Populer: Jurnal Penelitian Mahasiswa
Volume. X Nomor. X Bulan 20XX
e-ISSN : 2828-9439; p-ISSN : 2828-9420, Hal. XX-XX
DOI: https://doi.org/10.55606/jurrit.v4i2
Available online at: https://prin.or.id/index.php/JURRIT

Dynamics of Fertilizer Subsidy Implementation: A Systemic Evaluation of the 6T Principles on Corn Productivity in Gorontalo

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Abstract. *Government intervention through fertilizer subsidies is a pivotal instrument for national food security, particularly for corn commodities in Gorontalo. This study evaluates the effectiveness of fertilizer subsidy policy implementation based on the "6T" principles (Right Type, Quantity, Price, Place, Time, and Quality) and its impact on corn production in Pulubala District. Using a quantitative explanatory design, 99 corn farmers were surveyed through proportional random sampling. Data were analyzed using Spearman Rank correlation to assess relationships between systemic variables: Targeting Accuracy (X_1), Quantity Accuracy (X_2), Timeliness (X_3), and Physical Availability (X_4). Findings reveal that X_1 ($r = 0.289$; $p = 0.004$) and X_2 ($r = 0.213$; $p = 0.034$) have significant positive correlations with production. Conversely, timeliness (X_3) and physical availability (X_4) showed no statistical significance ($p > 0.05$). This anomaly suggests a "Governance Paradox" where physical stock availability does not guarantee accessibility due to bureaucratic rigidities within the e-RDKK digital system. The study recommends database synchronization and logistics debureaucratization to ensure sustainable agricultural output.*

Keywords: *Corn production, digital governance, fertilizer subsidy, governance paradox, policy implementation.*

Abstrak. Intervensi pemerintah melalui subsidi pupuk merupakan instrumen krusial dalam menjaga stabilitas ketahanan pangan nasional, khususnya pada komoditas jagung di Provinsi Gorontalo. Penelitian ini bertujuan untuk mengevaluasi efektivitas implementasi kebijakan subsidi pupuk berdasarkan prinsip "6T" (Tepat Jenis, Jumlah, Harga, Tempat, Waktu, dan Mutu) serta dampaknya secara sistemik terhadap produksi jagung di Kecamatan Pulubala. Menggunakan desain kuantitatif eksplanatori, studi ini melibatkan 99 responden petani jagung yang dipilih melalui *proportional random sampling*. Data dianalisis menggunakan korelasi Spearman Rank untuk mengukur hubungan antara variabel sistemik: Ketepatan Sasaran (X_1), Ketepatan Jumlah (X_2), Ketepatan Waktu (X_3), dan Ketersediaan Fisik (X_4). Temuan mengungkapkan bahwa variabel X_1 ($\rho = 0{,}289$; $p < 0{,}01$) dan X_2 ($\rho = 0{,}213$; $p < 0{,}05$) memiliki korelasi positif yang signifikan terhadap hasil produksi. Sebaliknya, variabel ketepatan waktu (X_3) dan ketersediaan (X_4) tidak menunjukkan signifikansi statistik ($p > 0{,}05$). Anomali ini mengidentifikasi adanya "Paradoks Tata Kelola" di mana ketersediaan stok fisik tidak menjamin aksesibilitas akibat hambatan administratif dan kegagalan sinkronisasi dalam ekosistem digital e-RDKK. Studi merekomendasikan transisi menuju mekanisme *e-voucher* subsidi langsung dan debirokratisasi rantai logistik untuk memastikan keberlanjutan luaran pertanian.

Kata kunci: Implementasi kebijakan, jagung, paradoks tata kelola, produksi jagung, subsidi pupuk.

1. BACKGROUND

The agricultural sector remains the bedrock of Indonesia's national economy, contributing approximately 12.4% to the Gross Domestic Product (GDP) and employing nearly 29% of the national workforce (World Bank, 2024). Within this framework, corn (*Zea mays L.*) has ascended as a strategic commodity, particularly in provinces like Gorontalo, which serves as a primary national production hub. To sustain this momentum, the Indonesian

Received: Februari 15, 2025; Revised: Maret 20, 2025; Accepted: April 01, 2025;
Online Available: April 08, 2025; Published: Oktober 30, 2025;

government has aggressively escalated its fiscal commitment to the fertilizer subsidy program, with the 2024 budget allocation reaching a staggering IDR 50.7 trillion (Ministry of Agriculture, 2024). However, despite this massive liquidity injection, the correlation between fiscal input and corn productivity at the smallholder level remains inconsistent, often plagued by what scholars term the "effectiveness paradox" in agrarian policy (Fauziyah et al., 2025).

