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Research paper



Institutional Reform for Equitable Value Distribution in The Rice Industry of Aceh, Indonesia

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Abstract

This study examines the marketing efficiency and farmers' income share within the rice grain industry of Pidie Regency, Aceh, Indonesia, with a focus on the institutional and structural determinants of value distribution. The research addresses the persistent imbalance in Indonesia's agricultural marketing system, where smallholder farmers—despite being primary producers—receive disproportionately low returns compared to intermediaries. Employing a mixed-methods approach, the study integrates quantitative analyses of marketing margins, farmer's share, and efficiency ratios with qualitative insights from in-depth interviews and field observations involving 200 farmers and traders. The results reveal that the rice marketing chain is dominated by collectors, who control transportation, financing, and price information, resulting in asymmetric market power. In the farmer–collector stage, farmers' share reached 94.3% with an efficiency ratio of 1.43%, while in the collector–mill stage it declined sharply to 44% with an efficiency ratio of 14%. These findings demonstrate that marketing inefficiency stems less from technical constraints than from institutional weaknesses—particularly the passive role of cooperatives, information asymmetry, and inadequate post-harvest infrastructure. The study recommends transforming cooperatives into autonomous agribusiness entities, promoting digital price transparency platforms, improving rural infrastructure, and fostering youth agripreneurship as pathways toward equitable market reform. This research contributes to the broader literature on institutional economics and supply chain governance by proposing a paradigm shift from the "Green Revolution" to a "Market Revolution"—a development model that aligns productivity with fairness and sustainability in Indonesia's agricultural value chains.

Keywords: *Marketing Efficiency; Farmer's Share; Value Chain; Institutional Economics; Digital Agriculture; Rice Industry; Indonesia.*

1. Introduction

The rice grain industry represents one of the most strategic sectors in Indonesia's national economy, serving not only as the primary source of staple food for the majority of the population but also as a major livelihood for millions of smallholder farmers. (Bahri et al., 2021). Despite its economic significance, marketing inefficiencies and structural imbalances within the rice value chain continue to constrain farmers' welfare. (Manurung et al., 2024). A recurrent issue in Indonesia's agricultural marketing system is the unequal distribution of value, where intermediaries and millers capture a disproportionately higher share of profits, while farmers—who bear the production risks—receive the smallest portion of the market value. This pattern mirrors findings from studies on other agricultural commodities such as palm oil and maize, where long distribution chains and high marketing margins reduce producers' profit share.

Marketing efficiency, in its most fundamental sense, measures how effectively the marketing system converts production value into equitable economic returns across the supply chain (Ernawati et al., 2021). According to Supply Chain Management Theory, efficiency in the agricultural marketing system depends on the coordination among actors, transaction costs, and the speed of value transfer along the chain. (Mukhlis et al. 2023). In this context, the concept of farmers' share—the percentage of the final consumer price received by farmers—serves as a critical indicator of both marketing efficiency and social equity. A high farmer's share signifies that value distribution is fairer and that the marketing system functions with lower transaction and intermediary costs.

Pidie Regency in Aceh Province exemplifies this challenge. As one of Aceh's largest rice-producing regions, Pidie contributes substantially to regional food security. (Jamaludin et al., 2021). However, smallholder farmers in the area remain trapped in an inefficient marketing structure characterized by long chains, high costs, and weak bargaining power. Most farmers sell freshly harvested rice immediately after harvest to collectors at low prices due to the lack of storage facilities and urgent cash needs. Collectors dominate the marketing channel by controlling transportation, capital, and access to milling facilities. (Winarso et al., 2023). Consequently, the price received by farmers at the farm gate is significantly lower than the price paid by consumers in the retail market.

Institutional weaknesses further exacerbate the problem (Prasetyo & Kistanti, 2020). Farmer cooperatives and associations in Pidie exist but often function merely as administrative or subsidy-distribution units rather than as active agribusiness institutions capable of price negotiation, collective marketing, or contract farming (Mukhlis & Saidah, 2025). This institutional vacuum reinforces dependency on

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collectors and perpetuates the patron–client relationship common in rural Indonesia. As a result, marketing inefficiency is not merely a technical issue but a structural and institutional one—a manifestation of what North (1990) termed "institutional inefficiency," where transaction costs are inflated by weak governance, information asymmetry, and limited collective capacity.

