigation of socio-economic vulnerabilities in a highly import-dependent megacity. By situating these arrangements within a social–ecological systems and adaptive governance framework, the study contributes empirical insights to the literature on urban food system resilience and informs food security governance in rapidly urbanizing contexts.

2. METHOD

This study employs a qualitative research approach to examine urban food system resilience in Jakarta, with particular emphasis on the role of contract farming and corporate farming as institutional mechanisms for managing food supply vulnerability (Figure 1). A qualitative research is understood as a systematic and interpretive approach that seeks to examine social phenomena through in-depth analysis of actors' perspectives, institutional processes, and contextual interactions, allowing researchers to capture underlying mechanisms, meanings, and relational dynamics that are not readily observable through quantitative or purely statistical techniques (Lim, 2025; Chowdury & Shil., 2021; Dewi, 2021). A qualitative design is adopted to capture governance processes, coordination dynamics, and adaptive capacities within the food system that cannot be adequately observed through quantitative or survey-based methods. This approach prioritizes depth, contextual understanding, and analytical interpretation rather than statistical generalization.

The analysis focuses on food system resilience as reflected in four interrelated attributes. Robustness, referring to the system's capacity to withstand disruptions; redundancy, denoting the availability of alternative supply channels and risk distribution mechanisms; flexibility, capturing the ability to reallocate resources and adjust institutional coordination; and adaptability, reflecting learning processes and institutional adjustment in response to evolving risks. These attributes guide the examination of contract farming and corporate farming arrangements that link urban food demand in Jakarta with rural production systems.

Fieldwork was conducted in Jakarta and in selected rice-producing regions that supply the city through institutional partnerships with PT Food Station Tjipinang Jaya, including Karawang and Indramayu Regencies (West Java), Cilacap Regency (Central Java), and Ngawi Regency (East Java). These locations were purposively selected as they represent core production areas involved in contract and corporate farming schemes supporting Jakarta's rice supply system. Primary data were collected through in-depth interviews and limited field observations involving three to five key informants, selected using purposive sampling. The informants comprised senior managers and program implementers at PT Food Station Tjipinang Jaya, representatives of the DKI Jakarta Agricultural Agency, and experienced farmers directly involved in contract and corporate farming programs. These actors were selected due to their direct involvement in decision-making, program implementation, and operational coordination within Jakarta's rice supply chain. In-depth interviews were conducted directly by the researchers using a semi-structured interview guide designed to explore institutional arrangements, governance mechanisms, risk-sharing practices, and adaptive responses to food supply disruptions. Interviews continued until analytical saturation was achieved, ensuring that the key institutional dynamics relevant to urban food system resilience were adequately captured.

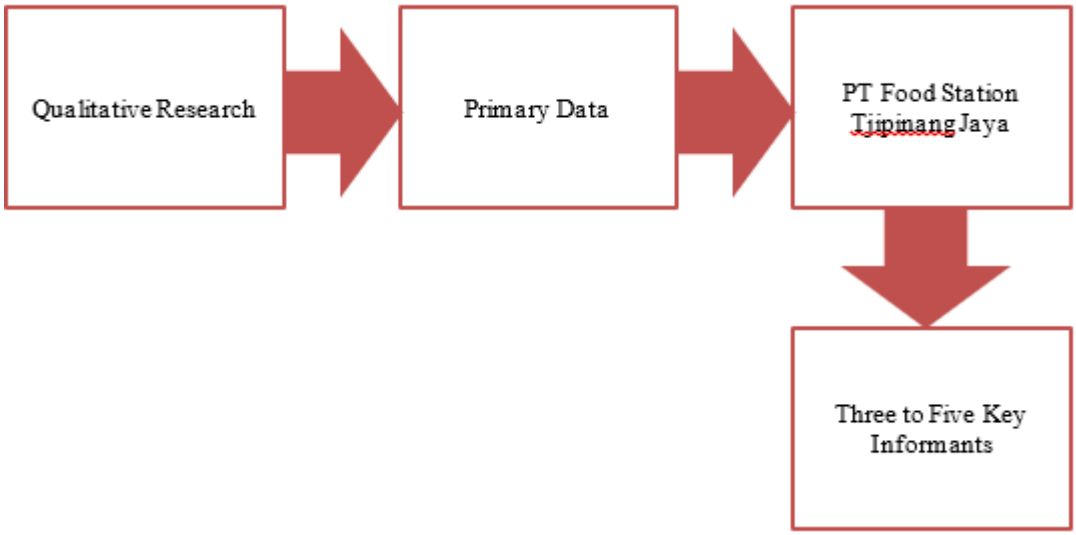

Figure 1. Method.