The fundamental logic of fertilizer subsidies is to lower the input-output price ratio, thereby enabling smallholder farmers, who typically manage less than 2 hectares of land, to adopt modern agricultural inputs (Andani et al., 2020). Operationally, the success of this distribution is measured through the "6T" principles: Right Type, Quantity, Price, Place, Time, and Quality. These principles serve as the performance benchmarks for the Indonesian bureaucratic apparatus in delivering public services to the agricultural sector (Jamil, 2023). Yet, the transition from a manual distribution system to a digitalized framework involving the Electronic Group Needs Definitive Plan (e-RDKK) and the *Kartu Tani* (Farmer Card) has introduced unprecedented administrative complexities.

In Gorontalo Province, specifically in Pulubala District, the implementation of these digital tools has been met with systemic challenges. While the e-RDKK was intended to improve targeting accuracy and minimize leakage, it has inadvertently created "administrative barricades" (Nurhayati & Fajar, 2024). Previous research has largely focused on either the economic returns of subsidies or the cognitive capacity of farmers in using fertilizers (Rossi & Freeman, 2004). However, there is a distinct lack of empirical evidence exploring the *systemic decoupling* between physical supply and administrative accessibility within the 6T framework.

This research seeks to bridge this gap by conducting a deep evaluation of the fertilizer subsidy implementation in Pulubala. The novelty of this study lies in its identification of the "Governance Paradox", a phenomenon where high physical availability of subsidized inputs does not translate into increased productivity because of systemic failures in timeliness and bureaucratic synchronization. By employing the policy implementation frameworks of George C. Edwards III and Van Meter & Van Horn, this study aims to dissect the structural impediments that hinder corn productivity, providing a roadmap for debureaucratized agrarian governance.

2. THEORITICAL REVIEW

Policy Implementation Frameworks

The success of any public policy is determined by the transition from legislative mandate to operational execution. George C. Edwards III (1980) posits that four critical variables dictate implementation success: Communication, Resources, Disposition, and Bureaucratic Structure. In the context of fertilizer subsidies, *Communication* refers to the transmission of e-RDKK requirements from the Ministry down to the village-level extension workers. *Resources* include both the fiscal budget and the digital infrastructure required to process *Kartu Tani* transactions. *Disposition* involves the willingness of retailers and local officials to adhere to set prices (HET), while *Bureaucratic Structure* encompasses the standard operating procedures (SOPs) of the distribution chain.

Complementing this, the Van Meter and Van Horn (1975) model emphasizes that policy performance is influenced by the characteristics of the implementing agency and the prevailing socio-economic environment. In Gorontalo, the "environment" is characterized by a high dependency on corn monoculture, making the timeliness of fertilizer delivery a critical survival factor for farmers.

The 6T Principles in Agrarian Governance

The 6T principles are the operational pillars of the Indonesian fertilizer subsidy system:

1. Right Type: Ensuring the fertilizer (Urea, NPK) matches the soil requirements.
2. Right Quantity: Meeting the volume requested in the RDKK.
3. Right Price: Adherence to the Government-mandated Maximum Retail Price (HET).
4. Right Place: Accessibility of kiosks within the farmers' reach.
5. Right Time: Synchronization with the biological planting cycle.
6. Right Quality: Ensuring the chemical composition meets national standards (SNI).

Recent literature suggests that while the "Price" and "Quality" dimensions are relatively stable due to strict industry regulation, the "Time" and "Quantity" dimensions are highly vulnerable to bureaucratic fragmentation (Adiraputra & Supyandi, 2021).

The e-RDKK and Digital Transformation

The digitalization of the subsidy system via e-RDKK aims to solve the "Targeting Accuracy" problem. However, as noted by Lestari & Wijayanto (2020), digital transformation in rural areas often faces the "double burden" of infrastructure deficiency and data incommensurability. When NIK (National Identity Number) data in the e-RDKK does not

match the *Kartu Tani* database, farmers are "administratively excluded" from their rights, regardless of the physical stock available in the warehouse.

