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Food supply improvement for planning to meet needs in Indonesia's New Capital City

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Abstract

The Republic of Indonesia is relocating its national capital to a new city (NCCI) in East Kalimantan Province (EKP). This future megacity will require a resilient and adequate food supply. This study provides critical evidence base for food supply planning by analyzing the balance of food production and needs, mapping supply chains, and formulating strategies to enhance food supply from buffer zones to the NCCI. Conducted in EKP and its key buffer provinces, the research employs a mixed-methods approach, combining quantitative food balance analysis with qualitative insights from stakeholder focus groups. Key findings reveal that in 2023, EKP faced significant deficits in rice and

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layer eggs, achieved self-sufficiency in broiler meat, and showed a surplus in beef. This dependency on external food supplies necessitates a complex multi-province buffer system, primarily involving South Kalimantan, East Java, South Sulawesi, East Nusa Tenggara, and West Sulawesi. The study concludes that securing NCCI's food supply requires an integrated strategy: boosting local production through land optimization and technology, strengthening core logistics infrastructure (including warehousing and maritime transport), and formalizing intergovernmental and public-private partnerships. These strategies provide a transferable framework for food security in large cities globally.

Keywords
food security, New Capital City, food balance, food supply, Indonesia, food system planning

Introduction

Food is a fundamental human right, recognized in Indonesia's 1945 Constitution (Republic of Indonesia, 1945) and international frameworks, such as the 1996 Rome Declaration (Food and Agriculture Organization of the United Nations [FAO], 1996). This principle is central to national law (Law No. 18 of 2012 on Food) and is critically important for sustaining Indonesia's large population (Chaireni et al., 2020). The strategic challenge of ensuring food security is now being redefined by a historic national initiative: the relocation of the capital from Jakarta to a newly developed area in East Kalimantan, enacted through Law No. 3 of 2022 on State Capital. This move addresses severe pressures in Java and aims to spur equitable development

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Conflict of Interest Disclosure
The authors declare no conflicts of interest.

(Herdiana, 2022; Rachman, 2019; Sulaiman et al., 2017). The relocation seeks to create a sustainable region as a development model, ensure equitable growth, and promote urban farming for food security (Brinkley et al., 2013; Rosmiati et al., 2023). The creation of the New Capital City of Indonesia (NCCI), Nusantara, presents a unique and unprecedented challenge: building a resilient food system from the ground up for a planned urban center whose population and infrastructure are in their initial stages.

As a new urban entity, the NCCI lacks an established agricultural base and must rely on a regional food system from its inception, drawing supplies from East Kalimantan Province (EKP) and surrounding buffer provinces. This creates an immediate vulnerability, as such systems are universally pressured by agricultural land conversion and rising demand for development (Ikerd, 2013; Kusumastuti, 2014). In Indonesia, these pressures are compounded by systemic weaknesses, including inefficient supply chains, poorly mapped food reserves, and fragmented institutional coordination (Rachman, 2019; Sulaiman et al., 2017). For the NCCI, these issues are paramount and manifest as three core problems: (1) projecting and meeting escalating food demand in a context of rapid population growth; (2) designing efficient supply chains and logistics where infrastructure is still developing; and (3) ensuring reliable flows from external buffer zones. However, a critical research gap exists in providing the integrated data and analysis necessary to strategically plan and secure the food supply for a new capital city from its inception, particularly mechanisms for integrating it with regional buffer zones that quantify both production deficits and logistical bottlenecks.

This study addresses this gap by introducing a novel, dual-scale analysis that systematically links the micro-level food balance of the NCCI's immediate regencies with the macro-level dynamics of interprovincial supply chains. This approach is crucial because it reveals not only the volume of deficits but also the specific geographic and logistical vulnerabilities of the entire system, a perspective absent from prior planning documents. The research is urgent for four reasons. First, it will identify the projected mismatch between future demand and existing production capacity, quantifying the NCCI's dependency on interprovincial flows (Blay-Palmer et al., 2018; Food and Agriculture Organization of the United Nations [FAO], 2018). Second, it will formulate strategies to enhance local production within EKP and strengthen critical partnerships across the supply chain. Third, it contributes to the discourse on building resilient food systems for new cities. Finally, it provides a valuable case study for other nations contemplating new capital cities. This study aims to (1) assess the current food production in the NCCI and EKP, (2) analyze the balance between production and need, (3) map food supply sources and chains, and (4) formulate strategic recommendations to secure the food supply for the NCCI.

Literature Review

Effective planning for the NCCI's food system requires robust data on food sources, distribution networks, and production volumes to meet the needs of a rapidly growing population. The food balance sheet is a critical tool in this planning, providing a quantitative estimate of staple food supply and demand that serves as an early warning system for potential shortages and informs regional food policy (Food Security Agency, 2016; P4W IPB University, 2021).

A primary challenge is that urban growth often occurs at the expense of agricultural land, as fixed land areas are converted to support housing and infrastructure (Chatterjee et al., 2016). This conversion directly threatens local food availability. Consequently, major cities frequently become food-deficient centers, dependent on external supplies, and experience higher and more volatile staple food prices (Ommani, 2011; Rachman, 2019). This reflects a well-documented urban phenomenon where cities are inherently dependent on food trade, with their security shaped by external demand and supply forces (Likoko, 2013; Omondi et al., 2017).

This dependency creates vulnerability, as long supply chains are susceptible to price shocks and disruptions (Hellegers, 2022; Singh-Peterson et al., 2013). In response, integrating urban agriculture and local food production has been widely advocated as a key strategy for enhancing urban

resilience and food security (Brinkley et al., 2013; Rosmiati et al., 2023), a principle central to the NCCI's planning vision. This paradigm holds for the NCCI, which is initially expected to rely heavily on interregional food flows, as current domestic production in East Kalimantan is insufficient (Mulyono et al., 2025; Silalahi & Silalahi, 2024).

Addressing urban food dependency requires a dual strategy. First, initiatives to boost local production, such as the provincial government's one-million-hectare agricultural program, are crucial for long-term self-sufficiency (Media Pusaran, 2024). Research indicates that food security depends on three key elements: sufficient agricultural land, productivity-enhancing technologies, and strong distribution partnerships (Azzurri et al., 2024; Puspitoarum, 2017). Second, and equally important, is strengthening the distribution infrastructure. Efficient transportation and logistics are fundamental to facilitating the flow of goods from production centers to the capital (Mulyono et al., 2025). Furthermore, strategic partnerships between East Kalimantan's governments and external food-producing provinces are essential to streamline this supply chain and ensure a reliable food system for the NCCI.

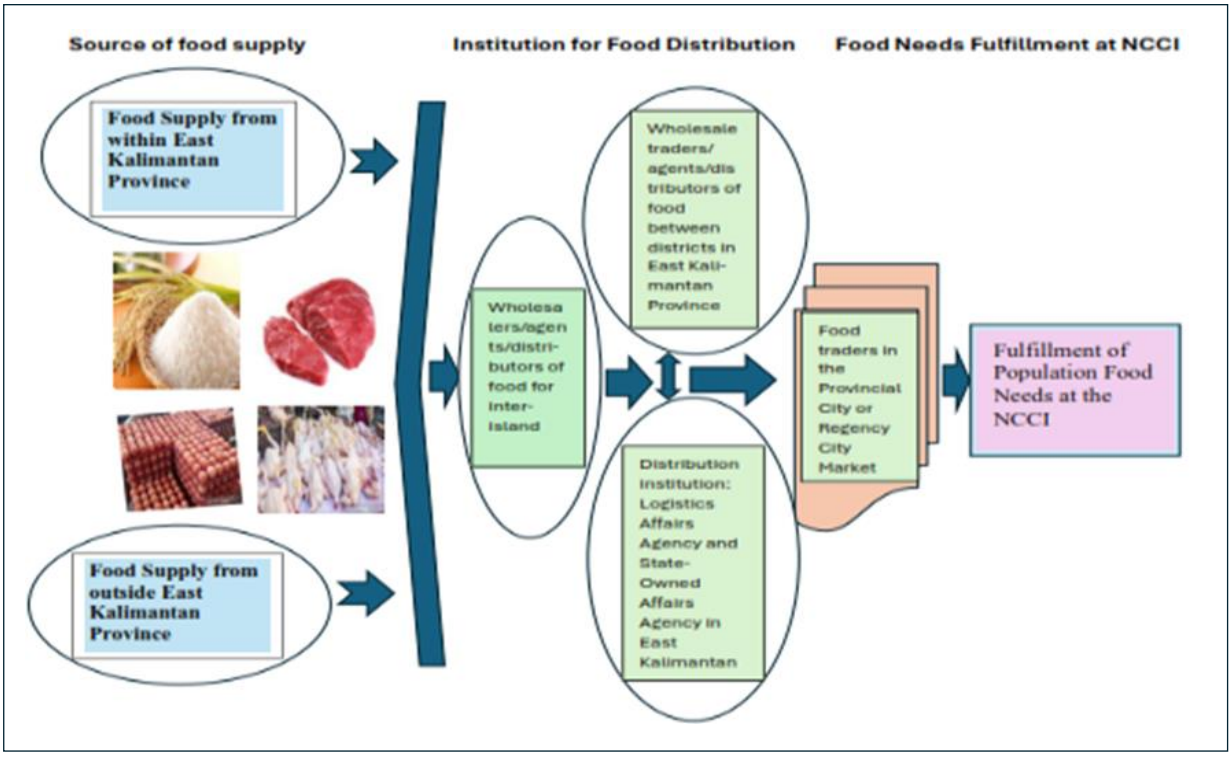
Methodology

This study employs a mixed-methods approach, combining quantitative analysis of food balances with qualitative insights from stakeholders to assess the NCCI's food supply system. The research was conducted in EKP and its key food buffer provinces. The following sections detail the research framework, locations, data collection, and analytical methods.

