

Analysis of the Marketing and Income Chain of Food Crop Farmers in Land Affected by Earthquakes and Liquefaction

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Abstract: This study aims to determine the marketing channels for rice and corn commodities and (ii) the level of income of farmers by looking at Farmer Share and Marketing Margins, including Marketing Efficiency on agricultural land affected by the liquefaction and earthquake natural disasters in Sigi and Palu Regencies in 2018. The method used is quantitative descriptive, while the data collection uses observation, interviews and uses a questionnaire instrument. The data obtained shows that income in one harvest season of lowland rice farmers in the villages of Oloboju and Jono Oge mostly have income from rice farming ranging from IDR 11,000,000 – IDR 21,000,000 per crop season while corn crops with an average value of IDR 9,357. 000. For each corn marketing channel, a different farmer's share is obtained for each marketing channel. Farmer's share of rice in marketing channel I was 86.95%, higher than Fs in marketing channel II, which was 80.01%. Meanwhile, marketing efficiency on channel I was 2.60% and for efficiency on channel II was 6.83%, so that of the two channels the most efficient was the first marketing channel, which was 2.60%.

Keywords: Marketing and Income Chain, Food Crop, Farmer, Natural Disaster.

I. INTRODUCTION

Increased production and productivity of food crops is important considering the increasing demand for rice, corn and soybeans due to population growth which continues to increase[1], [2]. Food availability is very important in order to meet the food needs of the community in a sustainable manner[3]. The government's efforts to improve and encourage food agriculture can be seen from the programs carried out such as the Special Efforts (Upsus) in increasing food production which are focused on three main commodities, namely Rice, Corn and Soybean (Pajale). crop productivity in terms of yield and quality through the application of appropriate technology to the specific relevant locations, although the progress sometimes encounters obstacles including natural disasters.

The earthquake and liquefaction that occurred in September 2018 in Palu City, Sigi Regency and Donggala Regency, Central Sulawesi Province, have destroyed various aspects of community life which greatly impacted the lives of farmers in Sigi Regency and Palu City due to liquefaction and in Donggala Regency as the affected area Earthquake[4]. Farmers' economic conditions have deteriorated greatly, purchasing power has decreased, and agricultural land cannot be planted because it is technically impossible to cultivate the land. Before the farmers' living conditions were restored, the Covid-19 pandemic hit the world, including Indonesia[5].

The villages of Jono Oge in Sigi Regency, Petobo in Palu City, and Toaya in Donggala Regency were the areas most affected by natural disasters. This condition caused the productivity of agricultural land affected by the earthquake and liquefaction to drop drastically because technically no production facilities were available, there was no counseling, limited government assistance, access to price and market information, as well as massive information on Covid-19 which had psychological implications for farmers.[6].

There are many reasons why farmers do not have the ability to maintain their socio-economic life, mainly because it is difficult to obtain fresh funds, production facilities and supporting factors are not available such as fertilizers, superior seeds, counseling, and the lack of attention from the local government and local government.[7], [8]. The government is still focused on providing temporary housing and permanent housing. In a downturn, the ownership status of farmers' land is also unclear due to a shift in the boundaries after the liquefaction occurred[9].

Jono Oge and Petobo, who were the research locations, show that the central and local governments have understood the negative impact experienced by the community, especially farmers affected by the earthquake and liquefaction due to the imposition of the Covid-19 emergency condition, but have not been able to provide optimal solutions.[10]. It is hoped that the implementation of a limited lock down will provide an opportunity for farmers to return to their activities by observing health protocols, especially in keeping their distance and using masks when leaving the house.[11]. The Government of Indonesia has understood the negative impact experienced by the community, especially farmers affected by the earthquake and liquefaction due to the imposition of the Covid-19 emergency condition. It is hoped that the implementation of a limited lock down will provide an opportunity for farmers to return to their activities by observing health protocols, especially in keeping their distance and using masks when leaving the house.[12].

Communities living in rural areas, especially farmers who were affected by the earthquake and liquefaction natural disasters around Jono Oge, Sigi Regency, and Petobo Village, Palu City, Central Sulawesi Province, experienced prolonged suffering. Their agricultural products, which have been channeled through middlemen to be sold to inner-city markets, have also been hampered by the government's policy of implementing a lock down to reduce human contact through the implementation of "Social Distancing". Two situations and conditions that affected the lives of farming families were traumatic due to the natural disaster in September 2018. Even farmers and communities who were faced with a difficult situation were helpless in finding their own way[13].

