

A Model for Implementing Sustainable Food Security Policies in Bekasi City

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Abstract

Urban food security in Bekasi City faces complex challenges related to high dependence on external food supplies and unequal distribution, requiring policy approaches that extend beyond environmental considerations to include social and governance dimensions. This study examines the implementation network model of sustainable food security policy in Bekasi City using a policy network perspective, focusing on interactions among government, community, and private-sector actors. An embedded concurrent mixed-methods design was applied, with qualitative analysis as the primary approach supported by quantitative data. Data were collected through interviews, observation, documentation, and surveys, and analyzed using NVivo and SmartPLS. The findings indicate that food security policy implementation in Bekasi City is transitioning toward a more collaborative network model but remains constrained by fragmented authority, state dominance over business actors, and weak cross-sectoral coordination. Although sustainability initiatives such as urban farming and technological utilization have been introduced, they have not yet formed an adaptive and resilient implementation network. This study highlights that sustainable food security implementation depends not only on actors, network structures, institutions, and power relations, but also on the integration of agricultural food technology and information systems, and recommends strengthening inclusive and adaptive food policy institutional networks.

Keywords: *Policy Network Model, Policy Implementation, Food Security, Sustainability.*

INTRODUCTION

Food is an essential condition for human survival and social development. In public policy, however, food security cannot be reduced to the quantity of food available in aggregate. Indonesian legislation defines food security in terms of the fulfillment of food needs from the national level to the individual level in sufficient quantity and quality, safety, diversity, nutrition, affordability, and conformity with social, cultural, and religious values. The dissertation underlying this article places food security within a broader public-administration problem because its implementation involves government institutions, producers, distributors, communities, businesses, and other actors whose resources and responsibilities are interdependent (Republic of Indonesia, 2012).

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Urbanization makes this governance problem more visible. Cities generally have high food demand but limited productive agricultural land. Their food systems therefore depend on flows of commodities, finance, infrastructure, information, and institutional decisions that cross administrative boundaries. Bekasi City illustrates this condition. The city has experienced rapid population and built-up-area growth, while agricultural land has declined. The documented paddy-field area fell from 434 hectares in 2019–2020 to 312 hectares in 2021–2023. The research material also reports that internal rice production contributed only about 1.05% of total city demand in an earlier assessment, leaving approximately 98.95% dependent on external supply (Prayitno, 2020; Utomo, 2020).

Such dependence does not necessarily mean that a city is food insecure at a particular moment. It does, however, create structural vulnerability. Disruptions in production areas, transportation, prices, climate, or interregional distribution can rapidly affect urban consumers. The problem is therefore one of resilience and sustainability: how can a city with limited productive land secure continuous access to safe, diverse, nutritious, and affordable food while protecting environmental resources and strengthening local capacity? Suryana (2014) emphasizes that food security must respond simultaneously to pressures from demand and supply, including demographic growth, changing consumption preferences, climate change, resource competition, and the dominance of small-scale producers.

The policy challenge is compounded by fragmentation of governmental responsibilities. National institutions establish broad policies, provincial governments coordinate and support implementation, and municipal institutions translate those policies into local programs, services, and interventions. At the local level, the implementation material identifies programs related to food availability, diversification, distribution, affordable food markets, urban farming, education, and price stabilization. The Government of Bekasi City, particularly the food-security and agriculture apparatus, works with farmer groups, urban farming communities, food businesses, and academic partners. Yet these relationships do not automatically constitute a mature collaborative network.

The distinction between a conventional implementation chain and a policy network is important. Classical implementation models such as those of Van Meter and Van Horn (1975), Edwards III (1980), and Mazmanian and Sabatier (1980) explain implementation through standards, resources, communication, dispositions, bureaucratic structures, and the characteristics of the policy and implementation environment. These models remain useful, but complex urban food systems also require attention to interdependence among actors who possess different resources and pursue partly different interests. Policy network theory addresses precisely this condition by emphasizing relationships, dependency, interaction, institutional rules, and resource

exchange among public and private actors (Rhodes, 1990; Klijn, 1996, 1997; Van Waarden, 1992).

