

Profitability of Small-scale Swamp Rice Production in Ini Local Government Area, Akwa Ibom State, Nigeria

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Abstract

Smallholder rice farmers especially in the southern parts of Nigeria are still depending on traditional farming techniques. These crude techniques often led to lack of profit, inefficiencies, low productivity and food insecurity. Rice is a staple food that is of high demand by many Nigerian households. However, its current demand outstrips local production. This study estimated the profitability of small-scale swamp rice production by farmers in Ini Local Government Area, Akwa Ibom State, Nigeria. Data were obtained from 120 swamp rice farmers through structured questionnaires and analyzed with descriptive statistics and budgetary techniques. The results showed that the rice farmers were predominantly male (64.2%), and married (84.2%) with a mean age of 44.91 years. The average years of formal schooling was 11.71 years, and a mean farm size of 0.71 ha. Most farmers rely on personal savings for capital, with limited access to institutional loans. The total annual costs of rice production per hectare were ₦680,850, with total revenue of ₦1,036,800.00, yielding a net profit of ₦355,950. The profit margin was 34.33%, and the returns on investment was 52.28%, suggesting moderate profitability with growth potential. High labour costs ($\bar{x} = 3.23$), climate variability ($\bar{x} = 3.23$), lack of market information ($\bar{x} = 3.23$), inadequate storage facilities ($\bar{x} = 3.22$), and high processing costs ($\bar{x} = 3.14$) were adjudged major constraints to swamp rice production by farmers in the study area. Limited access to agricultural credit and land tenure issues further exacerbate production inefficiencies. The study concludes that while swamp rice farming is profitable in the study area, although substantial inefficiencies persist due to socioeconomic constraints; strengthening extension services and market access will be crucial in optimizing rice profitability.

Keywords: Food security, Staple crop, Swamp rice, profitability.

1.0 Introduction

Rice (*Oryza sativa*) is one of the world's most important staple foods, supplying a large share of calories and protein for much of the global population (Amaechina *et al.*, 2017). It is the second largest consumed cereal after wheat (Udoh and Akpan, 2025). Over half of the Nigeria's population depends on rice for 80% of its food calorie requirements. In many households, especially in southern Nigeria, rice is consumed daily. It has become a staple food, moving from a ceremonial food to a food that is most preferred by children. Nutritionally, rice is a major source of carbohydrates; a 100g serving of white rice contains about 2.8g of protein, it contains about 3% of fat (Pottgen, 2016).

Rice provides critical nutrients such as vitamins B1, B2, B3 and E, iron, fibre that can help alleviate malnutrition (Ayedum and Adeniyi, 2019). The projected global production of rice is expected to reach 700-800 million tonnes by year 2045-2050 (FAO, 2025). Nigeria is now the largest rice producer in West Africa, with an annual output of 3.2 million tonnes of paddy (Akenbor and Esheya, 2022). However, local supply consistently lags demand (Esheya, 2024; Udoh and Akpan, 2025) only roughly half of the rice consumed in Nigeria is grown domestically, creating a national deficit of millions of tonnes. With Nigeria's population exceeding 200 million and rising, the gap between rice demand and domestic production raises critical food security concerns (Ayedum and Adeniyi, 2019). In particular, Nigeria's extensive inland wetlands and coastal floodplains offer significant potential for swamp (wetland) rice cultivation, a system that, under good management, can yield far more per hectare than upland rice (Esheya, 2024)

Rice production in Nigeria today, especially the southern region remains overwhelmingly a smallholder enterprise. Most producers cultivate plots under one hectare, using rudimentary tools and traditional varieties (Esheya, 2024; Godwin, 2020), with fragmented land and intensive labour use. As a result, output per farmer is low, making it difficult to either make profit or meet local rice consumption demand. Various authors have noted that Nigerian rice yields are far below their potential, due to poor resource use (Esheya, 2024; Ibitoye *et al.*, 2021; Godwin, 2020; Jonah *et al.*, 2023); weak producer–market linkages and poor infrastructure, lack of modern processing mills, inadequate storage, and unreliable transport networks make rice farming risky and unprofitable (Esheya, 2024; Osanyinlusi *et al.*, 2020). In addition, climate variability is now reducing rice yields and increasing farmers' uncertainty (Etim and Ndaeyo, 2020). These systemic issues mean that, despite favorable ecologies, Nigerian rice farmers often face low returns. For example, Okon *et al.*, (2021) found that only moderate net profits of 30%–35% return on investment were achieved even in optimally managed swamp systems in Southeast Nigeria (Esheya, 2024). In that study swamp rice was the most profitable system in absolute terms, but farmers still operate with small margins, limited capital and little mechanization and low profit margin.

