Check for updates

Comparison of added value received by actors in the rice agro-industry supply chain system in lampung province: Is it fair enough for smallholder farmers?

Irmayani Noer[a] †
Sri Handayani[b]
Henry Kurniawan[c]

[a]Applied Food Security Study Program, Politeknik Negeri Lampung, Lampung Province, Jl. Soekarno Hatta Rajabasa Bandar Lampung, 35141, Indonesia.
[b]Agribusiness Management Study Program, Politeknik Negeri Lampung, Lampung Province, Jl. Soekarno Hatta Rajabasa Bandar Lampung, 35141, Indonesia.
[c]Informatics Management Study Program, Politeknik Negeri Lampung, Lampung Province, Jl. Soekarno Hatta Rajabasa Bandar Lampung, 35141, Indonesia.

† ✉ irmayani_noer@polinela.ac.id (Corresponding author)

ABSTRACT

The objectives of the research were to identify the rice supply chain system and the actors involved from the producer to the consumer, to identify value-added activities carried out by each actor, and to calculate the added value obtained by each actor. The research was conducted using a survey method with questionnaires to gather the necessary data and information. The study respondents included farmers, farmer groups, traders, collectors, rice millers, wholesalers, retailers, and consumers. A value chain analysis was performed to obtain an overview of the rice supply chain system. The method used to analyze added value in the rice supply chain system was a participatory analysis approach. The analysis model employed was Economic Value Added analysis, which determines the economic value added of a product. The results of the research indicated that there are four supply chain channels within the rice supply system. Several actors are directly involved, including farmers, collectors, inter-regional grain traders, rice millers, local rice traders, inter-regional rice traders, retailers, and consumers. The value-added activities performed by each actor include threshing, drying, transportation, milling, bleaching, sieving, weighing, packaging, and storage. The highest added value received by actors was in supply channel 3, which accounted for 80.3%. In this channel, the distribution of added value among actors was as follows: farmers (24.2%), collectors (1.5%), rice millers (35.4%), inter-regional rice traders (13.1%), and retailers (6.2%). The largest recipients of added value are rice millers, while collectors receive the smallest share.

Contribution/Originality: This study is one of the few investigations that have examined the description and comparison of all existing rice supply chains, all involved actors, all value-added activities, and all added value created within a specific study area.

How to cite: Noer, I., Handayani, S., & Kurniawan, H. (2025). Comparison of added value received by actors in the rice agro-industry supply chain system in lampung province: Is it fair enough for smallholder farmers?. Asian Journal of Agriculture and Rural Development, 15(3), 419–427. 10.55493/5005.v15i3.5567

1. INTRODUCTION

Food security is an important issue at the international, national, and household levels. Food security is also closely related to the rice commodity as the main source of food. Rice is one of the most important staple foods in the world (Mgbanya, Aze, & Obiora, 2018) because it is consumed by more than half of the world's population (Center for Agricultural Data and Information Systems, 2021; Onoja & Herbert, 2012).

The amount of rice consumption in Indonesia occupies the fourth position in the world after China, India, and Bangladesh, which is around 36.6 million tons per year or equivalent to 79.08 kilograms per capita per year. In 2024, rice production in Indonesia was about 30.3 million tons (BPS, 2024). The high level of production and consumption indicates that rice is a strategic food commodity in Indonesia.

As a country with diverse natural resources, Indonesia should be able to meet the food needs of its people in a sovereign manner. However, until now, Indonesia has not been able to guarantee the fulfillment of food supply for its population (Widada, Masyhuri, & Mulyo, 2017). The development of food security should be carried out by paying attention to three main components (Ariani & Suryana, 2023; Saliem & Ariani, 2002; Sutrisno, 2022), namely: 1) sufficient and equitable food availability; 2) effective and equitable food affordability in all regions; and 3) consumption of nutritious and balanced food.

In order to accommodate the achievement of those three components, the aspect of the food supply chain must be considered and studied in depth. Supply chain analysis is considered one of the key factors for competitive strategy to help improve organizations (Stadtler, 2015), including businesses. An increase in rice demand that is not offset by sufficient supply will lead to an increase in rice prices and trigger inflation. One of the essential aspects of rice production is the distribution of rice products or marketing. Rice production increase programs, such as crop intensification programs, will not be effective if the rice marketing system is inefficient (Saragih, Tinaprilla, & Rifin, 2017; Sultana, 2012). In addition, it is also necessary to carry out market reform, price control, and segmentation of regional and domestic rice markets as policies to optimize market strength and supply chain effectiveness.

The food supply chain system, including rice, still faces several problems, including quality risks that occur along the supply chain (Purwandoko, Seminar, Sutrisno, & Sugiyanta, 2022) as well as problems of integration and communication between actors in the supply chain. The supply chain is a series of activities to transform various resources in order to produce final products that have added value, as well as activities related to material flows, information flows, and financial flows (Hadiguna, 2017). The principle of supply chain is the integration of activities from upstream to downstream in the production process of goods, which involves various actors directly or indirectly (Purwandoko et al., 2022).

The supply of rice for the needs of the community is highly dependent on the flow of the rice supply chain from the level of producer farmers to the final consumer. The rice supply chain system plays a role in connecting each actor, both internal actors who are directly involved and external actors. The rice agro-industry must be supported by an innovative, competitive, and sustainable supply chain system to provide alternatives for farmers in choosing a supply chain that can provide decent margins. Price disparities that tend to increase for actors in the supply chain system have implications for increasing marketing margins. Larger margins indicate weak market integration and low marketing efficiency among the actors involved (Aryani, 2015).

