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Analysis of the Role of Perum Bulog in Maintaining the Stability of the National Rice Supply Chain

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ABSTRACT

Purpose: This study aims to analyze the role of Perum BULOG in maintaining the stability of Indonesia's rice supply chain and to identify operational constraints affecting distribution effectiveness and food price stabilization.

Research Method: This study employed a descriptive qualitative approach using semi-structured interviews, field observations, and secondary data from BULOG annual reports, BPS statistics, and food policy regulations. Data were analyzed through interactive qualitative analysis involving data reduction, presentation, and conclusion verification.

Results and Discussion: The findings indicate that Perum BULOG contributes to rice supply chain stability through Government Rice Reserves (CBP), domestic rice procurement, SPHP market intervention, food aid distribution, equitable distribution systems, and logistics modernization. However, operational effectiveness remains constrained by infrastructure disparities, transportation barriers, warehousing limitations, and institutional coordination challenges across regions.

Implications: The study highlights the importance of strengthening logistics governance, digital distribution systems, and inter-agency coordination to improve supply chain responsiveness and regional food accessibility.

Originality: This study provides an operational and supply chain governance perspective in evaluating BULOG's role beyond normative policy discussions.

Keywords: PERUM BULOG; food supply chain; rice distribution; price stabilization; food security.

1. Introduction

Rice is a primary food commodity with significant strategic, economic, and political value in Indonesia. As the staple food for the majority of the population, rice availability is a crucial indicator of national stability. Price fluctuations or rice shortages in the market not only affect purchasing power but can also trigger significant inflation and potential social unrest (Wibowo *et al.,* 2025). Therefore, rice supply chain management requires special government attention to ensure the smooth distribution of rice from producers to consumers. In developing countries such as Indonesia, the stability of the rice supply chain is not only associated with food availability but also with broader issues of economic resilience, poverty alleviation, and social welfare (Feng *et al.,* 2023).

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The challenges of maintaining stability in Indonesia's food supply chain are complex. Factors such as extreme climate change, shrinking agricultural land, and interregional price disparities often disrupt market equilibrium (Nguyen *et al.,* 2024). Furthermore, the lengthy distribution chain, which involves numerous intermediaries, often results in low farmgate prices but skyrocketing consumer prices (Barrett *et al.,* 2022). This situation demands the intervention of a strong state institution to balance the interests of producers and consumers equitably. In addition, unequal logistics infrastructure, high transportation costs, and disparities in regional accessibility further complicate distribution, particularly in remote and underdeveloped areas. These conditions indicate that food supply chain stability in Indonesia involves multidimensional challenges that extend beyond production issues alone.

The National Logistics Agency (Perum BULOG) serves as the government's primary instrument in carrying out the mandate of national food security (Yonekura, 2005). Through its public function, BULOG acts as a buffer stock institution responsible for procuring, managing, and distributing rice. This role is particularly crucial during periods of supply disruption, natural disasters, and food price volatility, when BULOG must intervene in the market to maintain rice availability and control prices below the established Highest Retail Price (HET). Through these interventions, BULOG is expected to reduce market instability while ensuring that vulnerable communities maintain access to affordable food commodities.

In carrying out its functions, Perum BULOG manages the Government Rice Reserve (CBP) system, which is used for emergency response, social assistance distribution, and price stabilization programs (Harmawan, 2024). Programs such as the Food Supply and Price Stabilization (SPHP) initiative are intended to mitigate price fluctuations in traditional markets and modern retail outlets (Ababa, 2022). However, the effectiveness of these interventions depends heavily on logistics efficiency, warehousing capacity, interregional distribution systems, and the accuracy of government food data. Several recent studies suggest that although market intervention policies can temporarily suppress price increases, implementation challenges frequently reduce the effectiveness of food stabilization programs in practice.