The empirical problem identified in the dissertation is that Bekasi City's implementation arrangement has not yet fully adopted the seven dimensions proposed by Van Waarden (1992). Six dimensions, actors, network structure, network functions, institutions, rules of conduct, and actor strategies are empirically visible, whereas government–business power relations are not yet strongly institutionalized. At the same time, technology has become increasingly visible through urban hydroponic farming and communication/information practices. This suggests that a contemporary urban food policy network may require an extension of the original framework.

Previous studies support the relevance of network approaches but also reveal unresolved gaps. Research in West Papua found that food-security network governance was not yet effective because actor participation, trust, information sharing, and resource exchange remained weak (Arrang et al., 2024). Research in Luwu Utara highlighted the importance of multi-actor interaction and strategic separation in food-security implementation (Setiyana & Alwi, 2024). Studies of food policy networks in wider food-system transformation likewise show difficulties in constructing diverse core groups, engaging business and civil-society actors, developing shared visions, and positioning networks constructively in relation to government (den Boer et al., 2023). In Bone, mutual adjustment among actors was identified as an important coordination mechanism, although the analysis was more limited to network structure (Rukmana, 2020).

The research gap addressed in this article is therefore twofold. First, previous food-security studies often examine individual dimensions of governance, while the present study integrates the dimensions of policy network into a single implementation model at the urban level. Second, the article empirically identifies technology as an additional dimension that can connect knowledge, urban agricultural practices, communication, and integrated food-system information with the conventional policy-network structure. The purpose is not to replace Van Waarden's framework but to make it more operational for the conditions of urban food governance in the digital and technological era.

Accordingly, the article addresses three questions: (1) How is food security policy implemented in Bekasi City? (2) What factors support or hinder implementation? and (3) What policy-network model is most relevant for sustainable food security implementation in the city? The article argues that sustainable urban food security requires a shift from government-centered program delivery toward a hybrid policy network in which government retains regulatory and facilitative authority but shares knowledge, resources, deliberation, and problem-solving with non-state actors.

LITERATURE REVIEW

Public Policy Implementation

Public policy can be understood as a purposive course of government action or inaction designed to address collective problems and produce consequences in society (Dye, 2011). Implementation is the stage in which policy decisions are translated into programs, actions, organizational routines, and services. Its success depends not only on the quality of the formal policy but also on resources, communication, organizational arrangements, implementer commitment, and the surrounding environment. Van Meter and Van Horn (1975) conceptualize implementation as a process influenced by policy standards and objectives, resources, interorganizational communication, characteristics of implementing agencies, implementer dispositions, and social, economic, and political conditions. Edwards III (1980) similarly emphasizes communication, resources, disposition, and bureaucratic structure.

These approaches are particularly useful for identifying internal implementation weaknesses. In food security, for example, limited resources, unclear responsibilities, weak coordination, insufficient infrastructure, or inconsistent commitment can constrain results. The dissertation nevertheless shows that food-security implementation in Bekasi cannot be adequately explained only through the behavior of a single implementing organization. Food moves through multiple jurisdictions and organizational boundaries; farmers depend on government support and markets, government depends on communities to implement programs, and businesses control important distribution resources. This interdependence creates a networked implementation context.

Policy Network Theory

Policy network theory emerged partly as a response to state-centered conceptions of policy making. Rhodes (1990) emphasizes policy networks as patterns of interdependence among organizations, while Klijn (1996, 1997) conceptualizes networks as arenas in which multiple actors interact around complex policy problems. Network governance is particularly relevant when no single actor possesses all resources necessary to solve a problem. The dissertation summarizes three central characteristics: dependency, processes, and institutions. Actors depend on each other for resources; policy emerges through interaction rather than unilateral control; and repeated interaction creates institutionalized rules and patterns of resource exchange.