While several government programs, including the National Rice Harvest Movement (Gerakan Panen Raya Nusantara 1 Juta Hektar), have aimed to improve farmer incomes and stabilize prices, their impacts on marketing efficiency remain uncertain. (Sarkum et al., 2020). Most interventions focus on production and productivity, overlooking the structural imbalance in post-harvest marketing and value distribution. (Purnomo et al., 2020). Recent literature emphasizes that achieving agricultural sustainability requires not only technological innovations but also equitable market institutions and inclusive value chains.

Despite extensive research on marketing margins and farmers' share in various agricultural commodities, limited studies have combined quantitative efficiency measurement with qualitative institutional analysis in Indonesia's rice grain sector. (Mukhlis, 2025). Existing studies often focus on price transmission and cost analysis, but fail to capture the socio-institutional dynamics shaping farmers' bargaining positions. (Fahlevi, Irsyadillah, Indriani, et al., 2022). Therefore, this study fills a critical gap by adopting a mixed-methods approach—integrating statistical analysis of marketing margins, farmers' share, and efficiency ratios with qualitative insights from interviews and field observations.

Specifically, this study aims to:

1) analyze the structure of rice marketing channels in Pidie Regency;
2) measure marketing efficiency and the distribution of margins across the value chain;
3) evaluate the institutional factors influencing farmers' share and market power; and
4) propose strategic reforms to enhance marketing efficiency and farmers' welfare.

By addressing both quantitative and institutional dimensions, this study contributes to the broader literature on agricultural marketing efficiency, supply chain governance, and rural economic transformation in developing economies. The findings are expected to inform policy design for building a more equitable and competitive rice value chain—one that aligns productivity with fairness and sustainability.

2. Literature Review

2.1. Marketing efficiency in agricultural systems

Marketing efficiency is a core indicator of the performance and equity of agricultural supply chains. (Rumerung et al., 2024). It reflects the extent to which marketing activities minimize transaction costs and maximize the value received by producers relative to consumers. (Mukhlis & Abdullah, 2025). In agricultural markets, efficiency is typically assessed through the ratio between marketing costs and consumer prices, the speed of product movement, and the equity of value distribution along the chain. An efficient marketing system not only ensures the optimal allocation of resources but also enhances the competitiveness and sustainability of agricultural production.

In developing economies such as Indonesia, inefficiency often arises from asymmetric information, poor infrastructure, and dependence on intermediaries. (R. Lestari et al., 2024). These structural constraints raise transaction costs, distort price signals, and reduce the farmers' income share. Rusydiana et al. (2023) emphasized that supply chain management (SCM) requires coordination and transparency across actors to optimize logistics, reduce waste, and ensure fair value distribution. Thus, marketing efficiency cannot be viewed solely in economic terms; it also represents the degree of institutional coordination among supply chain participants.

2.2. Farmer's share and value distribution

The concept of farmers' share—defined as the proportion of the consumer price that accrues to the producer—is widely used to measure fairness in agricultural markets. (Pratono, 2020). A higher farmer's share indicates that farmers receive a greater proportion of the value created within the marketing system, reflecting both economic and social efficiency. (Mukhlis et al. 2025). Conversely, a declining farmer's share reveals the dominance of intermediaries and inefficiencies in market governance.

Empirical studies in Indonesia and other Southeast Asian countries show that longer marketing chains generally result in lower farmers' share and higher marketing margins. For instance, Jusni & Aswan (2021) found that farmers who sold directly to processors in the palm oil sector captured up to 100% of the marketing margin, compared to only 60% when intermediaries were involved. Similarly, Fitz-Oliveira & Tello-Gamarra (2022) demonstrated that rice farmers engaging in short supply chains achieved higher returns due to lower transaction and logistics costs. These studies suggest that reducing the number of intermediaries can significantly increase farmers' profitability and marketing efficiency.

However, value distribution is not determined by market structure alone. It is also shaped by institutional relationships, such as access to credit, contract farming arrangements, and cooperative participation. (Suasih et al., 2024). When farmers are bound by patron–client relations, their ability to negotiate prices diminishes, even in competitive markets. (Mukhlis, Janwari, et al., 2023). Therefore, improving farmers' share requires simultaneous interventions in both structural (market length) and institutional (bargaining power) dimensions.

