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RESEARCH ARTICLE

Rice Price Dynamics and Market Structures: Rice Policy, Value Chains, and the National Food Agency in Indonesia

Hendy Febrianto Kurniawan [a], Mohamad Dian Revindo [b], Rizky Deco Praha [a], & Naufal Zaki Arrafif [a*]

[a] Institute for Economic and Social Research, Faculty of Economics and Business, University of Indonesia, Depok, Indonesia

[b] Graduate School of Sustainable Development, University of Indonesia, Jakarta, Indonesia

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CORRESPONDING AUTHOR
The corresponding Author 's Naufal Zaki Arrafif
n.zakiarrafif@gmail.com

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ABSTRACT
This study examines how rice supply chain fragmentation, government price interventions, and institutional governance interact in shaping rice market outcomes in Indonesia. It evaluates the alignment of government purchase prices (HPP) and retail price ceilings (HET) with market prices and assesses the emerging governance role of the National Food Agency (NFA). Using a qualitative institutional case study supported by descriptive price analysis, the study examines monthly producer, milling, and retail price data from Statistics Indonesia for January 2017–June 2023. Market prices are compared with prevailing HPP and HET benchmarks, complemented by documentary analysis of rice distribution structures, regulatory frameworks, and institutional responsibilities. The results reveal persistent discrepancies between regulated and observed prices. Farm-gate and milling-level grain prices exceeded HPP benchmarks by an average of 21.98% and 13.67%, respectively, while retail rice prices periodically exceeded HET, particularly in Zone 1. Fragmented distribution networks and multiple intermediary layers further complicate price coordination. These patterns suggest limitations in the operational effectiveness of price interventions and highlight constraints on BULOG's procurement activities. The establishment of the NFA provides an institutional basis for improved coordination, although its longer-term effectiveness remains uncertain. The study integrates supply chain structure, regulatory price gaps, public procurement constraints, and institutional governance into a unified analytical framework. It contributes to agricultural market governance literature by highlighting the importance of aligning price-setting mechanisms with market conditions, distribution structures, and institutional capacity in emerging economies.

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1. INTRODUCTION

The Indonesian rice supply chain is characterised by extensive layers of production, processing, and distribution, involving numerous intermediaries between farmers and retailers. This fragmentation frequently undermines national goals of price stability and farmer welfare. From an economic perspective, tracing these value chain nodes is essential, as each stage incurs costs that inflate final prices. However, two primary

"supply chain barriers" impede this traceability: the prevalence of informal upstream intermediaries and imperfect competition, alongside bureaucratic formalities that prevent direct market access for farmers. Streamlining these institutional and market boundaries remains a critical priority for ensuring a more efficient domestic rice market.

Breaking down these chain barriers, minimising intermediaries' role, and optimising rice market supply chain has been vital to food policy issues globally. In fact, over the decades, policies favouring more direct and transparent supply chains have been widely implemented (Aubry & Kebir, 2013; IFC, 2013). These policies encourage to shorten the supply chain by sourcing directly from producers, thereby bypassing multi-layered and non-transparent intermediary channels. The main concerns driving this policy shift include health, safety, quality, and productivity issues. Most importantly, reducing supply chain barriers is expected to drive down prices and, thus, offer consumers cheaper and healthier access to agricultural commodities.

In Indonesia, National rice policy has shifted toward integrated interventions that address production, distribution, and institutional frameworks. By investing in infrastructure and incentivising productivity, the government seeks to streamline agricultural practices and reduce systemic inefficiencies. They also subside prices at the consumer level to maintain consumers' purchasing power. From an institutional aspect, the government has mandated several institutions to coordinate under the newly formed National Food Agency (NFA/Bapanas) to administer food policies, especially rice. However, these policies have yet to focus on handling the market rice supply chain. This intervention serves as a critical mechanism through which public institutions exercise control and provide support within the agri-food system (Brooks, 1995).

With the establishment of NFA and the seemingly growing appetite for reforms, some institutional and implementation hurdles remain. Domestic prices remain volatile, and as pressures from the internal market grow, more interventions from the government are expected. On the other hand, domestic market players—farmers and consumers—are vulnerable to shocks from rising production costs, rising consumer prices, and various structural problems inhabiting the agriculture market in Indonesia. The government's business-as-usual policy reliance on import and international markets may not be enough to mitigate the problems in the long term (Kurniawan, et al., 2026) Structural interventions through the implementation of top-down policies are possible from the government. The consolidation of authority within a single body, replacing previously overlapping ministerial mandates, provides an opportunity for more concerted policies along the agriculture supply chain, especially rice. Consequently, assessing NFA's role against existing market conditions is crucial. By analysing rice policy through this institutional lens, this research aims to identify pathways for improved market stability and enhanced welfare for stakeholders across the value chain.

The primary contribution of this article it to examine Indonesia's food security and agriculture sector governance, in particular rice commodity. This study integrates four aspects, previously examined separately into a single institutional-price framework. We integrate analysis on market structure and intermediary layers, HPP/HET price-gap

evidence, BULOG's procurement policy and constraints, and NFA's constitutional mandate in the rice market. The study is focused on two critical structural dimensions that determine policy outcomes: (1) the descriptive mapping of domestic rice price deviations relative to government-mandated price controls (HPP/HET), and (2) the structural length and inefficiencies within the rice value chain. By synthesising these descriptive empirical findings with an institutional analysis, this manuscript contributes a comprehensive evaluation of how food governance frameworks can be optimised to improve domestic market alignment. Overall, the study offers a forward-looking pathway to transform Indonesia's traditional rice trade into a transparent and competitive national industry.

2. LITERATURE REVIEW

2.1 Theoretical Foundations: Market Equilibrium, Price Mechanisms, and Agricultural Policy

Neo-classical economics suggests that the market's pricing, output, and income distribution are done through the mechanism of demand and supply (Solo, 1975). The basic assumption is that each maximises utility and maximises profits. As an illustration, rational choice theory suggests that individuals act independently based on complete and relevant information.

Theoretically, consumer-level demand can be directly reconciled with producer-side supply to determine market equilibrium (Dixit, 1996; Williamson, 2005). The primary assumption is: first, individual behaviour is perfectly rational. It rests upon the tenets that (a) individuals behave with maximizing utility, and (b) individuals behave individualistically. Second, the model assumes perfect information and product homogeneity. Perfect information is a prerequisite for a perfectly competitive market, implying zero transaction costs and instantaneous delivery (timelessness). Furthermore, identical products denote that goods are perfectly homogeneous and indistinguishable to the consumer.

