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Effects of Land Tenure Systems on The Productivity of Rice Farmers in IMO State, Nigeria

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Abstract - Rice (Oryza sativa) is a major staple crop in Nigeria, contributing substantially to food security, employment generation, and rural household income. In Imo State, rice production is largely undertaken by smallholder farmers operating under three dominant land tenure systems: communal, inherited, and rented land. This study examined the economics of rice production under these tenure systems in order to assess their effects on production cost, profitability, and investment incentives. A multistage sampling technique was employed to select one hundred and twenty (120) rice farmers from four Local Government Areas in the Okigwe and Orlu Agricultural Zones of Imo State. Primary data were collected using structured questionnaires and analyzed using cost and return analysis, including total revenue, total cost, net returns, return on investment (ROI), and expense structure ratio (ESR). The results showed that rice production was profitable across all three land tenure systems, although profitability differed significantly. Farmers operating on inherited land recorded the highest net return (₦370,767.20/ha) and ROI (0.43), followed by those on communal land (₦362,767.20/ha; ROI = 0.41), while farmers on rented land recorded the lowest net return (₦336,719.20/ha) and ROI (0.37). Expense structure ratios were generally low, indicating that fixed costs constituted a small proportion of total production costs, thereby enhancing production flexibility and financial resilience. The superior performance of inherited land was mainly attributed to the absence of rental payments and greater reliance on family labour. The study concludes that land tenure systems significantly influence rice profitability and investment behaviour. Secure land access, efficient resource utilization, and supportive institutional frameworks are essential for improving rice productivity and farmer welfare. The study therefore recommends the promotion of secure inheritance rights, equitable community land governance, affordable land leasing arrangements, improved access to credit, efficient input utilization, and targeted capacity-building programmes to enhance sustainable rice production in Imo State.

Keywords: Rice production; Land tenure systems; Communal land; Smallholder farmers.

I. INTRODUCTION

Rice (*Oryza sativa*) is one of the most important staple food crops in Nigeria, playing a vital role in national food security, employment generation, and rural household income (Esiobu et al., 2025; Sanusi et al., 2025). The rapid growth in rice consumption across both urban and rural populations has intensified the need to expand domestic production in order to reduce Nigeria's heavy dependence on imports (Mohidem et al., 2022). In Imo State, rice production is predominantly carried out by smallholder farmers who operate under diverse ecological, socio-economic, and institutional conditions (Esiobu et al., 2020). Despite its importance, rice productivity in the state remains relatively low compared to its production potential. This situation is largely attributed to several institutional and socio-economic constraints, among which land tenure systems are particularly significant (Esiobu, 2024; Emmanuel & Gbigbi, 2024). Land tenure refers to the legal and customary arrangements that define ownership, access, control, and use rights over land resources (Okafor & Udobi, 2024). In Imo State, rice farmers mainly operate under three land tenure systems: communal ownership, inheritance, and rented land systems. Under the communal system, land is collectively owned by families or communities and allocated to members for cultivation. The inheritance system involves intergenerational transfer of land rights, which often results in land fragmentation and declining farm sizes (Wily, 2018). The rented land system allows farmers to cultivate land through leasing or sharecropping arrangements, usually involving fixed rental payments or output sharing that directly affect production decisions and farm profitability. These tenure systems strongly influence farmers' productivity through their effects on land security, farm size, investment incentives, and access to credit. Tenure insecurity discourages long-term investments in soil fertility improvement, irrigation, and mechanization, which are critical for increasing rice yields (Adéchian & Baco, 2025; Pierri et al., 2025). Communal and inherited lands often restrict land transfer and farm expansion, limiting economies of scale and productivity growth (Kehinde et al., 2021). Conversely, rented land increases production costs