2.3. Institutional roles in marketing systems

Institutions—both formal and informal—play a decisive role in determining how efficiently markets function. According to Prasetyo & Kistanti (2020)Institutions are the "rules of the game" that shape economic behavior and transaction costs. Weak institutions increase uncertainty, elevate risks, and allow dominant actors to capture rents at the expense of smaller producers (Darby et al., 2022). In the context of agricultural marketing, institutions such as farmer cooperatives, producer organizations, and government agencies influence access to markets, capital, and information.

In Indonesia, most farmer cooperatives remain administrative entities focused on distributing inputs or government aid rather than functioning as market-oriented enterprises. (Ernawati et al., 2021). This limited functionality hampers their ability to negotiate prices, aggregate production, and coordinate logistics. Comparative studies show that in countries like Vietnam and Thailand, cooperative-based marketing significantly improves price efficiency and farmers' share. (Mukhlis, 2025a). These cooperatives act as contractual partners for rice mills, allowing farmers to participate in higher-value segments of the supply chain.

Furthermore, digital technology has begun transforming institutional dynamics within agricultural markets. Sellitto et al. (2024) argue that digitalization reduces transaction costs by improving price transparency, connecting producers directly to consumers, and facilitating access

to credit and logistics services. Digital market platforms and mobile-based price information systems are particularly effective in mitigating information asymmetry—a key cause of inefficiency in traditional agricultural systems.

2.4. Empirical studies and research gaps

Recent empirical research highlights the structural and institutional challenges that constrain marketing efficiency in developing countries. For instance, Jusni & Aswan (2021)showed that inadequate rural infrastructure and high post-harvest losses directly increase marketing costs. Meanwhile, Prasetyo & Kistanti (2020) argued that without institutional reforms, smallholders remain vulnerable to price volatility and exploitation by intermediaries.

However, most existing studies on rice marketing in Indonesia are limited to descriptive or quantitative analyses of prices and margins. Few have combined quantitative measurement of marketing efficiency with qualitative inquiry into institutional behavior and farmer empowerment. This gap restricts our understanding of how structural inefficiency interacts with social relations and local governance mechanisms. Moreover, there is limited evidence on how institutional innovation—such as modern cooperatives or digital platforms—can restructure local rice marketing systems to enhance both efficiency and equity.

Therefore, this study contributes to the literature by adopting a mixed-methods approach that integrates quantitative efficiency analysis with qualitative institutional exploration. By focusing on Pidie Regency in Aceh—a region emblematic of Indonesia's rice economy—the study aims to uncover how market structure, transaction costs, and institutional weakness collectively shape farmers' share and marketing efficiency. The findings are expected to advance theoretical understanding and provide practical policy guidance for transforming agricultural marketing systems in developing economies.

3. Methodology

3.1. Research design

This study employed a mixed-methods research design that integrates both quantitative and qualitative approaches to provide a comprehensive understanding of marketing efficiency and value distribution in the rice grain industry of Pidie Regency, Aceh, Indonesia. (Johnson, 2014). The mixed-methods approach was chosen to complement the strengths of statistical measurement with in-depth contextual insights. The quantitative component focused on analyzing the structure of marketing channels, the magnitude of marketing margins, and the proportion of the farmer's share using descriptive and ratio analyses. Meanwhile, the qualitative component explored the institutional dynamics that influence marketing efficiency—such as the role of cooperatives, patron–client relationships, and information asymmetry—through interviews and field observations. (Leavy, 2014). The integration of both datasets followed a convergent parallel design, allowing the researchers to compare and validate findings from different methodological perspectives.

3.2. Study area

The research was conducted in Pidie Regency, located in the Province of Aceh, Indonesia. Pidie represents one of the largest rice-producing regions in the province, with approximately 26,826 hectares of irrigated rice fields and 1,100 hectares of dry fields spread across 23 districts. The region was purposively selected because it typifies the structural problems common to Indonesia's rice marketing system: long marketing chains, dominance of collectors, and weak institutional capacity among farmer groups. The area's socio-economic profile—characterized by aging farmers and limited access to digital technology—also provides a compelling context for analyzing both structural and institutional inefficiencies.

