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The Political Economy of Fertilizer Scarcity: Social and Economic Implications for Smallholder Agriculture in Indonesia

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The scarcity of subsidised fertiliser has emerged as a structural political economy problem that undermines agricultural productivity in Indonesia, particularly for smallholder farmers who rely on timely and affordable access to inputs. Although fertiliser subsidies remain central to government food security strategies, their implementation is constrained by political bargaining, fiscal limitations, and exposure to global market volatility. Empirical findings at the national level, in East Java Province, and in Bojonegoro District reveal persistent challenges in the distribution system, including inaccurate e-RDKK data, delivery delays, supply shortages, corruption, and leakages into black markets. These inefficiencies have generated significant economic impacts, such as rising production costs, declining yields, shrinking profit margins, and food price inflation that undermines household purchasing power. The social impacts are equally severe, encompassing heightened food insecurity, growing tensions within farming communities, declining trust in local leadership, and the erosion of rural solidarity and *gotong royong*. The novelty of this study lies in its simultaneous examination of both the economic and social dimensions of fertiliser scarcity, providing a broader perspective on long-term sustainability challenges. Addressing these issues requires comprehensive reforms to Indonesia's fertiliser subsidy policy. Priority actions include strengthening governance through real-time digital monitoring, independent audits, and effective grievance mechanisms; ensuring regular updates to the e-RDKK database to reduce mistargeting and elite capture; and enhancing institutional capacity through cross-ministerial coordination and the establishment of a national fertiliser buffer stock. Furthermore, diversification of inputs through organic fertilisers, compost, and waste-based innovations should be scaled up with research, incentives, and extension services, while policies must also account for regional disparities to ensure equitable access for vulnerable smallholders. Taken together, these measures can transform fertiliser subsidies from short-term buffers into strategic instruments that promote agricultural productivity, economic stability, food security, and rural social cohesion in Indonesia.

1. Introduction

The scarcity of subsidised fertilisers represents a pressing global challenge, particularly in agrarian economies such as Indonesia. Subsidies play a crucial role in sustaining agricultural productivity, especially for smallholder

farmers. Yet recent disruptions in global supply chains, energy crises, and geopolitical conflict have worsened shortages. The World Bank (2023) noted a 78% rise in global fertiliser prices in 2022, heightening concerns over food security and rural economies. While consumers demand stable food prices, farmers face rising input costs that reduce productivity and incomes. In Indonesia, fertiliser scarcity has become a critical issue, sparking concern among policymakers, farmers, and the public. Fertiliser is vital for increasing yields, and shortages threaten agricultural sustainability. This challenge is particularly serious because smallholder farmers depend heavily on subsidies to maintain livelihoods and contribute to food production. Beyond immediate costs, rising inputs deepen poverty, widen rural-urban gaps, and endanger food security nationally.

Subsidised fertiliser refers to government financial support that lowers fertiliser prices, ensuring affordability and access. This is essential for maintaining productivity and farmer welfare. Scarcity occurs when demand outstrips supply, driving up prices and limiting access, directly affecting food security. The FAO (2020) defines food security as sustained access to sufficient, safe, and nutritious food for an active and healthy life. Fertiliser availability thus becomes central to achieving food security. Market failure and public goods theory justify government intervention when markets cannot supply essential goods affordably. Subsidies act as corrective tools, enabling farmers to sustain production despite market failures. Agricultural development theory, rooted in the Green Revolution, highlights fertilisers' role in boosting productivity. Today's shortages threaten these gains, making support strategies urgent. Schultz (1964) stressed efficient resource use through sound government programmes as key to raising productivity.

Extensive studies highlight the role of subsidies in boosting productivity and food security. Jayne & Rashid (2013) showed subsidies improved farm incomes in Sub-Saharan Africa. In Indonesia, subsidies have long strengthened food security and reduced rural poverty. However, inefficiencies such as corruption, misallocation, and political interference undermine effectiveness, as Banful (2011) also observed in Ghana. These inefficiencies weaken support for vulnerable farmers. Prior studies also linked scarcity to poor distribution, misguided policies, and global disruptions. A prior study found that in Zambia, fertiliser allocation favoured ruling party constituencies, showing political influence in distribution. In Nigeria, subsidies reveal socio-economic complexities, while in China, Fan et al. (2023) and Guo et al. (2021) showed that subsidy reforms reduced chemical fertiliser use and supported sustainability. These cases stress the need to address inefficiencies and integrate environmental goals into subsidy policies.