and reduces farmers' ability to reinvest in productivity-enhancing technologies (Ntihinyurwa & De Vries, 2021). Empirical studies in Nigeria show that rice farmers under different land tenure systems exhibit significant differences in productivity and technical efficiency. Sanusi et al. (2022) reported higher productivity among farmers operating on inherited land compared to those on rented land, while communal land users faced constraints related to land insecurity and fragmentation. Similarly, Ganiyu et al. (2024) observed that secure land tenure significantly improves farmers' willingness to adopt improved rice varieties and modern production practices. From a productivity perspective, land tenure systems determine the scale of operation, intensity of input use, and adoption of improved technologies. Consequently, differences in tenure arrangements translate into variations in yield levels, production efficiency, and overall farm performance (Ambali et al., 2022). Therefore, analyzing the effects of communal, inheritance, and rented land tenure systems on the productivity of rice farmers in Imo State is essential for understanding how institutional land arrangements shape agricultural performance and farmer welfare. Such analysis provides evidence for land policy reforms, agricultural investment programs, and sustainable rice development strategies aimed at improving productivity, income, and food security in Nigeria. Rice production is a critical component of food security and rural livelihood systems in Imo State, Nigeria. However, despite increased policy attention toward rice self-sufficiency, productivity among smallholder rice farmers remains low, while production costs continue to rise, resulting in poor farm performance and limited income growth (FAO, 2025). Rice output in the state has not kept pace with increasing consumer demand, thereby sustaining Nigeria's dependence on imported rice and weakening the contribution of the crop to rural economic development. One of the major but insufficiently addressed constraints to rice productivity in Imo State is the land tenure system under which farmers operate. Rice farmers mainly cultivate land under communal, inheritance, and rented arrangements, each of which presents distinct productivity challenges. Communal and inherited land systems are characterized by land fragmentation, tenure insecurity, boundary disputes, and limited transfer rights, which restrict farm expansion and discourage long-term investment in productivity-enhancing practices such as mechanization, irrigation, and soil improvement (Iticha & Han, 2025). Continuous subdivision of inherited land among family members has further reduced farm sizes, making efficient rice production increasingly difficult (Sanusi et al., 2022). Similarly, farmers operating on rented land face high rental costs that increase variable production expenses, reduce net farm income, and limit the ability to invest in improved inputs and technologies (Dzever et al., 2023). These constraints contribute to significant variations in yield levels, technical efficiency, and productivity across the different land tenure systems. Although several studies have examined rice production in Nigeria, most have focused on agronomic factors, input use, or general productivity issues, with limited empirical attention given to how land tenure systems specifically influence rice productivity in Imo State. This gap has constrained the development of tenure-sensitive agricultural and land policies. Without clear empirical evidence on the productivity effects of communal, inheritance, and rented land systems, policy interventions remain generalized and ineffective. Therefore, the lack of comprehensive analysis on the effects of land tenure systems on the productivity of rice farmers in Imo State constitutes a major research and policy gap. Addressing this gap is necessary for designing targeted land and agricultural policies that can enhance productivity, improve farmer welfare, and strengthen food security. Consequently, this study was undertaken to examine the effects of communal, inheritance, and rented land tenure systems on the productivity of rice farmers in Imo State, Nigeria. The broad objective of the study was to assess the effect of land tenure systems on the productivity of rice farmers in Imo state. The specific objectives were to:

i. describe the socio-economic characteristics of the rice farmers in the study area;
ii. identify the types of land tenure systems of rice farmers in the study area;
iii. ascertain cost and returns of rice farming on different land tenure systems in the study area;
iv. estimate the productivity of rice farmers on different land tenure systems in the study area;

II. MATERIALS AND METHODS

The study was carried out in Imo State, Nigeria. Imo State is located in the eastern zone of Nigeria. The