3.3. Sampling and participants

The quantitative survey involved 200 respondents, consisting of rice farmers (70%) and collectors or traders (30%), selected through proportionate stratified random sampling. This sampling method ensured representation across different sub-districts, marketing levels, and production capacities.

For the qualitative component, 15 participants were purposively selected for in-depth interviews, including farmers, collectors, mill owners, and local agricultural officers. These participants were chosen based on their involvement in the rice marketing process and their knowledge of institutional practices and market linkages. The qualitative data were complemented by direct field observations, which provided contextual understanding of logistical operations, transaction mechanisms, and power relations among actors.

3.4. Data collection

3.4.1. Quantitative data

Quantitative data were collected using a structured questionnaire designed to capture information on production volume, selling price, marketing costs, transportation expenses, and profit margins at each marketing level. Secondary data were obtained from government statistics, agricultural extension offices, and cooperative reports to support the analysis.

3.4.2. Qualitative data

Qualitative data were gathered through semi-structured interviews and field observations. Interview guides were designed around three thematic areas:

1) institutional arrangements and power dynamics between farmers and intermediaries,
2) access to market information and financing, and
3) perceptions of marketing efficiency and barriers to fair trade.

Observations were conducted at local markets, warehouses, and rice mills to record practices of negotiation, transportation, and post-harvest handling. All interviews were audio-recorded, transcribed, and thematically coded.

3.5. Data analysis

3.5.1. Quantitative analysis

The quantitative data were analyzed using descriptive statistics and ratio analysis to measure marketing efficiency, margin distribution, and farmers' share.

1) Marketing Margin (M)

$$M = P_c - P_f$$

Where $P_c$is the price at the consumer or next marketing level, and $P_f$is the farm-gate price received by the farmer.

2) Farmer's Share (FS)

$$FS = \left(\frac{P_f}{P_c}\right) \times 100$$

The farmer's share expresses the percentage of the final consumer price received by the producer, serving as a key indicator of marketing equity and efficiency.

3) Marketing Efficiency (EP)

$$EP = \left(\frac{C_m}{P_c}\right) \times 100$$

Where $C_m$represents total marketing costs. A lower ratio implies higher efficiency since it indicates a smaller proportion of costs relative to the selling price.

Comparative analysis across marketing stages (farmer–collector and collector–mill) was conducted to identify differences in value distribution, cost structure, and pricing behavior. The results were tabulated and interpreted using graphical and ratio-based presentations.

3.5.2. Qualitative analysis

The qualitative data were analyzed using the Miles and Huberman (1994) interactive model, which includes three iterative stages:

1) Data Reduction – organizing interview transcripts and field notes to identify emerging themes;
2) Data Display – presenting the findings through matrices and charts for pattern recognition; and
3) Conclusion Drawing and Verification – developing interpretive insights supported by triangulation of interview, observation, and quantitative results.

This method allowed for a systematic understanding of the social and institutional factors affecting marketing efficiency and farmers' share.

3.6. Validity and reliability

To ensure credibility and reliability, multiple validation techniques were applied.

- Triangulation was conducted by comparing data from interviews, surveys, and field observations.
- Member checking was performed by discussing key findings with selected participants to confirm the accuracy of interpretations.
- Audit trails were maintained throughout data collection and analysis to enhance transparency and reproducibility.
- For the quantitative component, the questionnaire was pilot-tested among 20 respondents to verify the consistency and reliability of measurement instruments (Cronbach's $\alpha = 0.82$).

These strategies collectively strengthened the validity of the mixed-methods approach and ensured that both numerical and narrative findings accurately reflected the realities of rice marketing in Pidie Regency.

4. Results

4.1. Structure of the rice marketing channel in Pidie Regency

Field observations and survey data revealed that the rice grain marketing system in Pidie Regency, Aceh, is dominated by four primary actors: farmers, collectors, mills, and consumers. The structure can be illustrated as follows:

Farmer → Collector → Rice Mill → Consumer

Most farmers sell their paddy immediately after harvest, primarily due to the absence of adequate storage and drying facilities, as well as immediate cash needs. This behavior creates a market structure heavily controlled by collectors, who function as intermediaries between farmers and mills. Collectors handle transportation, financing, and simple post-harvest processing before selling to mills.