Profit is an important aspect of sustainability in any farm enterprise. In rice production, profit from previous season is the only way a farmer can afford farm inputs such as high-yielding seeds, fertilizer and pesticides. Without making profits, farmers may not be able to afford high labour cost or rent machines for sustainable farm operations. Also, profit could provide swamp rice farmers with capital to invest in climate resilient infrastructures since swamp rice production is sensitive to weather. Farmers with profits have market power; they can afford storage facilities and/or add value to their farm produce, hence enabling them to sell at will for higher profit.

Akwa Ibom State is in Nigeria's humid coastal Southeast region. The State is richly endowed with wetlands suited to swamp rice production, and rice is a traditional staple in this region (Etim and Ndaeyo, 2020). Indeed, one of Akwa Ibom's largest rice growing areas is Ini Local Government Area (L.G.A), which is often called the "food basket" of the state (Okon *et al.*, 2021; Udoh & Akpan, 2025). Swamp rice provides both household food and cash income for many farmers in Ini (Briner *et al.*, 2021; Agom *et al.*, 2022). Moreover, farmers report persistent constraints: labour shortages and high wage rates (due to lack of mechanization), limited access to finance and inputs (fertilizers, quality seed), and poor market access and information (Agom, Okon & Archibong, 2022; Etim & Ndaeyo, 2020). These challenges mirror findings on swamp rice production in sub-Saharan Africa. Swamp rice farmers in Nigeria frequently struggle with high cost of farm labour and other inputs, inadequate irrigation or drainage control, and vulnerability to floods and pests (Etim & Ndaeyo, 2020).

Studies on swamp rice production in Nigeria compared profitability of different rice systems (upland vs. lowland vs. swamp) in Southeast Nigeria (Esheya, 2024; Chidiebere-Mark *et al.*, 2019), and the profitability and poverty status of rice farmers (Idiong & Iko, 2019; Oloyede *et al.*, 2021; Gona & Danmaigoro, 2019; Usman *et al.*, 2024). However, there is a dearth of data on profitability of swamp rice production and the various constraints to rice production in Ini L.G.A. Little is known about the actual net returns to swamp rice farmers in Ini L.G.A which is a major rice producing centre in Akwa Ibom State.

Swamp rice in Ini could contribute significantly to local and national food supply if its profitability were optimized. Better information on who the farmers are and what limits their output is crucial for designing effective policies that could improve credit schemes, extension or mechanization. This study addresses the profitability of swamp rice in Ini L.G.A and its implications for food security at both the State and national level. Specifically, the study sought to examine the socio-economic characteristics of swamp rice farmers, estimate the costs and returns to rice enterprise, and identify the constraints to rice production in the study area.

2.0 Methodology

2.1 Study Area

The study was conducted in Ini L.G.A of Akwa Ibom State. Ini is one of the 31 Local Government Areas in the State. The location of the Ini Local Government Area covers the former Ikono Local Government Area and Abia State. It has a land area of 320,451 square kilometres. The people of Ini Local Government area are members of the Ibibio tribe. Ibibio, Itu Mbon Uso and Nkari languages are spoken. As of 2024, using annual growth rate of 2.8 % from the 2006 National Census, Ini has a population of 163,634 people. Natural resources found within Ini include limestone, clay, gravel, fine sand, crude oil, gold and iron ore. The forest region provides timber and firewood. Ini is known as the food basket of Akwa Ibom State. Due to Ini's land expansive area, the citizens are predominantly farmers. Ini produces food items such as rice, palm produce, cassava, cocoa, plantains, and bananas.