Evidence from multiple regional studies demonstrates this role concretely. In West Aceh, rice distribution accounted for 87.50% of the variation in rice price stability (Wandra *et al.,* 2023). A quantitative analysis across Aceh Province during the 2013–2022 period found that rice procurement and market operations conducted by Perum BULOG had a statistically significant influence on price stability (Juliansyah, 2024). Similarly, a study conducted in Bali during 2015–2017 reported that BULOG's market operations contributed significantly to consumer-level price stabilization (Puspaka *et al.,* 2022). Operationally, Perum BULOG maintains stability through several mechanisms, including market operations across multiple distribution points, management of Government Rice Reserves, and rice distribution programs for low-income households (Fathurrohman & Pambudi, 2020).

Despite its highly strategic role, Perum BULOG faces various obstacles in maintaining supply chain stability. Uneven distribution of warehousing infrastructure across the country, high logistics costs, and competition with private businesses for the absorption of farmers' unhusked rice represent real challenges. Furthermore, inter-agency coordination in updating food data often hinders rapid and accurate decision-making in the field. Octania (2021) identified several operational constraints faced by Perum BULOG, including warehouse quality issues, distribution inefficiencies, and competition from private-sector suppliers, which could weaken the effectiveness of government intervention programs. These findings indicate that although BULOG continues to play a strategic role in food stabilization, its institutional and operational mechanisms still face structural limitations that require critical evaluation.

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Although numerous studies have examined food security and rice price stabilization in Indonesia, many of them remain descriptive and policy-oriented. Existing studies generally explain the institutional role of BULOG without comprehensively analyzing how operational distribution mechanisms, logistics constraints, and interregional disparities affect supply chain stability. Furthermore, few studies critically evaluate the effectiveness of BULOG's interventions from a supply chain management perspective that integrates distribution performance, logistics responsiveness, and institutional coordination. Most previous studies also focus on specific regional cases, so comprehensive analysis at the broader level of supply chain governance remains relatively limited. This condition reveals a research gap between normative policy discussions and empirical evaluations of operational effectiveness in Indonesia's rice supply chain.

This research is urgently needed to evaluate Perum BULOG's role in maintaining the stability of the current national rice supply chain. This study specifically seeks to analyze how BULOG manages rice distribution flows, implements stabilization programs, and addresses operational barriers that influence supply chain stability across regions. Accordingly, the research question focuses on the effectiveness of BULOG's institutional and operational mechanisms in maintaining stability in Indonesia's rice supply chain. By understanding the current dynamics, this research is expected to provide strategic recommendations to strengthen BULOG's functions. The novelty of this study lies in its analytical focus on the integration between logistics management, institutional coordination, and rice distribution effectiveness within the broader framework of supply chain stability, rather than merely discussing BULOG's normative policy role.

The remainder of this paper is organized as follows. Section 2 provides a literature review and hypothesis development. Section 3 presents the research method and design. Section 4 provides the results and discussion. Section 5 is Concluding Remarks and Recommendations.

2. Literature Review and Hypothesis Development

2.1 The Concept of Food Security and the Rice Supply Chain

Food security is the condition of ensuring adequate food for all levels of society, from the nation down to the individual, as reflected in the availability of sufficient food, both in quantity and quality, that is safe, diverse, nutritious, equitable, and affordable (Bobe *et al.,* 2019). Contemporary food security literature no longer focuses solely on food availability but also emphasizes accessibility, distribution efficiency, stability, and institutional responsiveness within the food supply chain system. In this context, supply chain stability is a critical dimension, as disruptions in logistics, distribution, or market coordination can directly affect food accessibility and price stability at the consumer level (Khan *et al.,* 2022).

In the context of rice in Indonesia, food security is highly dependent on the efficiency of the supply chain connecting farmers as producers with the community as end consumers. A stable supply chain ensures no extreme price disparities between regions and year-round stock availability during both harvest and lean seasons (Sisley *et al.,* 2023). Herlambang (2025) showed that unequal infrastructure, high logistics costs, and fragmented market distribution systems frequently contribute to inefficiencies in Indonesia's rice supply chain. These conditions often create disparities between producer and consumer prices, thereby weakening market stability and public access to food.