Despite substantial research, much attention remains on economic outcomes such as productivity and income, with limited focus on broader social consequences. Issues like community tensions, trust in governance, and socio-political impacts of scarcity are underexplored. Moreover, little work connects local agricultural challenges to global disruptions like supply chain breakdowns, energy crises, and geopolitical conflicts. This study addresses these gaps by investigating the socio-economic impacts of fertiliser scarcity on Indonesian smallholders. Unlike most studies focusing only on economic dimensions, it also examines social impacts such as community conflict, declining trust in local leaders, and implications for food security. By integrating global disruptions into localised crises, this research offers a holistic perspective on farmer challenges. Liu et al. (2024) found subsidies improve efficiency by promoting better land use and reducing chemical dependence, strengthening this approach.

The study's objectives are threefold: (1) Assess the economic effects of fertiliser shortages on costs, yields, and incomes; (2) Examine social consequences, including food insecurity, poverty, and governance trust; and (3) Provide policy recommendations to mitigate shortages while ensuring sustainable agriculture. By combining these dimensions, the research contributes to broader discussions on agricultural sustainability, food security, and rural socio-economic resilience.

2. Theoretical Frameworks

2.1. Market Failure and Public Goods Theory

Fertiliser subsidies in this study are grounded in the theories of market failure and public goods. Market mechanisms often fail to provide essential goods such as fertilisers at affordable prices, particularly for smallholder farmers. The 78% increase in global fertiliser prices in 2022, driven by the energy crisis, supply chain disruptions, and geopolitical conflicts, shows that markets cannot always stabilise agricultural inputs (World Bank, 2023). In such conditions, state intervention is essential. Fertilisers also have quasi-public good characteristics since their benefits extend to national food security. Thus, subsidies are justified as instruments to ensure equitable access and sustain production (FAO, 2020). Schultz (1964) further stressed

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that efficient resource use through well-designed programmes is vital for productivity.

2.2. Agricultural Development Theory and Political Economy of Subsidy Distribution

The agricultural development framework highlights the link between fertilisers and productivity, rooted in the Green Revolution when fertilisers, high-yield seeds, and irrigation increased outputs across Asia and Africa. In Indonesia, subsidies have long been used to boost productivity and reduce poverty. Jayne & Rashid (2013) found similar results in Sub-Saharan Africa, where subsidies enhanced household productivity and food security. In Indonesia, subsidies support rice and other staples, but scarcity risks reversing these gains, worsening food insecurity and inequality between smallholders and large-scale producers. This theory underscores that continued access to inputs is essential for agricultural sustainability (Schultz, 1964).

At the same time, the political economy framework explains how subsidy policies are influenced by power and political interests. Distribution is rarely neutral and often contested among political actors and institutions. Banful (2011) found in Ghana that fertiliser allocations favoured ruling party areas, while Mason & Ricker-Gilbert (2013) observed similar dynamics in Zambia. A prior study reported mistargeting, corruption, and manipulation of the e-RDKK database, which diverted subsidies to ineligible farmers while smallholders struggled to access them. Thus, effectiveness depends not only on technical design but also on political structures, clientelism, and institutional capacity.

2.3. Food Security Framework and Socio-Economic Impact Perspective

FAO (2020) identifies four food security dimensions: availability, access, utilisation, and stability. Fertilisers are critical for availability as they drive productivity. When subsidised fertilisers are scarce, yields fall, prices rise, and household access weakens. Scarcity also threatens stability through volatile prices and utilisation, as poor households compromise dietary quality. FAO (2021) emphasised that sustained availability of inputs is central to long-term food security. Hence, scarcity is not simply a technical issue of distribution but a systemic threat to national food sustainability.

Beyond economics, scarcity generates social consequences. Previous research emphasised declining yields, rising costs, and lower incomes, but this study shows that fertiliser shortages also trigger conflicts among farmers, erode trust in leadership, and polarise communities (FAO, 2020). Lokosang et al. (2024) found in Africa that weak governance and input shortages provoked conflicts and reduced resilience. Kaufman (2015) reported that organic farmers in Thailand experienced better well-being and sustainability perceptions, while Barboza et al. (2011) in Mexico stressed that adopting composting required knowledge support and social legitimacy. This perspective enriches analysis by linking fertiliser scarcity to tensions and resilience within farming communities.

2.4. Sustainability Transition and Alternative Input Theory

The sustainability transition framework links subsidies to broader agricultural reform. Fan et al. (2023) showed that redesigned subsidies in China reduced chemical fertiliser use and encouraged sustainable practices. Guo et al. (2021) confirmed that targeted subsidies could lower intensity without reducing yields, while Liu et al. (2024) found subsidies improved efficiency through better land use. Schreiber et al. (2021) in the United States highlighted that adoption of fertilisers from waste depends on social legitimacy. Thus, subsidy reforms should aim not only at economic efficiency but also at transitioning towards a system that is environmentally sustainable, resilient, and socially acceptable.

3. Research Method

This study adopts a mixed-methods approach designed to provide a deeper and more comprehensive understanding of the dynamics and complexity of the subsidised fertiliser scarcity issue faced by farmers (Creswell & Plano Clark, 2018). The research focuses on Bojonegoro Regency as a representative study area, with a sample of 150 farmers selected purposively based on their involvement in agricultural practices affected by fertiliser subsidy policies (Patton, 2002).