2.2 Sampling Technique/Sample Size

Two stage, purposive and simple random sampling techniques were used to select 120 rice farmers from Ini L.G.A. The first stage involved the purposive selection of four major rice-producing communities in Ini namely: Mbiabet Ikpe, Ikpe Ikot Nkon, Ibam Ukot, and Ikpe Atan Ubom. In the second stage, a list of all swamp rice farmers in each of the above-mentioned villages was collected from each of the selected village heads and community leaders. From the list, 30 swamp rice farmers were randomly selected from each of the four villages; this gave a total of 120 respondents for this study.

2.3 Source of Data/Data Collection Procedure

Data for this study were obtained mainly from primary sources through the use of structured and close-ended questionnaires. Primary data gathered included the socio-economic characteristics of the rice farmers, land size, labour usage, rice yield per hectare, quantities of various inputs, and constraints to rice production in the study area among others.

2.4 Analytical Techniques

Simple descriptive statistics such as mean, frequencies, Tables and percentages were used to describe the socioeconomic characteristic of swamp rice farmers in the study area and gross margin analysis was used to estimate the profitability of swamp rice production. The budgetary technique was used to determine the profit margin at various scales of operation. The model used in estimating the Gross Margin was:

$$Profit = \Sigma TR - \Sigma TC \dots\dots\dots Equation 2.1$$

$$TR = P_y \times Y_i \dots\dots\dots Equation 2.2$$

$$TVC = P_x \times X \dots\dots\dots Equation 2.3$$

$$TC = TVC + TFC \dots\dots\dots Equation 2.4$$

Where:

TR = Total Revenue (₦)

TVC = Total Variable Cost (₦)

TC = Total Cost (₦)

P_y = Unit Price of Output Produced (₦)

Y = Quantity of Output (Kg)

P_{xi} = Unit Price of Variable Inputs Used (₦)

X_i = Quantity of Variable Inputs (Kg)

$$Gross\ Margin\ (GM) = TR - TVC \dots\dots\dots Equation 2.5$$

$$Profit\ margin = \frac{Net\ profit}{Total\ revenue} \times 100 \dots\dots\dots Equation 2.6$$

Where:

$$Net\ Profit = TR - TC \dots\dots\dots Equation 2.7$$

$$\text{Rate of Return (ROR)} = \frac{\text{Net profit}}{\text{Total Cost}} \dots\dots\dots \text{Equation 2.8}$$

$$\text{Return on Investment (ROI)} = \frac{\text{Net profit}}{\text{Total investment}} \times 100 \dots\dots\dots \text{Equation 2.9}$$

Where:

Total investment = Total Production Cost

A three-point likert type rating scale was used to identify the constraints to rice production in the study area. The 3-point rating scale was graded as Strongly Agreed (SA) = 3, Agreed (A) =3, Disagreed (D) =1. The mean score of respondents based on the 3-point rating scale was computed; $3 + 2 + 1 = 6/3 = 2.0$ (Benchmark).

3.0 Results and Discussion

3.1 Socio-economic Characteristics of the Respondents

The socioeconomic characteristics of rice farmers in the study area are presented in Tables 3.1a and 3.1b. The results showed that the study composed of both male and female with a mean age of 44.91 years, suggesting that the rice farmers in the study area are in their active and productive age. The result also implies that rice farmers are energetic and may employ better farm management strategies to improve rice yield in the study area. This finding is in consonance with Ndubueze-Ogaraku and Ogbonna (2016), who reported that the majority of their respondents were between 50 – 60 years of age. Omobolaji (2019) reported a mean age of 47.8 years, and Egbodion *et al.*, (2024) reported a mean age of 43 years.

Although most respondents were males (64.2%), the data demonstrate that the majority (84.2%) of respondents were married. This implies that rice farming in the study area is male-dominated. This is in line with the findings of Egbodion *et al.*, (2024), but contrary to the findings of Ndubueze-Ogaraku and Ogbonna (2016) who reported female-dominated respondents. Also, married farmers indicate a family-oriented population and implying availability of farm labour. In terms of educational status, the majority of farmers have acquired basic secondary (40%) and tertiary education (39.2%), as only 2.5% were identified as illiterate. The mean years of formal education was 11.71 years, implying that the educated farmers could easily adopt new production techniques and practices that can improve their efficiency in rice production. This is in line with the findings of Omobolaji (2019), and Egbodion *et al.*, (2024).