Van Waarden (1992) provides a useful multidimensional framework for examining policy networks. The dimensions are actors, network structure, network functions, institutions, rules of conduct, power relations, and actor strategies. Actors define the composition and capacity of the network. Network structure concerns the pattern and breadth of relationships and dependencies. Network functions concern what the network actually does, including access, information exchange,

coordination, and negotiation. Institutions provide organizational arrangements and membership patterns. Rules of conduct regulate attitudes, perceptions, and motivations. Power relations concern autonomy and the distribution of influence between public and private actors. Actor strategies describe how participants choose partners, resources, incentives, and forms of participation.

Policy networks do not automatically produce effective policy. Klijn (1997) argues that network management is required because actors hold different perceptions, interests, and resources. Two broad tasks are managing perceptions and managing interactions. Facilitating interaction, preventing exclusion of ideas, introducing new ideas, and encouraging reflection can help actors move from fragmented perceptions toward workable collective action. This insight is important for food security because stakeholders may define the problem differently: government may emphasize program compliance and price stability, farmers may emphasize production costs and market access, businesses may emphasize profitability and continuity of supply, and communities may emphasize affordability and health.

Sustainable Food Security

The concept of food security has evolved from a narrow concern with aggregate availability toward a multidimensional concept encompassing access, utilization, and stability. The dissertation adopts four practical dimensions: food availability, accessibility, utilization, and stability. Availability concerns the existence and continuity of food supplies; accessibility concerns economic and physical access; utilization concerns the ability of households to use food appropriately and nutritiously; and stability concerns continuity over time despite shocks. This four-dimensional understanding is more suitable for an urban context than a production-only approach.

Suryana (2014) argues that sustainable food security must respond to the opposing pressures of rising demand and increasingly complex constraints on supply. These include population growth, land conversion, climate variability, infrastructure limitations, and changing consumption patterns. The dissertation similarly identifies land conversion, external food dependence, distribution constraints, economic access, institutional fragmentation, human-resource capacity, low diversification, and nutrition literacy as major challenges.

Technology is increasingly relevant to this sustainability agenda. The dissertation identifies urban hydroponics and knowledge as important technological dimensions. Technology can reduce land constraints through intensive urban farming, strengthen knowledge transfer, improve communication, and potentially integrate information about production, actors, and distribution. However, technology is not a substitute for governance. Without institutional arrangements, market access, actor capacity, and coordinated information, technological interventions may remain isolated projects.

METHOD

This study employed a concurrent embedded mixed-method design, with qualitative inquiry as the primary approach and quantitative analysis as supporting evidence. The study was conducted in Bekasi City, West Java, Indonesia, which represents an urban food-security context characterized by limited agricultural land, high food demand, dependence on external supplies, and efforts to strengthen local food production. The Food Security Index increased from 76.44 in 2019 to 82.19 in 2023, despite fluctuations during the period.

Primary data were collected through in-depth interviews, observation, documentation, and a structured survey. Twelve key informants were selected purposively from the food-security agency, Bekasi City legislature, farmer and women-farmer groups, hydroponic communities, and food-industry actors. Secondary data included government documents, statistical records, policy documents, and relevant literature.

Interview protocols covered the policy-network dimensions and four dimensions of food security: availability, accessibility, utilization, and stability. Qualitative data were coded and analyzed using NVivo to identify themes, relationships, actor roles, and network patterns. Quantitative data were analyzed using SmartPLS to assess the measurement and structural models. The model comprised eight explanatory constructs, actors, network structure, actor strategies, rules of conduct, institutions, power relations, network functions, and technology, and one food-security construct.

The measurement model was assessed through outer loadings, composite reliability, and Cronbach's alpha. All indicators met the reported loading criterion (>0.50), with values ranging from 0.664 to 0.941, while the reliability results satisfied the reported criteria. Qualitative and quantitative findings were subsequently integrated to provide a comprehensive interpretation of policy-network implementation. Because qualitative analysis was dominant, the quantitative coefficients were used as supporting evidence rather than as the sole basis for interpretation.

RESULT AND DISCUSSION

Urban Food-Security Context in Bekasi City

Bekasi City's food-security problem is structurally different from that of an agrarian district. The principal challenge is not simply increasing local production but maintaining reliable access to food within a dense urban economy with limited agricultural space. The decline of paddy-field area from 434 hectares to 312 hectares illustrates the long-term pressure of urban land conversion. At the same time, earlier data indicate strong dependence on external rice supplies. This means that resilience depends on the city's ability to connect with production regions, stabilize distribution, maintain affordability, and develop complementary local production.