Research Framework and Commodity Selection

This study's framework addresses the challenge of planning a resilient food system for the NCCI, guided by Law Number 3 of 2022 (Ibu Kota Nusantara [IKN], 2022). The conceptual model, illustrated in Figure 1, provides a structured framework for planning and analyzing the NCCI's food supply, positing that it is a function of two interconnected subsystems, to ensure availability and access as key pillars of food security (Syathori, 2018).

Figure 1. Conceptual Framework on the New Capital City of Indonesia (NCCI) Food Supply System



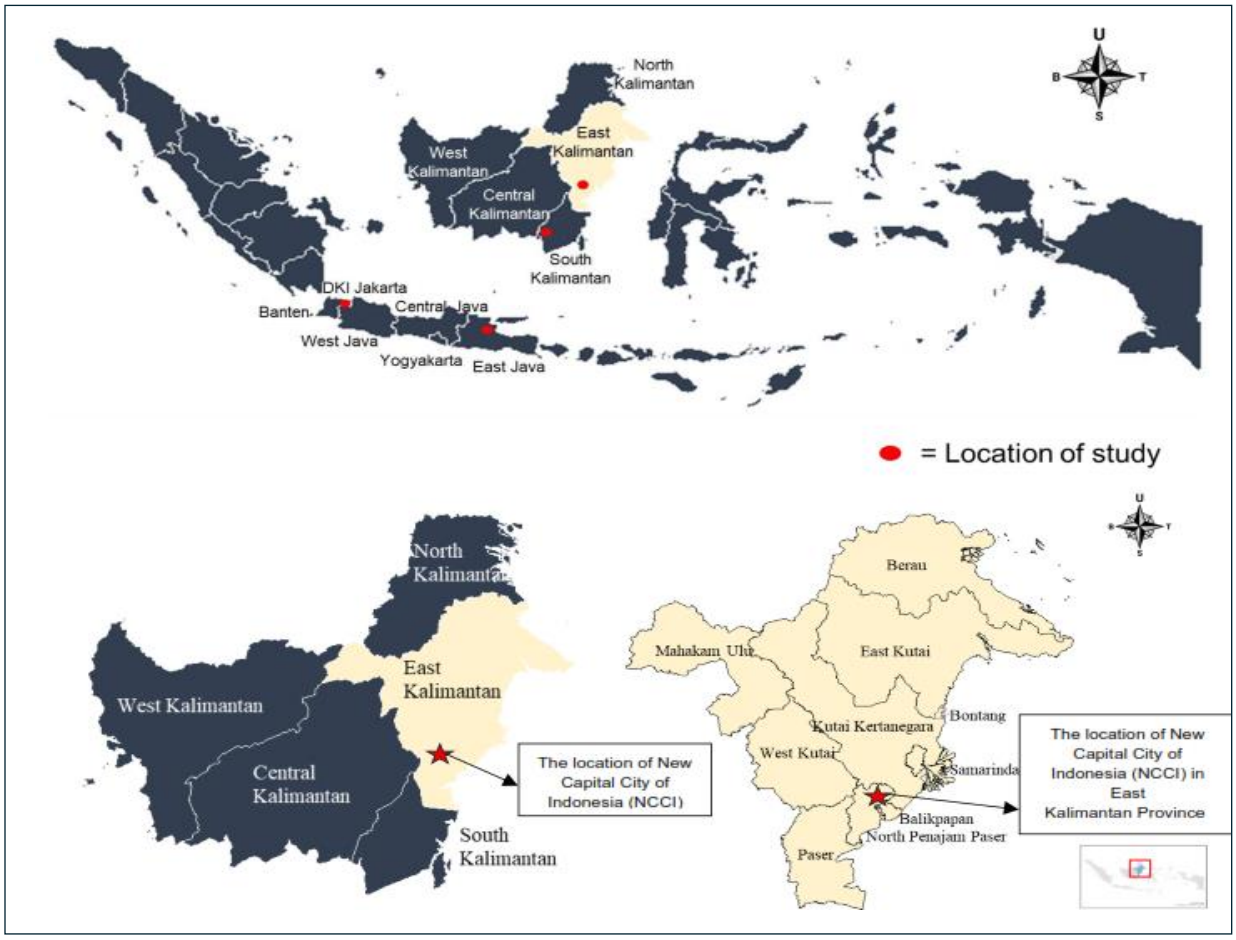
The first is the local production system within EKP, centered on the NCCI's regencies of North Penajam Paser and Kutai Kartanegara. Its capacity is determined by land availability (e.g., rice field area), agricultural technology, and local policies, which directly influence productivity and harvested area (Santosa & Sudrajat, 2017). The second is the regional buffer system, which supplies the NCCI through interregional flows. This system's efficiency, dependent on distribution infrastructure and market linkages, functions by aligning distribution flows with regional needs and surplus production (Zhou & Benton, 2007).

The framework traces commodity flows from these two systems through supply chain institutions to the NCCI. This enables a holistic analysis of production-consumption gaps and supply chain bottlenecks, as effective food planning requires integrated information on production centers, distribution institutions, and collaborative strategies (Sulaiman et al., 2017; Widodo et al., 2013). The analysis focuses on four strategic commodities mandated by Presidential Regulation number 125 of 2022 on the Administration of Government Food Reserves: rice, beef, layer eggs, and broiler meat. These were selected for their critical role in food security, their high urban consumption, and their representation of both plant- and animal-based food sources.

Study Area

The core study area is the NCCI, a designated special capital region whose territory spans parts of two regencies within EKP: North Penajam Paser and Kutai Kartanegara (Figure 2). This empirical setting frames the analysis, with the "NCCI area" referring specifically to these two regencies in all subsequent results and tables. To capture the

Figure 2. Location of the New Capital City of Indonesia (NCCI) in East Kalimantan Province (EKP), 2025



whole food supply chain, the research scope was expanded to include the broader EKP and key external food buffer provinces.

The selection of buffer provinces was based on data from the EKP Food, Food Crops, and Horticulture Office, the BPS-Statistics East Kalimantan Province (BPS-Statistics EKP), and a prior study by the Indonesian Center for Agricultural Socio-Economic and Policy Studies (ICASEPS). South Kalimantan and East Java were chosen as representative samples due to their established role as major suppliers of food commodities to the EKP region.

Data Collection

The analysis integrated primary data from focus group discussions (FGDs) with secondary data. This secondary data consisted of quantitative figures on food production, total utilization, and food imports for the period 2021–2023, obtained from official publications of the BPS-Statistics EKP (2024), and from the EKP Food, Food Crops, and Horticulture Office (2024). It is worth noting that no official data were available for food exports originating from East Kalimantan.

Primary data were collected through FGDs with purposively selected respondents from across the food system. A total of 150 participants were engaged in 34 FGDs (typically 4−5 participants per session), ensuring triangulation between different government tiers and key private-sector supply chain actors. The distribution of FGDs, which included officials from relevant agencies and traders of the four key commodities (rice, beef, layer eggs, and broiler meat), is summarized in Table 1.

Analytical Methods

This study employed a mixed-methods approach, integrating quantitative and qualitative analyses to provide a comprehensive understanding of NCCI's food system. Quantitative analysis was conducted in three key areas: (1) trend analysis: examining production developments from 2021 to 2023; (2) food balance analysis: calculating the surplus or deficit for each commodity by comparing total domestic supply and total utilization; and (3) supply chain analysis: determining the percentage share of different sources in the food supply to the NCCI.