The process of changing the form of rice production at the farmer level from harvested dry grain (GKP) to rice involves a number of actors and a series of agro-industrial activities. The number of actors involved in the production supply chain system will affect the amount of costs in the rice supply chain channel and ultimately have an impact on rice prices. According to the *Food Corporation of India* (FCI), an average of 20-30% of products are lost during transportation from farmers to factories (Bhardwaj & Palaparthy, 2008).

Poor road conditions and storage facilities, as well as high transportation costs, are obstacles to realizing an efficient rice supply chain system. In addition to internal actors who are directly involved in the supply chain system, there are external actors (e.g., transportation services) that contribute to the addition of activities and influence the added value received by internal actors. The pressure from external actors significantly affects the amount of added value that farmers obtain (Arshad, Moazzam, Raziq, & Ahmed, 2024).

Lampung Province is one of the centers of rice production in Indonesia. Most of the rice supply chain flow for the needs of the main market of the country's capital city (Jakarta) comes from Lampung Province (Nazilah, Noer, & Kurniawan, 2024). Based on the results of the research of Noer and Unteawati (2022) it is known that the problem with rice in Indonesia, especially Lampung Province, is the low actual capacity of both rice production input flows and rice production output flows, namely rice, which causes a relatively small production response.

Efforts to improve the rice supply chain system that are able to increase added value play an important role in improving the welfare of rice farmers. In the current situation, the rice supply chain has not provided meaningful added value for farmers. This problem must be studied by mapping the added value obtained by actors in the supply chain. Business relationships that successfully create bonds between farmers and business partners in the rice supply chain can reduce costs, increase efficiency, increase profits, and enhance competitive advantage, thereby increasing added value for farmers. The increase in added value received by farmers will motivate them to improve their farming performance. The results of Tey et al. (2020) research suggest that the involvement of smallholders in direct marketing within the rice value chain system can provide clear benefits.

This research focuses on the output flow of rice production because the development of the economic aspects of rice commodities is highly dependent on a smooth supply chain system. The problem raised in this study is: "How is the rice supply chain system able to provide the best added value for farmers?" and "Does every actor directly involved in the rice supply chain system receive fair economic added value in accordance with the value-added activities carried out?" The objectives of the research are: 1) to identify the supply chain system and the actors involved from the producer farmer level to the end consumer; 2) to identify added value activities carried out by each actor in the rice supply chain system; and 3) to calculate the added value obtained at each node in the rice supply chain system.

2. METHODS

The research was carried out by survey method, to obtain facts from existing symptoms and seek factual information from a region (Nazir, 2011). The focus of the research is to identify the flow of the supply chain, as well as the actors and value-added activities carried out, from the level of rice farmers to end consumers. The method used to

analyze added value in the rice supply chain system is a participatory analysis method. The study respondents were producer farmers (56 rice farmers), producer organizations (4 rice farmer groups), traders (3), collectors (3), rice millers (5), wholesalers (3), retailers (8), and consumers (16).

The research unit comprises producer farmers, rice collectors, and rice millers (small, medium, and large scale) in Gading Rejo District, Pringsewu Regency. Additionally, other research units include rice wholesalers at the sub-district and district market levels, as well as wholesalers and retailers at the rice market centers of Bandar Lampung City, namely Rajabasa, Kedaton, Way Halim, Sukarame, Tugu, Tamin, Kangkung, and Sukaraja Panjang markets.

The selection of the location for retailers and final consumers is in the market of Bandar Lampung City, as the provincial capital. This decision is based on the results of previous research indicating that the structure of rice flows in Lampung moves from the rice production center area to the city of Bandar Lampung (Noer, 2013). Data were collected through observation and interviews with selected respondents using a prepared set of questions.

Sampling of farmers was carried out using key informants, namely village heads, heads of farmer groups, heads of joint farmer groups, and community leaders. The determination of the trader sample was deliberately based on tracing information from the rice mill that was the biggest collector or buyer of rice, then traced based on value chain mapping where the rice flowed.

Value chain analysis was carried out to obtain an overview of the upstream to downstream rice agroindustry supply chain system. Financial indicators for each actor in the supply chain include production input costs, labor, procurement, storage, and margin calculation, as well as value added. Added value is the result of receipts minus input costs as a financial indicator that shows the amount of welfare rewards for labor and management sacrifices in producing added value for rice.

Profit is net income (revenue minus total costs) from the business results carried out by each actor in the rice supply chain. The revenue or sales value (price x volume) obtained by a value chain is the sum of the added value obtained by the actors and the purchase value of the product (mid-level goods) (Perdana & Noor, 2009). The components of the total value generated by an actor from the value chain are:

(Added Value)= (Total Revenue Value) - (Value of Mid-level Goods)

