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Analysis of Factors Influencing The Shift from Rice to Maize In Lembantongoa Village, Sigi Regency, Indonesia

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ABSTRACT
This study analyzes the factors that drive farmers to shift from cultivating lowland rice to corn in Lembantongoa Village, Palolo District, Sigi Regency. Using a descriptive qualitative method, data were collected through observation, interviews, and questionnaires, with proportional random sampling. Analysis was conducted using frequency distribution tables. Findings reveal that the shift was mainly due to declining rice productivity, which reduced farmer income. Corn was chosen as an alternative because of its shorter harvesting period and higher economic value. Data from 2015 to 2022 show a 4.6% decrease in rice planting area and an 11.2% increase in corn. These economic and environmental factors have influenced the village farmers' transition.

Keywords: Commodity Transfer, Corn Commodity, Lowland Rice Commodity.

I. Introduction

Agriculture is an individual activity that encompasses crop cultivation, animal husbandry, fisheries, and forestry. In a narrow sense, agriculture refers to cultivating plants on land or fields to meet human needs. In a broader sense, agriculture includes all activities related to the subsectors of food crops, plantations, forestry, livestock, and fisheries. The science of agriculture essentially investigates all matters related to agriculture, including the subsectors of food crops, plantations, livestock, and fisheries (Daniel, 2002). The food crop subsector is a branch of agriculture that contributes to increasing national foreign exchange and absorbing labor. The government emphasizes the plantation subsector due to its high export potential to developed countries (Soediono, 1989). However, the agricultural sector is currently facing significant challenges in the form of land-use conversion and commodity shifts. Land-use conversion refers to transforming agricultural land into non-agricultural uses, whereas commodity shifts involve the replacement of primary cultivated commodities, such as rice with maize. One critical aspect of land-use conversion is understanding the driving factors behind such changes, as the resulting impacts are often permanent and difficult to reverse. The decline in food production caused by land-use conversion tends to be irreversible and challenging to rectify. For the agricultural sector, land is the primary and irreplaceable factor of production (Hidayat dan Rofiqoh, 2020).

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Various complex and interrelated factors drive the commodity shift from rice to maize. Limited irrigation water for rice cultivation and the high intensity of pest attacks have led to declining harvest yields, reducing farmers' income. In contrast, the demand for maize has shown stable growth, accompanied by a higher selling price. On the other hand, the continuously increasing demand and rising market prices for maize have further motivated farmers to switch to maize cultivation. Maize is considered more profitable due to its higher economic value compared to rice farming (Novianti et al., 2023). Data from Palolo Subdistrict reinforce this phenomenon. The harvested area for maize increased from 2,412 hectares in 2015 to 2,683 hectares in 2022, while the harvested area for rice decreased from 6,031 hectares to 5,754 hectares during the same period (BPS Kabupaten Sigi, 2016; DTPHP Kabupaten Sigi, 2023). Palolo Subdistrict is one of the regions in Sigi Regency that has undergone significant changes in cropping patterns, particularly in shifting commodities from rice to maize. The decrease in harvested rice area by 277 hectares and an increase in harvested maize area by 271 hectares reflect a clear commodity transition. Among the villages in the subdistrict, Lembantongoa Village was selected as the research site due to its tangible dynamics of commodity shift. This village was previously known as a center for rice farming for household consumption. However, it has begun to shift toward maize cultivation with a stronger focus on economic and market-oriented goals. Some farmers continue to intercrop rice and maize on the same plot of land, separated only by narrow bunds, while others have completely transitioned to maize. The decision to shift commodities has been influenced by various factors, including broader market opportunities for maize beyond the regency and the more efficient farming system, which can be managed collaboratively within the family.

Based on this phenomenon, this study aims to identify and analyze the factors that drive farmers to shift from lowland rice to maize cultivation in Lembantongoa Village, Palolo Subdistrict, Sigi Regency. This research is expected to provide empirical insights into the impact of commodity transition on local agricultural systems and support the formulation of agricultural policies more responsive to environmental and market changes.