The food balance analysis adapted the standard model (Food Security Agency, 2021; ICASEPS, 2023; Santosa & Sudrajat, 2017) to the data constraints and future-oriented policy goal of food self-sufficiency for EKP. The standard food balance equation is

Table 1. Distribution of Focus Group Discussions (FGDs)

Location	Stakeholder Groups	Number of FGDs
Central Government, Jakarta	• National Food Agency • Directorate General of Food Crops • Directorate General of Livestock and Animal Health	4
East Kalimantan Province	• Food, Food Crops, and Horticulture Office • Livestock and Animal Health Office • Logistics Affairs Agency • Traders (rice, beef, layer eggs, broiler meat)	14
South Kalimantan Province	• Agriculture and Food Security Office • Plantation and Livestock Office • Logistics Affairs Agency • Traders (rice, beef, layer eggs, broiler meat)	8
East Java Province	• Agriculture and Food Security Office • Livestock Office • Logistics Affairs Agency • Traders (rice, beef, layer eggs, broiler meat)	8
Total		**34**

$$Pd = Pr + Mi - Xi - (Fd + Sd + In + Wa + Uo)$$

where *Pd* is food available for consumption, *Pr* is production, *Mi* is import, *Xi* is export, *Fd* is feed, *Sd* is seed, *In* is industrial use, *Wa* is waste, and *Uo* is other uses. Due to the lack of data on food exports (*Xi*) from East Kalimantan, the food balance was calculated using a simplified and policy-relevant approach:

$$Balance = Pr - TU$$

where *TU* represents the total domestic food needed, encompassing food consumption, feed, seed, industrial use, waste, and other uses ($TU = Fd + Sd + In + Wa + Pd + Uo$). Therefore, a surplus occurs when $Pr > TU$, and a deficit occurs when $Pr < TU$. This method effectively calculates the province's net dependency, as a deficit indicates the minimum volume that must be supplied from external sources to meet internal demand. This approach aligns with the provincial government's aspiration for self-sufficiency by directly contrasting local production capacity (*Pr*) with total domestic needs (*TU*).

Complementing the quantitative analysis, a qualitative thematic analysis of FGD transcripts identified key challenges, policy responses, and stakeholder perspectives. These insights were used to explain quantitative trends, triangulate findings, and provide contextual depth, resulting in a more complete and reliable understanding of the food system.

Results and Discussion

This section presents the results and discussion through a sequence of four analyses that systematically address NCCI's food security challenges. It begins by analyzing production trends to establish a baseline of local capacity, then quantifies the regional food balance to identify specific commodity deficits and surpluses. Next, it maps supply chains from buffer provinces to reveal the NCCI's external dependencies. Finally, the findings are integrated with stakeholder perspectives to formulate strategic recommendations.

Food Production Trends in EKP

This section analyzes EKP's capacity to build a foundational food supply for the NCCI by integrating quantitative production data with qualitative insights from stakeholders. The analysis reveals a precarious and divergent trajectory, consistent with the known challenges that urban food security faces, including pressures from decreasing agricultural land and rising population demands (Ikerd, 2013; Kusumastuti, 2014). This trajectory is characterized by a structurally declining staple crop sector alongside a rapidly growing, yet strategically concentrated, livestock sector.

Government ambitions for food sovereignty in EKP are articulated through development roadmaps that focus on land diversification and productivity enhancement (Antara National News Agency, 2023; EKP Food, Food Crops, and Horticulture Office, 2024). A key challenge in this endeavor is significant land-use competition from mining, plantations, and housing. In direct response, authorities are actively identifying idle land for potential agricultural development. A concrete step in this direction is the plan to prepare 1,890 hectares (4,670 acres) for a new rice field program in 2024/2025 (Presisi, 2025). However, evidence from stakeholder discussions, summarized in Table 2, reveals a consistent gap between these plans and on-ground realities.

The FGDs crystallized the core challenges facing production growth. Officials from both the central government and EKP specifically identified the suboptimal utilization of agricultural land, with EKP officials detailing the difficulties of cultivating dry and former mining lands, as well as the uneven distribution of cultivation technology, as direct constraints (Table 2). Notably, stakeholders across all regions, from central to buffer province governments, converged on expanding pump irrigation systems as a critical policy response to these water-related challenges. These stakeholder-identified issues provide the causal link explaining the quantitative trends of low production, confirming earlier studies (Adi et al., 2021) with current, on-the-ground evidence.

A critical insight from the FGDs is that EKP's challenges are part of a broader, fragile system. Perspectives from buffer province officials revealed that the NCCI's food security depends on regions confronting distinct and severe threats to their own

production capacity. Officials in South Kalimantan directly reported a three-year decline in rice production due to climate change–induced drought. At the same time, those in East Java identified large-scale land conversion as their primary challenge. This lack of a uniform, secure external supply creates a compound risk for the NCCI, as a climate shock in one buffer zone cannot be easily compensated by another that is simultaneously losing productive capacity, a vulnerability underscored in broader food security literature (Kovács & Sigala, 2021).

The statistical data from 2021 to 2023 provide stark evidence of these systemic issues. As shown in Table 3, provincial rice production declined at an annual rate of 6.37%, falling from 142,321 tons to 125,228 tons. This significant decline is the quantitative manifestation of the qualitative challenges reported by stakeholders, underscoring the urgent need for the massive production increases advocated to meet regional food needs (Andoko & Doretha, 2019).

A critical nuance is that the decline was nearly universal, except in the NCCI's core regencies of North Penajam Paser and Kutai Kartanegara. This suggests that the presence of the capital project is already creating a stabilizing or positive influence on agricultural production in its immediate vicinity. This aligns with the qualitative data from EKP officials, who highlighted active beef cattle programs in Sepaku Subdistrict and initiatives to optimize rice fields. However, this localized stability is insufficient and highlights a risk of a core-periphery disparity emerging within EKP's agricultural sector, where the capital's development inadvertently benefits its immediate hinterland at the expense of wider provincial production.

In contrast to the declining staple crop sector, the livestock sector in EKP presents a more complex and promising picture, yet one that is strategically imbalanced. A sequential analysis of beef, layer eggs, and broiler meat reveals a sector marked

Table 2. Stakeholder Perspectives on Food Production Challenges and Policy Responses

Stakeholder	Key challenges	Policy response
Central Government, Jakarta.	• Suboptimal utilization of agricultural land. • Uneven and limited distribution of cultivation technology (mechanization, superior seeds). • Limited development in cattle and poultry businesses.	• Promoting intensification and extensification programs. • Land optimization, rice field development, and the expansion of pump irrigation systems to increase the cropping index. • Increasing livestock production, specifically broiler chicken and beef cattle. • Developing a national strategic beef cattle program in Sepaku Subdistrict, North Penajam Paser Regency.
East Kalimantan Province (EKP), New Capital City of Indonesia (NCCI)	• Suboptimal land use (dry land, ex-mining land) and limited agricultural technology support. • Underdeveloped livestock businesses (beef cattle, broiler chickens). • Limited capacity of farmer groups in agricultural product processing.	• Programs to optimize existing (14,876 ha) and create new (100,000 ha) rice fields. • Increasing cropping index through mechanization and superior seeds. • Developing beef cattle programs in Sepaku Subdistrict, North Penajam Paser Regency, and broiler centers across EKP. • Providing rice milling and supporting meat processing facilities.
South Kalimantan Province	• Declining rice production due to climate change (drought). • Suboptimal use of dry and tidal land in production centers.	• Land use optimization and the expansion of pump irrigation systems across 41,829 hectares. • Promoting beef, chicken, and egg production to fulfill its role as an NCCI buffer province.
East Java Province	• Decreasing productive land due to conversion. • Limited farmer access to capital. • Low farmer bargaining power in marketing.	• Controlling agricultural land conversion. • Increasing rice production through the expansion of pump irrigation systems. • Providing farm credit, modernizing agriculture, and stabilizing commodity prices.

by contrasting trajectories and critical vulnerabilities.

The story of beef production (Table 4) is one of modest overall growth (2.27% annually), masking significant internal volatility and a troubling trend of urban displacement. While regencies like Paser and North Penajam Paser saw dramatic growth (>40%), likely linked to targeted government programs like the national strategic cattle program in Sepaku Subdistrict, this was partially offset by a sharp decline in major urban centers. Samarinda City and Balikpapan City experienced declines of 28.16% and 22.22% respectively. This starkly illustrates the pressure of urban expansion, where agricultural land is directly converted for other uses, undermining production in the very population centers where demand is highest.