II. RESEARCH METHODOLOGY

Data collection was carried out using observation techniques to obtain primary data while secondary data were obtained through relevant agencies, including using a questionnaire instrument equipped with participatory face-to-face interview methods. This study uses descriptive analysis method, namely analysis of research data to test the generalization of research results based on several respondents by determining respondents or informants Purposive sampling.

The total sample for this study was 87 heads of families divided into five age groups namely (i) ≤ 20 years, (ii) 21-30 years, (iii) 31-40 years, (iv) 41-50 years, and (v) ≥ 51 years. Based on the age group purposively determined who will be the subsample. Data collection was carried out through the main respondents, namely (i) farmers around the areas affected by the earthquake and liquefaction Jono Oge and Sidondo, Sigi Regency; (ii) collectors; (iii) retail traders; (iv) sellers in markets (v) end consumers of rice and corn food crops in Manonda traditional markets, Talise markets and Masomba. Data collected through surveys and interviews include; (i) data on soil characteristics and (ii) socio-economic conditions of farmers affected by disasters and liquefaction.

In justifying the research results obtained, a study was carried out by determining marketing margins, farmer share, and marketing channel efficiency.

III. RESULTS AND DISCUSSION

Rice production

Rice food crop is a strategic commodity and a source of food to meet the basic needs of society. Data for the last year (2018 to 2020) is presented in Figure 1. Total Paddy production in Sigi Regency in 2020 was 82,683.39 tons of dry milled grain (GKG), or an increase of 17,733.92 tons of GKG (27.3 percent) compared to 2019.

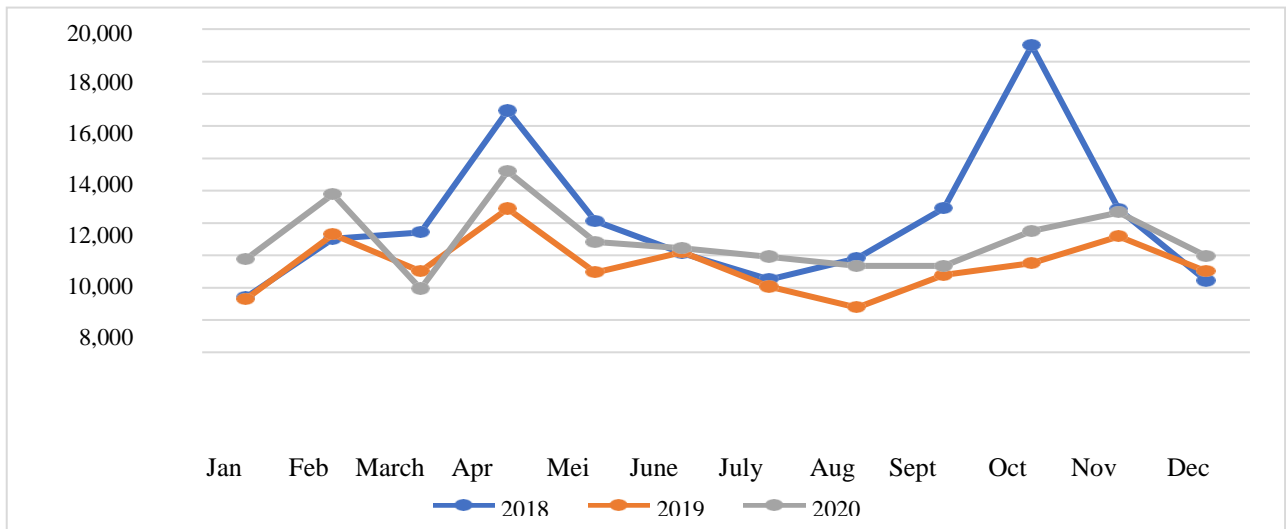


Fig 1. Rice Production in Sigi Regency in 2018 -2020

If you look at the comparison of production between the same months in different years, the biggest increase in production in 2020 occurred in August, which was 5,345.55 tons, 2,576.97 tons more than in August 2019 which amounted to 2,768.58. The highest production in 2020 occurred in April, which reached 11,200.71 tonnes of GKG.