II. Literature Review and Hypothesis Development

2.1. Decision-Making Theory

Decision-making theory can be defined as a guideline for individuals or organizations in making choices (Pasolong, 2023). This theory posits that individuals (in this case, farmers) make decisions based on rational considerations to maximize benefits and minimize risks or losses. In the context of commodity shifts, farmers will compare the potential benefits and risks between cultivating rice and maize, and choose the most advantageous option economically and socially. The theory also emphasizes that individuals have limited knowledge and act based on their situation perception. Each person possesses a distinct knowledge structure that influences their decision-making process. Furthermore, this process does not occur in isolation but is embedded in various social contexts, including political, social, and economic pressures and influences (Amalia dan Firmadhani, 2022). Hayati and Maisaroh (2019) found that factors influencing farmers' decisions in choosing commodities include land size, income, and farming experience. In addition, the decision-making process regarding the shift from rice to maize in Lembantongoa Village can be analyzed through economic, environmental, social, and policy factors, which significantly influence farmers' choices. A multidimensional approach is necessary to ensure policies and interventions align with local needs and conditions. Significant income differences exist across commodity types, where financial analyses reveal that certain commodities generate higher returns than others.

The decision-making process in farming is generally based on the knowledge possessed by farmers, which is acquired through personal experience or information from close sources such as family members and fellow farmers. These sources of information play an important role in production and marketing decisions, although their levels of trustworthiness may vary. Past planting season experiences are also considered, including production costs, risks of crop failure, availability of inputs and labor, selling prices, and market

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opportunities. Environmental factors such as climate suitability and soil fertility also influence the cropping patterns chosen by farmers (Yuliarso, 2006).

2.2. Risk in Agriculture

According to Siregar in Oekartawi et al. (1993), risk in agricultural activities encompasses both the potential for losses and gains, where the level of risk is assessed prior to action based on the expectations or forecasts of the farmer as the decision-maker. Mardiana et al. (2022) identifies several significant types of risk in farming: production risk, related to yield variability due to weather and pests; price risk, arising from fluctuations in input and output prices; financial risk, involving limited capital and access to credit; institutional risk, resulting from policy changes; technological risk, linked to the adoption of new technologies; human resource risk, stemming from labor errors; and market risk, which can be both systematic and sector-specific. Understanding the various types of risks in farming is essential, as it forms the basis for farmers' decision-making in managing and developing their agricultural enterprises. In practice, the decision to shift commodities often emerges as an adaptive response by farmers to the multiple risks they face, such as production risks arising from yield variability due to weather conditions, pest and disease outbreaks, and water availability. Price risks from fluctuations in crop and input prices significantly impact farmers' income. Financial risks, including limited capital, lack of access to credit, and unstable cash flow, can increase the likelihood of failure in rice and maize farming. Institutional and human resource risks, such as limited knowledge, inadequate technology, and weak farming institutions, are also critical risk factors that must be mitigated.

2.3. Theory of Agricultural Production

The theory of agricultural production is a concept that examines the transformation process of inputs (such as land, labor, capital, and technology) into outputs in the form of agricultural products. Production theory can be categorized into two parts. First, short-run production theory assumes that some production factors are variable while others are fixed. Second, long-run production theory assumes that all inputs are variable and there are no fixed inputs, thereby simplifying the model to two primary factors of production: labor and capital (Soekartawi, 2003). Production results from an economic process or activity utilizing a combination of inputs. Thus, production activities involve combining various inputs to generate outputs (Sugiharso, 2008). According to Daniel (2004), agricultural production inputs such as labor, capital, land, and farm management increase agricultural output. Each factor serves a different yet interrelated function. Technology also influences the interaction among production factors such as land, labor, technology, and management. For example, in managing one hectare of food crop land, the required amount of capital and labor can be determined based on the technology employed (Mubyarto, 1989).

Agricultural production efficiency refers to the farmer's ability to utilize production inputs optimally to achieve maximum output. This efficiency level can be evaluated through technical and allocative efficiency (Aumora et al., 2016). In the context of commodity shifts, production efficiency becomes a key consideration for farmers when switching crops, as they tend to choose commodities that yield optimal outputs with more efficient input use. This includes shorter production cycles, lower input requirements, and ease of crop management and maintenance. The theory of agricultural production is highly relevant for analyzing the commodity shift from rice to maize in Lembantongoa Village. Farmers' decisions are influenced by production factors (land, water, labor, capital, technology), economic factors (prices and income), and policy and innovation support. This commodity transition reflects the farmers' adaptive strategies to optimize outcomes and ensure the sustainability of their farming enterprises amid environmental and market changes.