The layer egg sector (Table 5) shows steadier, though more modest, growth of 4.64% annually. Driven by private-sector investment, production is concentrated in a few key areas: Samarinda City, Kutai Kartanegara Regency, and Berau Regency. However, this growth has proven insufficient. As established in the regional food balance analysis, EKP maintains a substantial deficit in layer eggs. This critical nuance reveals that the livestock sec-

Table 3. Rice Production by Regency/City in East Kalimantan Province (EKP), 2021–2023 (Tons)

No.	Regency/City	2021	2022	2023	r (%/year)
1	Paser	30,230.50	25,556.41	15,338.02	–31.41
2	West Kutai	1,175.83	798.72	780.86	–21.50
3	Kutai Kartanegara	60,750.49	61,725.02	61,895.95	0.93
4	East Kutai	7,631.26	7,079.05	6,268.86	–9.74
5	Berau	13,008.91	11,453.00	11,792.76	–5.03
6	North Penajam Paser	24,505.74	24,773.28	25,665.05	2.32
7	Mahakam Ulu	542.17	284.68	378.63	–20.35
8	Balikpapan City	205.99	183.58	90.09	–36.24
9	Samarinda City	4,965.21	3,016.05	2,927.36	–28.02
10	Bontang City	205.26	160.73	90.08	–37.88
	East Kalimantan Province	142,321.38	135,030.52	125,227.66	–6.37

Source: BPS-Statistics EKP (2024).

Table 4. Beef Production by Regency/City in East Kalimantan Province (EKP), 2021–2023 (Tons)

No.	Regency/City	2021	2022	2023	r (%/year)
1	Paser	477.23	478.49	1,025.86	41.53
2	West Kutai	300.93	245.17	300.46	–0.08
3	Kutai Kartanegara	749.41	777.84	874.36	7.80
4	East Kutai	707.07	903.25	769.95	3.96
5	Berau	595.86	517.04	708.97	9.31
6	North Penajam Paser	229.06	557.56	602.50	40.33
7	Mahakam Ulu	11.85	13.43	17.53	19.93
8	Balikpapan City	1,794.34	1,362.49	1,155.58	–22.22
9	Samarinda City	2,951.08	1,956.46	1,709.08	–28.16
10	Bontang City	702.97	653.84	711.34	0.61
	East Kalimantan Province	7,529.80	7,465.56	7,875.63	2.27

Source: BPS-Statistics EKP (2024).

tor's growth is not a panacea; it has so far failed to address this specific commodity gap, leaving the NCCI dependent on external sources for a crucial source of protein and nutrients, a point confirmed by stakeholders in South Kalimantan.

The highest growth is found in the broiler meat sector (Table 6), which expanded at a remarkable 10.52% annual rate, adding over 12,800 tons of production between 2021 and 2023. Heavily driven by integrated private enterprises in feed, medicine, and trade, this growth represents the success of a market-led development pathway. However, this success introduces a new strategic vulnerability: extreme spatial concentration. The production is overwhelmingly centralized, with Samarinda City and Kutai Kartanegara Regency accounting for over 50% of the total provincial output in 2023. This concentration, explicitly flagged as a risk by Logistics Affairs Agency officials, creates a fragile supply chain. A disease outbreak, logistical disruption, or economic shock in one of these core hubs could jeopardize a significant portion of the province's primary meat supply, undermining the food security it is meant to bolster.

The central conclusion for NCCI planning, derived from integrating quantitative data with

Table 5. Layer Eggs Production by Regency/City in East Kalimantan Province (EKP), 2021–2023 (Tons)

No.	Regency/City	2021	2022	2023	r (%/year)
1	Paser	1,556.80	1,483.72	1,498.56	–1.85
2	West Kutai	418.57	424.55	428.80	1.21
3	Kutai Kartanegara	3,669.02	3,726.94	3,764.21	1.29
4	East Kutai	1,310.25	1,799.30	1,817.29	19.16
5	Berau	2,371.80	2,262.04	2,284.66	–1.81
6	North Penajam Paser	770.45	777.91	785.69	0.98
7	Mahakam Ulu	49.01	48.15	48.63	–0.38
8	Balikpapan City	937.43	945.85	955.31	0.95
9	Samarinda City	3,195.57	4,027.44	4,067.71	13.52
10	Bontang City	123.67	98.43	99.41	–9.71
	East Kalimantan Province	14,402.57	15,594.33	15,750.27	4.64

Source: BPS-Statistics EKP (2024).

Table 6. Broiler Meat Production by Regency/City in East Kalimantan Province (EKP), 2021–2023 (Tons)

No.	Regency/City	2021	2022	2023	r (%/year)
1	Paser	2,627.88	2,653.23	3,223.17	10.50
2	West Kutai	2,409.64	2,434.67	2,957.66	10.54
3	Kutai Kartanegara	13,989.87	14,126.97	17,161.60	10.51
4	East Kutai	3,561.20	3,597.75	4,370.59	10.53
5	Berau	1,689.92	1,707.75	2,074.59	10.54
6	North Penajam Paser	1,704.67	1,721.72	2,091.56	11.24
7	Mahakam Ulu	70.73	71.43	86.77	11.24
8	Balikpapan City	12,228.08	12,351.30	15,004.50	11.24
9	Samarinda City	14,799.23	14,946.29	18,156.92	10.51
10	Bontang City	3,503.11	3,539.08	4,299.31	10.53
	East Kalimantan Province	56,584.33	57,150.19	69,426.69	10.52

Source: BPS-Statistics EKP (2024).

stakeholder perspectives, is that EKP's current production system cannot serve as a standalone anchor for food security. This is due to a dual dependency: first, a non-negotiable dependency on external staples, driven by a declining rice sector that EKP and central government officials attribute to systemic land and technology challenges; and second, a dependency on a vulnerable private sector for livestock, which, while dynamic, is concentrated in areas that logistics officials warn are at risk from urban expansion.

This integrated analysis provides a more nuanced understanding than either dataset could alone. It reveals that the core challenges are not just about volume but also about governance, including aligning central and local plans, the geographic specificity of threats in buffer zones, and the sectoral dynamics of contrasting drivers and risks associated with crop versus livestock production. The following sections will quantify these deficits through a food balance analysis and map the vulnerable supply chains that the new capital must urgently address.

Production Balance and Food Needs in the NCCI Area

This section analyzes the 2023 balance between food production and consumption in EKP. The results, summarized in Tables 7 and 8, provide a critical quantitative baseline, revealing that the NCCI's food security starts from a position of high dependency on external staples, despite emerging strengths in livestock production. This analysis of commodity needs is crucial for ensuring supply and enabling local economic development, particularly in agriculture (Ingram, 2011; Kay, 2021; Robert & Mullinix, 2018).

The quantitative data reveal EKP's most critical vulnerability: a deep structural deficit in its primary staple food. As detailed in Table 7, the province faced a rice deficit of 224,694 tons in 2023, with domestic production meeting only about 36% of total needs. This finding directly validates the concerns raised by central and regional government stakeholders in FGDs (Table 2), who highlighted suboptimal land use and low productivity as fundamental constraints. The deficit was nearly universal, with severe shortfalls in major urban centers such as Samarinda City and Balikpapan City underscoring the intense pressure urban populations place on the food system (Mbow et al., 2022). A critical, though isolated, exception was North Penajam Paser Regency, which recorded a surplus of 7,977 tons (Figure 3a). This aligns with qualitative reports on targeted agricultural programs in the NCCI area but also highlights that local capacity is insufficient to secure the food supply for a rapidly growing

Table 7. Balance of Rice and Beef by Regency/City in East Kalimantan Province (EKP) ((EKP), 2023 (Tons)

	Rice			Beef		
Regency/City	Production	Needs	Surplus/deficit	Production	Needs	Surplus/deficit
Paser	15,338.02	25,427.85	−10,089.83	1,025.86	136.37	889.49
West Kutai	780.86	15,853.14	−15,072.28	300.46	85.02	215.44
Kutai Kartanegara	61,895.95	67,732.71	−5,836.76	874.36	363.26	511.11
East Kutai	6,268.86	40,767.25	−34,498.39	769.95	218.64	551.31
Berau	11,792.76	23,116.96	−11,324.20	708.97	123.98	584.99
North Penajam Paser	25,665.05	17,687.89	7,977.16	602.50	94.86	507.64
Mahakam Ulu	378.63	3,022.42	−2,643.79	17.53	16.21	1.33
Balikpapan City	90.09	63,548.58	−63,458.49	1,155.58	340.82	814.76
Samarinda City	2,927.36	76,131.39	−73,204.03	1,709.08	408.30	1,300.78
Bontang City	90.08	16,633.58	−16,543.5	711.34	89.21	622.13
East Kalimantan Province	125,227.70	349,921.77	−224,694.07	7,875.63	1,876.67	5,998.96