This channel configuration represents an oligopsonistic market, in which a limited number of buyers (collectors) dominate transactions with numerous small-scale farmers. Consequently, farmers' bargaining power remains extremely weak. Moreover, patron–client relationships between farmers and collectors reinforce dependency, as collectors frequently provide pre-harvest loans or production inputs in exchange for the obligation to sell harvested paddy at a predetermined price.

Institutional mapping showed that farmer cooperatives remain functionally inactive, serving mainly administrative roles such as distributing government inputs or subsidies. They do not engage in aggregation, collective marketing, or contractual agreements with mills. This institutional void has perpetuated structural inefficiency and price asymmetry in the marketing system.

4.2. Marketing margin, farmer's share, and efficiency analysis

Quantitative analysis was performed to evaluate marketing margins, farmers' share, and marketing efficiency across two major stages of the supply chain:

(1) from farmer to collector, and (2) from collector to mill.

4.2.1. Stage 1: farmer → collector

At this stage, the average selling price received by farmers was IDR 6,600/kg, while collectors resold the paddy at IDR 7,000/kg after incurring minor marketing costs, mainly for transportation (IDR 100/kg) and a net profit margin of IDR 300/kg.

Table 1: Marketing Performance: Farmer–Collector Stage

Component	Value (IDR/kg)	Description
Farmer's selling price	6,600	Average farm-gate price
Marketing cost	100	Transportation and handling
Collector's profit	300	Net profit margin
Selling price to mill	7,000	Price at the collector level
Marketing margin	400	7,000 − 6,600
Farmer's share (%)	94.3	(6,600 ÷ 7,000) × 100
Marketing efficiency (%)	1.43	(100 ÷ 7,000) × 100

The results indicate that the farmer–collector stage remains relatively efficient, with minimal marketing costs and a high farmer's share of 94.3%. The limited number of intermediaries and short transaction distance contribute to this efficiency.

4.2.2. Stage 2: collector → mill

At the second stage, the collector resells the paddy to mills at IDR 15,000/kg, after incurring substantially higher costs and extracting larger profits. Marketing costs included transportation (IDR 500/kg), electricity (IDR 350/kg), equipment depreciation (IDR 500/kg), retribution (IDR 250/kg), loading/unloading (IDR 250/kg), labor (IDR 100/kg), and waste management (IDR 150/kg), totaling IDR 2,100/kg.

Table 2: Marketing Performance: Collector–Mill Stage

Component	Value (IDR/kg)	Description
Purchase price (from farmer)	7,000	Price paid by collector
Total marketing cost	2,100	Transport, electricity, labor, etc.
Collector's profit	5,900	Net profit margin
Selling price to mill	15,000	Final price to the processor
Marketing margin	8,000	15,000 − 7,000
Farmer's share (%)	44.0	(6,600 ÷ 15,000) × 100
Marketing efficiency (%)	14.0	(2,100 ÷ 15,000) × 100

This stage shows a sharp decline in efficiency and a significant redistribution of value. The marketing margin increased twentyfold compared to the first stage, while the farmer's share dropped drastically from 94.3% to 44.0%. These results confirm the presence of a disproportionate profit capture by intermediaries.

4.2.3. Comparative summary

Table 3: Comparative Overview of Marketing Stages

Marketing Stage	Selling Price (IDR/kg)	Margin (IDR/kg)	Farmer's Share (%)	Efficiency (%)
Farmer → Collector	7,000	400	94.3	1.43
Collector → Mill	15,000	8,000	44.0	14.0

The comparative data show a dual structure within the marketing chain:

- The initial stage (farmer–collector) is efficient but yields low returns.
- The subsequent stage (collector–mill) absorbs a substantial portion of the total value, suggesting rent-seeking behavior by intermediaries.

These findings empirically substantiate the hypothesis that longer marketing chains reduce efficiency and erode farmers' income. They also align with the transaction cost theory, which posits that additional intermediaries increase the overall cost of exchange and reduce welfare at the production end (North, 1990).

4.3. Institutional dimensions and power relations

Qualitative findings from interviews corroborate the quantitative results by revealing institutional constraints that sustain inefficiency. Farmers described strong dependency on collectors due to limited working capital and lack of access to formal credit. Collectors frequently provide in-kind loans before planting, binding farmers to sell their harvests at prices below the prevailing market rate.