The principle of adding value calculation can be applied to each actor in the supply chain network as seen in Figure 1, which shows how added value is distributed to each part of the supply chain network and between actors in the supply chain network, as well as external actors.
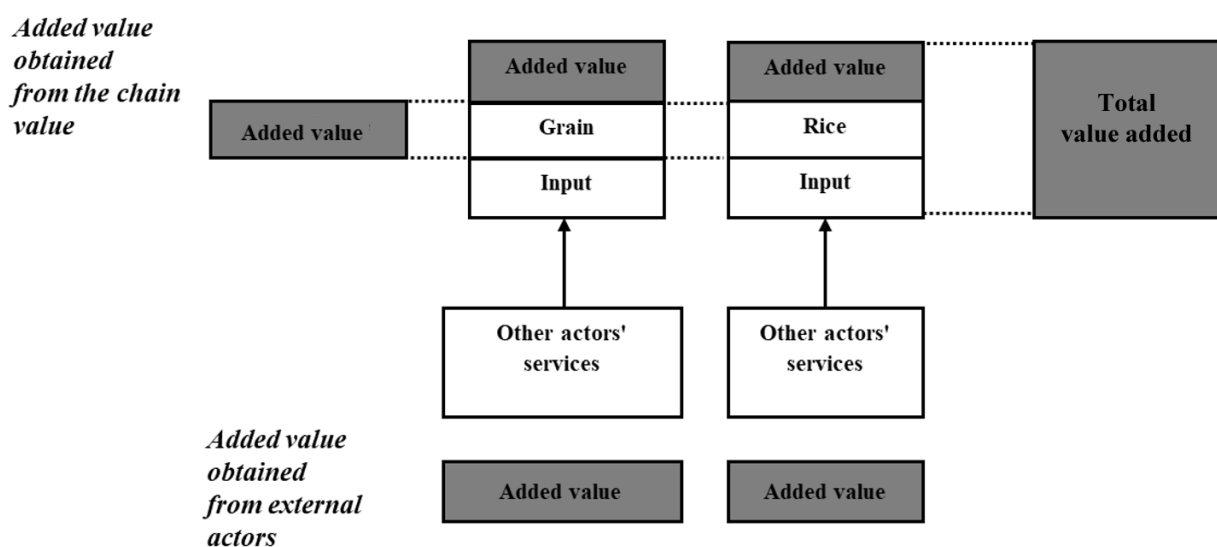

Figure 1. Analysis of the distribution of added value in the rice agro-industry supply chain system.
Source: Adopted from Noor (2011) and Perdana and Noor (2009).

The analysis model used is Economic Value Added (EVA), which is an analysis to determine the economic added value of a product after processing. This analysis examines how the value of an agricultural product increases through various processing, transportation, or storage processes. Grain value-added economics refers to efforts to increase the economic value of grain through various processing and marketing processes and to increase the selling value of grain through a more efficient supply chain. The value-added analysis in this study refers to (Ashayeri & Lemmes, 2006; Noor, 2011; Perdana & Noor, 2009; Sudiyono, 2002), as follows:

Value-added formula: VA = NP − IC.
Where:
VA: *Value Added* or added value in the rice production process (IDR/kg).
NP: Production Value is the selling price of rice per kg (IDR/kg).
IC: *Intermediate Cost*, namely the costs derived from value-added activities per unit kilogram of rice (IDR/kg).
Value-added economic analysis is carried out in the following stages.
1.   Identifying rice supply chain channels.
2.   Identify actors directly involved in the grain-rice supply chain system.
3.   Identify value-added activities carried out by each actor directly involved in the rice supply chain system.
4.   Collecting data on costs incurred from value-added activities, calculated in rupiah per kilogram.

5. Collecting rice price data on each actor in the rice supply chain system, in rupiah per kilogram.
6. Calculating the costs incurred from rice value-adding activities for each actor involved in the rice supply chain system, calculated in rupiah per kilogram.
7. Calculating added value, which is the difference between the selling value of rice and the costs arising from the activity of adding value to rice for each actor involved in the rice supply chain system, calculated in rupiah per kilogram.
8. Calculate the value-added ratio between actors involved in the rice supply chain system, considering the value-added and prices at the end-consumer level.