Data collection was carried out using an integrated approach that combined both quantitative and qualitative techniques. Quantitative data were collected through carefully designed structured surveys distributed to farmers. These surveys aimed to capture their perceptions, experiences, and challenges related to the scarcity of subsidised fertiliser, its economic impact on farm productivity, and their views on the effectiveness of the subsidy policy (FAO, 2021). The survey instrument was also utilised to identify variations in conditions among farmers that might influence their access to subsidised fertiliser.

Meanwhile, qualitative data were gathered through

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semi-structured interviews with a subset of survey respondents, selected based on their diverse socio-economic characteristics, to explore in depth their experiences and adaptation strategies in the face of fertiliser scarcity (Kvale & Brinkmann, 2009). Interviews were also conducted with key stakeholders, including agricultural extension officers, village officials, and farmer group representatives, to gain a more comprehensive institutional and policy perspective, especially concerning the implementation of fertiliser subsidy policies at the local level (Anderson & Feder, 2007).

Furthermore, focus group discussions (FGDs) were held to enrich the qualitative data. Through the FGDs, the researcher facilitated dynamic interactions among participants to uncover collective experiences, identify potential social conflicts, and discuss the collaborative solutions farmers have attempted (Krueger & Casey, 2015). This approach aimed to reveal the social context that influences the distribution patterns and access to subsidised fertiliser in greater depth, thereby ensuring that the research findings provide a holistic and relevant basis for future policy recommendations (Long, 2001).

Before conducting the research, the researcher provided an explanation to all participants regarding the purpose, procedures, benefits, and potential risks of their involvement in this study. This explanation was delivered directly using clear and easily understandable language to ensure the participants' comprehensive understanding. After receiving this explanation, the participants expressed their willingness to participate voluntarily, without coercion, through verbal consent. The researcher chose verbal consent from participants because most of them are members of rural communities who live in villages with limited literacy levels and are accustomed to oral communication as a form of both formal and informal interaction (Marshall & Rossman, 2016). The use of written consent was considered to potentially cause discomfort that might affect their participation in the study. Moreover, this approach was approved by the village authorities, thus ethically still upholding the principle of protecting participants' rights (Israel & Hay, 2006).

The data analysis combines quantitative and qualitative techniques to offer a thorough analysis of the impacts. Quantitative data were analysed using descriptive statistics to summarise key features and inferential statistics to explore relationships and differences between variables (Field, 2013). Qualitative data were analysed through thematic and content analysis to identify and interpret patterns and themes (Braun & Clarke, 2006). The integration of both data types was achieved through triangulation, which compares and contrasts findings to ensure a well-rounded understanding of the issue (Denzin, 2012).

By integrating quantitative and qualitative insights, this research aims to provide a detailed picture of how the scarcity of subsidised fertiliser affects farmers socially and economically. The mixed-methods approach allows for a richer analysis, combining broad statistical trends with in-depth personal experiences, ultimately offering actionable recommendations for improving fertiliser policies and their implementation.

4. Results

The Indonesian government has long implemented subsidised fertiliser policies to ensure that smallholder farmers can access affordable inputs. These subsidies are part of broader agricultural programmes aimed at boosting productivity and safeguarding food security. They focus on strategic crops such as rice, maize, and soybeans, which are vital for stabilising production and supporting rural incomes. Implementation is carried out through a distribution system managed by local agricultural offices and village cooperatives, but challenges remain, including supply delays, inaccurate farmer data, and logistical inefficiencies that reduce programme effectiveness.

Shortages and mismanagement of subsidised fertilisers have produced serious consequences. Smallholder farmers, who depend most on subsidies, struggle to maintain yields without adequate inputs. Reduced productivity intensifies food insecurity, particularly in rural regions where farming is the main livelihood. To cope, some farmers cut back on fertiliser use or turn to less effective alternatives, but such practices risk long-term soil fertility and agricultural sustainability. These difficulties highlight the vulnerability of rural households when subsidy systems fail to function effectively.

East Java, one of Indonesia's most productive provinces, illustrates both the importance and limitations of the subsidy policy. The government, together with PT Pupuk Indonesia and other producers, is tasked with ensuring affordable fertiliser for registered farmers to sustain high yields of rice, maize, and sugarcane. On paper, the programme appears well-structured, with allocations tied to planting schedules. In practice, however, discrepancies in data management and registration under the e-RDKK system often delay access. Distribution depends heavily on local cooperatives, which at times lack capacity to manage and deliver fertilisers efficiently, further reducing

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programme credibility.