2.4. Cost Theory

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Kartasapoetra (1998), in which the availability of funds (cost) is carefully calculated to ensure that the production process can proceed smoothly. Farm business costs are generally classified into two types: fixed costs and variable costs. Fixed costs refer to expenditures that remain relatively constant and are incurred regardless of changes in production output, such as land rent, taxes, agricultural equipment, and irrigation fees. On the other hand, variable costs are expenses that fluctuate depending on the production level, including costs for production inputs, seeds, fertilizers, labor, and seasonal workers. These variable costs are flexible and adjust according to the expected production output (Hanafie, 2010). Farm income is obtained by multiplying the harvest yield by the selling price. Profit (income) is calculated as the difference between total revenue (TR) and total cost (TC). This theory encompasses three primary cost components: the cost of rice production, the cost of maize production, and influencing factors in commodity shifts.

2.5. Farm Income

Income is regarded as the output value in the economy, representing the return on the use of production factors in the production process. This relationship indicates that generating output requires labor, capital goods, and money. However, these inputs alone will not yield results without entrepreneurial capability (Rahardja dan Manurung, 2006). Total revenue, or gross income, refers to the overall value of agricultural commodity production before deducting production costs. Farm income is derived from the difference between total revenue and all incurred production expenses (Hastuti, 2007). Gross income or total revenue represents the monetary value of commodity output. The difference between gross farm income and total farm expenditures is called net farm income. Net farm income reflects the return received by farm households for utilizing production factors such as labor, management, and either personal or borrowed capital invested in farming activities (Hastuti dan Rahim, 2007). Several studies have shown that land management, input utilization, and crop yields influence farm income. The contributing factors are the size of cultivated land, expenditure on production inputs, and labor utilization. Additionally, the income level of farmers is affected by market conditions and the outcomes of commodity sales. These factors illustrate that various elements in the production and marketing processes significantly influence farm income (Nurjanah et al., 2018).

2.6. Crop Conversion

Crop conversion refers to changing the use of agricultural land from cultivating one type of crop to another. According to Daulay (2004), several factors influence this shift, including economic and social considerations. Economic factors involve the number of dependents, land size, and labor availability, while social factors include age, education level, and farming experience. Farmers generally undertake crop conversion in pursuit of higher income and improved welfare compared to what was achieved with the previous crop. Crop-specific land conversion may be partial or complete, and such land use changes can potentially negatively impact soil quality and the surrounding environment (Astuti et al., 2011).

2.7. Land Use Conversion

Land use conversion can be defined as the reallocation of part or all of a land area from its original function to a different use, which often results in adverse environmental impacts and alters the potential utility of the land (Muthalib et al., 1992). Farmers generally consider converting land use when crop conditions deteriorate or are no longer viable. This conversion is typically aimed at increasing income by changing the land's function or purpose. In general, farmers' decisions to convert agricultural land are influenced by three main aspects. First, external factors such as regional development, population growth, and economic conditions. Second, internal factors related to the socio-economic status of the landowning household. Third,

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policy-related factors, including regulations, legislation, and their implementation in land management (Janah et al., 2017).

2.8. Maize

Maize (Zea mays L.) is a monocotyledonous plant belonging to the grass family (Gramineae). It has a sturdy, slightly tufted stem with a coarse texture and can grow between 0.6 and 3 meters in height. Maize is an annual crop with a life cycle of approximately three months (Nuridayanti, 2011). Taxonomically, maize is classified as follows: Kingdom: Plantae; Division: Spermatophyta; Subdivision: Angiospermae; Class: Monocotyledone; Order: Graminae; Family: Graminaceae; Genus: Zea; Species: Zea mays L. (Paeru dan Dewi, 2017). Maize is widely cultivated due to its economic value, adaptability to various agroecological zones, and relatively short growing period, making it a strategic crop for smallholder farmers. One of Indonesia's primary staple crops is rice (Oryza sativa L.). Rice is a vital agricultural product due to its significant contribution to economic and political stability (Purnamaningsih, 2016). The rice plant has a relatively short life cycle and typically does not regenerate after harvest. It thrives in hot and humid climates, requiring an average monthly rainfall of approximately 200 mm. Variations in rainfall patterns significantly influence rice production variables (Rouw, 2008).