3. FINDINGS

Based on the results of the research, the value chain system of rice commodities was identified as shown in Figure 2. The rice value chain system involves numerous economic actors, including producer farmers, collectors, rice millers, local rice traders, inter-regional rice traders, retailers, and consumers. Although there are slight differences, the findings of this study align with those reported by Primasatya, Kalaba, and Sulaeman (2020), which also identify producer farmers, distributors, rice millers, retailers, and consumers as key participants. A supply chain system is established when all actors in the chain collaborate effectively to maximize value creation along the entire chain.
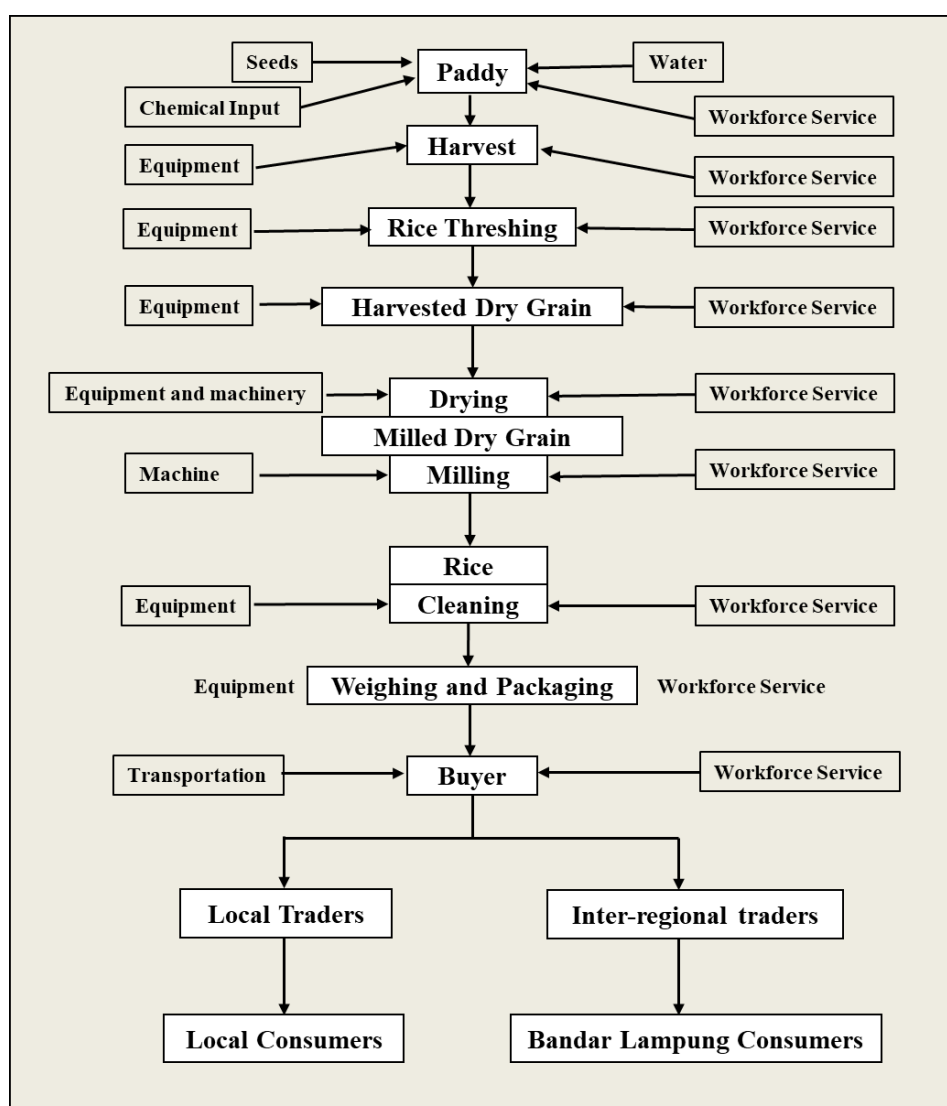

Figure 2. Rice value chain system.

Various internal and external actors are involved in value-added activities within the supply chain until the final product, rice, is produced. The supply chain encompasses various activities, including planting, maintenance, harvesting, threshing, drying, milling, packaging, and transportation, which must be carried out during rice production until it becomes rice.

The structure of the rice flow is shown in Figure 3. The grain to be sold flows entirely from farmers to collectors, then is distributed to rice mills. This aligns with the research of Nurpalina, Noer, and Kurniawan (2022) that grain from farmers is sold to collectors, not slashers. Furthermore, rice products (grains) flow from production centers to several rice milling industries.
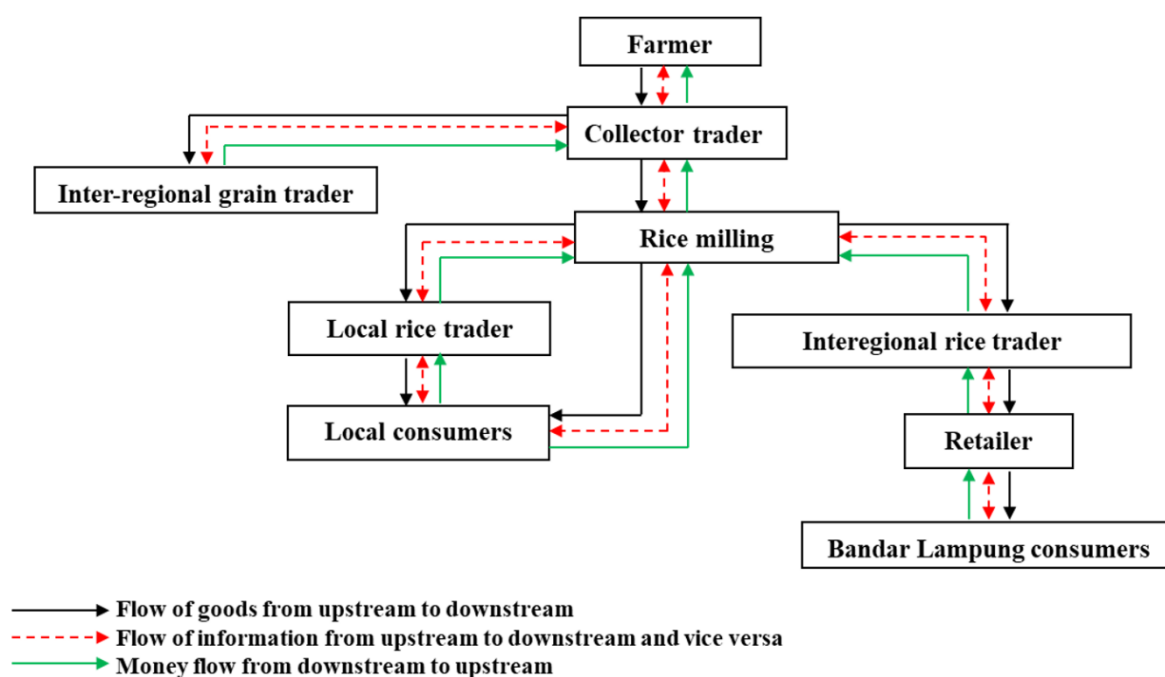
Figure 3. Rice supply chain system and linkages between an actors.