Price is the value of goods and services that reflects the willingness of consumers to pay based on the value of their utility, and the outpouring of resources producers use to produce them. The degree of purchasing power available to a consumer dictates their ability to procure specific goods and services within the market. Price is one of the considerations in exchanging ownership rights, which is an essential basis in commercial transactions. Prices can be set by (a) The exact price that has been determined through the contract, (b) The future price is determined according to a mutually agreed formula, (c) The market price is determined through a bargaining process between the interested parties (producers and consumers). In trade, prices are determined by (a) The buyer's willingness to pay for goods/services, (b) The seller's willingness to accept payment for goods/services, and (c) The willingness of competitors to release their goods/services.

Almost every country implements agricultural development policies to increase agricultural production. As Gardner said, “Agricultural policy is ubiquitous and contentious” (Gardner, 1987; Sadoulet & de Janvry, 1995). Agricultural policy is essential; however, the justification for specific measures varies significantly, often creating a necessitating difficult trade-offs between competing policy objectives (Sadoulet & de Janvry, 1995; P. Timmer et al., 1983). Agricultural policy is generally classified as a redistributive or Political Economic Seeking Transfers (PEST), a political-economic issue (Pope & Hallam, 1986; Rausser, 1992; Sadoulet & de Janvry, 1995). The main argument for the importance of agricultural development policy is carefully designed through a comprehensive policy analysis (Simatupang, 2003).

Recent empirical work on Indonesia's rice market provides more contemporary grounding for these theoretical mechanisms. Kharisma and Indrawan (2023) find asymmetric vertical price transmission between farmer- and consumer-level rice prices in West Java, attributing the asymmetry to non-competitive behaviour among intermediary traders in concentrated local markets. Complementing this, Rachmadhan and Wijayati (2024) calculate rice price margins at each level of the supply chain — producer, wholesaler, and retailer — across six provinces on Java Island, providing a directly comparable margin-based benchmark rather than inferring inefficiency from price differences alone. These two studies anchor the present analysis in current (2023–2024) empirical evidence rather than relying solely on older price-transmission literature.

2.2 Price Control Policies and Governance in Indonesia

The agricultural policy applied can be in the form of a non-price or price policies. The Indonesian government has long implemented non-price and price policies for rice commodities to increase production and stabilize prices. However, At the height of the bumper harvest, rice farmers often receive under-cost prices for production. More interventions in the form of non-price policies are needed to encourage farmers to increase production and maintain price stability. Therefore, the government needs to combine non-price and price policies (Sawit & Halid, 2010).

The supply chain strengthening strategy is one of the Indonesian government’s main policy directions in the Ministry of Agriculture Strategic Plan. Other policy directions are increasing productivity, utilising mechanisation, product development, product promotion, and expanding the agricultural product industry. The current government-owned rice farming Supply Chain Management (SCM) differs from its implementation. A report by the Centre for Indonesian Policy Studies (CIPS) contrasts the supply chain management (SCM) frameworks utilised by the state-owned enterprise BULOG with empirical survey data collected from farmers. (Octania, 2021). There are oligopsonistic differences that affect the upstream and downstream markets. Generally, the distribution process between farmers and consumers includes intermediaries, millers, wholesalers, and retailers. Characterised by upstream oligopsony and downstream oligopoly, the domestic rice market faces significant structural imbalances. Recent research advocates for SCM models designed for Indonesia’s fragmented smallholder

sector, emphasising alignment with actual implementation challenges (Perdana et al., 2020).

Price stabilisation remains a critical pillar of food policy, operationalised through various instruments including subsidies and the implementation of regulated floor and ceiling prices. Theoretically, both forms of price control, either floor price or ceiling price, left the market below its efficient outcomes. It would lead to shortages by capping prices below its efficient outcomes (in case of ceiling price) and oversupply if prices are kept higher than market clearing price (Figure 1). The implementation of such measures enables price volatility to be mitigated, ensuring market fluctuations remain within a more predictable range. For producers, stable food prices reduce risks and transaction costs. Stable market environment encourages long-term investments through increased certainty for all participants in the agriculture sector and it protects against price volatility for consumers (Dawe & Peter Timmer, 2012; Poulton et al., 2006).

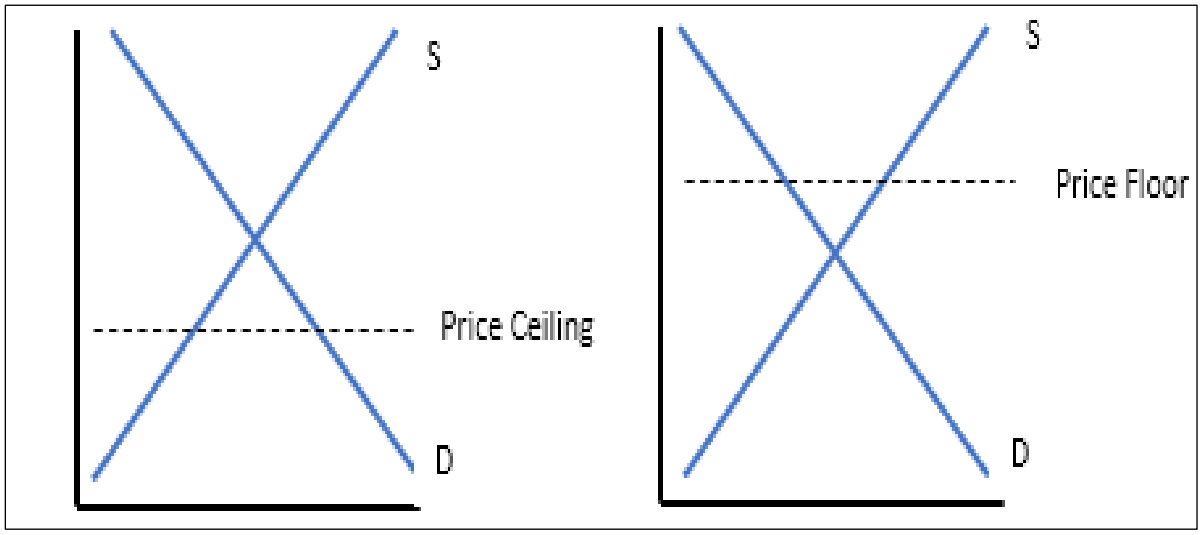


Figure 1. Ceiling and Floor Price

In addition to maintaining price through regulation, government across the globe often pursues price stabilization policies and interventions to protect food prices from volatile fluctuations by maintaining buffer stocks. Public procurement is utilised as an instrument to purchase an excess supply of food, preventing a fall in prices and then to distribute them into the market when prices are high. In essence, it functions as a counter-cyclical mechanism empowering authorities to automatically stabilise the market. The merits of such policies are subject to many criticisms, mainly due to their significant costs (i.e., the financial and opportunity costs of holding stocks) borne by the public and welfare costs for producers and consumers (Beaujeu, 2016; Cummings et al., 2006; C. P. Timmer, 1989). In the long run, price control alone would not meet its objectives without addressing the imbalances in the market themselves. Despite its drawbacks, ceilings and floor prices are still widely adopted to maintain price stability in food markets through government indirect interventions.