The mean household size was about 6 persons, suggesting that family members can contribute to farm labour supply during rice production. This finding is in agreement with Omobolaji (2019), Antia-Obong *et al.*, (2021) and Egbodion *et al.*, (2024) findings that reported a mean household size of about 6 and 7 persons. Swamp rice farmers in the area were highly experienced. More years of farming experience could mean better utilization and management of available farm resources. About 31.67% of the respondents had 11 to 15 years of experience in rice cultivation, 30.83% had 6 to10 years of farming experience, 30% of the farmers had between 16 to 20 years of experience, 6.7% of the respondents had between 1 to 5 years of farming experience, and 0.8% of the farmers had more than 20 years of experience in rice farming. The mean years of farm experience was 12.37 years. This implies that the

accumulated experience can help them to adopt farming techniques that may enable them to improve their efficiency in resource allocation and utilization in rice farming over the years. The finding lend credence to the report by Ndubueze-Ogaruku (2016) who had an average of 11 years of experience, and Egbodion *et al.*, (2024) reported an average of 13 years of experience.

In many African settings including the study area, land fragmentation is a major impediment to farmers taking advantage of economies-of-scale and mechanized agriculture which can help improve productivity. The results showed that the rice farmers had scattered and fragmented plots with different sizes as the majority (82.5%) had between 1 to 5 plots of land, and 17.5% had between 6 to 10 plots of farmland (Table 3.1b). The mean number of plots was 4. Also, 58.3% of the farmers reported a plot size less than 1ha, and 41.7% of the farmers reported a plot size between 1 to 2ha. The mean plot size was 0.71ha per plot. Lack of improved crop varieties may reduce farm profit, the result showed that all the farmers in the study area opted for an improved variety of rice seeds as opposed to local cultivars or hybrid cultivars. Being a member of a social organization could make farmers access credit facilities, market information, extension services, and other benefits that can improve overall efficiency.

About 37% of the respondents had been members of social organizations for about 3 to 4 years, while 27.5% spent only 1 to 2 years as members of social organizations, and 35.8% do not belong to any social organization (Table 3.1b). This implies that many of the farmers are members of social organizations. Also, the majority (49.2%) of the respondents used personal savings as a major source of capital, and 23.3% sourced their farm capital from friends and family, suggesting that none of the respondents sourced credit from financial institutions or cooperatives.

The result also shows that 25.8% of the farmers inherited the land used for rice cultivation, 25% of the respondents out-rightly purchased their farmlands, and 20.8% of the respondents cultivated in communal lands. This indicates that many of the farmers own the farmland that they cultivate, implying that they can use their lands as security to obtain loans for agricultural or non-agricultural purposes. Furthermore, the distribution of the respondents according to the type of labour utilized by the farmers indicates that 31.7% of the respondents utilized exchange labour, 20.8% utilized both family labour and hired labour for production purposes, 19.2% of the farmers hired labour for rice cultivation, and 9.1% of the respondents utilized family labour for production purposes. The predominance of exchange labour can be linked to communal land use and the community-oriented approach towards rice farming in the study area. Egbodion *et al.*, (2024) reported that most of the farmers use hired labour.

3.2 Profitability of Swamp Rice Production in the Study Area

Table 2 presents the profitability analysis of rice production in Ini LGA. The total revenue was ₦1,036,800. This was generated from the sale of 576 kg/ha of rice, valued at ₦90,000 per 50 kg bag. The Total variable cost was ₦588,350.00. Labor costs (₦386,750) formed a crucial part of the variable costs, constituted about 57% (56.86%) of the total production cost. This shows that swamp rice production in the study area is highly labour-intensive. The labour includes cost of land clearing, tiling, manure application, weeding, harvesting, among others. Other components of the variable costs were the cost of seeds (₦80,000) and herbicides (₦67,600). The considerable expenses on herbicides suggest that weed management is a major challenge for farmers, necessitating heavy use of chemicals to ensure

a high yield. Also, cost of pesticide was ₦54,000.00. The total fixed cost was ₦92,500 and was calculated using the depreciated value of the farm assets. The farm assets that depreciation was calculated for were knapsack sprayers, basins, head-pans, hoes, machete and other essential tools such as spades, and sickles. These farm assets, while representing a high initial investment, are likely to benefit farmers over multiple farming seasons.