The research material documents that local rice production has historically covered only a small share of city demand. In the 2020 comparison, external supply was much larger than internal production. The city could therefore experience a paradox: relatively strong purchasing power and food availability in ordinary conditions, but high structural dependence that creates vulnerability when supply chains are disrupted. Sustainable food security must consequently be interpreted as a networked capacity to maintain flows rather than as a goal of complete local self-sufficiency.

Government responses include affordable-food movements, food diversification, urban farming, support for farmer groups, agricultural extension, and collaboration with academic and private actors. The Gerakan Pangan Murah, for example, is designed to support affordability, availability, and distribution through rotating activities across districts. Urban farming initiatives, including hydroponic programs, create opportunities to use limited urban space and increase community participation. However, the dissertation reports that hydroponic groups respond better to internal conditions than to external market conditions, indicating a need for stronger marketing and distribution support.

Actors: A Government-Centered but Expanding Network

Actors constitute the strongest dimension in the quantitative model. The dissertation's structural result gives the actor dimension the highest positive coefficient among the principal explanatory dimensions (0.378), while another coefficient table reports a positive actor coefficient of 0.257. Regardless of the difference between the two presentations, both indicate that actors are central to food-security implementation. The qualitative findings explain why: government institutions occupy the principal policy position, but implementation also requires farmer groups, urban farming communities, food businesses, academics, and civil-society organizations.

The network is therefore broader than the formal government structure. At the national level, the National Food Agency organizes policy and programs; at the provincial and city levels, food-security and agricultural agencies translate programs into local action. Municipal agencies provide extension, education, assistance, and facilitation. Farmer and women-farmer groups contribute local production and community-based implementation. Academic institutions can provide knowledge and inputs, while private firms contribute production and distribution capacity. The dissertation documents cooperation involving academic networks and seed provision as well as private participation in the food-production and distribution chain.

Yet actor plurality does not automatically produce equal participation. The qualitative findings indicate that non-government actors are still mainly supporting nodes rather than equal decision-making partners. This creates a central contradiction: the policy system needs multi-actor resources, but strategic control remains concentrated in government. The implication is not to weaken government authority,

but to redefine it from sole controller toward network facilitator. This finding is consistent with Alwi et al. (2020), who argue that local collaborative institutions are needed because top-down approaches often fail to mobilize stakeholder resources effectively.

Network Structure: Dependency Without Full Deliberation

The network structure has a positive relationship with food security. The dissertation reports coefficients of 0.184 and, in the more detailed eight-dimensional presentation, 0.187. Qualitatively, however, the structure remains largely centralized. Coordination tends to flow vertically from government to community rather than horizontally among interdependent actors. Government needs communities as implementers and beneficiaries, while communities need government assistance in the form of equipment, inputs, training, and facilitation. Business actors have not yet been structurally integrated into strategic decision-making. This configuration resembles a transitional network: it is no longer purely hierarchical because non-state actors are involved, but it is not yet a mature governance network because dependency is asymmetric and deliberation is limited. Klijn (1996) emphasizes that policy networks arise from resource interdependence, but interdependence must be recognized and managed. If one actor continues to define the problem, agenda, and acceptable solutions, network participation can become administrative rather than collaborative.

Trust is particularly important. The dissertation's theoretical framework treats trust as part of network structure, and the qualitative discussion suggests that network functions have not fully developed as spaces for trust-building. The practical recommendation is to institutionalize deliberative forums where actors can negotiate priorities, exchange information, reflect on implementation failures, and develop shared agendas. Such forums can transform coordination meetings from reporting mechanisms into problem-solving arenas.

Actor Strategies: Collaboration, Education, and Incentives

Actor strategies have a positive coefficient of 0.184 in the structural model and 0.163 in the alternative coefficient presentation. The principal strategies identified are collaboration, education, and subsidy/incentive mechanisms. These strategies show that actors do not simply implement instructions; they actively choose how to participate, whom to cooperate with, and which resources to mobilize.