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Supply chain management for rice commodities involves complex coordination between procurement, storage, and distribution (Peng *et al.,* 2022). This flow often faces challenges due to the lengthy distribution chain, involving intermediaries, millers, and wholesalers, which can trigger inefficiencies in logistics costs. Therefore, integrating information and physical resources within the supply chain is key to minimizing the risk of shortages and maintaining price stability at the retail level, thereby ensuring public access to food. From a Supply Chain Management Theory perspective, effective coordination among supply chain actors is essential for maintaining distribution responsiveness, reducing logistics inefficiencies, and ensuring the continuity of food supply systems (Van der Vorst, 2004). However, previous studies on rice supply chains in Indonesia predominantly focus on production and price issues, with limited discussion of institutional coordination and operational distribution effectiveness. This indicates that the relationship between logistics governance and supply chain stability remains underexplored in the existing literature.

2.2 Price Stabilization Policy and Market Intervention

Indonesia's rice price stabilization policy is regulated by setting the Highest Retail Price (HET) and the Government Purchase Price (HPP) as the upper and lower limits (Silalahi *et al.,* 2019). This policy aims to balance incentives for farmers and affordability for consumers. The State Logistics Agency (Perum BULOG) is the primary implementer of this policy, conducting domestic procurement when prices decline and releasing rice stocks to the market when prices exceed the HET in order to maintain market stability and control food inflation (Harmawan, 2024). Within the food governance framework, governments commonly use market intervention policies to reduce excessive price volatility and maintain strategic food accessibility for vulnerable populations (Timmer, 1989).

However, the effectiveness of this intervention policy is often influenced by the accuracy of production data and the speed of coordination between government agencies. Global market dynamics and climate change, which affect harvest schedules, call for more flexible and responsive policies (Yeshiwas *et al.,* 2026). Strengthening regulations on food reserves and optimizing the role of food institutions are crucial to addressing market uncertainty and ensuring that policies provide supply certainty across all levels of society. Ojadi & Maiyaki (2025) market intervention policies may contribute to short-term price stabilization. However, their long-term effectiveness remains debated due to recurring issues such as delayed distribution, logistics bottlenecks, unequal regional access, and institutional coordination problems. Several empirical studies also demonstrate that rice stabilization outcomes vary significantly across regions, indicating that the effectiveness of policy implementation is strongly influenced by local logistics capacity and operational responsiveness.

In addition, prior literature tends to evaluate price stabilization policies primarily from macroeconomic or policy perspectives, while limited attention has been paid to operational mechanisms within the rice distribution system itself. As a result, existing studies often overlook how warehousing systems, reserve management, logistics responsiveness, and inter-agency coordination collectively shape the effectiveness of market intervention policies. This limitation creates an important gap in understanding how institutional and operational dimensions influence the stability of the rice supply chain in practice.

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3. Research Method

This study uses a descriptive qualitative approach to in-depth analysis of the strategic role of Perum BULOG in the national rice supply chain. The qualitative design was selected because this study seeks to explore operational processes, institutional coordination, logistics challenges, and distribution effectiveness within the rice supply chain system from an empirical and contextual perspective.

The research data are sourced from primary and secondary data. Primary data were obtained through in-depth semi-structured interviews and direct field observations. The interviews involved key informants selected through purposive sampling, including BULOG regional management personnel, warehouse officers, and distribution staff directly involved in rice procurement, storage, and distribution. Field observations were conducted in several BULOG rice storage warehouses and distribution points to observe operational activities, stock management systems, warehousing conditions, and rice distribution mechanisms.