Similar data is also shown for production in 2020, where the highest rice production in 2019 occurred in April, namely 8,883.66 tonnes. For 2018 the highest rice production occurred in October, reaching 18,973.20 tons of GKG.

Total Corn production in Sigi Regency in 2020 was 56.173 tons, with a productivity value of 5.53 tons/ha or an increase (4.5%) while in 2019. Corn production in Sigi Regency in 2019 was 51.488 tons, with a value Its productivity is 4.59 tonnes/ha or has increased (5.6%) compared to 2018.

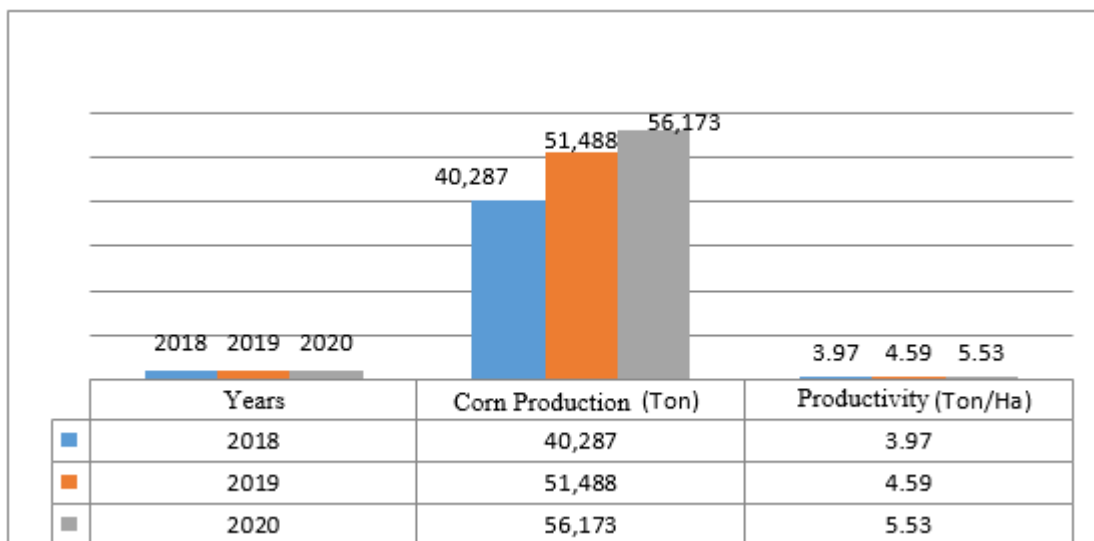


Fig 2. Corn Production in Sigi Regency in 2018 -2020

In 2018, due to the aftermath of the earthquake and liquefaction, the total production has greatly decreased. If you look at the comparison of production between the same months in different years, the biggest increase in production was in 2020, followed by 2019 and 2018. This study aims to obtain some strategic information, namely to find out the income of farmers before and after being affected by natural disasters and liquefaction, to find out the main obstacles in carrying out farming activities on land affected by earthquakes and liquefaction, and to find out marketing strategies for farmers after being affected by earthquakes and liquefaction. Natural disasters are natural phenomena that can destroy the joints of life [14], [15], can even impoverish the community including affected farmers [16], so that it requires a stimulus to restore the morale of the community so that they can maintain normal life as before [17], [18].

Analysis of Lowland Rice Farming Income

Restoring the lives of the community, including farmers affected by natural disasters, earthquakes and liquefaction is a strategic effort that must be carried out by the government[19]. To find out the income of affected people who have returned to farming, an analysis is carried out in accordance with the primary data obtained as shown in Table 1.