In Indonesia, a major hallmark of agriculture policy is the guaranteeing of minimum prices and ceiling prices by the government through BULOG. The government does not only rely on legal mechanisms to enforce its floor and ceiling price (HET) policies. Instead, it attempts to influence the prices by maintaining public stock for strategic commodities and the role of BULOG in purchasing and selling stocks under pre-determined prices (government procurement prices/HPP). Historically, much of Indonesia's government success of interventions can be attributed to the relative success of BULOG in its defence of price stability. This can be achieved not without, adequate funding and storage capacity (C. P. Timmer, 1996, 2002). However, the maintenance of artificial prices comes at a cost. Protectionists market, and thus, domestic market dependency, has left rice prices more susceptible to domestic volatilities, and its price, while relatively stable, remained higher than its global counterparts since the late 2000s (Fane & Warr, 2008; Warr & Yusuf, 2014).

3. METHODOLOGY

This study employs a qualitative research design utilising a desk literature review and an institutional case study approach, focusing on Indonesia's contemporary rice sector as the bounded system. The data collection relies entirely on secondary sources, purposively selecting national rice price datasets, relevant legislative frameworks, and policy documents spanning the targeted implementation timeline of national price controls. The primary data utilised are monthly farm-gate (GKP), milling-level (GKG), and retail rice price series published by Statistics Indonesia (BPS) for the period January 2017–June 2023. Analysis is conducted by cross-referencing price data series against government-mandated HPP and HET benchmarks published in the corresponding Ministry of Trade and Badan Pangan Nasional (Bapanas) regulations effective during the same period. This study deliberately selected 2017-June 2023 period as timeframe for the analysis due to the years spanning over the most recent HPP/HET regulatory regime for which complete monthly BPS price series were available at the time of analysis.

Data analysis is executed via a two-staged descriptive and thematic framework. First, quantitative price movements are descriptively mapped and systematically compared against the official floor and ceiling prices established by the government to identify periods of market divergence. Second, these trends are triangulated and synthesised alongside an analytical review of the institutional mandate of the newly established National Food Agency and by incorporating lesson learned from other country as case study. Further analysis is conducted by examining the prevailing literatures on Indonesia's rice market dynamics and value chain to contextualise the price structures in the market. Conclusions regarding future supply chain efficiencies and policy optimization are derived by synthesizing the observed structural price gaps with the analysis of Indonesia's rice market structure as ingredients for future improvement for government institutions' interventions. This ensures all forward-looking recommendations are grounded directly in the institutional evidence.

The conceptual framework of the study links the analysis of market structure to producer and consumer outcomes. As illustrated in figure 2, The framework traces a sequential analytical chain: (1) rice market structure and the role of intermediaries, (2) price transmission from farmer to retail level, (3) the position of government reference prices (HPP/HET) relative to observed market prices, (4) BULOG's and NFA's institutional intervention capacity, and (5) resulting outcomes for producers and consumers. Results and Discussions section is divided into parts corresponding to one stage of this framework.



Figure 2. Conceptual framework linking rice market structure, price transmission, government price controls, and institutional intervention to producer/consumer outcomes
Source: Authors' Illustration

4. RESULTS AND DISCUSSION

4.1 Rice Supply Chain and Structure

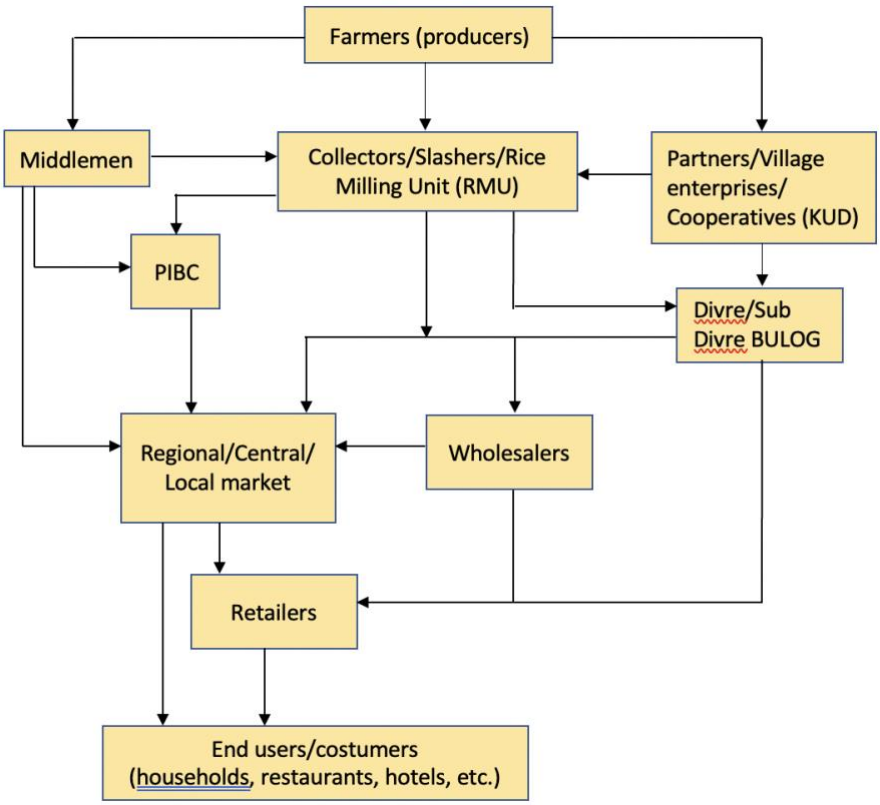


Figure 3. Formal domestic rice distribution structure/ supply chain in Indonesia
Source: Directorate General of Domestic Trade, Ministry of Trade, 2011; Hidayat (2020); modified by authors

Indonesian rice supply chain has long been characterised by its complexity and extensive length, which significantly impacts price transmission across market layers. Involving a multitude of commercial entities—from primary producers to final consumers—this fragmented structure creates market dynamics that necessitate frequent government intervention to stabilize stocks and prices. Furthermore, effective institutional governance is essential to ensure regional food security, preventing supply deficits in strategic areas and maintaining national distribution equilibrium (Yudhatama et al., 2021).

As illustrated in Figure 3, the distribution of grain and rice across Indonesia's primary production centres exhibits a structurally entrenched yet complex configuration. The data reveals a diverse ecosystem of supply chain participants, each varying significantly in their operational scale and the extent of their logistical networks.

Grain and rice supply chain actors comprised of farmers, rice slashers, collecting traders, business partners, KUD, village enterprises (BUMDes), BULOG, Rice Milling Unit (RMU), Cipinang Central Market (PIBC), inter-regional wholesalers, traders in parent and local markets, large and small retailers, to consumers. Most commodities are transported from production centres in villages to consumption centres in cities, where consumers are concentrated, especially in major cities such as Jakarta. Most rice produced in Java and its surrounding areas are then distributed through the PIBC.