Moreover, cooperatives and farmer groups lack operational autonomy and fail to aggregate members' outputs for collective bargaining. Interviews with local officials revealed that most cooperatives function only as channels for government programs rather than as independent business entities. This situation perpetuates what North (1990) calls "institutional path dependency," where outdated arrangements persist despite their inefficiency.

In contrast, case studies from Thailand and Vietnam show that cooperative-based contract farming allows smallholders to access better markets, negotiate directly with mills, and retain up to 70–80% of the final market value (Nguyen et al., 2022). The absence of such institutional mechanisms in Pidie underscores a missed opportunity for collective empowerment and efficient market integration.

4.4. Emerging issues: digitalization and infrastructure

The survey and interviews also highlighted two cross-cutting themes affecting marketing efficiency:

(1) digital exclusion, and (2) infrastructural inadequacy.

Only 12% of farmers reported using digital tools (e.g., mobile-based price information or online trading). The majority (88%) relied solely on collectors for price information, reflecting severe information asymmetry. Digitalization—if adopted—could reduce transaction costs, enhance transparency, and increase farmers' share (Zilberman et al., 2019).

Furthermore, the lack of post-harvest infrastructure (e.g., drying machines, warehouses, and milling units) forces farmers to sell immediately after harvest when prices are lowest. Poor road conditions also raise transportation costs by an estimated 10–15%, directly undermining marketing efficiency. These infrastructural deficiencies create a vicious cycle: low storage capacity compels early sales, while poor transport conditions inflate collector margins.

4.5. Synthesis of quantitative and qualitative findings

The integration of data from both research strands reveals a coherent pattern:
1) The marketing chain in Pidie is structurally collector-dominated and institutionally fragmented.
2) Farmers receive a disproportionately low share of the value due to limited bargaining power and asymmetric access to information and infrastructure.
3) The inefficiency is not technical but institutional, rooted in weak cooperatives, dependency relations, and policy gaps.

In sum, while Pidie's rice sector exhibits strong production potential, its marketing system remains trapped in a structure that benefits intermediaries rather than producers. These findings lay the empirical foundation for the strategic reforms discussed in the next section, aiming to build an equitable and efficient rice value chain.

4.6. Distinguishing technical inefficiency and institutional inefficiency

This study distinguishes clearly between technical inefficiency and institutional inefficiency in the rice marketing system of Pidie Regency. Technical inefficiency refers to losses arising from physical, logistical, or technological constraints, such as inadequate storage facilities, poor road conditions, and limited access to drying and milling technology. These factors increase post-harvest losses and transportation costs, thereby reducing overall marketing efficiency.

In contrast, institutional inefficiency is rooted in governance failures, asymmetric power relations, and weak collective institutions. Despite relatively low technical costs at the farmer–collector stage, farmers remain price takers due to information asymmetry, dependency on informal credit, and the passive role of cooperatives. The sharp decline in farmers' share at the collector–mill stage demonstrates that inefficiency is primarily institutional rather than technical. This distinction confirms that improving infrastructure alone is insufficient without parallel reforms in market governance, cooperative empowerment, and transparency mechanisms.

5. Discussion

5.1. Interpreting marketing inefficiency through institutional economics

The empirical findings reveal that marketing inefficiency in Pidie Regency's rice grain sector is not merely a matter of cost structure or logistics but rather a manifestation of institutional failure. (Mukhlis, Arifin, Ridwan, Zulbaidah, et al., 2025). Following Ismaila & Tanko (2021) institutional economics framework, institutions—defined as "the rules of the game" governing economic interactions—shape transaction costs, market behavior, and value distribution. When formal institutions such as cooperatives and agricultural extension agencies fail to function effectively, informal institutions such as patron–client relationships fill the gap.

In Pidie, this informal arrangement creates path-dependent inefficiency, where farmers depend on collectors for credit and market access, reinforcing asymmetric power relations. The patron–client nexus suppresses competition, discourages collective marketing, and limits price transparency. (Pratono, 2020). Such dependency also reflects bounded rationality: farmers prioritize short-term liquidity over long-term gains due to structural vulnerability and the absence of institutional safeguards. (Hidayati et al., 2023). This pattern mirrors findings from studies in the Philippines and Bangladesh, where rural credit-debt linkages similarly constrain farmers' autonomy and reinforce middlemen dominance.