Government collaboration with academic institutions and community groups expands the resource base available for implementation. Education is also central because sustainable food security requires behavioral and knowledge changes, including awareness of food diversification, nutrition, local food, production techniques, and technology. Subsidies and assistance can enable community participation, particularly in urban farming where equipment and inputs may be costly.

However, the strategies of private actors are shaped by business logic. The dissertation documents that food traders participating in government food programs may continue to prioritize profit and market considerations. This should not be interpreted as a governance failure in itself. Rather, it demonstrates that a network must accommodate different actor incentives. Effective policy design should therefore align public objectives with legitimate private incentives through market facilitation, procurement arrangements, transparent rules, and appropriate incentives.

Rules of Conduct: Attitudes, Perceptions, and Motivation

Rules of conduct show a positive relationship with food security, with a coefficient of 0.126 in the principal structural model and 0.154 in the second coefficient presentation. In network theory, rules of conduct are not limited to formal regulations. They also include expectations, attitudes, perceptions, and motivations that shape interaction. This is significant because food-security implementation depends on whether actors perceive one another as partners, beneficiaries, suppliers, competitors, or simply administrative recipients.

The evidence suggests that the government's facilitation role, community participation, and educational activities are important supportive factors. Agricultural extension workers act as front-line actors who translate policy into practical knowledge. Their interaction with farmer groups creates an important social mechanism through which formal policy is adapted to local conditions.

At the same time, low public participation, limited socialization, and declining youth interest in agriculture remain constraints. Sustainable food security therefore requires rules that encourage participation beyond formal program enrollment. Community organizations should be treated as institutional partners, not merely beneficiaries. This is consistent with the network-management argument of Klijn (1997), which stresses the need to prevent exclusion of ideas and facilitate interaction among actors with different perceptions.

Institutions: The Need for Institutional Redesign

The institutional dimension produces the most complex result. One structural model reports a negative coefficient of -0.033, while the alternative eight-dimensional coefficient table reports a positive value of 0.110. The qualitative interpretation provides a way to reconcile these apparently different presentations: institutional presence exists, but the current configuration does not yet consistently support effective network governance. In other words, adding institutional structures is not sufficient; the institutions must be designed around functional collaboration, clear membership, shared responsibilities, and sustainable coordination.

The dissertation identifies institutional fragmentation and weak coordination as major constraints. Multiple government levels and agencies possess related responsibilities, while community and business

actors are not consistently incorporated into strategic decision-making. This creates duplication in some areas and gaps in others. Alwi et al. (2020) similarly found that local food-security policy performance can remain weak when normative and regulatory systems continue to be dominated by government and resource distribution is not effectively shared among stakeholders.

The policy implication is to create a permanent multi-actor food-security forum or institutional platform. Such a platform should have clear membership, operating rules, decision procedures, information-sharing mechanisms, and monitoring responsibilities. Its purpose should be substantive: joint agenda setting, conflict resolution, market coordination, early warning, and learning. This would move institutions from administrative coordination toward collaborative governance.

Power Relations: An Underdeveloped Dimension

Power relations are distinctive because the dissertation found that this dimension was not strongly identified in the actual implementation arrangement, even though it is theoretically part of Van Waarden's framework. The more detailed structural model gives power relations a positive coefficient of 0.099, indicating that the dimension is relevant to the model even though its empirical institutionalization is limited.

The absence of clearly structured government-business power relations is important. Businesses control distribution channels, market access, and commercial resources, while government controls regulatory authority, programs, and public resources. A sustainable network must recognize this interdependence transparently. Government should retain its public-interest mandate and regulatory autonomy, but businesses should be integrated into planning and implementation through clear, accountable partnership mechanisms.

This finding also shows why policy-network theory is useful: power is not simply a possession of government. It is distributed through resources, access, information, market position, and institutional authority. A hybrid model must therefore establish safeguards so that collaboration does not become capture by either government or business interests.