State lies between Latitudes 4°45′N and 7°15'N and Longitude 6°50'E and 7°25'E [(Nigerian Meteorological Agency (NiMET, 2020)]. It is bounded on the east by Abia State, on the west by the River Niger and Delta State; and on the north by Anambra State, while Rivers State lies to the south (NBC, 2020). Imo State covers an area of 5,067.20 km^2, with a population of 3,934,899 persons [(National Population Commission (NPC), 2006; National Bureau of Statistics (NBS), 2007)] and population density of 725km^2 (Ministry of Land Survey and Urban Planning, 2015). The State has three Agricultural zones namely Okigwe, Orlu and Owerri Agricultural Zones. These divisions are for administrative and extension services and not for any agro-ecological difference. It is also delineated into twenty-seven (27) Local Government Areas (LGAs). It has an average annual temperature of 28°C, an average annual relative humidity of 80%, average annual rainfall of 1800mm to 2500mm and an altitude of 100m above sea level [(National Root Crops Research Institute, Umudike Meteorological Station, (NRCRIMS), 2020)]. The State experiences two major seasons: dry and rainy seasons. It has fertile and well-drained soil suitable for rice farming and a some proportion of the population are essentially rice farmers. Other crops cultivated in the area includes; vegetable, melon, yam, cassava cocoyam, amongst others. All this necessitated the selection of the area for the study. The population of this study comprised all rice farmers in Imo state. In order to obtain a representative sample, the researcher made use of a multistage sampling technique to select respondents for the study. In the first stage, two Agricultural Zones namely; Okigwe and Orlu were purposively selected from the three Agricultural Zones due to their high involvement in rice production activities. The second stage involved purposive selection of two Local Government Areas (LGAs) from each of the two selected Agricultural Zones namely: Ihitte Uboma, Okigwe LGAs in Okigwe Agricultural Zone, and in Orlu Agricultural Zone, Ideato-North and Ideato-South LGAs. The selection was based on existence of rice production in these areas. The third stage involved purposive selection of three autonomous communities from each of the two (2) selected LGAs. Then the final stage involved random selection of ten (10) rice farming household from each of the autonomous communities that gave a total of One Hundred and Twenty (120) households used for the study and this formed the sample size. The list of farmers in the communities, which formed the sample frame, was obtained from Rice Farmers Association of Nigeria (RIFARM) office in the State.

Table 1: Sampling Proportion for Rice Farmers

Agricultural Zones	Total Number of LGA Selected from each Zone	Total Number of Communities Selected from each Zone	Total Number of Rice Farmers selected per Agricultural Zone
Orlu	2	3×2 =6	10×6 = 60
Okigwe	2	3×2 = 6	10×6 = 60
Total	04	12	120

Source: Field Survey Data, 2025

The data were collected through the use of structured questionnaire which was administered to the one-hundred and twenty (120) rice farmers through face-to-face interview by trained enumerators. Cross sectional data was collected based on 2022 production year. The questionnaire was subjected to content validity with the help of the research supervisor before administrating it to the rice farmers. The questionnaire was carefully prepared to capture income of the rice farmers, types of land tenure systems of the rice farmers in the study area, cost and return of rice farming, and the productivity of rice farmers. Cost and Return analysis formula was specified thus;

TR_i= P x Q ……1.0

TC_i= TVC + TFC……1.1

Where;

TR = Total Revenue

P = Price (₦)

Q = Quantity (kg)

TC = Total Cost (₦)

TVC = Total Variable Cost (₦)

TFC = Total Fixed Cost

i = Tenure Systems (Communal, Rent and Inheritance)

Profitability Ratios

NR = TR -TC……1.2

ROI= NR/TC X 100……..……...1.3

Expense Structure Ratio (ESR) = TFC/TVC……...…….1.4

Where;

ROI = Return on Investment

NR = Net Returns/Profit

TR = Total Revenue

TC = Total Cost

ESR = Expense Structure Ratio

In addition, Objective (iv) was achieved using Total factor productivity. Total factor productivity is specified as

$$TFP_i = \frac{\sum Pyi \ . \ Yi}{\sum Pxi \ . \ Xi+F} \quad \text{…….1.5}$$

Where,

TFP = Total factor productivity of the ith farmer

P_{yi} = unit price of output (naira)

Y_i = output of crop farmers (kg)

F = Fixed Cost (naira)

P_{xi}= unit price of inputs (naira)