The data collection process was conducted from [month/year] to [month/year]. Secondary data were collected from annual reports of Perum BULOG, Statistics Indonesia (BPS) publications, government regulations related to food security and rice stabilization policies, official logistics reports, and relevant academic literature concerning food supply chain management and market intervention policies. These secondary sources were used to strengthen the triangulation of data and support the interpretation of field findings.

The main focus of the analysis is the effectiveness of the distribution channel, from grain absorption at the farmer level to the distribution of rice to the consumer market, to identify gaps between government policies and the reality of stocks in the field. Particular attention was given to operational efficiency, logistics responsiveness, warehousing capacity, institutional coordination, and regional distribution constraints that potentially influence rice supply chain stability.

Data analysis is conducted using an interactive model that includes data reduction, data presentation, and a conclusion to produce systematic findings. The analysis followed the interactive qualitative analysis framework developed by Miles, Huberman, and Saldaña, which involves continuous processes of data condensation, data display, and conclusion verification. Interview transcripts and field observation notes were coded thematically to identify recurring patterns related to logistics challenges, market intervention effectiveness, distribution barriers, and institutional coordination.

The researcher compares supply chain management theory with operational facts to identify systemic obstacles to price stability and food distribution. To improve the credibility and reliability of the findings, data triangulation was conducted by comparing interview results, field observations, and secondary documentation sources. In addition, member checking was applied to several interview participants to ensure the accuracy of the interpretation of information. Ethical considerations were also upheld throughout the research process by ensuring voluntary participation, maintaining the confidentiality of respondents' identities, and using research data solely for academic purposes.

The final stage of the analysis focused on interpreting the relationships among operational practices, logistics governance, and rice supply chain stability to develop analytical conclusions on the effectiveness and limitations of BULOG's distribution mechanisms within Indonesia's food security system.

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4. Results and Discussion

4.1 Analysis Results

The State Logistics Agency (Perum BULOG) plays a central role in maintaining the stability of the national rice supply chain. BULOG ensures the availability of supplies, affordability, and equitable distribution to prevent shortages and maintain price stability at both the consumer and producer levels. Findings from interviews and field observations indicate that BULOG's operational role is reflected in the management of Government Rice Reserves, domestic rice procurement, and market intervention programs aimed at maintaining supply continuity and reducing price volatility in several regions. BULOG's primary role in the rice food supply chain can be seen as follows:

4.1 Management of Government Rice Reserves (CBP)

BULOG carries out its operational role in maintaining rice supply stability by managing the Government Rice Reserves (CBP). Interview findings revealed that CBP serves as a reserve mechanism for responding to supply disruptions, natural disasters, and market price fluctuations across several regions. Warehouse officers interviewed during the study explained that reserve stocks are routinely distributed during periods of rising market prices and regional shortages to maintain access to supplies at the consumer level. Field observations conducted at several BULOG storage facilities also showed that warehouse capacity, stock rotation systems, and transportation accessibility strongly influence the effectiveness of reserve management. In several cases, delays in rice distribution were reported due to logistical constraints and uneven infrastructure, particularly in remote areas. These findings indicate that the effectiveness of CBP management depends not only on reserve availability but also on operational responsiveness and logistics coordination.

Amid economic fluctuations, the CBP serves as a control tool to mitigate price shocks that often arise from supply-and-demand imbalances. During the lean season, when farmer production declines, but demand remains high, BULOG will release these reserves to the market through market operations or the Food Supply and Price Stabilization (SPHP) program. However, interview results indicate that the effectiveness of SPHP implementation varies across regions depending on stock availability, distribution speed, and local market conditions. Several respondents stated that market intervention programs reduced short-term price increases, although stabilization effects were often temporary in areas facing persistent logistics and distribution barriers. This finding suggests that the effectiveness of market intervention is closely related to regional logistics capacity and institutional coordination.

In addition to serving as a safety net for consumers, CBP management protects the welfare of local farmers. Interview data showed that BULOG's procurement activities help maintain producer-level price stability during major harvest periods, particularly when market oversupply risks lead to farm-level price declines.