TABLE I. Distribution of Respondents Based on Rice Paddy Farming Income in Oloboju Village, Sigi District, City of Sigi Regency

Lowland Rice Farmer Income (Rp)	Amount	Percentage (%)
1,000,000-10,000,000	13	30 %
11,000,000-20,000,000	21	49%
21,000,000-30,000,000	5	12%
31,000,000-40,000,000	3	7%
41,000,000-50,000,000	1	2%
Total	43	100 %

Based on TABLE I, the distribution of respondents based on the income of paddy rice farming farmers in Oloboju and Jono Oge Villages, Sigi District, Sigi Regency City shows that the income of lowland rice farmers is between Rp. followed by lowland rice farmers whose income is between IDR 11,000,000 – IDR 20,000,000 as many as 21 lowland rice farmers. While cultivating farmers who have incomes ranging from IDR 21,000,001 – IDR 30,000,000 are only 5 people. There are only 3 farmers who have the second largest income, around IDR 31,000,000 – IDR 40,000,000. The farmer with the highest income in one cropping season is only 1 person with an income received once in a planting season of IDR 41,000.

The decline in the income of farmers affected by natural disasters is a logical consequence that directly affects the lives of farmers[20], [21], even their lives can reach the point of poverty which occurred beyond expectations before being affected by natural disasters[22]. Unpredictable natural disasters make farmers not prepare things when facing emergencies[23]As a result, the affected farmers are unable to escape the psycho-social-economic downturn[24], [25].

Analysis of Corn Farming Income

Commodity corn as an ingredient for animal feed and also as food is one of the commodities developed by farmers around areas affected by natural disasters in 2018. Data on the distribution of income for corn farmers is presented in Table 2.

In TABLE II The distribution of respondents based on the income of corn farming farmers in Jonooge Village, Sigi District, Sigi Regency shows that the income of corn farmers is between Rp. – IDR 3,600,000 for 6 farmers with a total percentage of 14%.

TABLE II. Distribution of Respondents Based on Corn Farming Income

Income of Lowland Rice Farmers (Rp)	Amount	Percentage (%)
500,000 -2,000,000	7	16 %
2,100,000-3,600,000	6	14 %
3,700,000-5,200,000	11	26%
5,300,000-6,800,000	12	28%
6,900,000-8,400,000	7	16%
Total	43	100 %

In addition, there are 11 corn farmers whose income is between Rp. 3,700,000-5,200,000, while corn cultivating farmers who have an income of Rp. 5,300,000-6,800,000 are 7 farmers. The last farmers who earn the highest income from corn farming are around Rp. 6,900,000-8,400,000 only amounted to 7 people. This illustrates that most of the corn farmers in Jono Oge village have income from corn farming of only around Rp. 3,700,000 – Rp. 5,200,000 per crop season. As a community affected by natural disasters, they are generally powerless in recovering the family economy due to various limitations[26], [27], and in a helpless condition, the creativity of the community including farmers is difficult to grow[28]which can directly disrupt the stability of productivity when cultivating[29].

Acceptance of Farmers before the Impact of Natural Disasters

Before the natural disaster occurred in Sigi Regency, the life of farmers was relatively normal with the ability to meet their basic needs. The level of farmer acceptance before the natural disaster is presented in TABLE III.

TABLE III. Total Acceptance of Respondents Before the Earthquake Affected

No	Previous Land Area (Ha)	Production (Kg)	Price (Kg)	Total Revenue (Rp)
1	0.75	3,150	3,500	11,025,000
2	0.75	3,150	3,500	11,025,000
3	0.50	2,300	3,500	8,050,000
4	0.75	3,200	3,500	11,200,000
5	0.50	2,250	3,500	7,875,000
6	0.50	2,300	3,500	8,050,000
Amount	5,25	16,350	21000	57,225,000
Average	0.8	2,725	3500	9,537,500

Based on Table 3, the acceptance of corn farming farmers in Jono Oge Village, Biromaru District, Sigi Regency shows that the acceptance of corn farmers before the Earthquake and liquefaction of the previous land area averaged 0.8 Ha with a production of 16,350 Kg with an average of 2,725 Kg per planting season . With the price at that time of 3500/Kg, farmers at the time before the earthquake were able to get income in one harvest season with an average value of IDR 9,357,000. This is very supportive for their family life. Natural disasters have changed all dimensions of the lives of affected farmers[30], [31], even as a result of liquefaction farmers lost agricultural land so that their arable land experienced a reduction of up to 50 percent. The decrease in land area directly affects production which has a correlation with income[32], [33].

Marketing Margins

Marketing margins, which consist of costs and finance, can be identified by analyzing marketing agencies. The value of the marketing margin is determined by subtracting the selling price and purchase price of each institution involved in the marketing chain, or in other words, looking at the large price difference that exists between farmers and each of the institutions involved until the price reaches the consumer level so that detected prices at the producer level, which is commonly referred to as farmer share (Fs).