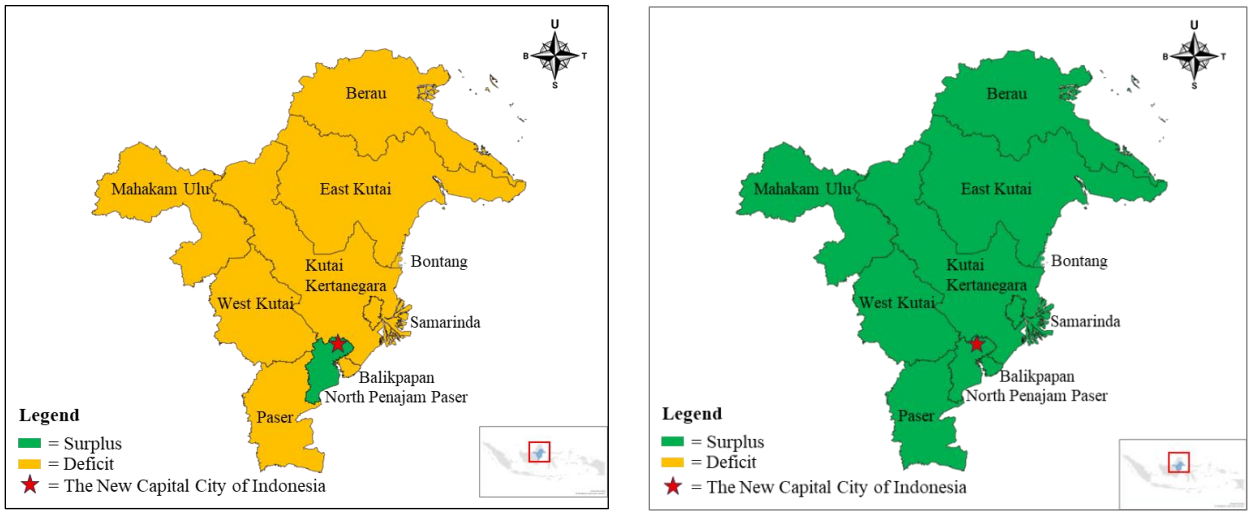
Source: BPS-Statistics EKP (2024),

capital city, whose population is projected to nearly quadruple (IKN, 2022).

The analysis reveals a dualistic reality within the animal protein sector, characterized by substantial surpluses alongside a persistent, specific deficit. EKP produced a significant surplus of beef (5,999 tons) and a massive surplus of broiler meat (43,676 tons), as shown in Tables 7 and 8. The universal regency-level beef surpluses (Figure 3b) and the scale of broiler production indicate a robust sector that has successfully transitioned EKP into a net exporter. This strength aligns with the emphasis placed by private traders in the FGDs on investment-driven growth, demonstrating a market-led development pathway.

In stark contrast, EKP maintained a substantial deficit for layer eggs (–15,767 tons), as seen in Table 8. This widespread shortfall (Figure 4a) corroborates reports from provincial officials on the constraints within the layer poultry sector. It reveals a clear commodity-specific gap that the current market growth has not yet filled, underscoring

Figure 3. Food Balance of Rice (a) and Beef (b) in East Kalimantan Province (EKP), 2023



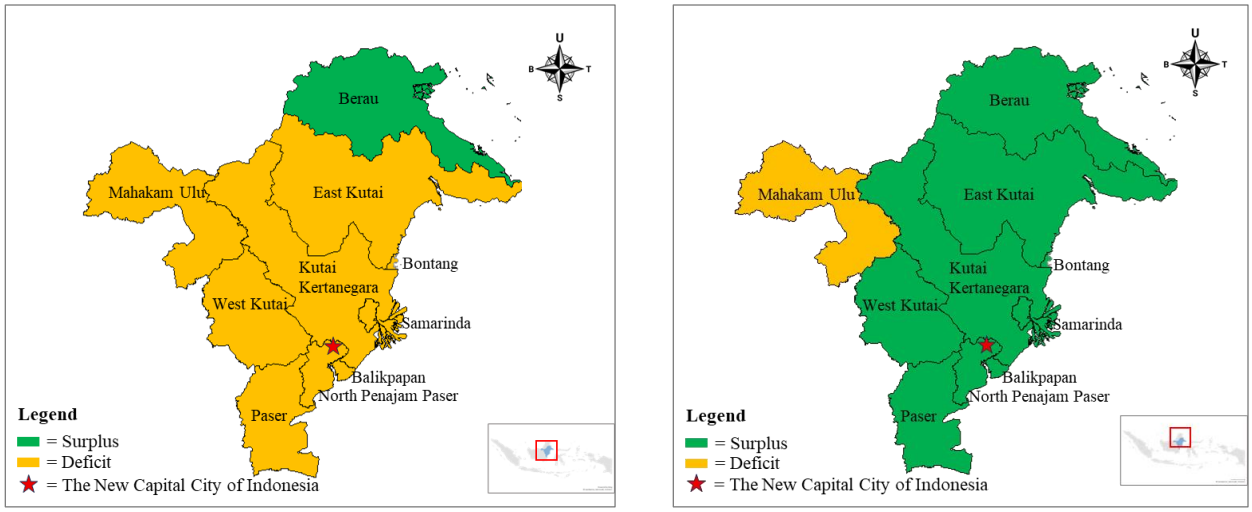
(a) (b)

Table 8. Balance of Layer Eggs and Broiler Meat by Regency/City in East Kalimantan Province (EKP), 2023 (Tons)

	Layer eggs			Broiler meat		
Regency/City	Production	Needs	Surplus/deficit	Production	Needs	Surplus/deficit
Paser	1,498.56	2,289.60	–791.04	3,223.17	2,505.50	717.68
West Kutai	428.80	1,432.30	–1,003.50	2,957.66	1,567.35	1,390.32
Kutai Kartanegara	3,764.21	6,099.72	–2,335.51	17,161.60	6,674.89	10,486.71
East Kutai	1,817.29	3,671.49	–1,854.20	4,370.59	4,017.68	352.91
Berau	2,284.66	2,082.22	202.44	2,074.59	280.10	1,794.49
North Penajam Paser	785.69	1,593.00	–807.31	2,091.56	1,743.21	348.35
Mahakam Ulu	48.63	272.75	–224.12	86.77	298.47	–211.70
Balikpapan City	955.31	5,722.68	–4,767.37	15,004.50	6,262.29	8,742.21
Samarinda City	4,067.71	6,856.00	–2,788.29	18,156.92	750.25	17,406.67
Bontang City	99.41	1,497.22	–1,397.81	4,299.31	1,638.40	2,660.92
East Kalimantan Province	15,750.27	31,516.98	–15,766.71	69,426.69	25,750.14	43,688.56

Source: BPS-Statistics EKP (2024).

Figure 4. Food Balance of Layer Eggs (a) and Broiler Meat (b) in East Kalimantan Province (EKP), 2023



that regional food security requires support across production, access, and utilization (Rohr et al., 2021; Yudha et al., 2023). Conversely, EKP experienced a substantial surplus of broiler meat (43,689 tons), a direct result of the expanding broiler farming industry and its supporting trade in inputs and products. This broiler meat surplus was evident in nearly all regencies and cities throughout EKP (Figure 4b).

The integrated quantitative and qualitative analysis leads to a clear strategic imperative for NCCI planning. The province's food system is defined by a "high-dependency profile"; it must import the majority of its staple grain while maintaining self-sufficiency in key meats. This finding highlights the importance of holistic ecosystem planning and collaboration in achieving food self-sufficiency, as emphasized by the EKP Food, Food Crops, and Horticulture Office. This duality means that securing the NCCI's food supply requires a targeted strategy that addresses the root causes of the staple crop deficit, rather than a one-size-fits-all approach. The following section will now trace the geographic pathways of these crucial food imports, mapping the supply chains that currently sustain the region.

Food Supply to the NCCI in EKP

This section analyzes the complex supply chains that sustain the NCCI, integrating stakeholder perspectives from across the system. The analysis reveals that the capital's food security depends on a multiprovince network that is currently characterized by fragmented logistics and infrastructure limitations, exemplifying the known systemic gaps in Indonesia's food system, such as long supply chains and poor institutional integration (Rachman, 2019; Sulaiman et al., 2017). This situation is further pressured by the universal challenges of meeting urban food demands amid land conversion and population growth (Ikerd, 2013; Kusumastuti, 2014).