The qualitative data were analyzed using a thematic analysis approach. Interview transcripts and field notes were coded using a combination of deductive categories derived from the four resilience attributes and inductive codes emerging from the empirical material. This analytical strategy enabled the identification of institutional practices and governance mechanisms that shape urban food system resilience under contract farming and corporate farming arrangements. Through this approach, the study provides a grounded and context-specific assessment of how institutional design and cross-regional coordination influence the resilience of Jakarta's food system in the face of supply uncertainty.

3. FINDINGS

3.1. The Behavioral-Institutional Resilience Contract Farming (BIRCF) Model

The Behavioral–Institutional Resilience Contract Farming (BIRCF) model is derived inductively from empirical evidence obtained through field observations and in-depth interviews on the implementation of contract and corporate farming within Jakarta's rice supply network. The findings indicate that the resilience characteristics exhibited by Jakarta's food system cannot be adequately accounted for by production-related attributes alone. Rather, these outcomes emerge from the complex interplay between farmers' behavioral responses and the institutional arrangements that structure coordination, compliance, and risk management across interconnected urban–rural supply chains.

The empirical patterns underlying the BIRCF model are theoretically grounded in four complementary frameworks. First, Collective Action Theory (Ostrom, 1990) provides a clear lens through which the behavior of farmer groups partnering with PT Food Station Tjipinang Jaya can be understood. Ostrom's design principles, clearly defined boundaries, congruence between rules and local conditions, collective-choice arrangements, monitoring, graduated sanctions, conflict-resolution mechanisms, and minimal recognition of organizational rights, are reflected in the institutional configurations observed in the field (Booker et al., 2025; Mehan, 2023). Interview evidence indicates that farmer organizations with stronger internal governance and clearer rule enforcement demonstrate higher levels of contract compliance and more stable supply performance. These findings suggest that collective action at the farmer-group level plays a crucial role in sustaining contractual relationships and reducing supply uncertainty.

Second, the results are consistent with Transaction Cost Economics (Williamson, 1985), which explains why contract farming emerges as a preferred governance structure in Jakarta's rice supply system. The relationship between PT Food Station Tjipinang Jaya and its partner farmer groups is characterized by moderate asset specificity, repeated transactions, and uncertainty. Under such conditions, hybrid governance arrangements such as contract farming outperform spot markets or full vertical integration. Empirical findings reveal that transaction efficiency and resilience outcomes are driven less by production capacity and more by institutional quality, as reflected in the relatively weak influence of production factors. This confirms that governance mechanisms that reduce opportunism, coordinate expectations, and stabilize transactions over time are central to resilience formation.

Third, Food System Resilience Theory (Tendall et al., 2015) provides the operational framework for interpreting how contract farming contributes to resilience within Jakarta's food system. Resilience is understood as the system's capacity to provide sufficient, appropriate, and accessible food amid unanticipated disruptions (Ben Hassen et al., 2025; Rimhanen et al., 2023). The empirical results indicate that contract farming strengthens resilience through four interrelated dimensions, robustness, redundancy, flexibility, and adaptability, by stabilizing procurement, diversifying supply sources, enabling adaptive adjustments, and fostering institutional learning. These dimensions emerge not as isolated outcomes, but as mutually reinforcing system properties shaped by coordinated behavioral and institutional responses.

Fourth, Social–Ecological Systems (SES) Theory by Ostrom (2009) frames Jakarta and its rice-producing hinterlands as a coupled socio-ecological system. Within this system, interactions between social actors, farmers, firms, and government agencies, and ecological conditions jointly determine resilience outcomes (Roy et al., 2025; Suarez-Pardo et al., 2022; Biggs et al., 2021). The empirical evidence suggests that contract farming functions as an institutional coupling mechanism linking urban demand in Jakarta with production systems in Karawang, Indramayu, Cilacap, and Ngawi. Through this coupling, shocks originating in one subsystem can be absorbed and managed through coordinated responses across multiple scales.

3.2. Structural Configuration of the Behavioral-Institutional Resilience Contract Farming (BIRCF) Model

Building on these empirical findings and theoretical lenses, the structural configuration of the Behavioral-Institutional Resilience

Contract Farming (BIRCF) model follows a logic model framework adapted from the W.K. Kellogg Foundation (2004), comprising inputs, activities, outputs, outcomes, and impact. This structure clarifies how behavioral and institutional components aggregate into resilience at the system level (Figure 2).

At the input level, the BIRCF model identifies three interrelated resource domains that determine the effectiveness of contract farming. The first and most influential domain is institutional capacity, encompassing formal and informal rules governing contractual relations, organizational structures of farmer groups, coordination mechanisms across actors, and internal monitoring and sanctioning systems. Field evidence shows that well-functioning farmer institutions play a decisive role in sustaining compliance, trust, and collective action within contract farming arrangements. Farmers consistently emphasized that clear internal rules, active leadership, and transparent coordination with PT Food Station Tjipinang Jaya reduced uncertainty and discouraged opportunistic behavior. These findings indicate that the effectiveness of contract farming depends less on physical resources than on the quality of institutional organization that mediates farmer behavior.