This margin share is the percentage of the price spread to the consumer's purchase price. Price grouping is the purchase price and marketing costs according to the marketing functions carried out in the marketing chain, where. Share margin is determined by comparing the price received by farmers or intermediary institutions with the price paid by consumers multiplied by 100%, so that the final unit obtained is in the form of % (percent).

It can be described that in this study information was obtained starting from the costs, profits, and marketing margins for Food Crops in marketing channel 1, presented in TABLE IV as follows:

TABLE IV. Costs and marketing margins for Rice in Marketing Channel 1

No	Description	Selling/buying price (Rp/kg)	Marketing costs (Rp/kg)	Share Margin (%)
1	Producer Farmers			
	Selling price	10,000		86.9
2	Retail Traders			
	Purchase price	10,000		
	Selling price	11,500		
	Marketing Expenses		300	2.60
	*Packaging / Sack		120	0.08
	*Transportation		150	0.13
	*Marketing loss		30	0.02
	Profit		650	
	*Marketing Margins	1,500		
3	Consumer			
	*Purchase price	11,500		

In marketing channel 1, as presented in Table 4 above, it can be seen that farmers in Oloboju Village sell rice in the form (rice) for IDR 10,000/Kg, or 86.95% of the final price received by consumers. The total cost by the retailer is Rp. 300/Kg. These costs include marketing costs of Rp. 120/Kg, packaging costs (sacks) and transportation costs of Rp. 150/Kg and marketing loss costs of Rp. 30/Kg. For this expenditure, the retailer obtains a profit of 650/Kg, with a marketing margin of IDR 1,500/Kg.

TABLE V. Costs and marketing margins of Paddy Paddy (Rice) Marketing Channel 2

No	Description	Selling/Purchasing Price (Rp/Kg)	Marketing Expenses (Rp/Kg)	Share Margins (%)
1	Producer Farmers			
	Selling price	10,000		83.3
2	Collector Traders			
	Purchase price	10,000		
	Selling price	11,500		
	Marketing Expenses		440	3.66
	*Packaging/Sack Fees		120	0.01
	*Labor		100	0.83
	*Transportation		150	1.25
	*Marketing loss		30	0.2
	String of raffia		40	0.3
	Profit		1,060	
	Marketing Margins	1,500		
3	Retail Traders			
	Purchase price	11,500		
	Selling price	12,500		
	Marketing costs		380	2.70
	*Packaging		100	0.83
	*Transportation		150	1.25
	*Labor		100	0.83
	*Marketing loss		30	0.16
Profit		620		
	Marketing Margins	1,000		
4	Consumer			
	*Purchase price	12,500		

Based on TABLE V above, it can be seen that sales in channel II at a price of IDR 10,000/Kg (83.5% of the final price received by consumers), collectors buy from farmers who are generally picked up to farmers' fields around Oloboju, where the area was affected by the earthquake. Collector traders then sell the paddy in that form (rice) to Masomba Market retailers with average sales of around 2500 kg to 5000 kg with a selling price to retailers of IDR 11,500/Kg. The marketing costs incurred by the collecting traders are IDR 440/Kg so that the collectors get a profit of IDR 1,060/Kg with a marketing margin of IDR 1,500/Kg as shown in TABLE VI.

Table VI. Costs and marketing margins for shelled corn in Marketing Channel 1

No	Description	Selling/buying price (Rp/kg)	Marketing costs (Rp/kg)	Share Margin (%)
1	Producer Farmers			
	Selling price	5,000		76,92
2	Retail Traders			
	Purchase price	5,000		
	Selling price	6,500		
	Marketing Expenses		280	4.30
	*Packaging		120	1.84
	*Transportation		150	2.30
	*Marketing loss		10	0.15
*Profit		1220		
	*Marketing Margins	1,500		
3	Consumer			
	*Purchase price	6,500		

Retailers sell the rice to consumers at Masomba Market at a price of IDR 12,500/Kg with a marketing cost of IDR 380/Kg so that retailers earn a profit of IDR 620/Kg from a marketing margin of IDR 1,000/Kg kg