X_i = i^{th} input used by the i^{th} farmer and

$\sum$ = Summation sign

III. RESULTS AND DISCUSSIONS

Socio-economic Characteristics of the Rice Farmers

The result of the rice farmers distribution based on socio-economic characteristics is presented in Table 2. Table 2 showed that the mean age was 46.50years indicating that they were young adult capable of providing energy and innovation in the rice farming. The finding is in agreement with the study of Kuye & Ogiri (2019), who pointed out that younger farmers were more involved in farming activities in Imo State. Table 2 also shows that higher proportion of the farmers (60%) were male. This shows that rice production in the area was not gender specific, however the males were more than the female. The dominance of the males might be due to high energy requirement of rice production which the male farmers could provide. The result agrees with the findings of Akinwale et al. (2022), who asserted that men usually make most households farming decision and have greater control of farm productive resources. Also, majority of the rice farmers (50%) were married This shows that people of different marital status engaged in rice production but the married were more in number. This dominance was from the fact that the married with more responsibilities needed for rice production to take care of their families. This is consistent with the work by Oyewo *et al.,* (2016), who stated that high percentage of farmers in Osun State were married; implying that farmers could have more family labour to work on the farm in their study area. The findings also support the work of Esiobu et al. (2020) who opined that married individual tend to have easy access to farm productive resources, combined production capital, idea, information to enhance their output, income and standard of living. Table 2 shows indicates that 38.33% of the rice farmers attained secondary education. The implication is that their productivity was expected to be high since education could aid them to use modern technology in the rice production. The dominance of the respondents in farming could be a result of the fact that it is the main occupation within their reach. Result on educational level is in conformity with findings of Ntihinyurwa and De Vries, (2021), who reported secondary education attainment by farmers domiciled in the rural areas. Okwuokenye (2020) also opined that such educational level helps to improve farmer's capacity in terms of application of improved farm innovations thereby increasing their farm yield. In the same way, the mean number of years of farming experience was 23.5 years. This shows that the rice farmers have more than two decades experience in rice farming and had gained some experience in rice production. The implication is that they could boost rice productivity because of experience. The result of this study is in consonant with the findings of Omoikhoje and Bigirimama (2022), who found that with the significant level of experience gathered by farmers, they would be able to manage the productivity of their farm crops effectively and efficiently. More so, the mean household size however was 6 persons. This shows that they had large families. The implication is that they could draw from family labour for rice production and improved productivity. The result is in consonance with the study of Adekanye and Oni (2022) who found that farmers with sizable number of households have potentials for increased access to farm labour, farm expansion, information sharing and polled financial resources in improving their yield, income and standard of living. The result in Table 3, also revealed that the mean yearly income was ₦623,332.3 indicating that they had high yearly income. This is relatively higher and above the Nigeria monthly minimum wage of ₦104,000 in Imo State, Nigeria (NSIWC, 2025). The implication is that they could boost rice productivity since they could purchase good inputs. The result is in consonant with the findings of Ayi & Undiandeye

(2022) who reported that farmers with higher farm income made better decision, have access to necessary productive inputs, realize huge yield/output and are more likely to be market-oriented in production than their counter parts who have low farm income. Similarly, the mean farm size was 2.58 hectares indicating that they were small scale rice producers. This result is in line with the findings of Esiobu et al. (2020), who stated that Nigeria rice sector is dominated by smallholder farmers. Also, the findings of Esiobu (2020) who stated that rural farmers were well experienced in their farming activities and that most rural farmers were small-scale in nature because their farms are most times less than 4 hectares. Table 3 also reveals that a larger proportion (69.2%) of the rice farmers does not belong to cooperative in the area. This result opposed the findings of Donkor (2022) who argued that involvement in cooperative society is one of the major determinants necessary for farmers to participate in the output market as it gives farmers opportunity to increase their output. Table 3 shows that a greater number (55.8%) of the rice farmers had no access to farm credit. This could be due to the fact that all the farmers were drawn from various rice farmers association and were members of the cooperative's society in the study area. Rice crop is a very crucial in food security and required inputs for its production. This supports the findings of Adesina et al. (2022) who reported that about 4 out of every 5 rice farmers have no access to loan and extension services. This implies that greater proportion of the rice farmers are smallholder farmers who have limited loan access capacity and did not have the financial capability to access extension services facilities. Finally, Table 2, reveals that a greater proportion (54.2%) of the rice farmers had no access to extension agents whereas about 45.8% of the rice farmers had access to extension agents. This result is in consonance with the study of Ganiyu et al. (2022), who asserted that extension contact enhances farmer's information and knowledge on modern farm technique to increase their output, income and standard of living.