2.9. Previous Studies

Previous research can be a valuable source of inspiration and support in conducting studies. Researchers may assess the strengths and weaknesses of earlier work to identify aspects that can be further developed. Such evaluations enable scholars to generate new research by understanding what has already been discovered and what gaps remain. The following prior studies serve as foundational references for this research.

Alamsyar (2022), in his study titled "The Impact of the Conversion of Rice Paddy Fields on Food Security in Sigi Regency", aimed to examine the rate of land-use conversion from rice paddy fields and its implications for food security in Sigi Regency. Utilizing secondary data analysis with both quantitative and qualitative approaches—including conversion rate analysis and production impact estimation—the study found that over eleven years (2009–2020), 9,310 hectares of rice paddy land were converted, representing a reduction of 43.6%, or approximately 4% annually. The total area of paddy fields decreased from 21,360 hectares to 12,050 hectares, with the most significant loss occurring in 2014 (4,473 hectares). A ten-year projection (2021–2030) indicated that although rice production is expected to decline by 16,449,939 kg, Sigi Regency may still meet its food needs due to a projected surplus of 20,189,836 kg by 2030. However, the declining trend in rice surplus—from 39,189,676 kg in 2021 to 20,189,836 kg in 2030—signals a potential threat to long-term food security. Factors contributing to this include housing development due to urbanization from Palu City, the Gumbasa irrigation revitalization project since 2018, and earthquake-induced damage to irrigation infrastructure. The study recommends more decisive governmental intervention to protect productive agricultural land and regulate population growth and urbanization in Sigi Regency.

Irmawati et al. (2019), in their study entitled "Analysis of Factors Affecting Land-Use Conversion and Its Impact on Farmers' Income (A Case Study of Cocoa Land Converted into Horticultural Land in Salulekbo Village, Topoyo Subdistrict, Central Mamuju Regency)", aimed to analyze the determinants of land-use conversion, the extent of land converted, and the potential for paddy production, while also comparing the income of farmers cultivating cocoa versus rice in Salulekbo Village. The study employed a simple random sampling method and analyzed the data using descriptive statistics, potential paddy production analysis, income analysis, and multiple linear regression. The findings indicated that the size of the cocoa land significantly influenced the conversion of cocoa plantations into rice fields in Salulekbo Village. However, other variables such as age, productivity, education, farming experience, environmental conditions, and

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regulations did not show a significant effect. The land-use conversion increased the area of rice fields and potential paddy production, positively impacting farmers' income.

III. Research Method

This research was conducted in Lembantongoa Village, Palolo Subdistrict, Sigi Regency, where five hamlets have undergone a commodity shift from lowland rice to maize cultivation. The selection of this location was based on the fact that all five hamlets—Hamlet 1 through Hamlet 5—within Lembantongoa Village have experienced a conversion of agricultural commodities from rice to maize, making this village a representative site for research on agricultural commodity conversion. This research utilizes qualitative descriptive data. The qualitative data consist of insights and explanations regarding the motivations of lowland rice farmers to switch to maize cultivation in Lembantongoa Village. The data were drawn from both primary and secondary sources. Primary data were collected through direct interviews with selected farmer respondents using a structured questionnaire. Secondary data were obtained from official sources, including the Office of Food Crops, Horticulture, and Plantations of Sigi Regency; the Lembantongoa Village Office; the Central Bureau of Statistics (BPS) of Sigi Regency; as well as from books and other relevant documentation. The population in this study comprises all rice paddy farmers in Lembantongoa Village who have converted their commodity to maize, totaling 93 farmers distributed across five hamlets. The sampling technique employed was proportional random sampling, which involves selecting samples randomly while considering the proportion of farmers in each hamlet (Sugiyono, 2013). The sample size was determined using the proportional random sampling formula with a tolerance level of 10%:

$$ni = \frac{Ni}{N} . N$$

Description:
Ni = Number of samples from each hamlet
Ni = Population in each hamlet
N = Total population
n = Total sample size