A synthesis of views from key actors, presented in Table 9, reveals a consensus on the core challenges but differing focal points. Central government officials in Jakarta identified weather-dependent and hampered distribution facilities as a primary constraint, emphasizing the need for transportation subsidies and improvements to the sea toll policy. This perspective was echoed by EKP and NCCI authorities, who specifically highlighted insufficient storage facilities and the need for formal cooperation with buffer provinces. Their insights point to a critical gap in the "last mile" of the supply chain within EKP. Buffer provinces confirmed their role but detailed their own constraints; South Kalimantan Province reported limitations in collection warehouses and land transport, while East Java emphasized the critical need for smooth sea transportation links. This collective diagnosis underscores that the NCCI's food supply

Table 9. Stakeholder Views on Challenges and Policies for the New Capital City of Indonesia (NCCI) Food Supply, 2024

Stakeholder	Key Challenges	Policy Recommendations
Central Government, Jakarta.	• Food distribution facilities to EKP, including the NCCI, are frequently constrained and disrupted by adverse weather or other distribution barriers.	• Provide transportation cost subsidies to distributors via National Food Agency programs. • Continuously improve the maritime toll policy to facilitate sea-based food distribution.
East Kalimantan Province, the New Capital City of Indonesia	• Food distribution from food buffer provinces to EKP remains hindered by persistent logistical challenges. • Food storage facilities (warehouses, cold storage) within EKP are limited.	• Establish formal food supply cooperation with buffer provinces (e.g., South Kalimantan, East Java). • Develop warehouse and cold storage facilities to stabilize supply and prices. • Utilize entities like Post Indonesia and local marketing institutions for last-mile distribution to the NCCI.
South Kalimantan Province	• Facilities and warehouses for collecting food commodities for export are limited. • Land transportation and warehousing for interprovincial supply are often constrained.	• Strengthen supply chains through local traders, the Agribusiness Sub-Terminal, and interprovincial traders. • Ship rice via land transport supported by the Logistics Affairs Agency and state-owned logistics companies. • Increase the number of storage units to enhance capacity for supplying the NCCI.
East Java Province	• The primary challenge is the adequacy and reliability of sea transportation facilities to the NCCI.	• Encourage and formalize cooperation in food supply to EKP. • Support and streamline the existing supply chain managed by interisland traders using sea transportation.

system is only as strong as its weakest logistical link.

The mapping of supply chains for key commodities quantifies these dependencies and highlights different risk profiles, directly stemming from the production capacities analyzed in the previous sections.

Rice: As the main staple, EKP's rice supply is highly fragmented and externally dependent. This heavy reliance is a direct consequence of the province's substantial structural deficit. With total annual rice needs reaching 349,922 tons, local production of 125,228 tons meets only 35.79% of provincial demand (Table 7). The NCCI's core regencies alone require a significant portion of this. Specifically, North Penajam Paser Regency needs 17,688 tons, and Kutai Kartanegara Regency needs 67,733 tons, highlighting concentrated demand within the capital area.

Traders report that approximately 90% of rice originates from external sources, specifically South Kalimantan and South Sulawesi (35% each, via land and sea) and East Java (20%) provinces. The geographic pathways of these critical external supplies are mapped in Figure 5. This reliance on long-distance maritime and land routes, a noted vulnerability among central government stakeholders, exposes it to weather disruptions, logistics costs, and price volatility. The projected increase in goods flow underscores the urgent need for improved road and port infrastructure, as well as the strategic warehouses near Kuala Samboja Village, Kutai Kartanegara Regency, identified in earlier studies (ICASEPS, 2023).

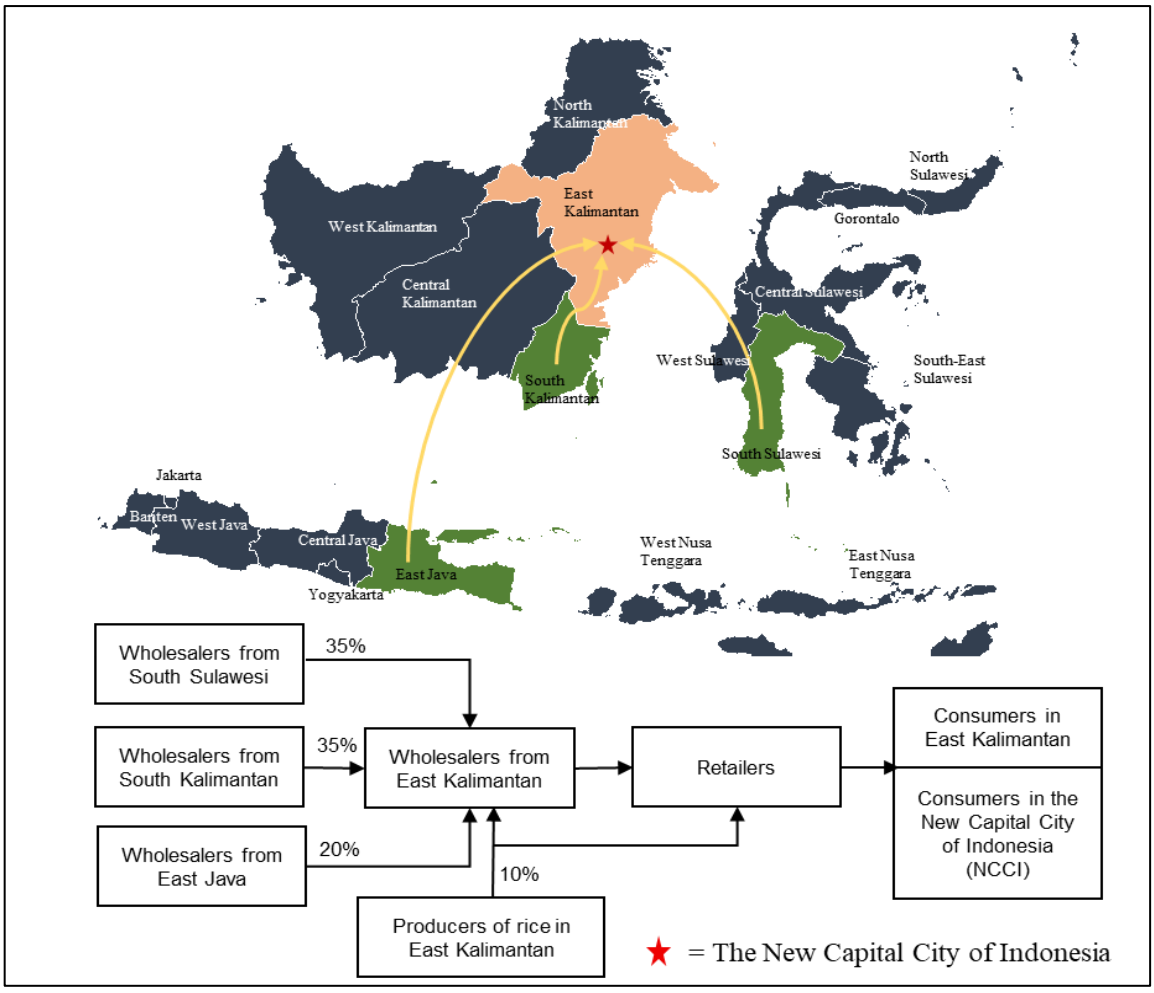
Beef: The beef supply chain presents a more diversified and strategic picture compared to the rice supply chain. While EKP itself supplies a significant 40% of its needs, supported by a modest annual production growth of 2.27% (Table 4) and a provincial surplus of 5,999 tons (Table 7), it maintains a deliberate 60% dependency on a multi-sourced interisland trade network. As illustrated in Figure 6, the NCCI's beef supply is strategically sourced from the provinces of South Sulawesi (20%), East Java (20%), and East Nusa Tenggara (20%). This diversification mitigates the risk of relying on a single external region.

East Nusa Tenggara Province primarily provides breeding cattle for fattening within EKP. This practice supports the ongoing development of a national strategic beef cattle program in Sepaku Subdistrict, North Penajam Paser Regency. This program directly addresses the stakeholder-identified need for developing livestock businesses and enhances local value addition. However, as noted by logistics stakeholders, the presence of a modern slaughterhouse with efficient transportation links remains crucial to fully capitalize on this potential and facilitate the flow of beef from these various production centers, both local and external, to consumers across the province.

Layer Eggs: The layer egg supply chain reveals a persistent deficit that external sources must fill. The total provincial requirement is 31,517 tons, with significant demand concentrated in the NCCI regencies of Kutai Kartanegara (6,100 tons) and North Penajam Paser (1,593 tons). Despite EKP supplying 60% of its needs, a substantial shortfall of -15,767 tons (Table 8) necessitates imports from four different provinces: South Sulawesi, South Kalimantan, East Java, and West Sulawesi, each accounting for 10% (Figure 7).