4.2 The Maintenance of Ceiling and Floor Price in Indonesia's Rice Market

The Indonesian government has issued several policies in rice supply that focus on ensuring sufficient rice availability at stable and affordable prices for consumers. The government has assigned Perum BULOG as a State-Owned Enterprise (SOE) to manage government's rice stocks, including the purchase and distribution of agricultural products, which among others, include, rice. The government also regulates a minimum purchase price (HPP) policy for BULOG to pay and the highest retail price for consumers (Harga Eceran Tertinggi / HET) to buy in order to control prices (Hermanto, 2017). In contrast, HET is set for rice in the retail market and function as reference ceiling price. The government's aims to maintain the stability and balance of grain and rice prices at the farmer, mill, trader, and retail levels.

BULOG is mandated to procure grain following the HPP set by the government. HPP functions primarily as the government's own procurement reference price — the price at which BULOG purchases grain/rice on behalf of the government's rice reserve (Cadangan Beras Pemerintah). Since 2015, government HPP has changed thrice. In 2015, Presidential Instruction 35/2015 was enacted with the price of farmers' GKP of Rp3,700 and millers' GKG of Rp4,600. Starting in April 2020, the government imposed a price of farmers' GKP of Rp4,200 and millers' GKG of Rp5,250 based on Minister of Trade Regulation No. 24/2020. Later, NFA issued NFA Regulation No. 6/2023, which regulates the current price of GKP farmers at Rp5,000 and GKG millers at Rp6,200 since April 2023. However, despite government regulation, as illustrated on Figure 4, starting from June 2017, the monthly average prices for farmers' GKP and millers' GKG had remained

consistently higher than the HPP implemented by the government. Only during April 2021 to December 2021 period did the price of millers' GKG, dropped below HPP. Overall, on average, farmers' GKP and millers' GKG gap prices were higher by 21.98% and 13.67% than government HPP, respectively (Table 1).

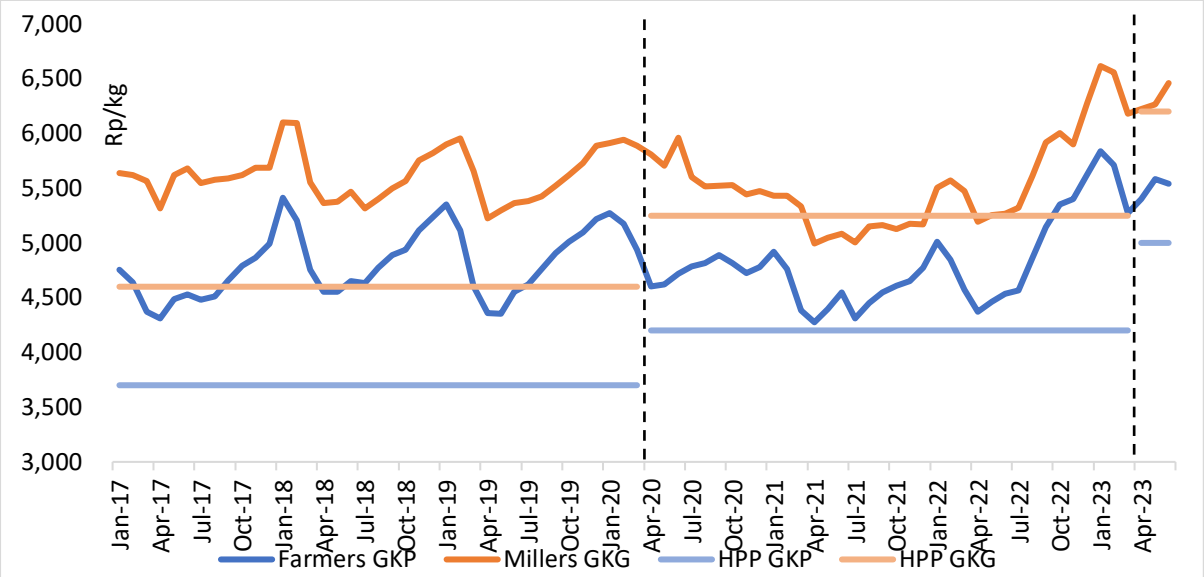


Figure 4. The monthly average price of farmers' GKP, millers' GKG, and government's purchase price (HPP) from 2017 – June 2023
Source: Statistics Indonesia

Data indicates that there are wide gaps between government HPP and actual prices received by farmers and millers in the market. The percentage price-gap reported in Table 1 is calculated as (market price − HPP) / HPP × 100%, computed separately for each of the three regulatory sub-periods identified. Government's HPP tend to be lower than what the market sets. However, there are periods in which the gap narrowed between the HPP and actual market price. In the first period of the study (January 2017 – March 2020), the average farmers' GKP and millers' GKG prices difference were higher by 29.89% and 22.16%, respectively. In the second period (April 2020 – March 2023), average farmers' GKP and millers' GKG gap prices were higher by 14.38% and 5.45%, respectively. In the third period (April – June 2023), average farmers' GKP and millers' GKG gap prices decreased to only higher by 10.17% and 1.86%, respectively.

Table 1. The monthly average difference price of actual farmers' GKP and millers' GKG to Government HPP

Monthly average actual gap to HPP price	Period 1	Period 2	Period 3	Total
Farmers' GKP	29.89%	14.38%	10.17%	21.98%
Millers' GKG	22.16%	5.45%	1.86%	13.67%

Source: Author's Calculations
Notes: GKP = Gabah Kering Panen (harvested dry grain); GKG = Gabah Kering Giling (milled dry grain); HPP = Harga Pembelian Pemerintah (government purchase price). Gap (%) = (market price − HPP) / HPP × 100%

HET dynamics, however, reflects a rather different story. In September 2017, through the Ministry of Trade, the Indonesian government regulated medium rice HET via Ministry of Trade Regulation No. 57/2017 in the range of Rp9,450-10,250 depending on

the region. More recently, NFA Regulation No. 7/2023, regulates the price of medium rice in the Rp10,900-11,800 range. Java, Lampung, South Sumatra, Bali, West Nusa Tenggara (NTB), and Sulawesi regions, considered the primary base of rice producers, is in HET Zone 1. Other Sumatra regions (except Lampung and South Sumatra), East Nusa Tenggara (NTT), and Kalimantan enter Zone 2, while Maluku and Papua regions are in Zone 3 with the highest HET (Figure 5). On average, the price of medium rice fluctuated wildly and was often above the HET price that the government announced. During Ministry of Trade-mandated HET era, the higher-than-HET, occurred primarily in Zone 1, a rice producing region. For Zone 2 regions, on average, only in January and February 2018 were prices above HET. While in zone 3, prices were relatively within regulated range. Furthermore, after the NFA took the authority, only regions in Zone 1 exhibited trends of prices for their medium rice averaging above HET.