Actors who are directly involved in the rice supply chain system in Lampung Province consist of farmers, collectors, rice millers, local rice traders, inter-regional rice traders, retailers, and consumers. This result slightly differs from the findings of previous research, which identified four actors in the food product supply chain system: farmers, wholesalers, retailers, and cross-border traders. The highest net marketing margin is earned by inter-regional rice traders, followed by wholesalers.

The results of research identified five main actors involved in the rice supply chain: producers, rice millers, wholesalers, retailers, and consumers. The primary recipients of grain from farmers are rice collectors and rice millers. Traders collect and mill rice, carrying out the procurement cycle, while rice mills perform the manufacturing cycle and play an important role in converting grain into rice that is ready for processing or storage as food reserves (Nurmahdy, Machfud, & Syuaib, 2020).

Rice is distributed by collectors to rice mills to be dried, milled, and packaged, and then sold to retailers (wholesalers) or directly to end consumers in the form of rice. The rice milling unit (RMU) is a central point in the rice supply chain system (Kusuma, Widayanti, & Pawana, 2023; Primasatya et al., 2020; Ridwan, Mubassiran, & Syafiq, 2015; Sepang, Mandei, & Pakasi, 2017).

There are four marketing channels in the rice agroindustry supply chain system that have been identified. In channel 4, rice is brought outside the region by inter-regional grain traders, so in this study, this rice is not tracked further. The relationship between actors in the supply chain can be seen in Figure 3. Activities in the rice agroindustry supply chain are divided into three main flows: the flow of goods, the flow of information, and the flow of finance. The comparison of added value and profit received by each actor in the rice supply chain (Figure 3) serves as a reference to determine which channel provides the highest added value and profit to farmers and actors.

Added value analysis refers to the price and costs of each actor, including how long it takes to prepare or present goods for sale. The performance indicators chosen are financial indicators for each actor involved in the rice supply chain, from rice producers, rice millers, to end consumers, which include production costs, labor, procurement, storage, transportation, and margin calculation, as well as added value. The added value and added value structure of each channel identified in the rice supply chain system are listed in Table 1.

Table 1. Added value structure and added value of actors in the rice supply chain system.

No.	Actors	Added value structure	Added value of actors (IDR/kg)			
Supply chain-channels			**1**	**2**	**3**	**4**
1.	Farmers					
	Harvest	Workforce	832.9	832.9	832.9	832.9
	Transport	Depreciation	7.7	7.7	7.7	7.7
	Threshing	Benefit	2.302.0	2.302.0	2.302.0	2.302.0
	Drying	Added value	3.142.6	3.142.6	3.142.6	3.142.6
	Packaging	Added value outside the farmers	1.557.4	1.557.4	1.557.4	1.557.4
	Storage	Output price	4.700	4.700	4.700	4.700

No.	Actors	Added value structure	Added value of actors (IDR/kg)			
Supply chain-channels			**1**	**2**	**3**	**4**
2.	Collectors/inter-regional grain traders		5.300	5.300	5.300	5.300
	Transport	Workforce	10.0	10.0	10.0	10.0
	Packaging	Depreciation	20.8	20.8	20.8	20.8
	Weighing		169.2	169.2	169.2	169.2
3.	Rice millers		10.000			
	Transport	Workforce	985.0	985.0	985.0	985.0
	Drying	Depreciation	300.0	300.0	300.0	300.0
	Milling	Benefit	3.315.0	3.315.0	3.315.0	3.315.0
	Whitening					
	Styling					
	Weighing					
	Packaging					
	Storage					
4.	Local traders			11.000		
	Transport	Workforce		50.0		
	Marketing commission	Benefit		650.0		
5.	Inter-regional rice traders				12.000	
	Transport	Workforce			210.0	
	Weighing	Depreciation			100.0	
	Packaging	Benefit			1.390.0	
	Storage					
6.	Retailers			13.000		
	Packaging	Workforce		20.0		
	Weighing	Depreciation		100.0		
	Storage	Benefit		680.0		
	Marketing commission					
7.	End consumers	Price	13.000	13.000	13.000	13.000

The analysis of the added value received by the actors in the rice supply chain was conducted by examining the supply chain channel. The unit used in the added value analysis is equivalent to one kilogram of rice. This means that the quantities of physical materials and raw materials are calculated and converted into an equivalent value to produce one kilogram of rice.

The added value activities carried out by each actor in the rice agro-industry supply chain system include threshing, drying, transportation, milling, bleaching, sieving, weighing, packaging, and storage. It was found that the added value activities include cleaning, peeling, drying, grinding, transportation, and storage.

The cost of the rice supply chain at the farmer level includes the costs of harvesting, threshing, drying, packaging, and storage, with a total cost of IDR 840.6/kg. In rice milling, the costs encompass transportation, drying, milling, sieving, weighing, packaging, and storage, totaling IDR 1,285/kg. At the trader level, the costs involve transportation, packaging, weighing, and sales commissions, with the highest total cost among interregional rice traders, amounting to IDR 310/kg. Sima and Simamora (2023) found that rice milling is the actor that incurs the highest supply chain costs, with a total cost of IDR 756,-/kg, consisting of labor costs (transportation and drying) and transportation costs.

Based on the results of the added value analysis, it was found that most of the added value from the rice supply chain channel was accepted by actors who were directly involved in the supply chain channel (61.1%-80.3%), while the rest (19.7%-38.9%) was accepted by actors from outside the rice supply chain channel. The order of the actors receiving the margin, from the highest to the lowest, is rice millers, farmers, interregional rice traders, retailers, and collectors.