This 40% dependency persists even though the industry in Muara Badak Subdistrict, Kutai Kartanegara Regency, has developed technologically advanced farms housing 5,000-20,000 chickens with automated feed systems. According to farmers, EKP's egg needs can be met locally, and studies confirm that centers like Samarinda City are

Figure 5. Rice Supply from Food Buffer Provinces to the New Capital City of Indonesia (NCCI) in East Kalimantan Province (EKP), 2024

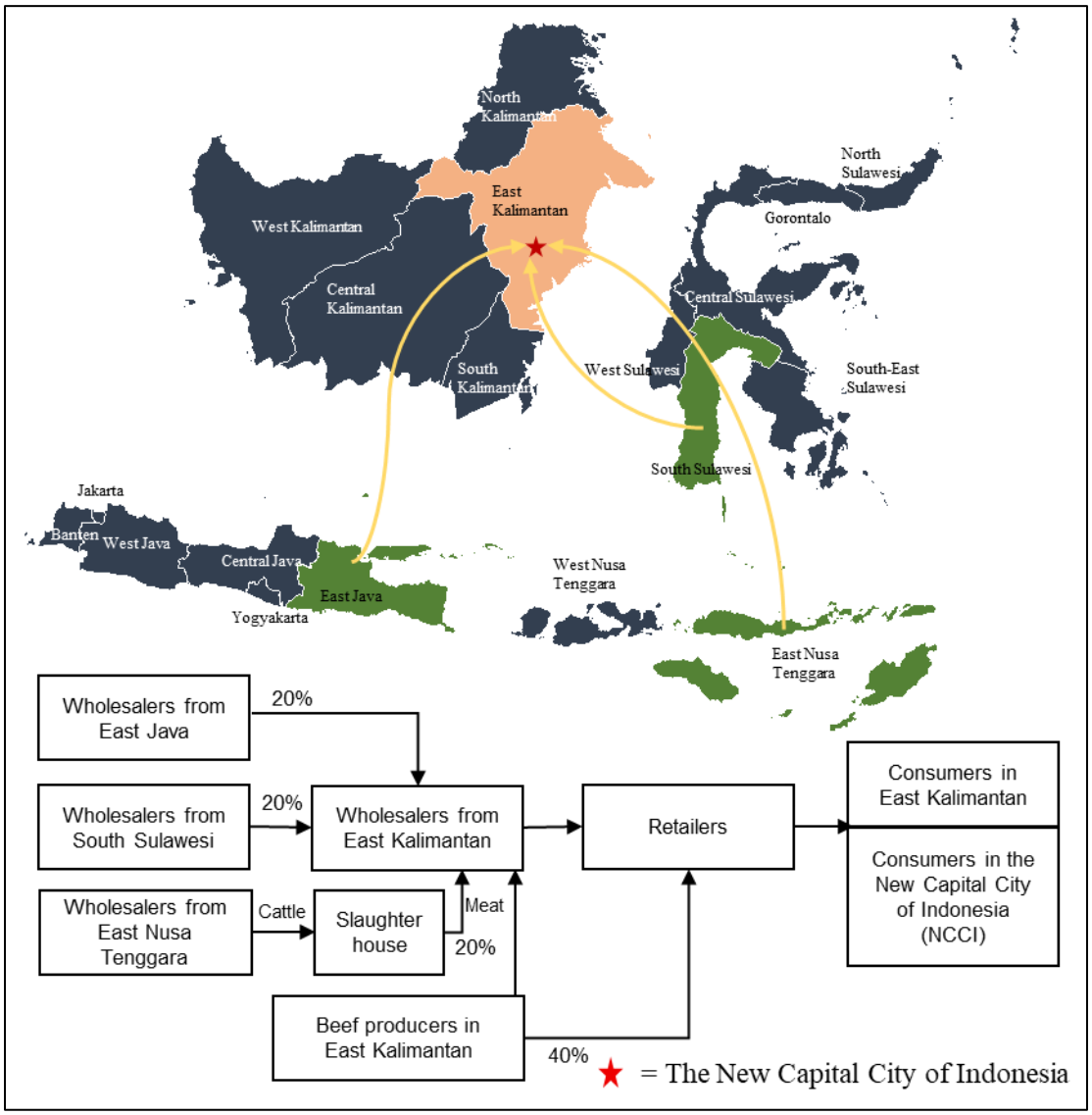


self-sufficient, while Balikpapan City relies on East Java Province (ICASEPS, 2023). This contrast highlights a disconnect between latent production capacity and adequate market supply, likely driven by the cost structures and distribution inefficiencies identified by stakeholders in Table 9.

Broiler Meat: The broiler meat sector demonstrates a high degree of self-sufficiency, underpinned by robust local production. EKP's total annual requirement is 25,750 tons, with significant demand from the NCCI regencies of North Penajam Paser (1,743 tons) and Kutai Kartanegara (6,675 tons). The province supplies approximately 70% of its needs internally, a direct result of the remarkable 10.52% annual production growth (Table 6) driven by private investment. The remaining 30% is sourced from South Kalimantan and East Java provinces (15% each), with the complete supply network detailed in Figure 8.

This established sector offers strong investment opportunities, especially as consumption is projected to reach 69 thousand tons by 2025, driven by the influx of 2.5 million new residents. To support this growth, stakeholders must address

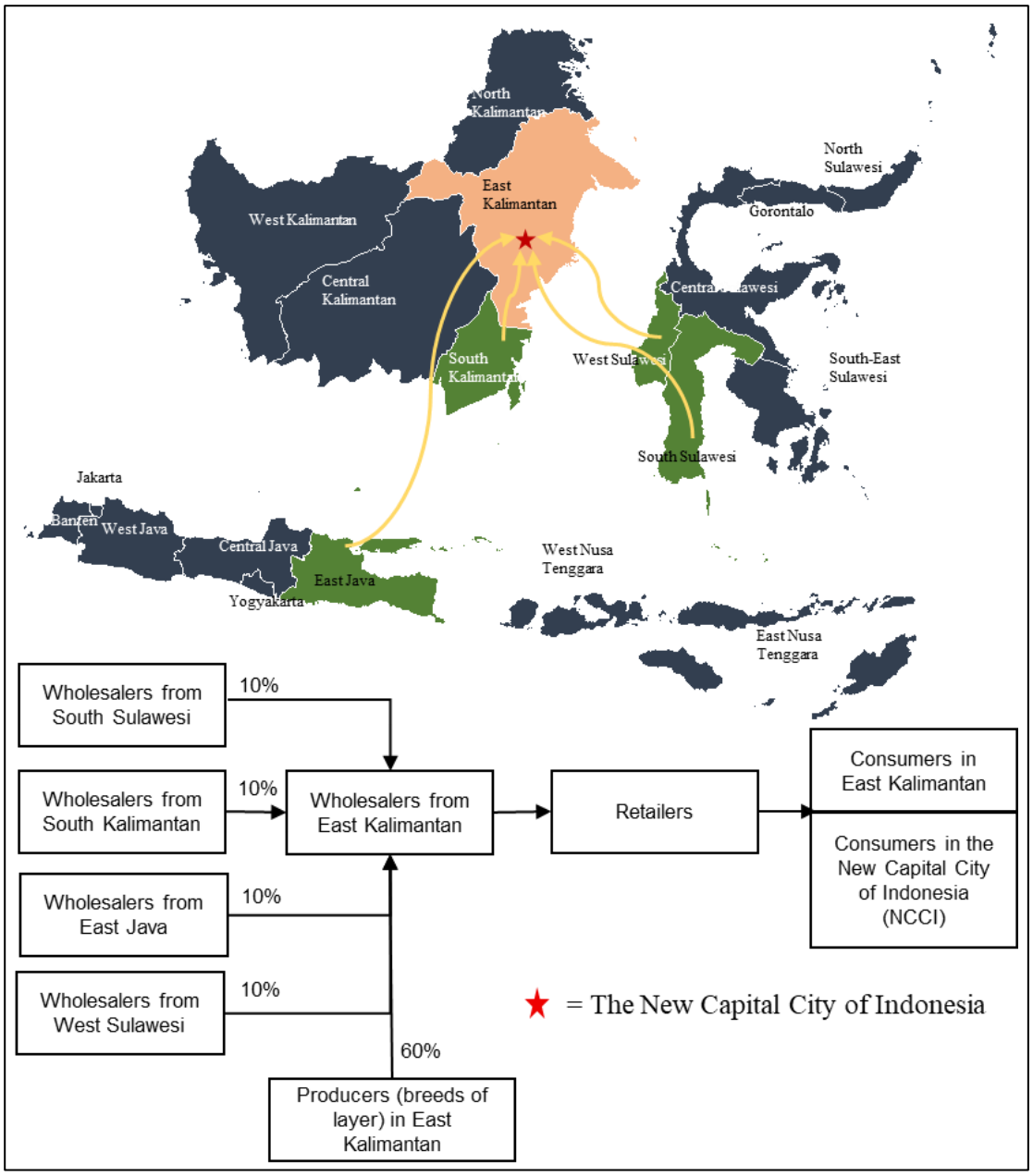
Figure 6. Beef Supply from Food Buffer Provinces to the New Capital City of Indonesia (NCCI) in East Kalimantan Province (EKP), 2024



critical constraints, such as strengthening breeder capacity and ensuring sufficient animal feed production. The strategic development of a maize-based feed industry in Balikpapan City and Samarinda City, as suggested by the EKP Food, Food Crops, and Horticulture Office (2018), along with planned processing facilities in Paser and North Penajam Paser regencies, will be crucial to capitalize on this potential and secure the sector's future.