Network Functions: From Coordination Toward Deliberation

Network functions have the lowest positive effect among the principal policy-network dimensions, with coefficients of 0.072 and 0.082. Qualitative findings indicate that the network already performs information exchange, distribution of resources such as seeds, equipment, and training, and coordination of programs. However, collective learning, co-creation, and institutional strengthening remain weak.

This means that the network functions more as a channel for delivering government programs than as a forum in which actors jointly formulate solutions. Such a condition is common in transitional governance arrangements. The network exists, but its interaction

remains instrumental. The next stage is to transform it into a learning system in which implementation experiences are systematically fed back into policy design.

Den Boer et al. (2023) found that food policy networks face challenges in building diverse core groups, involving business and civil-society actors, developing shared visions, and maintaining meaningful relationships with government. The Bekasi findings are consistent with this pattern. The solution is not merely more meetings but better network management: structured deliberation, shared evidence, negotiated priorities, joint monitoring, and mechanisms for reflection.

Technology as the Eighth Dimension

Technology is the principal conceptual novelty of the study. Van Waarden's original framework contains seven dimensions, but the Bekasi case demonstrates that contemporary food-security implementation increasingly depends on technological knowledge and utilization. The structural model gives technology a positive coefficient of 0.185 in one presentation and 0.020 in another. More importantly than the numerical difference, the qualitative evidence shows that technology has become an actual part of implementation through hydroponic urban farming, knowledge transfer, and digital information practices.

The technology dimension has two sub-aspects: knowledge and utilization. Knowledge refers to the capacity of actors to understand agricultural practices, food diversification, nutrition, and production techniques. Utilization refers to the practical adoption of technological tools and systems. Hydroponics is particularly relevant because it addresses the scarcity of urban land. However, the study also demonstrates that production technology alone cannot solve distribution and market problems. Hydroponic groups may perform adequately internally but remain weak in responding to external market conditions.

The more strategic opportunity is therefore an integrated food-information network. The recommended digital system would contain information on actors, productive land, production volumes, active communities, harvest schedules, market needs, and local distribution channels. Such a system could support early warning, matchmaking between producers and buyers, and evidence-based policy decisions. Technology thus becomes a connective infrastructure for the network rather than merely a production tool.

Measurement Model and Structural Results

The measurement model provides support for the operationalization of the policy-network dimensions. All reported outer loadings exceed 0.50, with most indicators above 0.80. The strongest loadings include collaboration under actor strategies (0.941), policy access under network functions (0.931), network structure indicators (0.899 and 0.886), and actor attitudes (0.918). The lowest loading is the food-security accessibility indicator at 0.664, which nevertheless exceeds the threshold reported in the dissertation.

Reliability assessment indicates that the constructs satisfy the reported composite-reliability and Cronbach's alpha criteria. The dissertation reports composite reliability values above 0.60 and Cronbach's alpha values above 0.70. It also reports satisfactory discriminant validity. These results support the use of the indicators as an empirical representation of the proposed constructs.

Construct	Path Coefficient (Reported Model)	Interpretation
Actors	0.378	Strongest positive relationship
Network structure	0.184	Positive relationship
Actor strategies	0.184	Positive relationship
Technology	0.185	Positive relationship
Rules of conduct	0.126	Positive relationship
Network functions	0.072	Positive but relatively weak
Institutions	-0.033	Negative in the detailed model; indicates redesign need
Power relations	Not strongly identified qualitatively	Relevant theoretically; weakly institutionalized

The numerical pattern reinforces the qualitative argument that actor capacity is the most important foundation of the current network. A network cannot become collaborative merely by establishing formal structures if actors lack capacity, trust, knowledge, or incentives to participate. The positive technology coefficient also supports the conceptual extension of the framework, although its smaller coefficient in the alternative table indicates that technology should be understood as an enabling infrastructure rather than a substitute for institutional and actor capacity.

Toward a Hybrid Policy Network Model

The combined findings lead to a hybrid model of sustainable food-security implementation. The term hybrid refers to the coexistence of governmental authority and collaborative network governance. The model does not eliminate hierarchy. Instead, it changes the function of government from dominant controller to strategic regulator, facilitator, convener, and guarantor of public interest. Other actors receive greater roles in production, distribution, knowledge creation, community mobilization, and innovation.