Based on this formula, the sample size for each hamlet is as follows:

- Hamlet 1= $(\frac{8}{93}) \times 49 = 4$ farmers
- Hamlet 2= $(\frac{30}{93}) \times 49 = 18$ farmers
- Hamlet 3= $(\frac{18}{93}) \times 49 = 9$ farmers
- Hamlet 4= $(\frac{14}{93}) \times 49 = 7$ farmers
- Hamlet 5= $(\frac{23}{93}) \times 49 = 11$ farmers

Table 1. Population and Sample Distribution of Respondents

No	Hamlet Name	Population	Sample

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1	Hamlet 1	8	4
2	Hamlet 2	30	18
3	Hamlet 3	18	9
4	Hamlet 4	14	7
5	Hamlet 5	23	11
Total		**93**	**49**

As shown in Table 1, a total sample of 49 respondents was selected proportionally from the overall population of 93 farmers across the five hamlets in Lembantongoa Village. The farmers' characteristics are relatively homogeneous; therefore, a 10% tolerance level still allows for a representative depiction of the population's general characteristics. As a result, it was not necessary to sample the entire population. Data collection is a crucial phase in research aimed at obtaining relevant information. Sugiyono (2008) states that data collection techniques can be done through observation, interviews, questionnaires, and documentation. In this study, four methods were employed for data collection:

1. Observation – This technique involves direct observation of the research object and is a fundamental basis for data collection, particularly in the social sciences and human behavior studies. It entails recording phenomena using instruments and documentation tools for scientific purposes (Hasanah, 2016).
2. Interview – Defined as face-to-face communication between the interviewer and the informant, this method can also be understood as the verbal and direct administration of questionnaires to each sample respondent (Makbul, 2021).
3. Questionnaire – A data collection technique conducted by distributing written questions or statements to respondents to be answered (Sugiyono, 2013).
4. Literature Study – This technique involves collecting data by reviewing books, literature, records, and reports related to the research problem (Nazir, 2013).

This research employed a qualitative descriptive analysis method using frequency distribution tables as an analytical tool. The analysis process began with collecting and categorizing data obtained through interviews, observations, and questionnaires. The collected data were grouped based on the farmers' objectives in the commodity conversion. The categorized information was then systematically presented in frequency distribution tables for further analysis. To calculate the percentage in the frequency distribution tables, Where P represents the desired percentage, f denotes the number of respondents providing the same response, and n is the total number of respondents. The results presented in the tables were then described qualitatively to identify the main reasons behind the farmers' decisions to convert commodities. These explanations were further substantiated with direct interview excerpts from respondents. To ensure the accuracy of the data, triangulation was conducted by comparing the findings with field observations and secondary data from the village office and the local agricultural department. To ensure clarity and consistency in interpreting research findings, this study provides operational definitions of key variables used throughout the analysis. These definitions help delineate each variable's scope and measurement units within the specific context of this research.

1. Commodity Conversion refers to the shift in agricultural commodities in Lembantongoa Village, specifically from lowland rice to maize (kg).
2. Lowland Rice Farming denotes the cultivation of rice that takes place in Lembantongoa Village (kg).
3. Farmer refers to residents of Lembantongoa Village engaged in agricultural or plantation activities (persons).
4. Revenue refers to the total income producers receive, namely the earnings from selling lowland rice and maize commodities (IDR).

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5. 5Production is maize farmers' farming activities, from planting to harvesting (kg).
6. Cost refers to all expenses incurred from the beginning of the commodity conversion process— from lowland rice to maize (IDR).
7. Income refers to farmers' monetary gain from selling harvested maize (IDR).
   Respondent refers to lowland rice farmers who have shifted to maize cultivation (persons).