The results of this study align with research indicating that rice production and marketing are profitable businesses, with rice milling generating a relatively large profit margin, followed by producers, wholesalers, and retailers. Rahman et al. (2021) found that the rice market behaves uncompetitively between wholesalers and rice millers, with retail traders holding substantial market power and playing a major role in the rice value chain. The percentage of added value contributed by actors to rice prices can be observed in Table 2.

Table 2. Percentage of added value (AV) received by the actors on the price of rice in Lampung Province.

Actors	Supply chain channels			
	1	2	3	4
Farmers (IDR)	3.142.6	3.142.6	3.142.6	
(% of rice prices)	(24.2%)	(24.2%)	(24.2%)	3.142.6
Collectors (IDR)	200.0	200.0	200.0	
(% of rice prices)	(1.5%)	(1.5%)	(1.5%)	-
Interregional grain traders (IDR)	-	-	-	200.0
Rice millers (IDR)	4.600.0	4.600.0	4.600.0	
(% of rice prices)	(35.4%)	(35.4%)	(35.4%)	-
Local rice traders (IDR) (% of rice prices)	-	700.0 (5.4%)	-	-
Interregional rice traders (IDR) (% of rice prices)	-	-	1.700.0 (13.1%)	-
Retailers (IDR)			800.0	
(% of rice prices)	-	-	(6.2%)	-
Total AV actors (IDR)	7.942.6	8.642.6	10.442.6	
(% of rice prices)	(61.1%)	(66.5%)	(80.3%)	-
Total AV outside actors (IDR)	5.057.4	4.357.4	2.557.4	
(% of rice prices)	(38.9%)	(35.5%)	(19.7%)	-
Rice prices	13.000.0	13.000.0	13.000.0	-

The results of this study show that the largest added value obtained by the actors on channel 3 is IDR 10,442.6 per kilogram of rice. The lowest added value was in channel 1, which was IDR 7,942.6 per kilogram of rice. The analysis indicates that the largest recipient of added value among the actors involved in the rice supply chain channel is rice millers, accounting for about 35.4% of the selling price of rice. The smallest recipients of added value are collectors across all channels, with an added value of 1.5% of the rice price. The low added value for collectors is because these actors do not engage in many value-added activities and do not hold rice for extended periods. The added value received by the actors on the rice price can be seen in Figure 4.
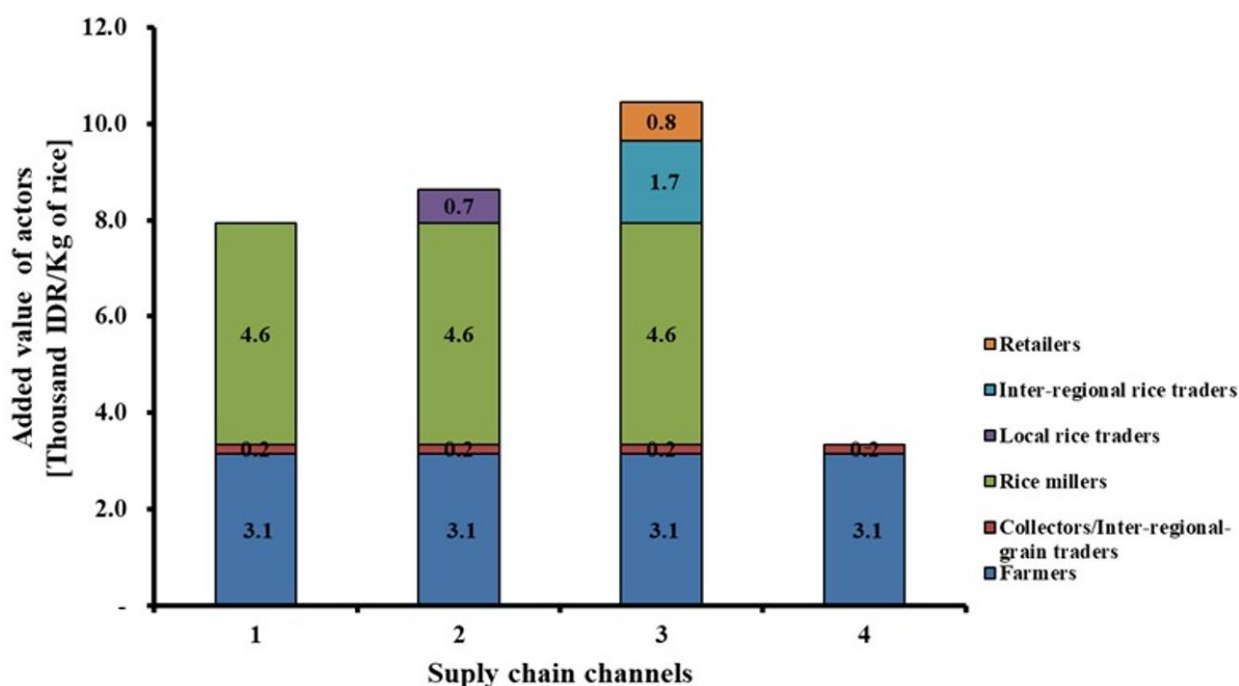
Figure 4. Added value received by actors.

Rice farmers are the backbone of food security. Connecting farmers to the rice value chain and involving smallholders at various stages will significantly benefit farmers. Farmers are often marginalized actors in the rice value chain (VC), participating primarily as paddy producers and presumed to receive a smaller share of the total value added (Mataia et al., 2018). Tey et al. (2020) explored the potential for increased smallholder involvement in the rice value chain, finding that direct marketing opportunities could offer clear benefits for smallholders.