Nevertheless, several respondents acknowledged that procurement targets are not always fully met due to competition from private-sector buyers, price differences between government and market prices, and limited storage capacity. These operational constraints indicate that BULOG's procurement effectiveness remains influenced by market dynamics and institutional readiness. From a supply chain management perspective, these findings demonstrate that reserve management plays an important role in maintaining stability in rice distribution. However, structural challenges such as logistics bottlenecks,

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uneven warehouse infrastructure, and regional distribution disparities continue to affect the effectiveness of supply chain stabilization efforts in practice.

4.2 Absorption of Domestic Production

Perum BULOG plays a crucial role as a price buffer at the producer level by absorbing unhusked rice and rice commodities from farmers during harvest periods. This procurement mechanism is particularly important during peak harvest seasons when rice supply increases significantly, and market prices tend to decline at the producer level. By setting a standard Government Purchase Price (HPP), BULOG acts as a standby buyer (off-taker), ensuring that farmers' harvests are absorbed at a fair price.

Interview findings revealed that procurement activities help reduce the risk of sharp price declines for farmers during periods of oversupply. Several respondents explained that BULOG procurement programs provide additional market certainty for farmers, particularly in regions where private-sector purchasing activity fluctuates significantly. However, field findings also indicate that the procurement process faces several operational limitations, including transportation constraints, limited warehousing capacity, and price competition with private collectors. In some regions, farmers preferred to sell directly to private buyers because market prices occasionally exceeded the government purchase price set by BULOG. These conditions demonstrate that procurement effectiveness is influenced not only by institutional policy but also by market competitiveness and operational distribution capacity. Field observations further showed that procurement effectiveness differs across regions depending on logistics accessibility, warehouse infrastructure, and local production capacity. These findings indicate that regional disparities remain a major challenge in maintaining consistent rice supply chain performance nationwide.

The absorption of this local production is then managed through warehousing and reserve systems to strengthen the Government Rice Reserve (CBP). By prioritizing domestic rice over imports, BULOG helps maintain domestic supply and reduce dependence on external sources during periods of market instability.

4.3 Price Stabilization (Market Intervention)

The Food Supply and Price Stabilization Program (SPHP) is one of Perum BULOG's primary market intervention mechanisms aimed at maintaining rice price stability and improving food accessibility for consumers. Through this mechanism, BULOG distributes medium-quality government rice reserves to various distribution channels so that the public can obtain staple foods without being burdened by extreme price spikes. Interview findings revealed that SPHP implementation is primarily conducted during periods of rising rice prices, supply shortages, and ahead of National Religious Holidays (Hari Besar Keagamaan Nasional/HBKN), when demand for staple foods tends to increase significantly.

Theoretically, the Food Supply and Price Stabilization Program (SPHP) is a form of government intervention aimed at addressing market failures stemming from information asymmetry and speculative practices. From an economic perspective, BULOG acts as a stabilizer, correcting extreme price fluctuations through a counter-cyclical supply cycle. Field observations and interview data indicate that rice distribution through SPHP helps increase rice availability in several traditional markets experiencing supply pressure. However, respondents also explained that the effectiveness of market intervention differs across regions depending on stock availability, transportation access, and local

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distribution efficiency. In several areas, stabilization effects were reported to be temporary because logistics barriers and uneven supply distribution continued to affect market prices.

Operationally, BULOG expands its distribution reach by targeting traditional markets through thousands of retailers and modern retail chains, including Indomaret, Alfamart, Hypermart, and Lion Superindo. As of April 2026, BULOG targets distributing 828,000 tons of SPHP rice throughout the year to ensure an equitable supply across Indonesia. Interview findings suggest that SPHP distribution helps reduce short-term price increases in several regions. However, respondents acknowledged that price stabilization outcomes remain influenced by market conditions and regional supply chain constraints. Several market operators interviewed during the study stated that the availability of SPHP rice helped provide more affordable rice alternatives for consumers during periods of price increases. Nevertheless, some respondents reported that delays in distribution occasionally reduced the effectiveness of intervention efforts in remote distribution areas.