3. METHODS

Research Design and Location

This study adopts a quantitative explanatory research design to determine the correlation between implementation variables and production output. The research was conducted in Pulubala District, Gorontalo Regency, a region designated as a high-intensity corn production zone. Fieldwork was carried out between August and September 2025.

Population and Sampling

The population comprised 7,794 corn farmers registered in the e-RDKK system within Pulubala District. Using the Slovin formula with a 10% margin of error, a sample size of 99 respondents was derived:

$$n = \frac{N}{1 + N(e)^2} = \frac{7794}{1 + 7794(0.1)^2} \approx 99$$

To ensure geographic representation and capture the variations in bureaucratic performance across villages, a proportional random sampling technique was applied across 11 villages, including high-production areas like Puncak and Bakti.

Variable Operationalization

Primary data were collected through a 5-point Likert scale questionnaire operationalizing four independent variables: Targeting Accuracy (X_1), Quantity Accuracy (X_2), Timeliness (X_3), and Physical Availability (X_4). The dependent variable is Corn Production (Y), measured in tons/hectare

Data Analysis

Data were collected via Likert-scale questionnaires (1-5). Initial normality testing using the Shapiro-Wilk test indicated a non-normal distribution ($p < 0.05$). Consequently, the study employed the **Spearman Rank Correlation (\rho)** to measure the strength and direction of the relationship between the ordinal implementation variables and the production output.

4. RESULT AND DISCUSSION

Evaluative Profile of Governance Performance

The descriptive analysis (Table 1) suggests that, on paper, the implementation in Pulubala is "Good" to "Very Good." However, a deeper look at the scores reveals a critical lag in logistical timing.

Tabel 1. Evaluation of Fertilizer Subsidy Governance Effectiveness

Indicator	Actual Score	Ideal Score	Percentage (%)	Category
Targeting Accuracy (X_1)	2,093	2,475	84.57	Very Good
Quantity Accuracy (X_2)	2,062	2,475	83.31	Good
Timeliness (X_3)	1,974	2,475	79.76	Good
Physical Availability (X_4)	1,974	2,475	79.76	Good

**Source: Processed Primary Data (2025)*

The high score for Physical Availability (85.21%) indicates that the supply chain successfully moves fertilizer from the national producer (Pupuk Indonesia) to the local kiosks. Similarly, Targeting Accuracy (84.57%) suggests that the e-RDKK has successfully filtered eligible recipients based on administrative criteria. However, the lower score for Timeliness (79.76%) serves as the first indicator of systemic friction.

Correlation Analysis: Identifying the Drivers of Production

The Spearman Rank analysis (Table 2) provides a more rigorous empirical reality. It distinguishes between *administrative presence* and *functional impact*.

Tabel 2. Spearman Rank Correlation Coefficients on Corn Production (Y)

Variable	Correlation (ρ)	Sig. (2-tailed)	Interpretation
Targeting Accuracy (X_1)	0.289**	0.004	Significant
Quantity Accuracy (X_2)	0.213*	0.034	Significant
Timeliness (X_3)	0.178	0.079	Not Significant
Physical Availability (X_4)	0.189	0.061	Not Significant

*Notes: ** Sig at 0.01; * Sig at 0.05*

Source: Processed Primary Data (2025)

The findings demonstrate that **Targeting (X_1)** and **Quantity (X_2)** are the primary systemic drivers of production. This confirms that the accuracy of the database and the volume

of fertilizer are fundamental. If the right farmer receives the right amount of NPK/Urea, production increases.

However, the non-significance of **Timeliness (X_3)** and **Physical Availability (X_4)** is a profound statistical anomaly that requires a qualitative deep-dive.

The Governance Paradox: Administrative vs. Physical Access

The result where physical availability (X_4) does not correlate with production output ($p = 0.061$) uncovers the **Governance Paradox**. In Pulubala, fertilizer is physically present in the kiosks, but farmers cannot "touch" it. This is due to the "Digital Lock" mechanism of the e-RDKK and *Kartu Tani*. If a farmer's NIK is not perfectly synced or if the kiosk's EDC (Electronic Data Capture) machine malfunctions, the fertilizer remains on the shelf while the corn plants wither.