On the other hand, it is also worth noting that after harvesting, rice generally has a fairly high moisture content, which is around 20-23% in the dry season and around 24-27% in the rainy season (Sinaga, Tamrin, Asmara, & Kuncoro, 2023). Rice drying by farmers usually uses sunlight. Therefore, quite a lot of farmers are overwhelmed with drying their rice and choose to sell their rice with high moisture content, although at a low price. The government can be

advised to introduce and open farmers' access to grain drying equipment and/or machines so that collectors can receive rice of better quality when selling to rice millers.

In addition, it can be seen in Figure 4 that rice millers receive the largest portion of added value across all channels. To increase farmers' income, it is necessary to consider expanding farmers' access and involvement in the rice milling industry. To facilitate this, farmers should be organized into farmer groups. This approach is worth considering because (Cavite & Suwanmaneepong, 2022) reported that farmers consolidated into community enterprises play a significant role in the rice supply chain in Thailand.

4. CONCLUSION

Based on the results of the research that has been carried out, conclusions can be drawn:

1. There are several actors who are directly involved in the grain/rice supply chain system, starting from the producer farmer level to the final consumer, namely farmers, collectors, rice millers, local rice traders, intercity rice traders, local consumers, and foreign consumers region.

2. The value-added activities carried out by each actor in the grain/rice supply chain system consist of threshing, drying, milling, bleaching, sieving, weighing, packaging, storage, and transportation.

3. The added value of the entire supply chain by actors directly involved in the rice supply chain system is 85.1 percent. The largest recipients of added value are rice mills, and the smallest are collectors. The added value of each actor is as follows: farmers (24.2%), collectors (1.5%), rice millers (35.4%), local rice traders (5.4%), inter-regional traders (13.1%), and retailers (6.2%).

4. In order to improve the quality of farmers' grain, the government can be advised to introduce and open farmers' access to grain drying equipment and/or machines so that the collectors can benefit from the impact of improving the quality of the rice they sell to rice millers with better quality and better prices.

5. To increase farmers' income, it is necessary to expand farmers' access and work in the rice milling industry. The government can be advised to strengthen organizational institutions at the farmer level so that they have the competitiveness to partner with the rice processing industry.

REFERENCES

Ariani, M., & Suryana, A. (2023). Indonesia's food security performance: Lessons from assessments using global and national criteria. *Analisis Kebijakan Pertanian, 21*(1), 1-20.

Arshad, M. W., Moazzam, M., Raziq, M. M., & Ahmed, W. (2024). Innovate, learn, sustain: Unveiling dynamics of value addition in smallholder dairy farming. *Journal of Agribusiness in Developing and Emerging Economies.* https://doi.org/10.1108/JADEE-10-2023-0250

Aryani, D. (2015). Vertical integration of the rice producer market with the rice retail market in Indonesia. *Manajemen Teknologi, 1*(2), 225–238.

Ashayeri, J., & Lemmes, L. (2006). Economic value added of supply chain demand planning: A system dynamics simulation. *Robotics and Computer Integrated Manufacturing, 22*(5–6), 550–556. https://doi.org/10.1016/j.rcim.2005.11.010

Bhardwaj, S., & Palaparthy, I. (2008). Factors influencing Indian supply chains of fruits and vegetables: A literature review. *The ICFAI University Journal of Supply Chain Management, 3*, 59–68.

BPS, B. P. S. (2024). *Paddy harvested area and production in Indonesia.* Indonesia: BPS-Statistics Indonesia.

Cavite, H. J., & Suwanmaneepong, S. (2022). Supply chain structure and constraints of a rice production community enterprise: Evidence from rural Thailand. *International Journal of Agricultural Technology, 18*(3), 951–964.

Center for Agricultural Data and Information Systems. (2021). *Food consumption bulletin.* Jakarta, Indonesia: Center for Agricultural Data and Information Systems, Secretariat General, Ministry of Agriculture.

Hadiguna, R. A. (2017). *Agro-industry supply chain management: A sustainable approach to performance measurement and risk assessment.* Padang, Indonesia: Andalas University Press.

Kusuma, I. M., Widayanti, S., & Pawana, N. I. (2023). Supply chain management of rice products at the Sumber Baru rice mill, Sidoarjo sub-district, Sidoarjo regency. *Scientific Journal of Agribusiness Management, 11*(1), 6–12. https://doi.org/10.33005/JIMAEMAGRI.V11I1.2

Mataia, A. B., Beltran, J. C., Manalili, R. G., Francisco, N., Flores, A. C., & Catudan, B. M. (2018). Analysis of the value addition and distribution in the rice value chain in the Philippines. *Philippine Journal of Crop Science, 43*(1), 129–130.

Mgbanya, J. C., Aze, A. V., & Obiora, C. C. (2018). Assessment of produce standardization adopted by the rice farmers in the marketing of their rice produce in Ebonyi State, Nigeria. *Australian Journal of Agricultural and Resource Economics, 60*(2), 146–152. https://doi.org/10.22004/AG.ECON.342171

Nazilah, Noer, I., & Kurniawan, H. (2024). Vertical integration of the rice market in Lampung Province. *Journal of International Conference Proceedings, 7*(2), 553–563. https://doi.org/10.32535/JICP.V7I2.3254

Nazir, M. (2011). *Metode penelitian. In Bogor: Penerbit Ghalia Indonesia.* Indonesia: Penerbit Ghalia Indonesia.