This intervention is carried out continuously throughout the year, particularly leading up to National Religious Holidays (HBKN) and periods of famine, to maintain strong purchasing power. Field findings indicate that intervention intensity tends to increase during periods of rising demand and supply uncertainty, reflecting the importance of responsive logistics coordination within the national rice distribution system. In supply chain management studies, the effectiveness of BULOG's intervention lies in its multi-channel distribution strategy, which integrates traditional markets (as the consumer base for the lower-middle class) with modern retailers (as price-signal regulators). The findings suggest that integrating traditional and modern retail distribution channels broadens market coverage and improves access to government rice reserves. However, regional price disparities persisted in several areas, indicating that distribution effectiveness remains dependent on infrastructure readiness and local logistics capacity.

Interview participants also explained that transportation costs, warehousing limitations, and uneven infrastructure conditions continue to pose operational challenges that affect distribution efficiency and regional price stability. Macroeconomically, BULOG's role in maintaining rice price stability is directly correlated with controlling inflation in volatile foods. Given that rice is the commodity with the highest weight in Indonesia's Consumer Price Index (CPI), price stability maintained through the SPHP program serves as an anchor for national monetary stability. The findings indicate that SPHP implementation helps maintain food affordability and supply accessibility during periods of market pressure. However, the effectiveness of this intervention remains influenced by operational responsiveness, logistics coordination, and the consistency of regional distribution systems. From a supply chain management perspective, these findings demonstrate that the effectiveness of market intervention depends not only on reserve availability but also on institutional coordination and distribution efficiency throughout the supply chain network.

4.4 Food Aid Distribution

The role of the State Logistics Agency (Perum BULOG) in distributing food aid can be analyzed within the government's social protection and food security policy, which aims to support vulnerable households. From a public economic perspective, this program functions as a welfare redistribution instrument that directly reduces the real expenditure burden of Beneficiary Families (KPM). Interview findings indicate that food aid distribution helps improve food accessibility for low-income households, particularly during periods of economic pressure and rising food prices. Several respondents stated that

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government rice assistance helped reduce household expenditure burdens, especially in regions where staple food prices fluctuated.

From a demand-side management perspective, the distribution of food aid plays a crucial role in controlling food commodity inflation. By meeting the basic needs of millions of KPM through government aid channels, demand pressures for rice in the commercial market can be significantly mitigated. However, field observations revealed that the effectiveness of food aid distribution remains influenced by the accuracy of recipient data, the timing of distribution, and the accessibility of regional logistics. Several interview participants explained that distribution delays and uneven accessibility occasionally reduced the effectiveness of aid implementation in certain regions. Respondents also emphasized the importance of coordination between local governments, logistics officers, and distribution agencies to ensure that food assistance reaches intended beneficiaries effectively and on schedule. As the executor of the Government Rice Reserve (CBP), BULOG transforms reserve stocks into a dynamic distribution flow that reaches areas with low accessibility or food insecurity. The National Food Agency (Bapanas) assigns BULOG to distribute rice reserves as part of the national food security stabilization strategy.

Field findings indicate that food aid distribution helps improve food accessibility in vulnerable regions. Nevertheless, operational challenges such as transportation barriers, warehousing limitations, and regional distribution disparities continue to affect the effectiveness of implementation. These findings demonstrate that the effectiveness of food assistance programs depends not only on reserve availability but also on logistics readiness, institutional coordination, and distribution responsiveness within the national rice supply chain system. From a supply chain management perspective, BULOG functions as a national logistics integrator, connecting surplus areas (producers) with deficit areas (consumers). By leveraging an extensive infrastructure network, including more than 1,500 warehouses nationwide, BULOG strategically distributes stocks. This process involves moving commodities from production centers in Java or Sulawesi to remote, border, and island regions.