IV. Results and Discussion

4.1. Result

4.1.1. Respondent Characteristic

This study collected data from 49 farmers who converted their lowland rice cultivation to maize in Lembantongoa Village, Palolo Subdistrict, Sigi Regency. Several factors—such as age, education level, number of dependents, land area, and farming experience—contribute to the decision of farmers to switch from rice to maize cultivation. The respondents in this research are categorized into groups based on various criteria. The characteristics of respondents are presented as follows.

a. Respondent Characteristics Based on Age

In the agricultural sector, age significantly influences individual work capacity and productivity. Younger individuals generally possess a greater physical ability and are more likely to work efficiently. In addition, younger farmers tend to be more motivated and receptive to technological advancements in agriculture, which can help them sustain their farming activities more effectively than older farmers. The age distribution of respondents in Lembantongoa Village, Palolo Subdistrict, Sigi Regency, is presented in the following table 2.

Table 2. Age Classification of Respondents/Farmers Who Shifted from Lowland Rice to Maize Cultivation in Lembantongoa Village

No	Age Group (Years)	Number of Respondents (People)	Percentage (%)
1	19 - 29	15	30.6
2	30 - 39	19	38.8
3	40 - 49	8	16.3
4	50 - 60	7	14.3
Total		**49**	**100**

Based on Table 2, most farmers who shifted from rice to maize cultivation were aged 30–39, comprising 19 individuals (38.8%), followed by the 19–29 age group with 15 individuals (30.6%). This indicates that the commodity shift is predominantly undertaken by farmers in their productive years, who generally possess stronger physical capabilities and higher motivation in managing their agricultural activities.

b. Respondent Characteristics Based on Education Level

Their educational background often influences the way individuals make decisions. Education plays a critical role in the success of farming activities, as it enhances farmers' ability to manage agricultural land and marketing processes. Furthermore, higher education enables farmers to calculate production costs, estimate potential income, and make strategic decisions such as shifting commodities to improve income and strengthen household economic conditions.

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Table 3. Educational Attainment of Respondents/Farmers Who Shifted from Lowland Rice to Maize Cultivation in Lembantongoa Village

No	Education Level	Number of Respondents (People)	Percentage (%)
1	Elementary School	25	51.0
2	Junior High School	14	28.6
3	Senior High School	7	14.3
4	Bachelor's Degree	3	6.1
Total		**49**	**100**

As shown in Table 3, most respondents are elementary school graduates, totaling 25 individuals (51.0%), followed by junior high school graduates with 14 individuals (28.6%). This indicates that most farmers have relatively low educational attainment; however, this has not hindered their ability to make decisions regarding commodity shifts to increase their household income.

c. Respondent Characteristics Based on Number of Family Dependents

The number of family dependents refers to the total number of family members—spouse, children, and other relatives—who rely on the household head to fulfill their daily needs. This factor can influence motivation and income levels. The activities of the household head are closely linked to the number of individuals they support. A larger number of dependents increases the family's economic burden due to higher expenses. In contrast, a smaller household requires less spending, potentially leading to better living conditions if the farming efforts are successful. The number of family dependents among respondents in Lembantongoa Village, Palolo Subdistrict, Sigi Regency, is presented in the following table 4.

Table 4. Number of Family Dependents Among Respondents/Farmers Who Shifted from Lowland Rice to Maize in Lembantongoa Village

No	Number of Family Dependents (People)	Number of Respondents (People)	Percentage (%)
1	1-2	29	59.2
2	3-4	16	32.7
3	5-6	4	8.2
Total		**49**	**100**

Table 4 shows that most respondents (59.2%) have 1–2 family dependents, followed by those with 3–4 dependents (32.7%). This data suggests that farmers who shifted commodities generally have relatively low household burdens, which may increase their willingness to risk changing their cultivated crops.

d. Respondent Characteristics Based on Land Size

Land size refers to the farmland owned or managed by the farmer, measured in hectares (ha), and used exclusively for agricultural purposes. The size of the farmland significantly influences the potential output. In general, larger landholdings provide greater opportunities for higher production volumes. Conversely, farmers with limited land area may face constraints in achieving substantial yields. However, it is important to note that having more land does not automatically guarantee higher productivity compared to smaller plots, as other factors such as input use, management practices, and crop choice also play a role. The distribution of respondents based on land size in Lembantongoa Village, Palolo Subdistrict, Sigi Regency, is presented in the following table 5.