Thus, the rice marketing system in Pidie exemplifies North's proposition that inefficient institutions persist because they benefit powerful actors—in this case, the collectors—who have little incentive to support reform. (Mukhlis, Maryam, et al., 2023). Sustainable efficiency improvements, therefore, require not only market adjustments but also institutional transformation.

5.2. Marketing chain structure and transaction cost dynamics

The results from Tables 1–3 confirm that longer marketing chains lead to higher transaction costs and reduced farmer income (Arsawan et al., 2023). The collector–mill stage absorbed a marketing margin of IDR 8,000/kg—twenty times greater than in the farmer–collector stage—while the farmer's share dropped from 94.3% to 44%. These findings align with transaction cost theory. (Wiryawan et al., 2020), which posits that each additional intermediary adds coordination costs, information asymmetry, and potential rent extraction.

From a supply chain management (SCM) perspective (Sriviboon, 2022), Pidie's rice value chain exhibits a low-integration, high-friction model, characterized by fragmented actors, limited coordination, and minimal information sharing (Mukhlis et al., 2024). Efficient SCM requires synchronized flows of materials, finances, and information. However, in this case, the information flow is monopolized by collectors, and the financial flow is unidirectional—from farmers to intermediaries—creating systemic inefficiency.

This structural problem indicates that improving marketing efficiency is not only a logistical task but also a governance challenge. (Fahlevi, Irsyadillah, Arafat, et al., 2022). Policies that merely reduce physical costs without addressing market power asymmetries will fail to achieve sustainable reform.

5.3. The role of cooperatives and collective action

Weak farmer cooperatives represent one of the most significant institutional gaps in Pidie's marketing system (Ruspayandi et al., 2022). The survey and interviews indicate that existing cooperatives operate primarily as administrative bodies, facilitating government input distribution rather than market participation. (Yustikasari, 2025). As a result, farmers continue to negotiate prices individually and sell in small volumes, forfeiting economies of scale and bargaining leverage.

Evidence from other Southeast Asian countries demonstrates that cooperative-based marketing systems can dramatically improve both farmers' share and market efficiency (R. Lestari et al., 2024). In Vietnam, contract-based rice cooperatives act as collective intermediaries,

selling directly to mills and capturing up to 80% of the final consumer price (Maryoni & Gunawan, 2025). Similarly, in Thailand, cooperative mills manage aggregation, grading, and logistics, enabling farmers to bypass private traders.

These comparative insights suggest that strengthening cooperative capacity could significantly reduce dependency on collectors. In line with Srihabut et al. (2021) Theory of collective action, cooperatives enhance trust, reduce opportunism, and internalize transaction costs through shared governance (Yulista, 2025). Therefore, institutional reform in Indonesia's rice sector must prioritize transforming cooperatives from passive recipients of government aid into autonomous agribusiness enterprises capable of price negotiation, aggregation, and direct marketing.

5.4. Digitalization, information asymmetry, and market transparency

The study also underscores the importance of digital transformation in reducing market asymmetries. With only 12% of farmers accessing digital information tools, most rely exclusively on collectors for pricing data (Sulastri, 2025). This information monopoly distorts market signals, allowing intermediaries to manipulate prices.

Fitz-Oliveira & Tello-Gamarra (2022) argue that digital platforms—such as mobile price alerts, e-marketplaces, and fintech credit services—can substantially lower transaction costs by improving transparency and linking farmers directly with buyers. In Kenya, for example, the M-Farm digital platform enabled smallholders to negotiate higher prices and access real-time market data. (Sukmawati, 2025). The adoption of similar systems in Aceh could empower farmers to make informed sales decisions, time their market entry, and compare buyers more effectively.

However, digitalization must be accompanied by capacity building. Many farmers in Pidie are above 45 years of age and lack digital literacy. Thus, government and private sector initiatives should focus on digital agripreneurship training, targeting young farmers who can act as "information intermediaries." These young agripreneurs could transform digital tools into collective bargaining mechanisms—bridging the gap between small-scale producers and modern markets.