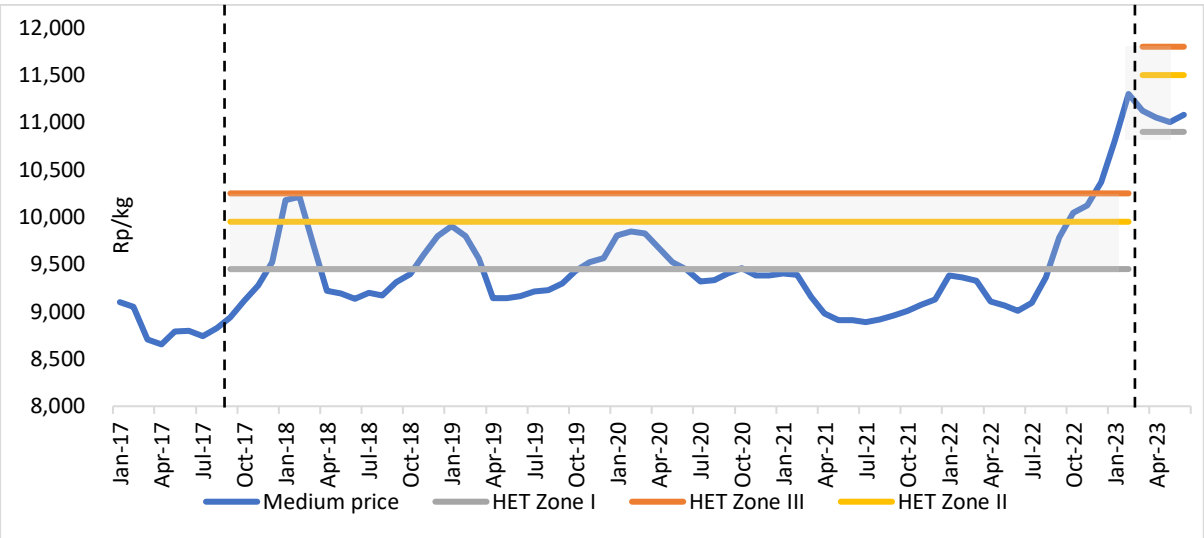


Figure 5. Average Retail Medium Rice and The Government's Highest Retail Price (HET)
Source: Statistics Indonesia, Ministry of Trade, and NFA

Prevailing market prices above the HPP at both the farm-gate and mill levels present the government, specifically BULOG, with operational constraints when intervening in the domestic market. Tasked with absorbing domestic supply to maintain strategic reserves, BULOG procures harvested GKP and GKG from farmers, millers, and village-owned enterprises strictly at state-administered prices. Purchasing above these statutory thresholds risks administrative non-compliance and regulatory penalties. Consequently, unconstrained by such price ceilings, private commercial buyers have come to dominate procurement, routinely outbidding the state enterprise. This structural displacement was particularly pronounced in 2023: the government’s reliance on foreign grain intensified significantly, with BULOG’s rice imports exceeding 2.6 million metric tonnes, more than five times its domestic procurement volume (BULOG, 2024). These private parties often act as companies for the food industry or take over the role of middleman and wholesaler, and this difficulty then arises because doing so would violate regulations and pose administrative constraints. Hence, market prices that persistently

remained elevated relative to BULOG's HPP can be interpreted as sign of structural procurement weakness to private buyers during the period.

4.3 The Role of BULOG and Government's Rice Market Governance

Government interventions, to a considerable degree, had remained largely ineffective in mitigating price volatility at both producer and consumer levels. Empirical evidence suggests that farmers, millers, and retailers frequently transact at prices exceeding these reference points, primarily because official benchmarks fail to reflect actual market conditions and evolving cost structures. This ineffectiveness is exacerbated by production inefficiencies and protracted distribution chains. Furthermore, when market prices exceed the HET, Perum BULOG initiates market operations by injecting strategic reserves into the distribution network. Perum Bulog also collaborated with the Police Food Task Force (Satgas Pangan) to track down retail rice traders who sold above the price set by the government. It is a challenging task considering the large number of retail rice sellers and traditional markets in Indonesia. Based on the trade regulation, retailers who sell above HET will receive warnings that can be escalated into license revocation which would require them to stop trading activities. These interventions are part of government effort to enforcing price compliance in the market. However, BULOG's limited procurement capacity, particularly outside of peak harvest periods, constrains its ability to maintain sufficient buffer stocks to influence market prices effectively.

To rectify the conundrum constraining BULOG, the government issued Presidential Regulation 125/2022 on government food reserves. In this new regulation, BULOG is given the task of maintaining rice reserves and has the potential to increase stocks in warehouses. Before this Presidential Regulation, the trend of rice procurement by BULOG continued to decline from 2016 to 2021. In 2016, grain absorption from farmers still reached 3.5 million tons, but in August 2021, grain absorption was only 765 thousand tons. In addition to the HPP problem, the leading cause of this decline was the changing distribution patterns of poor rice aid and the reduction of the role of BULOG. From a state strict-intervention perspective, this declining might raise major concern because it implied challenges and inefficiencies in BULOG procurement process. On the other hand, this might also indicate a well-functioning market where private entities are actively involved in grain transactions.

Ultimately, there are regulatory barriers, administrative constraints, or other factors hindering BULOG's ability to compete with the private sector in grain procurement. This also became a supply chain protracted problem with limited distribution, stock build-up, and no rice absorption. So far, BULOG has only been able to absorb 6-8 per cent of total rice production. The grain and rice soaked by BULOG are often below market prices. Producers will only sell to BULOG when the selling price is lower than BULOG at the same quality.

4.4 Indonesia's Rice Market Structure and Price Dynamics

Despite extensive government interventions, the effort to improve rice market supply chain remains a challenge. Under prevailing market structure, the distribution pattern and the number of parties involved, formally and informally, disadvantage both farmers and consumers. The difference in rice prices according to the level of commercial actors in the market chain consists of grain and rice prices at the farmer and millers level, rice prices at the collecting trader level, rice prices at the wholesale level who usually operate in the parent market, rice prices at the traditional market (retail prices), and rice prices at the consumer level (fees paid by consumers generally at the stall level). This was in line with the theory of commerce: the longer the trading system of a commodity, the smaller the share of profits received by farmers (farmers share) because the more marketing institutions, the more dividers (Hidayat, 2020).

This lengthy supply chain led to widespread implications among parties involved. Margins are shared unequally among parties involved. The monthly average prices, as illustrated in Figure 6, shows the price level at the farmer level of harvested grain, milling levels of milled grain, and medium rice at retailers. During period of analysis, much of the changes in price can be identified to concentrate at distribution stage from millers to retailers. Farmers as producers only receive a fraction of what the consumers paid for the product. This indicates that Indonesia's rice farming has long been associated with low farmer revenue, although consumer prices tend to remain high.