Marketing channel 1 as presented in Table 6 above shows that farmers sell corn yields at IDR 5,000/Kg, or 76.92% of the price. In general, retailers in marketing channel 1 buy shelled corn from farmers and pick it up directly from the land where the corn is harvested, namely around the land area in Jono Oge which was affected by the earthquake and liquefaction. Marketing costs incurred Rp. 280/kg which is an accumulation of Rp. 120/kg packaging costs and Rp. 150/kg transportation costs, while the marketing loss is Rp. 10/Kg. For these expenses, the retailer earns a profit of IDR 1,220/Kg, a marketing margin of IDR 1,500/Kg.

In addition to the pattern 1 marketing channel, the following is a description of the shelled corn marketing pattern in marketing channel 2 as shown in TABLE VII.

TABLE VII. Costs and marketing margins for shelled corn in Marketing Channel 2

No	Description	Selling/Purchasing Price (Rp/Kg)	Marketing Expenses (Rp/Kg)	Share Margins (%)
1	Producer Farmers			
	Selling price	5,000		62.5
2	Collector Traders			
	Purchase price	5,000		
	Selling price	7,000		
	Marketing Expenses		390	4,25
	*Packaging Fee (Sack)		120	1.25
	*Labor		100	0.62
	*Transportation		150	1.87
	*Marketing loss		20	0.5
	Profit	2,000	1610	20.75
	Marketing Margins			
3	Retail Traders			
	Purchase price	7,000		
	Selling price	8,000		
	Marketing costs		360	4.06
	*Packaging		120	1.25
	*Transportation		150	1.87
	*Labor		80	0.62
	*Marketing loss		10	0.31
	Profit		640	
	Marketing Margins	1,000		
4	Consumer			
	*Purchase price	8,000		

Based on table 7 above, it can be seen that the sales of shelled corn in channel II are priced at IDR 5,000/Kg (62.5% of the final price received by consumers). In channel II, collectors buy corn from farmers who are generally picked up from farmers' fields around the Jono Oge area, where this area was affected by earthquakes and liquefaction. Collector traders then sell the shelled corn to retailers in Manonda and Masomba Markets with an average selling price of around 1,000 to 1,500 kg with a selling price to retailers of Rp. 7,000/Kg. The marketing costs incurred by the collecting traders are IDR 390/Kg so that the collectors get a profit of IDR 1,610/Kg with a marketing margin of IDR 2000/Kg. Furthermore, Retailers sell corn in shelled form to consumers in both Manonda and Masomba at a price of IDR 8,000/Kg with a marketing cost of IDR 360/Kg so that retailers earn a profit of IDR 640/Kg from a marketing margin of IDR 1. 000,-/Kg. The size of the marketing margin determines the level of acceptance of producers, in this case farmers[34], [35], and the higher the acceptance of producers, the economic conditions of farmers are also increasing[36], [37].

Farmer's Share

Infarming business, farmers' share is important to know as an indicator of the results of the distribution of prices received by farmers compared to prices at the end consumer level[38], [39]. Calculation of Farmer's share (Fs), which is a comparison of the price received by farmers with the price paid by final consumers and expressed as a percentage (%) as presented in TABLE VIII.

TABLE VIII. Percentage of farmer's share in each rice and corn marketing channel

Channel Marketing	Farmer Selling Price (Rp/Kg)	Consumer Purchase Price (Rp/Kg)	Farmer's Share (%)
Rice			
I	10,000	11,500	86.95
II	10,000	12,500	80.01
Corn			
I	5,000	7,000	76.92
II	5,000	8,000	62.50

Based on Table 8 above, it can be seen that each corn marketing channel has a different percentage of farmer's share. Farmer's share of rice in marketing channel I was 86.95%, higher than Fs in marketing channel II, which was 80.01%. This shows that the longer the marketing chain for a commodity, the smaller the Fs received by farmers. Every marketing agency involved in the marketing chain also determines the margin and with a long marketing chain, in the end, it is the end consumer who bears the high price. The Fs value in the rice marketing chain in channel I compared to the marketing chain II for rice food crops has a difference of 6.95%, where the difference reflects the lower farmer income due to the involvement of a level 1 marketing agency. The same thing happened with the corn marketing chain, where the Fs value in marketing channel I was 76.92% while in marketing channel II was 62.50%. This condition indicates that the value of Fs in channel I is more profitable for farmers than marketing channel II as a result of the length of the multilevel marketing chain. The increase in Fs is increasingly profitable for farmers[40], [41] as a form of income from farming that is developed, especially the main commodity which is used as a source of income for producing farmers[42], [43].