The scarcity of subsidised fertilisers in East Java has created wide-ranging social impacts. Many smallholder farmers report yield declines, which directly threaten household food security. Unequal quota distribution has fuelled tensions, as some farmers receive allocations while others are left without, leading to disputes and community friction. In extreme cases, families are forced to sell assets or take on debt to purchase fertilisers, deepening social and economic inequality in rural areas. Such patterns reinforce how policy shortcomings at the implementation stage quickly translate into broader social stress.

At the Bojonegoro district level, research highlights mixed farmer perceptions of the subsidy programme. While 83% of farmers are aware of the policy, understanding varies: 49% believe subsidies improve harvests and welfare, 30% think they are available to all farmers, 18% view them simply as cheap inputs, and 11% assume they are limited to those with small plots. This divergence indicates that less than half align with government objectives, while others hold fragmented interpretations shaped by personal experience and local information.

The effectiveness of the policy depends heavily on communication. Farmers gain information from multiple sources: 67% through Agricultural Extension Officers (PPL), 19% from farmer groups, 8% from village officials, and others via media and social networks. Clear communication helps reduce misinformation and potential conflicts. The Bojonegoro government has sought to address this by organising socialisation events, with 88% of farmers attending. Among participants, 76% found the information clear, while 24% considered it insufficient. These variations show that beyond formal policy design, the clarity and consistency of communication play a decisive role in shaping farmer perceptions, ensuring compliance, and reducing tension within rural communities.

Table 1: Sources of Information and Policy Communication.

Aspect	Details	Notes
Sources of Information	67% from Agricultural Extension Officers (PPL)	Local government plays a key outreach role
	19% from farmer groups	
	8% from village officials	
Socialization in Bojonegoro	88% of farmers invited to events	Farmers with less understanding are more likely to experience conflict
	76% felt the information was clear	
	24% found it unclear	

Farmers' evaluations of the subsidy are mixed. 74% view it positively, particularly for small plot farmers, as it reduces production costs and maximises profits. They argue that subsidised fertiliser is crucial for optimal yields and that non-subsidised fertiliser is too expensive. In contrast, 26% believe the policy is flawed because it benefits both small and large plot farmers, who can afford non-subsidised fertiliser.

Knowledge about subsidised fertiliser prices varies. While 72% of farmers know the price, their perceptions differ: 55% see it as cheap, 43% as moderately priced, and 2% as expensive. This reflects personal experiences and economic capabilities. Additionally, while the government subsidises four types of fertiliser (Urea, SP-36, NPK, and ZA), 34% of farmers mistakenly believe all fertilisers are subsidised, although 61% correctly identify subsidised versus non-subsidised fertilisers.

Table 2: Farmers' Understanding and Perceptions of Subsidized Fertilizer.

Aspect	Details	Notes
Farmers' Awareness	83% know about the policy	Outreach needs strengthening
	49% align with policy objectives	
	Misconceptions: 30% think subsidies are for all farmers; 11% think it's only for smallholders	
Farmers' Evaluation	74% view subsidies positively for smallholders	Regulations do not strictly differentiate recipients
	26% believe subsidies also benefit large-scale farmers who can afford non-subsidized fertilizer	
Perception of Prices	72% know subsidized prices	Price perception influences fertilizer use
	55% view it as cheap; 43% as moderately priced; 2% as expensive	
Types of Subsidized Fertilizers	Urea, SP-36, NPK, ZA	Subsidies apply only to select fertilizers (MOA Reg. No. 10/2022)
	34% mistakenly believe all fertilizers are subsidized	
	61% correctly identify subsidized vs. non-subsidized fertilizers	

Fertiliser is essential for agriculture, with 98% of farmers needing it, regardless of plot size. Despite the subsidy being aimed at small plot farmers, 96% of farmers can afford it, indicating broad accessibility. The government's regulation, which now includes only nine key crops for subsidy, aims to improve food security and streamline fertiliser distribution. The Ministry of Agriculture Regulation No. 10 of 2022 governs

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fertiliser distribution, adhering to the 6T principles: right type, amount, price, place, time, and quality. In 2023, the list of subsidised crops was reduced to nine. This approach aims to enhance future food security and improve the efficiency of fertiliser distribution by focusing on essential crops.

Despite improvements, challenges remain. About 43% of farmers face difficulties accessing subsidised fertiliser due to delayed deliveries, limited availability, and insufficient stock. In contrast, 57% find it relatively easy to obtain through designated channels. This discrepancy highlights ongoing issues in the distribution system. Farmers' understanding of the distribution chain is varied. 71% are unaware of the detailed process, knowing only that fertilisers are available at cooperatives, while 29% understand the full chain from local cooperatives to retailers and manufacturers. Fertiliser needs and costs vary by crop and plot size, with different requirements for rice, maize, and soybeans.