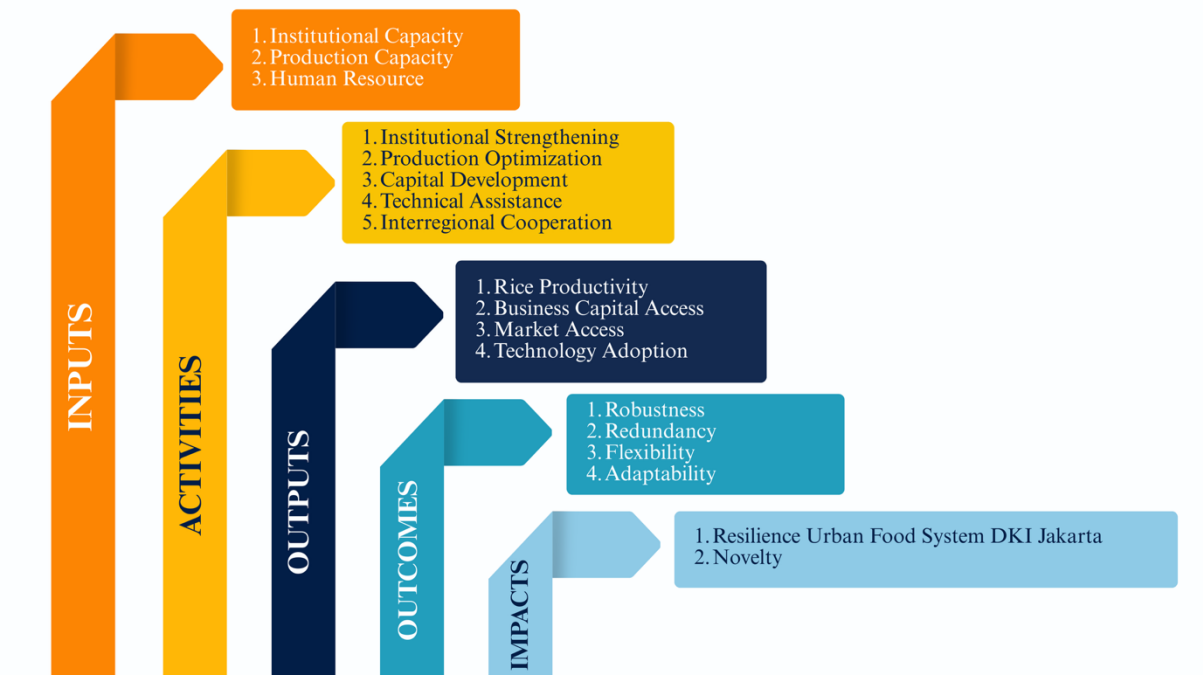

Figure 2. Structural Configuration of the Behavioral-Institutional Resilience Contract Farming (BIRCF) Model.

The second domain concerns production capacity, including access to land, availability of production inputs, agricultural infrastructure, and cultivation technologies. Many participating farmers operate under land tenure arrangements such as rental or sharecropping systems, which limit long-term investment incentives. While production capacity contributes to the smooth implementation of contracts, qualitative evidence suggests that its role is secondary compared to institutional capacity. Contract farming remains operational even under constrained production conditions, provided that institutional coordination and contractual enforcement are strong.

The third domain relates to human resource characteristics, including age, education, farming experience, and household dependency structures. The farmer population involved in the scheme is largely composed of older and moderately educated farmers. However, interviews indicate that individual demographic characteristics do not critically determine the success of contract farming. Well-designed institutional arrangements enable farmers with diverse backgrounds to participate effectively by embedding individual behavior within collective organizational structures.

These inputs are translated into activities that explicitly prioritize institutional mediation. The BIRCF model incorporates five strategic intervention areas: institutional strengthening of farmer groups as economic entities; optimization of production processes through adaptive technologies and quality inputs; development of business capital through integrated financing schemes and insurance mechanisms; provision of structured technical assistance through field schools and extension services; and interregional coordination linking Jakarta with major rice-producing regions. These activities reflect the central premise that food system resilience is generated through institutional governance of behavior rather than through productivity enhancement alone.

The outputs of these activities include improvements in production performance, enhanced access to business capital, secured market access, and gradual adoption of improved technologies. While productivity gains and technology uptake remain uneven, farmers consistently reported increased market certainty as the most tangible and immediate benefit of contract farming. Guaranteed purchase arrangements reduce exposure to price volatility, stabilize income expectations, and lower risk perceptions. Access to financing remains a challenge, yet contractual arrangements lower entry barriers by linking credit access to assured markets.