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Table 5. Land Size of Respondents/Farmers Who Shifted from Lowland Rice to Maize in Lembantongoa Village

No	Land Size (ha)	Number of Respondents (People)	Percentage (%)
1	0.5-1.0	5	10.2
2	1.1-1.5	7	14.3
3	1.6-2.0	9	18.4
4	2.1-2.5	13	26.5
5	2.6-3.0	15	30.6
Total		**49**	**100**

Based on Table 5, most respondents (30.6%) own land in the range of 2.6–3.0 hectares, followed by 26.5% who manage between 2.1–2.5 hectares. This indicates that farmers engaged in commodity conversion generally possess relatively large landholdings, offering them greater potential to produce maize in substantial quantities.

e. Respondent Characteristics Based on Farming Experience

The success of maize farming is closely tied to the experience of the farmers in managing agricultural enterprises. Farming skills often determine how effectively a farmer can manage their operations. Farmers with longer experience typically demonstrate greater ease in adopting innovations and applying new agricultural technologies. Greater experience is also associated with improved decision-making and strategic planning in farming practices. However, younger farmers may also possess substantial experience due to their higher productivity levels in accessing agricultural information, their application in the field, and their openness and dynamism. This suggests that both experience and attitude contribute to success in agricultural endeavors. The farming experience of respondents in Lembantongoa Village, Palolo Subdistrict, Sigi Regency, is presented in the following table 6.

Table 6. Farming Experience of Respondents/Farmers Who Shifted from Lowland Rice to Maize in Lembantongoa Village

No	Years of Farming Experience	Number of Respondents (People)	Percentage (%)
1	1-3 years	20	40.8
2	4-6 years	17	34.7
3	7-9 years	9	18.4
4	> 9 years	3	6.1
Total		**49**	**100**

Based on Table 6, most respondents have 1–3 years of farming experience, totaling 20 individuals (40.8%), followed by 17 individuals (34.7%) with 4–6 years of experience. This indicates that most farmers who shifted commodities are relatively new to farming but are open to change and innovation to increase their income.

4.1.2. Farmers' Reasons for Crop Conversion

Based on interviews and questionnaires, several reasons were identified as the basis for farmers to shift from lowland rice cultivation to maize, as shown in the following table 7.

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Table 7. Reasons for Farmers' Conversion of Lowland Rice to Maize in Lembantongoa Village

No	Reason	Number of Respondents (People)	Percentage (%)
1	Short harvest period to meet basic needs	10	20.4
2	Declining rice productivity	20	40.8
3	Land suitability for maize	1	2.0
4	High market demand	18	36.7
Total		**49**	**100**

This study's findings indicate four main reasons farmers switched from lowland rice to maize cultivation in Lembantongoa Village, Palolo Subdistrict, Sigi Regency. As presented in Table 7, the most cited reason was declining rice productivity (40.8%), followed by high market demand for maize (36.7%), the short harvest period of maize, which helps meet daily needs more quickly (20.4%), and the suitability of the land for maize cultivation (2.0%).

4.2. Discussion

The findings indicate four primary reasons farmers in Lembantongoa Village, Palolo District, Sigi Regency have shifted from lowland rice cultivation to maize. Table 7 presents the four main reasons why farmers in Lembantongoa Village, Palolo District, Sigi Regency, have transitioned from rice to maize cultivation: declining rice productivity (40.8%), high market demand for maize (36.7%), shorter harvest periods (20.4%), and land suitability for maize (2%). Each of these reasons is discussed in detail below.