The delay in subsidised fertiliser delivery significantly impacts crop growth and farmers' economies. 91% of farmers report that delays hinder crop development, lead to poor harvests, and force them to purchase more expensive non-subsidised fertilisers. This raises production costs, reduces profits, and strains the economies of poorer farmers. Socially, delays can erode trust in local leaders and foster conflicts, as farmers suspect mismanagement or corruption in the distribution process.

Table 3: Socio-Economic Impacts of Subsidized Fertilizer.

Aspect	Details	Notes
Fertilizer Needs	98% of farmers need fertilizer regardless of plot size	Uses the "6T" principle: right type, quantity, price, place, time, and quality
	96% can afford subsidized fertilizer	
Impact of Delays	91% reported delays impacting crop growth	Significant economic strain for smallholders
	Forced to buy more expensive non-subsidized fertilizer	
	Higher production costs	
Food Security	Lower yields due to delayed fertilizer delivery	Directly affects household food security
	Rising production costs → higher food prices	
Social Impacts	Unequal distribution causes farmer disputes	Highlights the need for subsidy distribution reform
	Reduced trust in cooperatives and local officials	

5. Discussion

This study assesses the social and economic impacts of subsidised fertiliser scarcity on smallholder farmers in Indonesia, while also situating the issue within the wider global political economy of agricultural inputs. Historically, the Indonesian government has relied on subsidy schemes as a cornerstone of food security strategies, ensuring that smallholder farmers can access affordable fertilisers to stabilise production and rural livelihoods (Bappenas, 2020b). Yet, the persistence of scarcity indicates that subsidies are not merely technical interventions but also outcomes of political negotiation and fiscal trade-offs. Similar patterns are evident in Sub-Saharan Africa, where fertiliser subsidy allocations have been influenced by electoral incentives and patronage, thereby weakening the targeting efficiency of the programmes (Banful, 2011). Consequently, fertiliser scarcity is best analysed as a political economy problem shaped by governance, budget constraints, and exposure to global market fluctuations.

In Indonesia, subsidies are distributed by PT Pupuk Indonesia through annual quotas for rice, maize, and soybeans. While designed to guarantee stability and protect household incomes, quota systems often produce rigidity and inefficiency. In Senegal, subsidy quotas have faltered under weak supply chains, forcing farmers to revert to low-input manure strategies. In Zambia, political actors have used quotas as patronage instruments to mobilise rural support. In Ghana, fertiliser subsidies were shown to increase household-level cereal production, but the gains were uneven across different groups of farmers depending on access, timing, and complementary resources (Tsiboe, Egyir, & Anaman, 2021). These cases reveal that while quotas may enhance predictability, they also risk generating inequality and exclusion when poorly governed.

The Indonesian distribution framework—anchored in the e-RDKK database and implemented via farmer cooperatives—was intended to modernise targeting and strengthen accountability. However, persistent challenges such as data inaccuracies, delays in supply, and logistical bottlenecks continue to undermine the programme. Malawi's experience with electronic vouchers demonstrated similar problems, as elite capture and misallocation persisted despite digital reforms (Jayne & Rashid, 2013). This indicates that digitalisation alone cannot correct structural flaws unless it is accompanied by robust data governance, grievance mechanisms, and community-level oversight.

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Without these institutional reinforcements, smallholders remain vulnerable to exclusion, while public confidence in subsidy systems continues to erode.

A major obstacle lies in the convergence of global and domestic pressures. Since 2021, rising international raw material costs and supply chain disruptions have constrained Indonesia's fertiliser procurement capacity. Across Africa, up to 70% of smallholders reduced fertiliser purchases during global price spikes, leading to depressed yields. In Senegal, persistent scarcity forced a reorientation towards low-input farming with negative impacts on household food security. In Indonesia, despite subsidies, many farmers are compelled to purchase fertiliser at higher market prices or reduce application rates, which threatens both productivity and livelihood security. These outcomes illustrate the vulnerability of national food systems to external volatility.

Governance weaknesses further exacerbate scarcity in Indonesia. Subsidised fertilisers are frequently diverted into black markets, where they are sold at inflated prices, effectively excluding intended beneficiaries. Errors in farmer registries have enabled ineligible actors to capture subsidised stock, while many genuine smallholders remain underserved. Such outcomes echo Zambia, where subsidy programmes privileged politically connected households and failed to protect vulnerable farmers (Banful, 2011). Sri Lanka offers an even starker example: a 2019 ban on chemical fertilisers, introduced without adequate alternatives, precipitated a 20% fall in rice production and heightened food insecurity. These cases demonstrate that input policies, if poorly designed or governed, can undermine rather than strengthen resilience.