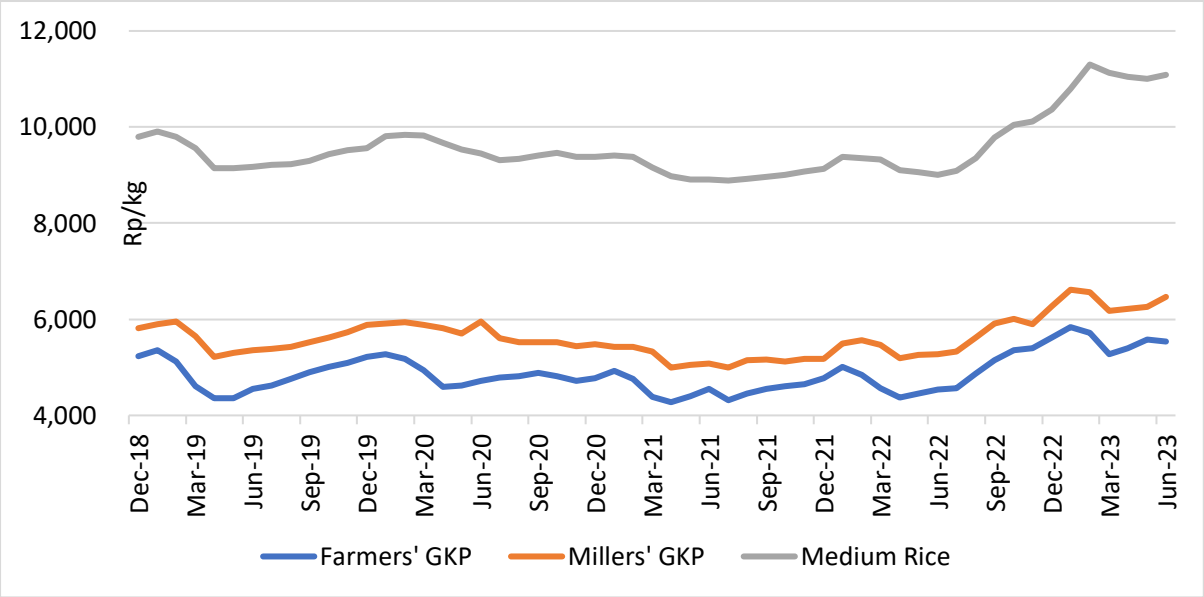


Figure 6. Monthly average prices as farmer level of harvested grain, milling levels of milled grain, and medium rice
Source: Statistics Indonesia (BPS), 2023

In addition to the distance and actors between upstream and downstream in the rice market, informal actors outside the scope of the structure further add to the inefficiencies. The price is then mostly determined by the traders. They can be independent or an employee of the rice mills, which face an oligopsony market when dealing with the rice mill. Meanwhile, the rice mills face an oligopoly market when dealing

with the wholesalers. Rice mills have the choice to whom they sell the rice which depends on the demand or price (Table 2).

Table 2. Rice Market Structure at Various Market Level

Seller	Buyer	Market Structure
Farmers	Traders	Oligopsony
Traders	Rice Mills	Oligopsony
Rice Mills	Wholesalers	Oligopsony
Wholesalers	Retailers	Oligopoly

Source: Author's Calculations

Notes: GKP = Gabah Kering Panen (harvested dry grain); GKG = Gabah Kering Giling (milled dry grain); HPP = Harga Pembelian Pemerintah (government purchase price). Gap (%) = (market price − HPP) / HPP × 100%

The imbalance in market structure also contribute to the creation of practices prevalent in Indonesia's agricultural economic landscape. During harvest, brokers wait for farmers to help negotiate prices with intermediaries who directly procure the grains (F., 2014). As indirect intermediaries, there are instances in which brokers carry out intimidation to ensure their dominance as intermediaries between farmers and to millers or other middlemen. On the other hand, farmers are not typically willing to store their grains for long due to the need to pay back debts incurred during the planting period. In many cases, they are more than willing to sell their crops to the intermediaries, unprocessed and below market prices. This practice leads to lower prices received by farmers and fundamentally prevents them from reaping the benefits from value-added down the production chain.

To better understand the movement of rice prices and how this multi-layer price structure hold, it's important to observe the dynamics over time. Grain prices at the farmer level fluctuate considerably with the season. Generally, grain prices are low during the harvest, usually from March to April. Meanwhile, farmers' grain prices creep up when the dry season arrives. Of course, the rise and fall of grain prices at the farmer level will affect rice prices at the next level of rice trading. These price fluctuations have been documented in various preceding studies, both domestic (Hermawa et al. 2008; Aryani 2012; Arifin 2020; Novianti et al. 2020) as well as abroad (Ceballos et al., 2017; Chaudhary et al., 2019; Darbandi, 2018; Zanin et al., 2020).

An analysis of price dynamics across the Indonesian supply chain reveals that while price volatilities for harvested dry grain (GKP), milled grain (GKG), and medium-grade rice tend to move co-linearly, the magnitude of these fluctuations varies significantly across levels. Paradoxically, while grain prices exhibit periods of relative stagnation, they also experience the most acute volatility; specifically, GKP prices at the farm-gate level show the sharpest fluctuations compared to downstream segments. This pattern indicates a dampening effect as the commodity moves through the value chain, where the intensity of oscillation diminishes toward the retail level. Furthermore, the data suggests that intermediaries positioned after the milling stage capture the most significant share of price margins during upward market shifts.

At national level, farmer-level price changes tend to be consistently lower. On average, from January 2019 to June 2023, GKP at the farm-gate increased by 0.18%

monthly. This farmers' price changes were lower than milled dry grain (GKG) at the milling and medium rice in the market, which increased by 0.239% and 0.242% monthly, respectively. Overall, in those 54-month periods, the price of farmers' GKP increased by only 5.84%. Meanwhile, the price of millers' GKG increased by 11.04%, and medium rice increased by 13.079%. Seasonal price fluctuations reach critical thresholds during the peak harvest period (typically February to April), often resulting in significant price depressions at the farm-gate. While grain and rice prices generally exhibit co-movement, empirical trends reveal instances of price divergence where grain prices decline despite rising retail rice prices. This phenomenon precipitates a double shock for farmers: first, through diminished revenue from grain sales, and second, through increased household expenditure as farmers—who are often net consumers—must purchase rice at inflated retail prices. Mardianto et al. (2016) states that most smallholders sell their rice crops and use the money received to purchase daily necessities, including rice.