Table 3.1a: Socio-economic Characteristics of the Rice Farmers in the Study Area (n=120)

Variable	Frequency (n = 120)	Percentage
Age ($\bar{x} = 44.91$)		
>30	1	0.83
30-39	35	29.2
40-49	44	36.7
50-59	36	30.0
60-69	4	3.3
Gender		
Male	77	64.2
Female	43	35.8
Marital Status		
Single	13	10.8
Married	101	84.2
Widowed	6	5.0
Education ($\bar{x} = 11.71$)		
No Formal	3	2.5
Primary	22	18.3
Secondary	48	40.0
Tertiary	47	39.2
Household Size ($\bar{x} = 5.92$)		
1-5	55	45.8
6-10	65	54.2
Farming Experience ($\bar{x} = 12.37$)		
1-5	8	6.7
6-10	37	30.8
11-15	38	31.7
16- 20	36	30
>20	1	0.8

Source: Field Survey, 2024

Table 3.1b: Socio-economic Characteristics of the Rice Farmers in the Study Area Continued (n=120)

Number of Plots ($\bar{x} = 4.04$)	Frequency (n = 120)	Percentage
1-5	99	82.5
6-10	21	17.5
Plot Size ($\bar{x} = 0.71$)		
>1	70	58.3
1-2	50	41.7
Rice cultivar		
Local	0	0
Improved	120	100
Hybrid	0	0
Years in Social Organization ($\bar{x} = 1.68$)		
<1	43	35.8
1-2	33	27.5
3-4	44	36.7
Credit Source		
None	33	27.5
Personal Savings	59	49.2
Friends	28	23.3
Land Acquisition		
Inherited	65	54.2
Purchased	30	25.0
Communal	25	20.8
Type of Labour		
No response	23	19.2
Family	11	9.1
Hired	23	19.2
Family and hired	25	20.8
Exchange	38	31.7

Source: Field Survey, 2024

The gross margin was ₦448,450/ha, indicating that after covering direct costs of production, the farmers retained a substantial amount, demonstrating the strong income-generating potential of swamp rice production in the area. The net farm profit stood at ₦355,950/ha. This confirms that rice production is a viable and profitable business, as farmers were able to generate returns well above their total investment. The profit margin was 34.33%. This means that for every ₦100 earned from rice sales, ₦34.78 was retained as profit, signifying a reasonably high level of efficiency in resource utilization. Additionally, the rate of Returns On Investment (ROI) of 52.28% implies that for every ₦1 invested in rice farming, the farmer earned 52.3 kobo in return. This is a strong indication that rice production in the study area yields favourable economic outcomes which could lead far household out of poverty. Households producing substantial profits from farm production are not likely to be vulnerable to economic shocks (Okon *et al.*, 2018).

The resource productivity analysis revealed that 35.45% of the total cost was allocated to material inputs such as seeds, herbicides, and other consumables, while labour accounted for 64.55% (Table 2). This suggests that rice farming in the study area is highly input-dependent, with the majority of costs being directed toward acquiring essential materials. The relatively high labour cost also indicates the continued reliance on manual labour, which could be reduced through the adoption of mechanized farming techniques. These measures of performance indicate that rice production in the study area is very profitable. Gona and Danmaigoro (2019) reported a net income of ₦57,151/ha, a profitability index of 0.36, a rate of return on investment to be 56.17%, and a Benefit Cost Ratio (BCR) of 1.56 respectively. Esheya (2024) reported a net farm income of ₦715,677.9/ha for swamp rice in Southeast Nigeria, with 30.6% returns on investment. Egbodion *et al.*, (2024) reported average farm net income to be ₦599, 681.28/ha in Edo North L.G. Area of Edo State, Nigeria.