Noer, I. (2013). *Marketing patterns of unhusked rice/rice in Lampung province.* Paper presented at the Proceedings of the National Seminar on Applied Technology, UGM Vocational School: Development of Superior, Dignified, and Professional Applied Technology.

Noer, I., & Unteawati, B. (2022). Rice marketing systems model to strengthen institutional of rice marketing in Lampung Province Indonesia. *Asia Pacific Journal of Management and Education, 5*(2), 100–110. https://doi.org/10.32535/APJME.V5I2.1636

Noor, T. I. (2011). The influence of rice agro-industrialization on agricultural development based on irrigated rice field agro-ecosystems in West Java. Dissertation, Postgraduate Program, Padjadjaran University.

Nurmahdy, A. I., Machfud, M., & Syuaib, M. F. S. (2020). Performance of rice supply chains in Karawang District. *Journal of Business and Management Applications, 6*(2), 325–334. https://doi.org/10.17358/JABM.6.2.325

Nurpalina, Noer, I., & Kurniawan, H. (2022). Marketing system of grain from farmers to rice mill producers in Pringsewu District. *Journal of The Community Development in Asia, 5*(2), 102–109. https://doi.org/10.32535/JCDA.V5I2.1501

Onoja, A. O., & Herbert, B. C. (2012). Econometric evaluation of rice profitability determinants in Kogi State, Nigeria. *Journal of Agricultural Extension and Rural Development, 4*(5), 107-114.

Perdana, T., & Noor, T. I. (2009). *Agribusiness supply chain management. In Module for the Education and Training Agency of the Regional Government of West Java Province.* . Bandung, Indonesia: : Education and Training Agency of West Java Province.

Primasatya, A., Kalaba, Y., & Sulaeman, S. (2020). Analysis of the rice supply chain at the workshop rice mill in Dolago Padang Village, Parigi Selatan District, Parigi Moutong Regency. *Agrotekbis: Journal of Agricultural Science (e-journal), 8*(4), 757-764.

Purwandoko, P. B., Seminar, K. B., Sutrisno, & Sugiyanta. (2022). Functional requirements analysis and traceability information modeling in the rice supply chain. *Food Journal, 31*(1), 1–12. https://doi.org/10.33964/JP.V31I1.557

Rahman, M. C., Pede, V., Balie, J., Pabuayon, I. M., Yorobe, J. M., & Mohanty, S. (2021). Assessing the market power of millers and wholesalers in the Bangladesh rice sector. *Journal of Agribusiness in Developing and Emerging Economies, 11*(3), 280-295. https://doi.org/10.1108/JADEE-04-2018-0053

Ridwan, A. Y., Mubassiran, M., & Syafiq, S. (2015). Development of a prototype rice logistics monitoring system (Case Study at the West Java Provincial Food Security Agency). *Journal of Systems and Industrial Engineering, 2*(2), 28-34.

Saliem, H. P., & Ariani, M. (2002). Food security, concepts, measurements and strategies. *Forum Penelitian Agro Ekonomi, 20*(1), 12-24.

Saragih, A. E., Tinaprilla, N., & Rifin, A. (2017). Supply chain of rice products in Cibeber sub-district, Cianjur regency. *Jurnal Manajemen & Agribisnis, 14*(3), 218-218.

Sepang, G. Y. M., Mandei, J. R., & Pakasi, C. B. (2017). Rice supply chain management in South Kotamobagu District, Kotamobagu City. *Agri-Socioeconomics, 13*(1A), 225-238. https://doi.org/10.35791/agrsosek.13.1A.2017.15638

Sima, A., & Simamora, L. (2023). Analysis of supply chain and marketing efficiency of rice in Semarang Regency, Central Java Province. *Journal of Agribusiness Management, 11*(1), 19–28.

Sinaga, E. I., Tamrin, T., Asmara, S., & Kuncoro, S. (2023). Drying of rice (Oryza sativa L) in the rainy season. *Jurnal Agricultural Biosystem Engineering, 2*(2), 313-318. https://doi.org/10.23960/jabe.v2i2.7501

Stadtler, H. (2015). Supply chain management: An overview. In H. Stadtler, C. Kilger, & H. Meyr (Eds.), Supply chain management and advanced planning. In (5th ed., pp. 3–28). Berlin, Germany: Springer. https://doi.org/10.1007/978-3-642-55309-7_1

Sudiyono, A. (2002). *Agricultural marketing.* Malang, Indonesia: Universitas Muhammadiyah Malang.

Sultana, A. (2012). Rice marketing in Bangladesh: From the perspective of village study at cox's bazar district. *African Journal of Agricultural Research, 7*(45), 5995-6004.

Sutrisno, A. D. (2022). Regional food security system policy. *Kebijakan: Jurnal Ilmu Administrasi, 13*(1), 28-42. https://doi.org/10.23969/kebijakan.v13i1.4862

Tey, Y. S., Ibragimov, A., Brindal, M., Sidique, S. F., Abduraupov, R., & Makhmudov, M. (2020). Moving smallholders up rice value chain: A system dynamics approach. *British Food Journal, 122*(3), 852-869. https://doi.org/10.1108/BFJ-08-2019-0632

Widada, A. W., Masyhuri, M., & Mulyo, J. H. (2017). Determinant factors of food security in Indonesia. *Agro Ekonomi, 28*(2), 205-219. https://doi.org/10.22146/jae.26245