The model contains four mutually reinforcing layers. The first is the actor layer, consisting of government, farmer groups, urban farming communities, businesses, academics, and civil society. The second is the governance layer, consisting of network structure, rules, institutions, strategies, and power arrangements. The third is the technological layer, connecting agricultural knowledge, urban farming technology, communication, and integrated data. The fourth is the food-security outcome layer, consisting of availability, accessibility, utilization, and stability.

The model's central mechanism is network management. Government convenes actors around shared problems; actors exchange information and resources; the network develops shared perceptions through deliberation; technology makes information and knowledge more

accessible; and collective learning feeds implementation experience back into policy design. This mechanism can strengthen resilience because the system is less dependent on one organization and more capable of adapting to shocks.

Model Component	Current Condition in Bekasi	Required Transformation
Government role	Dominant policy center	Network facilitator and public-interest regulator
Community role	Implementer/beneficiary	Co-producer and deliberative partner
Business role	Partly involved in supply/distribution	Institutionalized partner with transparent incentives
Academic role	Knowledge/input support	Continuous knowledge and innovation partner
Network function	Coordination and resource delivery	Deliberation, learning, negotiation, co-creation
Institution	Fragmented/administrative	Permanent multi-actor food-security forum
Technology	Hydroponics and communication tools	Integrated production, actor, market, and food-data infrastructure
Outcome orientation	Program delivery	Resilient availability, access, utilization, and stability

The findings extend previous studies in several ways. First, they confirm the relevance of network governance identified by Arrang et al. (2024), but show that network participation must be accompanied by institutional design and actor capacity. Second, they complement Setiyana and Alwi (2024) by demonstrating that multi-actor interaction is not enough unless the network provides deliberative space and durable coordination. Third, they support den Boer et al. (2023), particularly the finding that food policy networks struggle to involve diverse actors and establish meaningful relationships with government.

The findings also refine Rukmana's (2020) discussion of mutual adjustment. In Bekasi, some adjustment occurs between government and community, but the network remains vertically structured. Mutual adjustment has not yet expanded into a balanced multi-actor arrangement that includes business and civil society in strategic decisions. Similarly, Listyowati et al. (2023) found that hydroponic groups in Bekasi had average internal responsiveness but low external responsiveness. The present study explains this gap as a network problem: production innovation requires market, information, and institutional linkages to become sustainable.

The study also supports Alwi et al. (2020), who identified top-down dominance and weak collaborative institutions as barriers to food-security policy performance. The Bekasi evidence, however, adds technology as a new network dimension. This extension is important because contemporary urban food governance is increasingly mediated by digital information, production technologies, and knowledge systems. The contribution is therefore theoretical and practical: policy-network theory becomes more operational for an urban food system when technological capacity is explicitly recognized.

CONCLUSION

This study demonstrates that sustainable food-security implementation in Bekasi City is a transitional policy network in which government remains dominant, while communities, farmer groups, businesses, academics, and other actors increasingly contribute to implementation. Using Van Waarden's framework, the study identifies actors, network structure, network functions, institutions, rules of conduct, and actor strategies as key dimensions, with technology emerging as an additional dimension.

The findings show that actor capacity has the strongest positive relationship with food security (0.378), while network structure, actor strategies, technology, rules of conduct, and network functions also contribute positively. The institutional dimension requires further strengthening, while power relations between government and business remain weakly institutionalized.

The study proposes a hybrid policy-network model that positions government as facilitator, regulator, and convener, while other stakeholders act as co-producers. Strengthening the Food Policy Institutional Network, integrated food-information systems, multi-actor collaboration, and public knowledge is essential for building a more inclusive, adaptive, and sustainable urban food-security system.