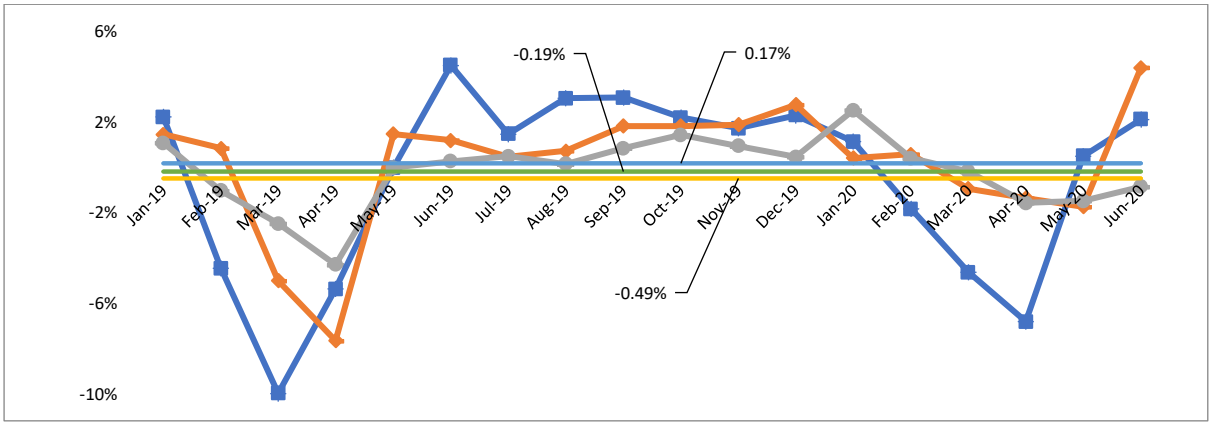


Figure 7. Changes in prices, January '19 – June '20

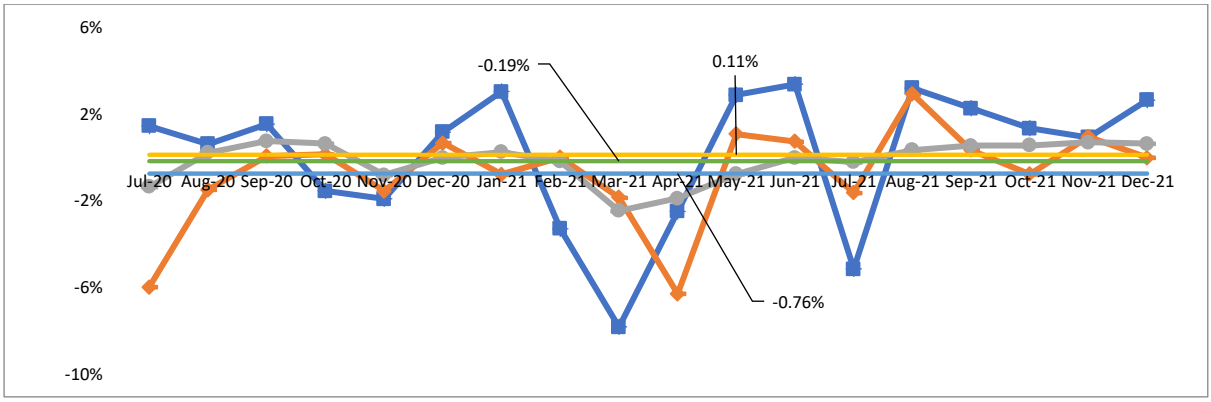


Figure 8. Changes in prices, July '20 – December '21

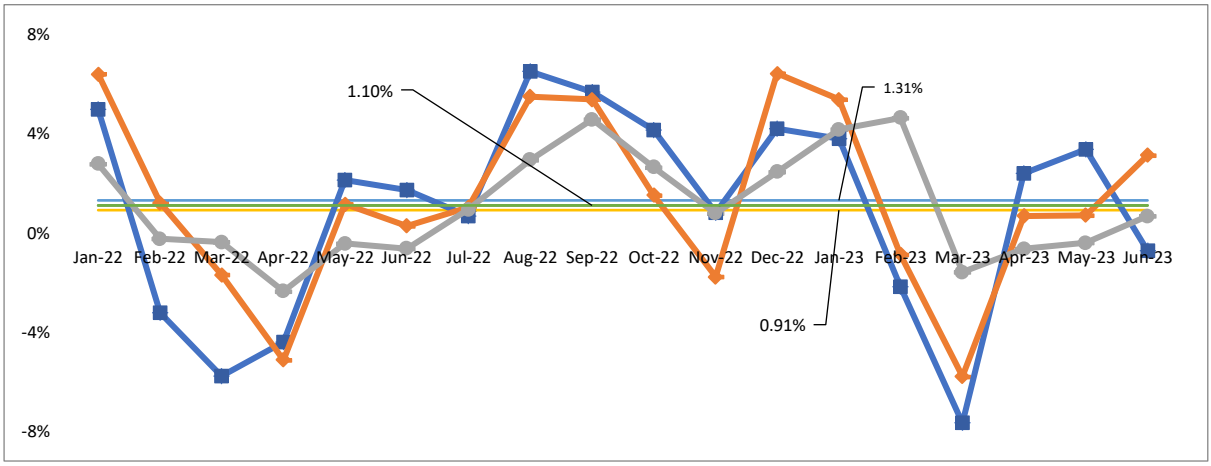


Figure 9. Changes in prices, January '22 – June '23



Figure 10. Monthly Average Changes in Prices as Farmer Level of Harvested Grain, Milling Levels of Milled Grain, and Medium Rice
Source: Statistics Indonesia (BPS), 2023

Price formation in rice market cannot be separated from its inherent structure. The lengthy supply chain from farmers to consumers led to the widening divide between retail prices and farmers' income. From 2011 to 2017, on average, Indonesian people experienced an increase in welfare of more than 20%. Meanwhile, Indonesian farmers experienced almost no increase in welfare at all (Yusuf, 2018). The disparity between farmer and consumer prices highlights disproportionate margins relative to the value intermediaries add, resulting in a misallocation of economic value that penalises both primary producers and end-users. This pattern aligns with recent margin-based evidence from Java (Rachmadhan & Wijayati, 2024) and asymmetric price-transmission evidence from West Java (Kharisma & Indrawan, 2023). However, it is still important to note that despite these inefficiencies, intermediaries function as aggregators, financiers, storage and logistics providers within the market. The only question is whether margins accrued to these functions exceed the value of services they provide.

The results of the study (Hermanto, 2017) on the behaviour of traders in the formation of prices for necessities obtained the following findings: First, prices at the consumer level are influenced by the pattern of distribution of goods in a particular area, which every layer forms their own price layer that makes the longer the chain, the more expensive the price would be. Second, the average selling price of market traders for each commodity depends on the comparative amount of goods relative to the regular supply pattern. Limited supply will lead to a higher price. Third, in the normal circumstances, the average purchase price of traders of five kinds of staple commodities increased by 63.78

percent above normal prices when the supply is below its regular pattern. When the supply of goods is higher, the average purchase price of traders decreased by 28.13 percent.