5.5. Infrastructure and the political economy of efficiency

Infrastructural deficits—particularly the absence of drying, storage, and milling facilities—force farmers to sell immediately after harvest at unfavorable prices (Satory, 2025). Poor rural roads further increase transportation costs by 10–15%, inflating marketing margins captured by collectors. These conditions reinforce structural inefficiency and limit farmers' capacity to participate in higher-value market segments. From a political economy perspective, inefficiency persists because dominant actors benefit from the status quo. (Nismawati, 2025). Therefore, improving marketing efficiency requires coordinated infrastructure investment, transparent governance, and performance-based agricultural policies rather than isolated technical interventions.

5.6. From the green revolution to the market revolution

The broader implication of this study lies in redefining agricultural modernization (Indra Martadinata, 2025). While the Green Revolution—spearheaded by Norman Borlaug—focused on boosting productivity through technology, it often overlooked equity in value distribution. As Pratono (2020) himself later acknowledged, "Production without distribution justice creates a paradox of abundance."

Indonesia's rice sector today faces a similar paradox: high productivity but low rural welfare. The findings from Pidie advocate for what can be termed a "Market Revolution"—a transformation that prioritizes fairness, transparency, and institutional empowerment alongside productivity. (Handayani, 2025). This shift calls for a holistic policy approach integrating four key pillars:

1) Institutional reform through cooperative strengthening,
2) Digital transformation for transparency and inclusion,
3) Infrastructure investment to reduce transaction costs, and
4) Human capital regeneration via youth agripreneurship programs.

By integrating these reforms, Indonesia can move beyond the Green Revolution paradigm—focused narrowly on yield—to a Market Revolution model that aligns productivity with justice and sustainability.

5.7. Theoretical and practical implications

Theoretically, this study strengthens institutional economics by demonstrating that marketing inefficiency is socially embedded in power relations and governance failures rather than purely technical constraints. Practically, the findings offer policy-relevant indicators—such as marketing efficiency ratios and farmers' share—that can be used by local governments to evaluate agricultural market performance and reform effectiveness.

5.8. Study limitations and future research directions

This study has several limitations that should be acknowledged. First, the empirical focus is limited to Pidie Regency, which may constrain the generalizability of the findings to other rice-producing regions with different institutional and market structures. Second, the cross-sectional design captures market dynamics at a single point in time and does not fully reflect seasonal or longitudinal variations in pricing and bargaining power.

Future research could address these limitations by conducting comparative cross-regional studies or longitudinal analyses to examine how institutional reforms and digital adoption affect marketing efficiency over time. Such approaches would strengthen causal inference and enhance the external validity of institutional reform models in agricultural value chains.

6. Conclusion and Policy Recommendations

This study concludes that marketing inefficiency in Pidie Regency's rice grain industry is primarily institutional in nature, rooted in asymmetrical power relations, weak cooperative governance, and limited access to market infrastructure and information. Although farmers contribute the largest share of labor and production inputs, their capture of market value remains disproportionately low. The substantial reduction of farmers' share—from 94.3% in the first marketing stage to 44% in the subsequent stage—reflects how institutional fragility

and extended distribution chains systematically erode producers' income and bargaining capacity. These findings reinforce the theoretical premises of institutional economics and supply chain governance, demonstrating that inefficiency arises not from technical deficiencies but from structural inequities embedded within market institutions.

Accordingly, enhancing marketing efficiency requires a paradigm shift from production intensification to institutional and governance reform. Strengthening farmer cooperatives as autonomous agribusiness entities, improving rural logistics and digital platforms, and promoting youth agripreneurship are critical strategies to increase transparency, reduce transaction costs, and foster inclusive market participation. This institutional transformation marks the evolution toward a "Market Revolution," where efficiency is inseparable from equity and sustainability. Future policy frameworks should integrate institutional strengthening with digital innovation to ensure that agricultural modernization in developing economies delivers both economic resilience and social justice for farming communities.

Policy implementation should involve clearly defined stakeholder roles. Local governments are responsible for infrastructure investment and cooperative governance reform; cooperatives should function as autonomous agribusiness entities; the private sector can support digital platforms and logistics integration, while NGOs and universities can facilitate farmer capacity building and digital literacy. In the short term, policy priorities should focus on digital price transparency and cooperative activation. Medium-term strategies include infrastructure development and contractual marketing models, while long-term reforms should emphasize youth agripreneurship and institutional sustainability to ensure equitable value distribution in the rice sector.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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