1. According to Mr. Saifudin and 19 other informants, declining rice productivity is the main reason for crop conversion. This decline is attributed to extreme weather conditions, such as excessive rainfall and heat, which prevent rice plants from receiving adequate water, ultimately reducing yields. Despite farmers' efforts to maintain their crops through optimal fertilization, pesticide application, and crop rejuvenation, the condition of the rice plants did not improve. As a result, many farmers decided to repurpose their paddy fields for maize cultivation, as maize offers a shorter growing period and faster harvest, making it a more viable option under such conditions.
2. Mr. Fandi and several other informants stated that the high market demand for maize has become a significant attraction for farmers. This sentiment arises from their observations of declining rice yields and plant damage, despite maximal efforts in fertilization, pesticide application, and crop rejuvenation. The maize marketing channels in Lembantongoa Village are highly efficient, as intermediaries or small-scale traders directly purchase the harvest from farmers' fields or homes. These products are distributed to regions outside the area, such as Manado, Gorontalo, and Kalimantan. This well-established marketing flow has motivated many paddy farmers to convert their crops to maize.
3. Mr. Jupri and nine other informants chose to switch to maize because of its shorter harvest period, which allows them to meet their household needs more quickly. Maize has proven to be a reliable crop, even when rice plants are damaged due to insufficient water and increasingly erratic weather. Before this shift, rice was the primary crop in Lembantongoa Village, and it was known for its high productivity. However, with continuous annual yield declines, farmers transitioned to maize, which can be harvested within a shorter time frame. Since switching to maize, many farming households have experienced economic improvements, as evidenced by their ability to meet daily needs and enjoy better social welfare.
4. According to Mr. Deky, the soil conditions in Lembantongoa Village are highly suitable for maize cultivation. The crop's productivity has improved due to favorable land characteristics. This factor served as an additional consideration for crop conversion, especially after observing continued declines in rice productivity despite thorough maintenance efforts, including fertilization, spraying, and plant rejuvenation. The land suitability has strengthened farmers' confidence in converting their paddy fields into maize plantations.

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This study demonstrates that respondent characteristics are closely related to the decision to undertake crop conversion. The dominance of farmers in the productive age group (30–39 years, accounting for 38.8%) aligns with the decision-making theory of Hayati and Maisaroh (2019), which posits that individuals in their productive years tend to be more willing to take risks and more open to change. Although most respondents have only completed primary education (51.0%), they can make decisions based on experience and peer-to-peer information sharing. This is consistent with Yuliarso's (2006) theory, which highlights the importance of experiential knowledge and peer information in farm management decision-making.

The driving factors behind crop conversion also align with several established theories. The decline in rice productivity (40.8%) is the primary reason, reflecting Mardiana et al. (2022)'s theory of agricultural risk, which addresses the production risks stemming from yield variability due to weather conditions. Meanwhile, the high market demand (36.7%) and shorter harvest period (20.4%) are in line with the farm income and agricultural production efficiency theories proposed by Aumora et al. (2016), which suggest that farmers are inclined to choose commodities that promise higher returns within shorter production cycles. In addition, land suitability (2.0%) supports Daniel's (2004) agricultural production theory, emphasizing the importance of land suitability as a key production factor. The findings also support the theory of farming costs and income. Most respondents own relatively large plots of land (2.6–3.0 hectares, accounting for 30.6%) and have relatively few household dependents (1–2 individuals, accounting for 59.2%), providing them with greater flexibility in managing production costs, as described by Kartasapoetra (1998). These conditions enable farmers to take greater risks in shifting commodities, as they possess sufficient capital and labor to manage the transition from rice to maize cultivation. Furthermore, farmers' crop conversion decisions reflect the crop conversion concept articulated by Daulay (2003), in which changes from one commodity to another are influenced by both economic and social factors. In this study, economic factors are evident in farmers' pursuit of higher income through faster harvest times and stronger market demand. In contrast, social factors are reflected in the farmer profile—dominated by individuals in their productive years with relatively recent farming experience (1– 3 years, accounting for 40.8%)—indicating openness to innovation and change within the farming system.

V. Conclusion

Four main factors were identified based on the research findings regarding the factors influencing farmers to convert their lowland rice cultivation to maize in Lembantongoa Village, Palolo District, Sigi Regency. The dominant factor was the decline in rice productivity, primarily due to extreme weather conditions that resulted in insufficient crop water. This was followed by the high market demand for maize, supported by an efficient marketing system that extends to regions such as Manado, Gorontalo, and Kalimantan. Another contributing factor was the shorter maize harvest period, allowing farmers to meet their household needs more quickly. Finally, land suitability for maize cultivation was also cited as a key reason for the conversion.

This crop conversion trend is predominantly undertaken by farmers in the productive age group (30–39 years), with primary-level education, 1–2 family dependents, 2.6–3.0 hectares of land holdings, and 1–3 years of farming experience. These findings suggest that the shift in commodity cultivation has brought positive outcomes for farmers in the area, contributing to improved economic well-being and social welfare.

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