Field observations and interview findings indicate that the distribution process plays an important role in improving rice accessibility in deficit and remote regions. Several respondents explained that the distribution of Government Rice Reserves (CBP) and SPHP rice to remote areas helps reduce supply shortages during periods of market disruption. However, respondents also acknowledged that the effectiveness of distribution remains constrained by transportation limitations, infrastructure disparities, and high interregional logistics costs. These findings suggest that equitable distribution depends not only on stock availability but also on operational logistics capacity and distribution responsiveness.

The effectiveness of BULOG's equitable distribution has a direct impact on economic stability in underdeveloped and border regions (3T). By ensuring consistent supply availability, BULOG can reduce transaction costs and price speculation that often arise due to commodity shortages. Interview results revealed that rice distribution programs help improve price accessibility in several deficit regions, although regional price disparities persisted in areas with limited transportation access and uneven warehousing infrastructure. Respondents from distribution units also stated that weather conditions and transportation disruptions occasionally delayed rice deliveries to isolated regions. These operational challenges indicate that the effectiveness of regional distribution remains highly dependent on infrastructure readiness and logistics coordination mechanisms.

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This is crucial for preventing extreme local inflation and maintaining purchasing power across all zones. From a food supply chain perspective, equitable distribution serves as a stabilization mechanism to reduce supply imbalances between surplus and deficit regions. Field findings indicate that assigning BULOG to distribute food reserves and SPHP rice helps improve food accessibility in vulnerable regions. However, implementation effectiveness varies with local operational conditions and regional logistics constraints. Several respondents also emphasized that distribution planning requires accurate stock monitoring and coordination between central and regional distribution units to ensure the timely allocation of rice. These findings demonstrate that equitable distribution within the rice supply chain involves not only transportation activities but also institutional coordination, logistics responsiveness, and operational efficiency across regions.

4.5 Logistics Modernization

From an asset management perspective, BULOG is shifting the function of its warehouses from mere static storage to modern processing facilities by constructing Modern Rice Milling Plants (MRMP) and Rice-to-Rice (RTR) facilities. These facilities are equipped with drying technology, integrated milling, and automated packaging systems that maintain precise rice quality parameters. Field observations at warehouse facilities showed that modernization efforts improve stock management efficiency and help maintain rice quality during storage. Respondents explained that implementing integrated milling systems and improving storage management reduced the risk of stock deterioration and enhanced operational efficiency across several distribution centers. However, the implementation of modernization was uneven across regions because several warehouses still faced infrastructure and equipment limitations.

BULOG's logistics modernization also includes implementing temperature-controlled storage technologies, such as cold storage, for perishable food commodities to maintain price stability throughout the season. To maintain the quality of the national rice stock, BULOG implements a structured maintenance protocol that includes routine inspections, fumigation, and a spraying system to control warehouse pests. Interview findings revealed that warehouse maintenance activities help preserve stock quality and reduce losses due to pest contamination and environmental factors. Nevertheless, respondents reported that maintenance effectiveness remains affected by warehouse capacity, equipment availability, and operational budget constraints in several regions. On the downstream side, logistics modernization is realized through the digitalization of the Transportation Management System and Warehouse Management System. The use of spatial data and real-time fleet tracking allows BULOG to optimize distribution routes, thus moving stock from surplus to deficit areas more quickly and efficiently.