Table 3.2: Profitability of rice production in the study area (n=120)

Variable	Quantity	Unit price	Amount	% of total cost
Revenue	576kg	90,000/50kg	1,036,800.00	
Variable cost				
Seed	75kg/ha	16,000/15kg	80,000	11.75
herbicide	5.2Ltrs	13,000/Ltrs	67,600	9.93
Pesticide	4 Ltrs	13,500/Ltrs	54,000	7.93
Labour	119 mandays	3,250	386,750	56.80
Total Variable Cost			588,350	
Fixed cost				
Depreciated value of farm assets			92,500	
Total Fixed cost		92,500		13.59
Total Cost			680,850	
Gross Margin			448,450	
Net farm profit			355,950	
Profit margin			34.33	
Returns on Investment			52.28%	
Resource Productivity				
Material cost			43.20%	
Labour cost			56.80%	

Source: Field Survey, 2024

3.3 Constraints to Swamp Rice Production

Table 3.3 shows the constraints to swamp rice production in the study area. The farmers adjudged high labour cost as the major constraint ($\bar{x} = 3.32$). This indicates a strong consensus among farmers that the cost of hiring labour is a major impediment to their farm profit. About 50.8% of respondents strongly agreed and an additional 30.0% agreed that high labour costs placed a significant financial burden on swamp rice production. Apart from reducing profitability, this could potentially discourage farm expansion and reinvestment. This indicates that labour-intensive farming practices in the study area have become economically burdensome. The dependency on manual labour in rice farming, with limited

mechanization, likely inflates production costs and may lead to dwindling profit margins and reduced productivity. The findings lend credence from a study by Rahaman, Sarkar, Rashid, Reza and Siddique (2022) who observed that labour cost constituted a highest share in gross operating expenses by rice farmers in Bangladesh.

Also, soil degradation and erosion ($\bar{x} = 3.23$), climate variability ($\bar{x} = 3.23$), and lack of market information ($\bar{x} = 3.23$) were other major constraints. Soil degradation and erosion can pose a significant threat to swamp rice production. This indicates widespread concern among farmers regarding declining soil fertility, reduced water retention capacity, and the loss of topsoil due to erosion.

These factors directly impact swamp rice yields by limiting nutrient availability and increasing vulnerability to drought stress. Climate change variability has the potential to disrupt traditional farming practices, impact planting schedules, and increase the risk of crop failure. Furthermore, access to timely and accurate market information is crucial for farmers to make informed decisions and obtain fair prices for their produce. The result indicated that the majority (76.7%) of respondents both (strongly agreed and agreed) perceived a lack of market information as a major constraint. This suggests that farmers often lack knowledge about market prices, demand, and consumer preferences, making them vulnerable to exploitation by intermediaries and limiting their access to profitable market opportunities. This is true because some middle men always create false abundance of farm produce in order to exploit farmers.

Inadequate storage facilities ($\bar{x} = 3.22$) were considered a major constraint by the respondents. This implies that post-harvest losses due to poor storage infrastructure hinder swamp rice farmers from preserving their produce, reducing potential income. This lack of infrastructure undermines the efforts of farmers and reduces the overall efficiency of the rice value chain. Furthermore, the high cost of processing was considered a major constraint to rice production in the study area ($\bar{x} = 3.19$). This may stem from the limited availability of affordable processing equipment and the inefficiency of existing mills. This is followed by land tenure problems ($\bar{x} = 3.16$), which may stem from challenges such as land ownership disputes, small landholding sizes, and unclear property rights which can limit farmers' ability to expand production.