Indonesia's experience resonates with wider debates on subsidy effectiveness in fragile governance contexts. Lokosang et al. (2024) found that in African Regional Economic Communities, subsidies rarely foster long-term resilience when institutions are weak, targeting lacks transparency, and preparedness for shocks is inadequate. In many countries, subsidies even entrenched dependency while discouraging investments in soil fertility and diversification. Indonesia faces similar risks, as systemic flaws in distribution and oversight limit the transformative potential of subsidies. Fertiliser scarcity in this light is not only the result of global supply shortfalls but also the product of governance arrangements that struggle to resist capture and anticipate volatility.

The social consequences of scarcity are severe. Smallholders unable to access affordable inputs face declining yields, reduced household food supply, and heightened vulnerability to poverty. Unequal access to quotas fuels resentment and conflict within farming communities (FAO, 2020). Comparable tensions were observed in Zambia and Malawi, where subsidy disputes eroded community solidarity and increased mistrust towards local leaders (Jayne & Rashid, 2013). In Indonesia's densely cultivated regions, unequal distribution not only weakens productivity but also undermines *gotong royong*, a cornerstone of rural cooperation.

Coping strategies adopted by farmers further illustrate the depth of the problem. Many reduce fertiliser use below recommended levels, abandon input-intensive crops, or resort to inferior substitutes. While these measures provide short-term survival, they carry long-term risks of soil degradation and productivity decline. Sri Lanka's case demonstrates the danger of abrupt low-input transitions without support, which culminated in a sharp national output collapse. In Indonesia, gradual nutrient depletion caused by under-application threatens to reverse decades of productivity gains and deepen rural vulnerability.

This study also underscores the role of social legitimacy and farmer perceptions in shaping outcomes. A prior study showed that the adoption of urine-based fertilisers required cultural legitimacy as much as technical feasibility. A prior study found that organic rice farmers reported higher well-being, attributing this to autonomy and alignment with ecological values. Prior literature described that compost adoption increased when institutional support and education were provided. These cases suggest that in Indonesia, alternative fertilisers will only gain traction if supported by farmer trust, local legitimacy, and responsive extension services.

Economically, fertiliser scarcity increases production costs, narrows profit margins, and renders livelihoods precarious. Yield reductions not only diminish household income but also fuel food price inflation, burdening consumers and straining macroeconomic stability (Jayne & Rashid, 2013). Cross-country evidence shows that uncertainty over input availability discourages on-farm investment and acreage expansion (Lokosang et al., 2024). Ghana's experience confirms that when subsidies are timely and accessible, cereal production responds positively; when they are not, benefits quickly erode (Tsiboe et al., 2021). In Indonesia, similar uncertainty drives delayed planting and reduced acreage, curbing national output and food system resilience.

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International experiences demonstrate that resilience is possible through diversification and decentralisation. In Lebanon, decentralised vermicomposting initiatives enabled farmers to withstand shocks while improving soil fertility and strengthening collective organisation (Moledor et al., 2016). In Nairobi's informal settlements, wastewater-based urban agriculture sustained both household food supply and income under resource-constrained conditions (Njenga et al., 2011). These cases highlight that alternatives, when socially accepted and institutionally supported, can complement chemical fertilisers. For Indonesia, such strategies could reduce dependence on volatile imports and build long-term resilience.

Regional variations in Indonesia reveal commonalities and unique challenges. In East Java, one of the nation's agricultural hubs, subsidies remain critical for sustaining rice, maize, and sugarcane yields. Yet logistical bottlenecks, late deliveries, and data errors frequently disrupt seasonal planting cycles. International price shocks exacerbate these shortages, while diversion of subsidised fertilisers into black markets worsens inequities. These local problems mirror African experiences where national policy intent was undermined at the community level due to capacity gaps and weak monitoring.

Surveys in Bojonegoro provide micro-level insights into subsidy effectiveness. While 83% of farmers are aware of subsidy programmes, only 49% believe they have improved welfare. Many farmers understand little beyond the availability of fertilisers at cooperatives, while just 29% grasp the full distribution chain. Furthermore, 43% report difficulties in access due to limited stock, delays, and bureaucratic hurdles. These findings echo Senegalese farmers' ambivalence towards subsidies when access remains uncertain (FAO, 2020). The discrepancy between awareness and perceived benefit underscores that communication, transparency, and farmer education are as critical as financial allocations in ensuring programme success.

Comparisons between Bojonegoro and national data highlight how structural weaknesses translate into social consequences. National reports confirm recurring shortages, corruption, and delays, but local evidence illustrates how these failures generate disputes, dissatisfaction with leaders, and weakened cooperation. Similar dynamics were documented in Zambia and Malawi, where subsidy failures exacerbated inequality and eroded solidarity (Banful, 2011). Thus, fertiliser scarcity in Indonesia should not be seen merely as a technical supply issue but as a social phenomenon that destabilises trust and challenges the legitimacy of governance structures.