REFERENCES

- Abidin, S. Z. (2019). *Kebijakan publik*. Salemba Humanika.
- Alwi, A., Susanti, G., & Rukmana, N. S. (2020). Going local for food security: strengthening local collaborative institution in implementation of food security in Indonesia. *International Journal of Management (IJM)*, 11(8), 1998-2009.
- Arrang, R. (2024). Implementation of Food Security Policy in a Network Governance Perspective: Study at the West Papua Food Security Service. *International Journal of Social Welfare and Family Law*, 1(4), 39-57.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage.
- den Boer, A. C., van der Valk, A. J., Regeer, B. J., & Broerse, J. E. (2023). Food policy networks and their potential to stimulate systemic intermediation for food system transformation. *Cities*, 135, 104239.
- Dye, T. R. (2011). *Understanding public policy*. Pearson.
- Edwards III, G. C. (1980). *Implementing public policy*. Congressional Quarterly Press.
- Jordan, G. (1990). Sub-governments, policy communities and networks. *Journal of Theoretical Politics*, 2(3), 319-338.
- Kalsum, U., Muhammadiyah, M., & Parawangi, A. (2021). Implementasi kebijakan pengadaan beras Badan Urusan Logistik dalam mewujudkan ketahanan pangan di Kabupaten Pinrang. *JPPM: Journal of Public Policy and Management*, 3(2), 166-174.

- Klijn, E.-H. (1996). Analyzing and managing policy processes in complex networks: A theoretical examination of the concept policy network and its problems. *Administration & Society*, 28(1), 90–119.
- Klijn, E.-H. (1997). *Policy networks: An overview*. In *Managing complex networks: Strategies for the public sector*. Sage.
- Listyowati, E. A., Kamilah, A., Budiono, H., & Lutfiadi, R. (2023). Urban Farming Development Strategy of Hydroponic Vegetables in Bekasi City. *AGRITEPA: Jurnal Ilmu Dan Teknologi Pertanian*, 10(2), 469–486.
- Prayitno, G. (2020). Ketahanan pangan kabupaten/kota Provinsi Jawa Barat. *Agribusiness Journal*, 14(1), 1–13.
- Rasman, A., Theresia, E. S., & Aginda, M. F. (2023). Analisis implementasi program food estate sebagai solusi ketahanan pangan Indonesia. *Holistic: Journal of Tropical Agriculture Sciences*, 1(1), 36–68.
- Republic of Indonesia. (2012). *Law of the Republic of Indonesia Number 18 of 2012 concerning Food*.
- Rhodes, R. A. W. (1990). Policy networks: A British perspective. *Journal of Theoretical Politics*, 2(3), 293–317.
- Rukmana S, N. S. (2020). *Analisis Governance Network Dalam Jaringan Implementasi Kebijakan Ketahanan Pangan di Kabupaten Bone* (Doctoral dissertation, Universitas Hasanuddin).
- Sabatier, P. A., & Mazmanian, D. A. (1980). The implementation of public policy: A framework of analysis. *Policy Studies Journal*, 8(4), 538–560.
- Salasa, A. (2021). Paradigma dan dimensi strategi ketahanan pangan Indonesia. *Jejaring Administrasi Publik*, 13(1), 35–48.
- Seftiyana, Y., Alwi, & Susanti, G. (2024). Strategies for strengthening network capacity in the implementation of food security policies at the local level in Indonesia. *SEEJPH*, 25, 943–949.
- Setiyana, Y., & Alwi. (2024). De-coupling games: Peran multi aktor dalam implementasi kebijakan ketahanan pangan di Kabupaten Luwu Utara. *PAMARENDA: Public Administration and Government Journal*, 4(2), 227–238.
- Suryana, A. (2014). Menuju ketahanan pangan Indonesia berkelanjutan 2025: Tantangan dan penanganannya. *Forum Penelitian Agro Ekonomi*, 32(2), 123–135.
- Utomo, M. C. (2020). *Ketersediaan dan kebutuhan beras Kota Bekasi*.
- Van Meter, D. S., & Van Horn, C. E. (1975). The policy implementation process: A conceptual framework. *Administration & Society*, 6(4), 445–488.
- Van Waarden, F. (1992). Dimensions and types of policy networks. *European Journal of Political Research*, 21(1–2), 29–52.
- Von Braun, J. (Ed.). (1992). *Improving food security of the poor: Concept, policy, and programs*. Intl Food Policy Res Inst.