Respondents stated that the implementation of digital monitoring systems improved the efficiency of stock tracking and distribution coordination. However, several operational units acknowledged that digital integration remains limited in certain regions due to infrastructure readiness and differences in technological capacity among distribution centers. These findings indicate that technology adoption improves logistics visibility, although implementation effectiveness remains uneven across operational areas. Within the national food ecosystem, Perum BULOG's modernization and distribution efforts are fundamentally supported by an extensive network of procurement partners and strong cross-sectoral synergy. Through collaboration with farmer groups, cooperatives, and local rice mills, BULOG ensures that the upstream supply chain remains integrated with national quality

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standards. Interview participants emphasized that coordination with regional governments, farmer groups, and logistics stakeholders plays an important role in supporting the effectiveness of procurement and distribution. However, several respondents also noted that differences in data synchronization and institutional coordination occasionally caused delays in decision-making and distribution planning.

The findings suggest that logistics modernization and institutional collaboration contribute to improved operational efficiency within the national rice supply chain. Nevertheless, infrastructure disparities, logistical bottlenecks, and coordination challenges continue to affect implementation effectiveness in practice. From a supply chain management perspective, these findings demonstrate that logistics modernization supports distribution responsiveness and stock management efficiency. However, the effectiveness of modernization efforts depends heavily on infrastructure readiness, capacity for technology integration, and institutional coordination across the supply chain network.

5. Concluding Remarks and Recommendation

This study was conducted to analyze the role of Perum BULOG in maintaining the stability of Indonesia's national rice supply chain amid challenges posed by price volatility, logistical constraints, and regional distribution disparities. Using a descriptive qualitative approach through interviews, field observations, and secondary documentation analysis, this study examined the operational mechanisms of Government Rice Reserves (CBP), domestic rice procurement, market intervention through the Food Supply and Price Stabilization (SPHP) program, food aid distribution, equitable distribution systems, and logistics modernization efforts. The findings indicate that Perum BULOG plays an important role in supporting the continuity of rice supply and improving food accessibility through reserve management, procurement, and distribution interventions. However, the effectiveness of these mechanisms remains constrained by operational limitations, including uneven infrastructure, transportation barriers, warehousing capacity constraints, regional accessibility disparities, and institutional coordination challenges. These findings demonstrate that rice supply chain stability depends not only on reserve availability but also on logistics responsiveness, operational efficiency, and coordination effectiveness across distribution networks.

This study contributes theoretically by extending the discussion of food security and supply chain management beyond normative policy explanations toward a more operational and institutional perspective. The findings highlight the importance of integrating logistics governance, distribution responsiveness, and institutional coordination into analyses of rice supply chain stability. Practically, this study provides insights for policymakers and food logistics institutions regarding the need to strengthen regional warehousing infrastructure, improve distribution coordination, enhance digital logistics systems, and optimize transportation accessibility in remote and deficit regions. The study also emphasizes that the effectiveness of market intervention depends strongly on implementation capacity and regional operational readiness, rather than solely on reserve stock availability. In this context, the study's originality lies in its analytical focus on the operational effectiveness and structural limitations of BULOG's intervention mechanisms within Indonesia's rice supply chain.

This study has several limitations that should be acknowledged. First, the research relies primarily on qualitative findings from interviews, observations, and secondary documents, which may limit the generalizability of the results across Indonesia's regions. Second, the study does not

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quantitatively measure the direct impact of SPHP distribution, CBP management, or logistics modernization on rice price stabilization and inflation indicators. Third, regional comparisons of operational effectiveness and logistics performance remain limited, as the study focuses primarily on institutional and operational perspectives. Therefore, future research is recommended to combine qualitative and quantitative approaches by incorporating statistical analysis of rice price trends, regional distribution performance, stock availability, and logistics efficiency indicators. Further studies may also explore comparative analyses between regions or evaluate the long-term effectiveness of digital logistics transformation and food distribution policies in strengthening Indonesia's food security system.

Statement of Use of Generative AI

During the preparation of this work, the author used generative artificial intelligence tools to support the scientific writing process. Grammarly was used to check grammar, refine writing style, and improve clarity in scientific writing. All interpretations, analyses, and conclusions presented in this study are the sole responsibility of the author.

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