To strengthen Indonesia's fertiliser subsidy programme, reforms must combine domestic lessons with international insights. First, logistics and digital tracking should be enhanced to ensure timely delivery, supported by independent audits to reduce diversion and elite capture. Second, e-RDKK registries must be continually updated, coupled with grievance mechanisms to safeguard vulnerable farmers. Third, diversification through compost, organic fertilisers, and circular-economy practices should be scaled with institutional backing (Moledor et al., 2016; Njenga et al., 2011). If these measures are properly sequenced, subsidies can evolve from short-term buffers into transformative instruments that enhance productivity, environmental stewardship, and rural cohesion.

Table 4: Social and Economic Impacts, Implementation Challenges, and Policy Recommendations Related to Subsidized Fertilizer Scarcity in Indonesia.

Dimension	Details	Evidence
Social Impacts	Decreased crop yields, leading to food insecurity and poverty	83% of Bojonegoro farmers aware of policy; 49% believe it improves harvests
	Heightened social tensions due to quota disparities	43% face difficulties accessing fertilizers (delayed delivery, limited stock)
	Adoption of unsustainable farming practices (e.g. reduced fertilizer use, reliance on inferior alternatives)	Tensions in communities due to perceived unfairness
	Erosion of trust in local leaders	-
Economic Impacts	Increased production costs; reduced profit margins	National-level: lower profit margins due to input costs
	Rising rural poverty	Bojonegoro: higher costs from non-subsidized fertilizers; debt/selling assets to afford fertilizer
	Higher food prices and inflation	-
	Discouraged agricultural investment due to uncertainty	-
Implementation Challenges	Global supply chain disruptions (raw material price hikes)	Subsidized fertilizers sold at higher prices illegally

6. Conclusion and Policy Recommendations

The scarcity of subsidised fertiliser in Indonesia is not merely a technical distribution issue but a complex political economy problem. Fertiliser subsidies, long regarded as a cornerstone of food

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security, are increasingly constrained by political bargaining, fiscal limitations, and vulnerability to global market fluctuations. The distribution system, based on annual quotas, the e-RDKK database, and farmer cooperatives, has been marred by inaccurate data, delivery delays, and leakages into black markets. As a result, many smallholders fail to access fertilisers during crucial planting periods. This situation generates significant economic impacts, including rising production costs, declining yields, shrinking profit margins, and food price inflation that undermines household purchasing power. The social impacts are equally severe, with heightened household food insecurity, growing tensions within farming communities due to perceived injustices in distribution, and the erosion of rural solidarity and *gotong royong* that traditionally sustain collective resilience.

Addressing these challenges requires a comprehensive reform of Indonesia's fertiliser subsidy policy, prioritising improved governance and accountability. Distribution must be strengthened through real-time digital monitoring, independent audits, and accessible grievance mechanisms. Regular updates to the e-RDKK database are essential to prevent mistargeting and elite capture. At the institutional level, stronger coordination across ministries and the development of a national fertiliser buffer stock are necessary to mitigate external shocks. Diversification of inputs should also be pursued by promoting the production of organic fertilisers, compost, and waste-based innovations, supported by research, financial incentives, and continuous extension services. Furthermore, subsidy policies must be sensitive to regional variations, ensuring that the needs of the most vulnerable smallholders are prioritised. Taken together, these measures would allow fertiliser subsidies to evolve from short-term buffers into transformative policies that strengthen agricultural productivity, economic stability, food security, and social cohesion in rural Indonesia.

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References

Anderson, J. R., & Feder, G. (2007). Chapter 44 Agricultural Extension. In R. Evenson & P. Pingali (Eds.), *Handbook of Agricultural Economics* (Vol. 3, pp. 2343-2378). Elsevier. doi: https://doi.org/10.1016/S1574-0072(06)03044-1

Banful, A. B. (2011). Old Problems in the New Solutions? Politically Motivated Allocation of Program Benefits and the "New" Fertilizer Subsidies. *World Development, 39*(7), 1166-1176. doi: https://doi.org/10.1016/j.worlddev.2010.11.004

Barboza, J. C., Morales, H., Barrantes, R. A., Moreno, A. S., & Lwanga, E. H. (2011). Perceptions and Attitudes Regarding Organic Waste: Feasibility of Establishing an Urban Composting Program in Chiapas, Mexico. *Journal of Agriculture, Food Systems, and Community Development, 1*(3), 115-131. doi: https://doi.org/10.5304/jafscd.2011.013.006

Braun, V., & Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology, 3*(2), 77-101. doi: https://doi.org/10.1191/1478088706qp063oa

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and Conducting Mixed Methods Research* (3rd ed.). Sage Publications.