Marketing Channel Efficiency

Efficiency in marketing channels is important in realizing the success of marketing activities by looking at marketing margins, the value of the farmer's share which is determined from the selling prices of commodities traded by producers. Price efficiency shows the ability of prices and price indications for sellers as well as providing information to consumers as a guide in the use of production resources from the production and marketing side. Using the concept of marketing costs, a marketing system is categorized as efficient if it can be implemented at a relatively low cost.

Based on the results of calculating the efficiency value of Rice marketing, an efficient marketing channel is the DI marketing channel. A marketing channel is called inefficient if the share received by farmers (farmer's share) is less than 50% and is called efficient if the Fs value is greater than 50% using the concept of marketing costs, as well as a marketing system that is carried out using relatively low costs. If you look at the two marketing channels for corn, basically they are equally efficient, but with a difference in the value of Fs, then the marketing channel I is more efficient with a phase difference of 8.93%, if you want to determine efficiency, you can use the equation[44];

$$Ep = \frac{TB}{TNP} \times 100\%$$

Marketing Efficiency describes marketing efficiency, Total Cost is the total marketing cost, and TNP is the total value of the product that must be paid by the end consumer. In this method the value of marketing efficiency is shown from a comparison of marketing costs incurred by marketing agencies with prices for end consumers[45], [46].

To find out the efficiency of each rice and corn marketing channel in the villages of Oloboju and Jono Oge are presented in TABLE IX below.

TABLE IX. Efficiency level in each rice and corn marketing channel

Marketing channel	Total Marketing Expenses (Rp/Kg)	Prices at the Consumer Level (Rp/Kg)	Efficiency Level (%)
Rice			
I	300	11,500	2.60
II	820	12,000	6.83
Corn			
I	280	6,000	0.46
II	750	8,000	0.93

Based on the data in Table 9 above, it shows that Rice, which has the highest marketing efficiency, is in marketing channel I compared to marketing channel II. Efficiency in channel I is 2.60% while the efficiency value for channel II is 6.83% of the two channels, the most efficient is the first channel with a value of 2.60%. This is due to the shorter chain link, because the longer the chain marketing and the more marketing agencies involved the higher the required marketing costs. This is related to activities that include packaging, transportation and marketing loss. Efficiency in marketing will provide benefits for farmers in terms of the use of costs that should not need to be spent [47], [48], however, unexpected costs often occur due to factors that are unpredictable [49], [50].

IV. CONCLUSION

Based on the various descriptions and reviews that have been described, several conclusions can be drawn:

1. The amount of income of lowland rice farmers in Oloboju Village, Sigi District, Sigi City Regency with an average value of land area of 0.7 Ha with an average revenue of Rp. 24,162,790 with an average total cost of 8,807,961 so that the income for 1 planting season is an average of Rp. 15,354,829
2. The amount of acceptance of corn farmers in Jono Oge Village, Sigi District, Sigi Regency City with an average land area of 0.3 Ha with an average revenue of Rp. 8,600,000 with an average total cost of 4,093,706 so that the income for 1 planting season is an average of Rp. 4,506,294
3. The total losses of corn farmers affected by liquefaction in Jono Oge Village, Sigi District, Sigi City Regency, namely the lost land area of 0.24 (Ha) with an average income per planting season of IDR 3,237,500
4. The longer the marketing chain in the rice and corn food crop trade system in the research areas around Oloboju and Jono Oge which were affected by the earthquake and liquefaction, the more inefficient it is. Thus, marketing channel I for both lowland rice and corn farming gives a higher Farmer's Share value and is more efficient than marketing channel II.
5. The margin share of producing farmers for each marketing channel for each rice and corn food crop farming business was 86.95% and 76.92%. While the efficiency level of each marketing channel for each food crop in marketing channels I and II was 2.60% and 6.83%, respectively, while chili in marketing channels I and II were 0.46% respectively and 0.93%.

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