The result further reveals that high transportation cost ($\bar{x} = 3.14$), lack of market access ($\bar{x} = 3.13$), and lack of inputs ($\bar{x} = 3.13$) were perceived as constraints by rice farmers in the study area. High transportation costs can significantly impede rice farmers. These costs, driven by poor infrastructure, limited transport options, and fluctuating fuel prices, directly reduce farmer profitability by consuming a substantial portion of revenue. They also restrict market reach, confining many farmers to local markets and limiting access to better prices and wider consumer bases. This creates economic hardship and limits growth potential. The lack of market access can encompass inadequate infrastructure, limited market information, weak buyer linkages, and exploitative intermediaries. This leads to post-harvest losses, forces farmers to accept low prices from local traders, and discourages increased production due to uncertainty about selling surplus produce. This negatively impacts farm incomes and regional rice production, contributing to food insecurity. Also, the lack of access to essential inputs such as improved seeds ($\bar{x} = 3.1$), fertilizers, pesticides, and irrigation facilities, can severely limit rice yields and farm incomes (Jonah *et al.*, 2023). High input costs, limited local availability, inadequate distribution, and lack of credit facilities contribute to this problem. This results in lower productivity, and increased vulnerability to pests and diseases ($\bar{x} = 3.08$),

and may perpetuate a cycle of low yields and poverty for farmers. Idiong and Ikoh (2019) had similar findings.

Table 3.3: Constraints to Rice Farming in Ini Local Government Area (n=120)

Constraint	Strongly agreed (%)	Agreed (%)	Disagreed (%)	Mean
High cost of labour	61(50.8)	36 (30.0)	23(19.2)	3.32
Soil degradation and erosion	57(47.5)	33(27.5)	30(25.0)	3.23
Climate change variability	57(47.5)	34(28.3)	29(24.2)	3.23
Lack of market information	56(46.7)	36(30.0)	28(23.3)	3.23
Inadequate storage facilities	56(46.7)	34(28.3)	30(25.0)	3.22
High cost of processing	51(42.5)	41(34.2)	28(23.3)	3.19
Land tenure problems	49(40.8)	41(34.2)	30(25.0)	3.16
High transportation cost	49(40.8)	39(32.5)	32(26.7)	3.14
Limited market access	49(40.8)	37(30.8)	34(28.3)	3.13
Lack of inputs	51(42.5)	33(27.5)	36(30.0)	3.13
Lack of improved rice seedlings	45(37.5)	42(35.0)	33(27.5)	3.10
Pest and diseases	47(39.2)	35(29.2)	38(31.7)	3.08
Limited access to agricultural insurance	46(38.3)	34(28.3)	40(33.3)	3.05
Inadequate Irrigation systems	41(34.2)	43(35.8)	36(30.0)	3.04
Insufficient extension services	43(35.8)	38(31.7)	39(32.5)	3.03
Limited access to credit facilities	37(30.8)	45(37.5)	38(31.7)	2.99

Source: Field survey, 2024

Additionally, limited access to agricultural insurance ($\bar{x} = 3.05$) leaves farmers highly vulnerable to income shocks from crop losses due to weather events, pests, or diseases, hindering their ability to recover and reinvest in their farms. Inadequate irrigation systems ($\bar{x} = 3.04$) further exacerbate this vulnerability by making rice production heavily reliant on unpredictable rainfall, limiting productivity and increasing the risk of crop failure during dry periods. Insufficient extension services ($\bar{x} = 3.03$) deprive farmers of vital information on improved farming practices, new technologies, and market trends, hindering their ability to optimize production and adapt to changing conditions. Finally, limited access to credit facilities ($\bar{x} = 2.99$), restricts farmers' ability to invest in necessary inputs, equipment, and infrastructure improvements, thus perpetuating a cycle of low productivity and limited economic opportunity.

4.0 Conclusion

Rice farming is profitable, with a profit margin of 31.85%. High production costs, reliance on manual labour, and fragmented landholdings constrained growth and reinvestment. Key challenges include high labour costs, soil degradation, climate variability, inadequate infrastructure, and restricted access to credit and inputs. Gender disparities and environmental risks further undermine efficiency and sustainability.

4.1 Recommendations

Rice farmers should be provided with access to modern agricultural tools and mechanized services to minimize labour costs and enhance efficiency. Targeted training programs should be provided to improve farming practices and resource allocation. Financial institutions in partnership with other stakeholders should develop farmer-friendly credit schemes. Farmers

should be encouraged to leverage group lending and shared resources in cooperative societies.

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