Denzin, N. K. (2012). Triangulation 2.0*. *Journal of Mixed Methods Research, 6*(2), 80-88. doi: https://doi.org/10.1177/1558689812437186

Fan, P., Mishra, A. K., Feng, S., & Su, M. (2023). The effect of agricultural subsidies on chemical fertilizer use: Evidence from a new policy in China. *Journal of Environmental Management, 344*, 118423. doi: https://doi.org/10.1016/j.jenvman.2023.118423

FAO. (2020). *The State of Food Security and Nutrition in the World 2020: Transforming food systems for affordable healthy diets*. Rome, FAO. doi: https://doi.org/10.4060/ca9692en

FAO. (2021). *The State of Food and Agriculture 2021. Making agrifood systems more resilient to shocks and stresses*. Rome, FAO. doi: https://doi.org/10.4060/cb4476en

Field, A. (2013). *Discovering Statistics using IBM SPSS Statistics* (4th ed.). Sage Publications.

Guo, L., Li, H., Cao, X., Cao, A., & Huang, M. (2021). Effect of agricultural subsidies on the use of chemical fertilizer. *Journal of Environmental Management, 299*, 113621. doi: https://doi.org/10.1016/j.jenvman.2021.113621

Israel, M., & Hay, I. (2006). *Research Ethics for Social Scientists: Between Ethical Conduct and Regulatory Compliance*. Sage Publications. doi: https://doi.org/10.4135/9781849209779

Jayne, T. S., & Rashid, S. (2013). Input subsidy programs in sub-Saharan Africa: a synthesis of recent evidence. *Agricultural Economics, 44*(6), 547-562. doi: https://doi.org/10.1111/agec.12073

Kaufman, A. H. (2015). Unraveling the Differences Between Organic and Non-Organic Thai Rice Farmers' Environmental Views and Perceptions of Well-being. *Journal of Agriculture, Food Systems, and Community Development, 5*(4), 29-47. doi: https://doi.org/10.5304/jafscd.2015.054.002

Krueger, R. A., & Casey, M. A. (2015). *Focus Groups: A Practical Guide for Applied Research* (5th ed.). Sage Publications.

Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the Craft of Qualitative Research Interviewing* (2nd ed.). Sage Publications.

Liu, F., Shahzad, M. A., Feng, Z., Wang, L., & He, J. (2024). An analysis of the effect of agriculture subsidies on technical efficiency: Evidence from rapeseed production in China. *Heliyon, 10*(13), e33819. doi: https://doi.org/10.1016/j.heliyon.2024.e33819

Lokosang, L., Kirui, L., Maru, J., Karugia, J., Bahta, S., & Enahoro, D. (2024). Research brief: Analysis of policy responses to seed, fertilizer, food and fuel shocks in three African Regional Economic Communities. *Journal of Agriculture, Food Systems, and Community Development, 14*(1), 393-401. doi: https://doi.org/10.5304/jafscd.2024.141.009

Long, N. (2001). *Development Sociology: Actors Perspectives.* Routledge. doi: https://doi.org/10.4324/9780203398531

Marshall, C., & Rossman, G. (2016). *Designing Qualitative Research* (6th ed.). Sage Publications.

Mason, N. M., & Ricker-Gilbert, J. (2013). Disrupting Demand for Commercial Seed: Input Subsidies in Malawi and Zambia. *World Development, 45*, 75-91. doi: https://doi.org/10.1016/j.worlddev.2012.11.006

Moledor, S., Chalak, A., Fabian, M., & Talhouk, S. N. (2016). Socioeconomic Dynamics of Vermicomposting Systems in Lebanon. *Journal of Agriculture, Food Systems, and Community Development, 6*(4), 145-168. doi: https://doi.org/10.5304/jafscd.2016.064.007

Njenga, M., Karanja, N., Prain, G., Gathuru, K., & Lee-Smith, D. (2011). Community-Based Wastewater Farming and its Contribution to Livelihoods of the Urban Poor: Case of Nairobi, Kenya. *Journal of Agriculture, Food Systems, and Community Development, 1*(3), 151-162. doi: https://doi.org/10.5304/jafscd.2011.013.004

Patton, M. Q. (2002). *Qualitative Research and Evaluation Methods* (3rd ed.). Sage Publications.

Schreiber, T., Opperman, S., Hardin, R., Cavicchi, J., Pallmeyer, A., Nace, K., et al. (2021). Nested risks and responsibilities: Perspectives on fertilizer from human urine in two U.S. regions. *Journal of Agriculture, Food Systems, and Community Development, 10*(3), 221-242. doi: https://doi.org/10.5304/jafscd.2021.103.016

Schultz, T. W. (1964). *Transforming Traditional Agriculture.* Yale University Press.

Tsiboe, F., Egyir, I. S., & Anaman, G. (2021). Effect of fertilizer subsidy on household level cereal production in Ghana. *Scientific African, 13*, e00916. doi: https://doi.org/10.1016/j.sciaf.2021.e00916

World Bank. (2023). *Commodity markets outlook: April 2023.* Washington, DC: World Bank. Retrieved from https://www.worldbank.org/en/research/commodity-markets

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