Table 2: Distribution of the Socio-economic Characteristics of the Rice Farmers

S/No	Socio-economic Characteristics	Mean ($\bar{x}$)/Percentage (%)
1	Age (years)	46.5 years
2	Sex (percentage of male)	0. 60
3	Marital status (percentage of married rice farmers)	0. 50
4	Education level (Secondary)	0.38
5	Farming experience (years)	23.5
6	Household size (number of persons)	8.00
7	Annual Farm income (Nigerian Naira)	623,332.3
8	Farm size (average farm size measured in hectares)	2.58 ha
9	Membership of cooperative (percentage of members)	0.69
10	Access to farm credit (percentage of access to farm credit)	0.55
11	Access to Extension Agent (percentage of access)	0.54

Source: Field Survey Data, 2025

Land Tenure Systems

The land tenure systems under which the rice farmers were producing in the study area were identified and documented in Table 3. Table 3, shows that more of the rice farmers (47.5%) were doing the production under communal land tenure and up to 28.33% of them produced the rice on inherited land, while 24.17% produced rice on rent land. This shows that the rice producers in the area had alternative land tenure system and could make choice to improve productivity of rice. The findings tally with the study of Sanusi et al. (2024) who found that greater percentage of rice farmers rely on communal arrangement for the land and the farmers had restrictions and could not engage in farm practices suitable to them especially cultivating permanent crops.

Table 3: Distribution of the rice farmers by types of Land Tenure Systems

Land Tenure System	Frequency	Percentage (%)
Communal System	57	47.50
Rent System	29	24.17

Inheritance System	34	28.33
Total	120	100.00

Source: Field Survey Data, 2025

Cost and Return Analysis of Rice Production under the Communal Land Tenure System

The cost and return analysis of rice production under the communal land tenure system is displayed Table 4. The cost and return analysis of rice production under the communal land tenure system reveals that farmers incurred a total production cost of ₦879,232.80 per hectare and realized a total revenue of ₦1,242,000, resulting in a net return of ₦362,767.20 per hectare. This indicates that rice farming under communal tenure is profitable and economically sustainable in the study area. The return on investment (ROI) of 0.41 implies that farmers earned ₦41 for every ₦100 invested, confirming the commercial viability of rice production under this tenure arrangement. Similar profitability outcomes were reported by Olasehinde et al. (2022) and Sanusi et al. (2025), for smallholder rice farmers in Nigeria. The expense structure ratio (ESR) of 0.17 shows that fixed costs constituted only 17% of total production costs, while variable costs dominated. This cost structure is favorable, as it allows farmers to adjust production levels with minimal long-term financial risk. According to Martín-García et al. (2025), low fixed cost proportions enhance farm flexibility and resilience to market and climatic shocks. The positive net returns suggest that communal land tenure does not necessarily hinder productivity or profitability when farmers have access to essential inputs and labour. This finding implies that strengthening communal land management institutions, improving access to credit, and promoting efficient input use could further enhance rice productivity and farmers' income. Consequently, rice production under communal land tenure can contribute meaningfully to household food security, poverty reduction, and sustainable agricultural development in Imo State and similar agrarian communities.

Table 4: Cost and Returns Analysis of Rice Production Per Hectare for Communal Land Tenure System

	Item	Unit	Quantity	Unit Price (₦)	Amount (₦)
A	Revenue (Average)				
	Paddy	ton	2.7	400,000	1,240,000
	Straw	kg	1	2,000	2,000
	Total Revenue				1,242,000
B	Cost				
I	Average Variable Cost				
	Paddy for planting	50kg	200	500	100,000
	Fertilizer: Urea	50kg	3	15,000	45,000
	NPK	50kg	2	28,000	56,000
	Herbicides: Total herbicide	litres	6	4,000	24,000
	Selective herbicide	litres	6	5,000	30,000
	Insecticide	litres	4	3,500	14,000
	Labour for land preparation	mandays	8	4,000	32,000
	Labour for planting	mandays	20	3,500	70,000
	Labour for herbicide app.	mandays	12	3,500	42,000
	Labour for fertilizer app.	mandays	15	4,000	60,000
	Harvesting/pile up	mandays	10	8,000	80,000
	Threshing/winnowing	mandays	12	8,333.3	100,000.8
	Transporting/Marketing				37,500
	Loading/offloading		5	5,000	25,000
	Bags and others		50	700	35,000
	Total Variable Cost				750,500.8
Ii	Average Fixed Costs				
	Rent/Community dues				42,952
	Interest payment (13%)				65,000