From the lens of Edwards III (1980), this is a failure of **Bureaucratic Structure**. The SOPs for digital validation are too rigid to accommodate the fluid reality of rural farming. Furthermore, the non-significance of Timeliness (X_3) suggests that farmers have developed "Coping Mechanisms." To mitigate the 2-3 week delay in subsidized fertilizer arrival, farmers often borrow funds to buy non-subsidized fertilizer or use leftovers from previous seasons (Nurhayati & Fajar, 2024). While this keeps the plants alive (maintaining production volume), it severely diminishes the farmer's profit margin, effectively neutralizing the "social protection" intent of the subsidy.

Implications for Agrarian Policy

The "Paradox" indicates that the government's focus on "stocking warehouses" is outdated. In a digitalized era, the bottleneck is no longer logistics, but **information accountability**. The decoupling of physical supply from digital authorization creates a "ghost supply" scenario, the goods are there, the money is allocated, but the utility is zero. This aligns with the findings of Jamil (2023), who argues that inclusive policy must prioritize "system interoperability" over mere "input availability."

The findings of this study also highlight a structural asymmetry between policy design and field-level execution, particularly in the context of digital governance adoption in rural agrarian systems. While the e-RDKK system is theoretically designed to enhance transparency and accountability, its rigid validation mechanisms have inadvertently marginalized farmers

who lack digital literacy or whose administrative data are incomplete. This condition reflects what can be termed as “technocratic exclusion,” where policy effectiveness is constrained not by the absence of resources, but by the inability of beneficiaries to navigate institutional requirements. Consequently, the intended inclusivity of subsidy distribution is undermined by procedural inflexibility, reinforcing disparities among farmers based on their administrative accessibility rather than their agronomic needs.

The insignificant relationship between timeliness and production suggests a deeper adaptive behavior among farmers that operates outside formal policy structures. Farmers in Pulubala appear to have developed informal resilience strategies, such as relying on social capital, informal credit systems, or alternative input sources to compensate for delays in subsidized fertilizer distribution. This phenomenon indicates that production stability is maintained not because the policy is functioning optimally, but because farmers are absorbing systemic inefficiencies through additional economic burdens. In the long term, this adaptive mechanism is unsustainable, as it shifts the cost of policy failure from the state to the individual farmer, thereby weakening the fundamental objective of subsidies as a social protection instrument.

The emergence of the “ghost supply” phenomenon underscores the critical need to reconceptualize performance indicators in agricultural policy evaluation. Traditional metrics, such as stock availability and budget absorption, are no longer sufficient to capture the real impact of policy implementation in a digitally mediated environment. Instead, greater emphasis must be placed on “effective accessibility,” which integrates both physical availability and administrative usability. Without this shift, policy evaluations will continue to produce misleadingly positive assessments that fail to reflect ground realities. Therefore, future policy frameworks should adopt a more holistic evaluation model that bridges the gap between digital authorization systems and biological production cycles, ensuring that technological advancements serve as enablers rather than barriers to agricultural productivity.

5. CONCLUSION AND RECOMMENDATIONS

The implementation of the fertilizer subsidy policy in Pulubala District has achieved high administrative marks but suffers from a deep systemic "Governance Paradox." The study concludes that Targeting Accuracy and Quantity are the critical pillars supporting corn productivity. However, the failure of Timeliness and Physical Availability to significantly impact production highlights a breakdown in the digital-bureaucratic interface. The e-RDKK

system, while improving transparency, has created administrative barriers that prevent timely access to physically available stocks.

Policy Recommendations:

1. Direct-to-Farmer e-Voucher: Transition from a commodity-based distribution to a direct e-voucher system. This allows farmers to purchase any fertilizer type from any registered vendor, bypassing the rigid "assigned kiosk" bottleneck.
2. Data Synchronization Audit: The Local Agriculture Office must conduct monthly factual audits of the e-RDKK database to resolve NIK discrepancies before the planting season begins.
3. Debureaucratization of Logistics: Implement a "Red-Flag" system where, if digital validation fails due to technical errors (EDC/Signal), a manual override protocol (verified by local extension workers) is permitted to ensure the biological needs of the crops are met.
4. Agro-Climatic Synchronization: The distribution schedule must be decentralized and aligned with the specific rain patterns of Gorontalo, rather than following a rigid national fiscal calendar.

ACKNOWLEDMENT

The authors extend their gratitude to the Rector of Universitas Muhammadiyah Gorontalo and the Dean of the Faculty of Science and Computer Science for providing the institutional support and research facilities. We also thank the Agricultural Extension Center (BPP) of Pulubala and the corn farmer groups for their transparency and cooperation during the data collection process.

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