The interconnectedness of the NCCI's food supply is its defining feature and its greatest vulnerability. The system is not a single pipeline, but a web of independent routes operated by various traders and agencies, each with its own bottlenecks. The central finding is that increasing production, while essential, is insufficient. The key to resilience

Figure 7. Layer Eggs Supply from Food Buffer Provinces to the New Capital City of Indonesia (NCCI) in East Kalimantan Province (EKP), 2024

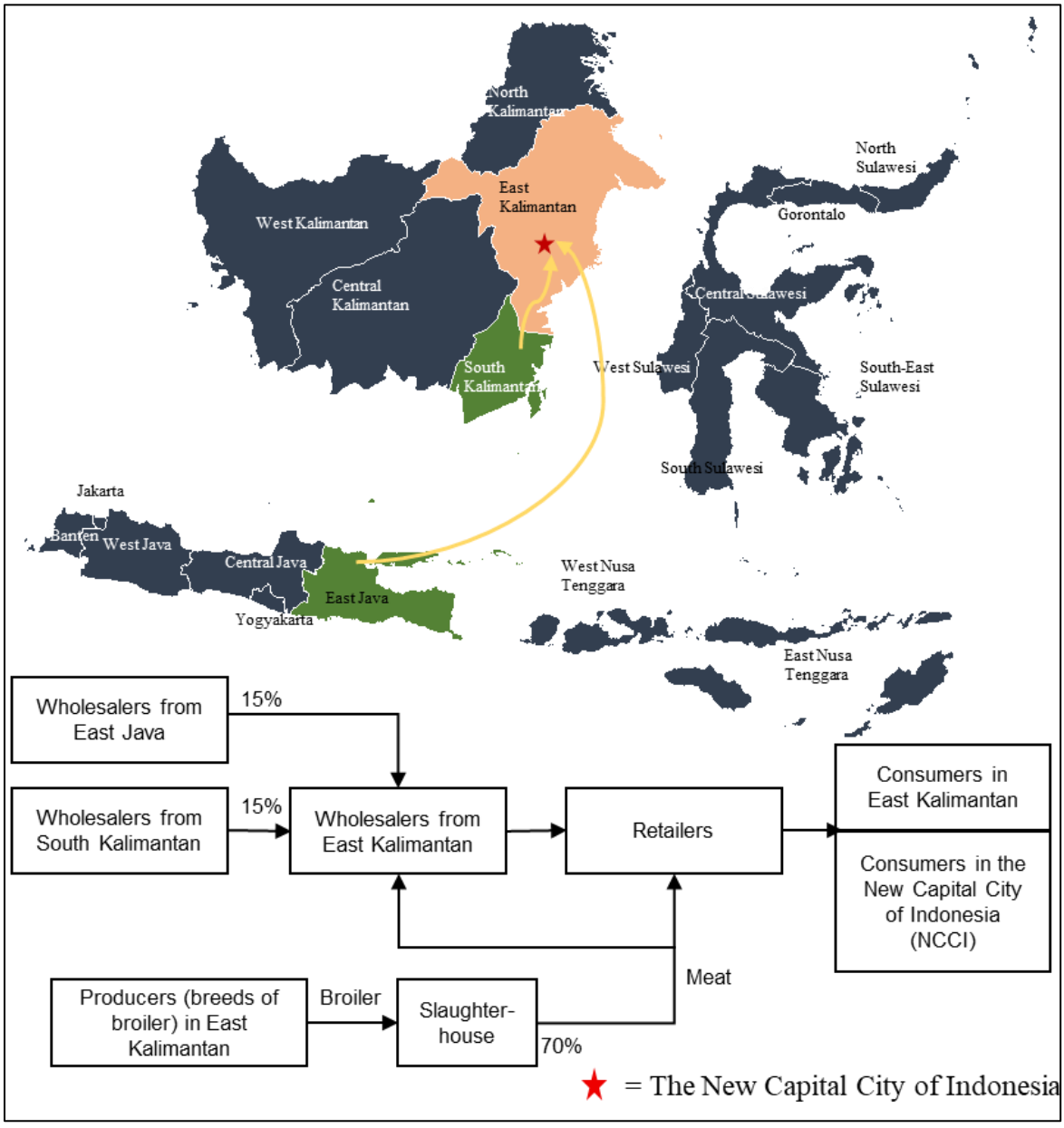


lies in integrating and strengthening the logistical infrastructure connecting the NCCI to its buffer zones, specifically by heeding stakeholders' calls for improved warehousing, reliable sea transport, and interregional government cooperation to create a more cohesive, reliable food system, thereby addressing foundational gaps in regional food distribution.

Strategies to Enhance Food Supply from Buffer Zones to the NCC

Based on the integrated analysis of production balances, supply chains, and stakeholder perspectives from FGDs, the following strategic recommendations are proposed as a direct input for the detailed planning and implementation of the NCCI's food security system:

Figure 8. Broiler Meat Supply from Food Buffer Provinces to the New Capital City of Indonesia (NCCI) in East Kalimantan Province (EKP), 2024



1. Increase local food production in EKP and the NCCI. This foundational strategy directly addresses the province's severe staple crop deficit by targeting the core challenges of suboptimal land use and limited technology. A primary focus must be on improving soil fertility, a critical barrier in the NCCI area (Armanto, 2024). The strategy should be implemented through three proven pathways: extensification, by rehabilitating marginal and ex-mining land to develop new rice fields; intensification, by increasing the cropping index on existing farmland through the deployment of pump irrigation systems; and productivity enhancement, through the dissemination of superior seeds and modern technology. This integrated approach, supported by established research (Aprillya et al., 2019; Burchi & De Muro, 2016), provides a clear framework for achieving local production growth. According to Azzurri (2024) and Puspitoarum (2017), an effective approach to food security requires agricultural land, productivity-enhancing technologies, and strong distribution partnerships.

2. Implement climate-resilient agricultural support. As consistently highlighted by stakeholders across regions, investment in irrigation infrastructure, particularly water-pumping systems, is critical. This will mitigate climate risks (a key challenge for South Kalimantan), optimize land use in buffer zones, and directly support the goal of increasing the cropping index in EKP.

3. Strengthen core logistics and distribution infrastructure. This recommendation directly responds to the calls from the central government, EKP, and officials of the buffer provinces. Strategic investment is required in (a) road networks and maritime transport facilities to accommodate the growing flow of goods and improve upon the sea toll policy, and (b) a network of modern warehouses and cold storage at key hubs to address the reported limitations in storage facilities and reduce post-harvest losses.

4. Foster intergovernmental and public-private partnerships. Formal cooperation mechanisms between the EKP/NCCI government and the governments of buffer provinces are essential to streamline policies, as recommended by Bahtiar & Raswatie (2023). Furthermore, strategic partnerships with the private sector, specifically involving traders, processors, and input suppliers, are crucial for driving investment, as emphasized by Suryana (2014) and confirmed by our FGDs.

5. Promote strategic investment in processing and human capital. To build a resilient, value-added food system, investment should be channeled into: (a) downstream processing industries within EKP to add value and reduce dependency; and (b) human resource capacity, especially for breeders and logistics operators, to ensure the sector's long-term sustainability.

Conclusion and Policy Implications

The development of NCCI in EKP poses a significant challenge to food security. This study concludes that the NCCI's food system begins from a position of high dependency, characterized by a critical deficit in staple rice and layer eggs, alongside a robust surplus in beef and broiler meat. This duality necessitates a heavy and strategic reliance on a multi-province buffer zone, primarily comprising South Kalimantan, East Java, South Sulawesi, East Nusa Tenggara, and West Sulawesi.

The integrated analysis, combining quantitative data with stakeholder perspectives, reveals that the core vulnerability lies not only in production gaps but also in fragmented and inefficient supply chains. Therefore, policy interventions must be dual-pronged. First, they must aggressively address local production constraints, such as suboptimal land use and limited technology, through programs that optimize land use, enhance irrigation (including water-pumping systems), and disseminate productivity-enhancing technologies. Second, and equally critical, is the need to strengthen logistical integration. This requires immediate investment in road and maritime transport infrastructure, as well as modern warehousing and cold storage facilities, a point consistently emphasized by stakeholders

across the government and private sectors. This dual-pronged approach provides a necessary roadmap for policymakers and urban planners. The strategies presented are not only vital for the NCCI but also offer a transferable, evidence-based framework for planning food systems in other new capital cities across the developing world.

Ultimately, achieving food resilience for the NCCI depends on formalizing cooperation and collaboration. This includes intergovernmental partnerships between EKP/NCCI authorities and buffer province governments to streamline policies, as well as public-private partnerships to leverage investment for processing, distribution, and market development. Future research should build on this foundation by incorporating the critical social and environmental dimensions of this vast urban transformation.

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