At the outcome level, the BIRCF model operationalizes food system resilience through four interrelated dimensions. Robustness is reflected in the stability of rice supply to Jakarta despite production fluctuations in individual regions. Redundancy is achieved through spatial diversification of supply across multiple producing areas with differing agroecological characteristics, allowing localized failures to be compensated elsewhere. Flexibility emerges from the system's capacity to adjust procurement volumes, prices, and supplier configurations in response to changing market conditions. Adaptability, the most complex dimension, involves organizational learning, institutional adjustment, and innovation over time. Empirical evidence suggests that adaptability is still evolving, as it requires sustained learning processes and long-term institutional commitment rather than short-term interventions.

Ultimately, the impact of the BIRCF model is the establishment of a resilient urban food system for Jakarta, characterized by

stable rice availability, affordable and equitable access, assured quality, and systemic sustainability. Achieving this impact depends on consistent institutional implementation over time. The findings demonstrate that urban food system resilience is not merely a function of increased production or logistical capacity, but an emergent property arising from the alignment of farmer behavior with institutional design across urban–rural supply chains. This distinguishes the BIRCF model from conventional contract farming approaches and establishes its contribution to the literature on food system resilience and adaptive governance.

The empirical evidence supporting the BIRCF model reinforces the argument that resilience within Jakarta's food system is fundamentally an institutional outcome rather than a by-product of production capacity. The interaction between farmer behavior, group-level governance, and contractual arrangements demonstrates that resilience emerges when institutions succeed in coordinating expectations, reducing uncertainty, and structuring incentives for cooperative action. This aligns with broader theoretical insights from institutional economics, which posit that predictable and trusted governance mechanisms are essential for mitigating transaction risks in fragmented supply chains. In Jakarta's case, contract farming serves not merely as a procurement instrument but as an institutional infrastructure that stabilizes behavior across spatially dispersed actors.

A second key discussion point concerns the asymmetry between institutional performance and technological or productivity gains. While contract farming generates modest improvements in production and technology adoption, these remain secondary effects relative to institutional stability. This finding challenges the conventional modernization narrative that frames productivity enhancement as the primary pathway to food system improvement. The Jakarta case shows that productivity is a necessary but insufficient condition; resilience is achieved through redundancy, flexibility, and adaptability, attributes that depend on relational governance, coordination capacity, and institutional learning. The BIRCF model therefore contributes to reframing contract farming from a purely economic arrangement into a governance architecture for managing systemic risks.

Finally, the study highlights the importance of conceptualizing Jakarta's food system as a coupled socio-ecological system. The resilience observed is not rooted in the performance of any single producing region, but in the structure of interconnections between Jakarta and multiple hinterland regions. Spatial diversification, coordinated procurement, and cross-regional institutional linkages are key mechanisms through which systemic vulnerabilities are reduced. Yet, this interconnectedness also introduces new governance challenges, particularly in ensuring consistent standards, aligning multi-level incentives, and managing climate-induced risks across regions. These findings indicate that policies must transition from isolated agricultural interventions to integrated urban–rural governance approaches.

4. CONCLUSION

The findings of this study show that the resilience of Jakarta's urban food system is shaped not primarily by production capacity, but by the interaction of farmer behavior with the institutional arrangements that govern contract and corporate farming. The Behavioral–Institutional Resilience Contract Farming (BIRCF) model highlights that resilience emerges as an institutional outcome, rooted in strengthened collective action, reduced transaction uncertainty, coordinated urban–rural linkages, and adaptive governance mechanisms. Through diversification of supply sources, stabilization of procurement processes, and enhancement of coordination across scales, contract farming functions as an effective coupling mechanism between Jakarta and its hinterland regions. The multidimensional resilience outcomes observed, robustness, redundancy, flexibility, and adaptability, confirm that institutional quality, rather than technological intensification alone, is the critical determinant of systemic stability in metropolitan food systems.

Based on these insights, several policy recommendations can be advanced. First, strengthening institutional capacity should be prioritized, including formalization of group governance structures, standardized monitoring mechanisms, and enhanced coordination between urban buyers and rural producers. Second, policies should promote spatial diversification and interregional cooperation to mitigate climate and market risks affecting any single production area. Third, embedded financing schemes and insurance instruments are needed to address farmers' persistent liquidity constraints and enable sustained participation in contract farming arrangements. Fourth, extension services should shift from purely technical training to institutional and behavioral facilitation, supporting farmer decision-making under uncertainty. Finally, Jakarta's food system governance must adopt a holistic urban–rural systems perspective, integrating agricultural policy with urban planning, logistics, and climate risk management. Collectively, these policy measures can reinforce the enabling conditions required for the BIRCF model to deliver long-term, equitable, and sustainable urban food system resilience.

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