The farmer's downstream price structure of the domestic rice market is dominated by value-added between millers and wholesalers or retailers. The significant price spreads observed in these segments suggest an imbalance between the functional utility provided by intermediaries and the economic rent they capture. This strengthens the finding in studies (Lasitya et al. 2022) states that wholesalers and retailers gain enormous margins and profits in the rice supply chain, considering the profit conversion. In general, during that period, millers only increased the added value of farmers' output by 13.2%. The average margin of trade and transportation of extensive trade and trade of rice commodity retailers in Indonesia was 9.84 percent and 11.35 percent, respectively. The study by Hermanto (2017) concluded that Indonesia's rice commodities' distribution pattern could have been more efficient than the existing one. This is judged by the relatively large disparity in rice price transmission starting from the producer to the consumer level. There are still frequent shortages of rice supply in times of need, especially in big cities. Indonesia's primary rice trade distribution channels are producers, distributors, agents, retail traders, and households.

4.5 NFA and Lessons for Future Policy Reforms

Only until recently, for the first time, the government established an independent national-level institution to manage national food affairs, especially rice as a staple commodity. Through Presidential Regulation 66/2021, the government established the NFA. This endeavour also refers to the mandate of the Food Law, which has been in place since 2012. NFA is tasked with carrying out government duties in the food sector. NFA functions include coordination, formulation, and determination of food availability policies; stabilisation of food supply and prices; food and nutrition insecurity; diversification of food consumption; and food safety. NFA is expected to encourage a more effective transformation of food policy governance. Before the establishment of NFA, food policies such as food import decisions involve cross-sectoral authorities, requiring limited coordination meetings attended by several relevant ministries and institutions.

NFA exercises great authority in food policy governance because it receives delegation of authority and grants power related to food policy from three other ministries. Delegation of such authority: first, from the Minister of Trade in formulating and determining food price stabilisation and distribution policies; and policy formulation and determination of food export and import needs. Second, from the Minister of Agriculture in terms of policy formulation and determination of the amount of government food reserves to be managed by SOEs (BUMN) in the food sector, and policy formulation and HPP determination and price. NFA also received a grant of power from the then Minister of SOEs to decide on the assignment of BULOG to implement national food policy.

The role of NFA aligns with the challenges rice commodities face today. These commodities need good management to improve supply chain governance, which is expected to correct multilayer prices and government absorption capabilities. In their beginning work, NFA's policy priorities are fluctuations in supply, food prices, and management of government food reserves. NFA has been carrying out this role since April 2023 in updating HPP and HET. NFA has also implemented a rice import policy to manage the government's rice reserves to match the capacity of BULOG.

Indonesian NFA was formed similarly to the National Food Authority (NFA) of the Philippines, which was formed in 1972. The Philippine NFA (PNFA) was designed to ensure a continuous rice supply at stabilised prices through domestic stocks and import control. The agency procures and sells rice at administratively determined prices and stores and maintains rice stocks as a contingency against future shortages. A stated goal of the PNFA is to support farm gate prices and reduce the retail price of rice. To accomplish its goal, the PNFA sells rice through accredited retailers at a fixed margin on the sale while, at the same time, offering to buy raw rice from farmers at a support price based on the average domestic cost of production plus an administratively determined markup. It holds buffer stocks equivalent to 30 days of consumption plus 15 days of emergency holdings by buying paddy during peak harvest. Then, the PNFA strategically sells rice from its stocks when prices are at seasonal highs to reduce the retail price (Intal & Garcia, 2005; Yao et al., 2007).

Meanwhile, the private marketing channel operates alongside PNFA. In the private channel, prices are determined by market mechanisms, while the PNFA purchases and sells at administratively determined prices. The two marketing channels are interrelated because farmers can decide to sell their rice to private markets or the PNFA. They influence market prices in two main ways: by changing the size of the buy price premium (the difference between the NFA buy price and the farm gate market price in surplus-producing regions) and by changing the sell price discount (the difference between the NFA sale price and retail market price in the consuming areas).

The PNFA’s procurement and distribution program has been questioned because it is expensive. Further, a study by Jolejole-Foreman and Mallory (2014) found that the program has had limited ability to influence the price of rice within the Philippines. Another study analysed the same issue with the Indonesian rice policy that PNFA has been unsuccessful in stabilising producer prices but relatively successful in stabilising retail prices, mainly through the exercise of its import monopoly (Intal et al., 2012).

One of the primary concerns related to align the producers and consumers interests, Indonesian NFA need to sort out the number of parties involved in the rice distribution and processing chain. The NFA could require mandatory registration and licencing, technology implementation, and regulatory reform. These aspects cover the whole concept, macro and micro, on reducing the chain complexity and making the market more efficient and competitive.

5. CONCLUSION

This study highlights the interconnected roles of rice supply chain structures, government price interventions, and institutional governance in shaping Indonesia's rice market outcomes. The findings reveal persistent discrepancies between government-administered prices and actual market conditions during January 2017–June 2023, with farm-gate and milling-level grain prices exceeding government purchase prices (HPP) by an average of 21.98% and 13.67%, respectively, while retail rice prices periodically surpassed the highest retail prices (HET), particularly in Zone 1. These discrepancies suggest limitations in the operational effectiveness of price interventions, particularly when administered procurement prices do not adequately reflect prevailing market conditions. Furthermore, the fragmented distribution network and multiple intermediary layers complicate price coordination and the distribution of economic benefits across the value chain. By integrating market structures, regulatory price discrepancies, public procurement constraints, and institutional governance, this study contributes to the literature on agricultural market governance, demonstrating the importance of aligning price policies with market dynamics and institutional capacity in emerging economies.

The findings underscore the need for an integrated policy approach that combines more adaptive price-setting mechanisms, improved supply chain transparency, and stronger institutional coordination. Periodic adjustments to HPP and HET should consider market conditions, regional distribution costs, commodity quality, and seasonal variations, while strengthening coordination between the National Food Agency (NFA), BULOG, and relevant government institutions could enhance procurement effectiveness and price stabilisation efforts. Improving market information systems, distribution traceability, and regulatory oversight may further strengthen market efficiency without undermining the essential economic functions performed by intermediaries. Nevertheless, the study's reliance on secondary data and descriptive analysis limits causal inference regarding market inefficiencies and policy effectiveness, while the observation period provides only limited evidence of the NFA's institutional performance. Future research should employ longitudinal and mixed-method approaches incorporating transaction-level data, intermediary costs, and econometric price transmission analysis to evaluate the long-term effectiveness of institutional reforms and their implications for producer welfare, consumer affordability, and food security.

Author Contributions

H.F.K.: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing.
M.D.R.: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Supervision, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing.
R.D.P.: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing.

N.Z.A.: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing.

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