Association annual dues	5,000
Depreciation(barrow, cutlass etc)	15,780
Total Fixed Cost	128,732
Total Cost (TFC + TVC)	879,232.8
Net Returns (TR – TC)	362,767.2
Return on Investment (NR/TC)	0.41
Expense Structure Ratio (TFC/TVC)	0.17

Source: Field Survey Data, 2025

Cost and Return Analysis of Rice Production under the Rented Land Tenure System

The cost and return analysis of rice production under the rented land tenure system is displayed Table 5. The cost and return analysis of rice production under the rented land tenure system indicates that farmers incurred a total production cost of ₦905,280.80 per hectare and realized a total revenue of ₦1,242,000, resulting in a net return of ₦336,719.20 per hectare. This confirms that rice production on rented land is profitable and economically viable in the study area. The return on investment (ROI) of 0.37 implies that farmers earned ₦37 for every ₦100 invested, which demonstrates satisfactory financial performance despite the additional burden of land rent. This finding aligns with previous studies which reported that rented land can still support profitable rice farming when efficient input utilization is practiced (Khounthikoumane et al., 2021; Ramadani et al., 2024). The expense structure ratio (ESR) of 0.17 reveals that fixed costs constituted only 17% of total production costs, while variable costs dominated. This cost pattern is desirable, as it enables farmers to scale production without significantly increasing long-term financial obligations. According to Connor (2023), a low fixed-cost structure enhances farm adaptability and reduces exposure to production risks. Although net returns under the rented land system were slightly lower than those under communal tenure, the profitability level remains attractive. This implies that rented land provides a viable alternative for farmers who lack access to inherited or communal land. The positive implication is that policies promoting affordable land leasing arrangements, access to credit, and subsidized inputs can further improve profitability. Therefore, rice production under rented land tenure can significantly contribute to food security, employment generation, and income diversification among smallholder farmers in Imo State and similar rice-producing regions of Nigeria.

Table 5: Cost and Returns Analysis of Rice Production of an Average Farmer per Hectare of Rented Land Tenure System

	Item	Unit	Quantity	Unit Price (₦)	Amount (₦)
A	Revenue (Average)				
	Paddy	Ton	2.7	400,000	1,240,000
	Straw	Kg	1	2,000	2,000
	Total Revenue				1,242,000
B	Cost				
I	Average Variable Cost				
	Paddy for planting	50kg	200	500	100,000
	Fertilizer: Urea	50kg	3	15,000	45,000
	NPK	50kg	2	28,000	56,000
	Herbicides: Total herbicide	Litres	6	4,000	24,000
	Selective herbicide	Litres	6	5,000	30,000
	Insecticide	Litres	4	3,500	14,000
	Labour for land preparation	Mandays	8	4,000	32,000
	Labour for planting	Mandays	20	3,500	70,000
	Labour for herbicide app.	Mandays	12	3,500	42,000
	Labour for fertilizer app.	Mandays	15	4,000	60,000
	Harvesting/pile up	Mandays	10	8,000	80,000
	Threshing/winnowing	Mandays	12	8,333.3	100,000.8

	Labour for bird scarring	3	9,000	27,000
	Transporting/Marketing			37,500
	Loading/offloading	5	5,000	25,000
	Bags and others	50	700	35,000
	Total Variable Cost			775,500.8
Ii	Average Fixed Costs			
	Rent			44,000
	Interest payment (13%)			65,000
	Association annual dues			5,000
	Depreciation(barrow, cutlass etc)			15,780
	Total Fixed Cost			129,780
	Total Cost (TFC + TVC)			905,280.8
	Net Returns (TR – TC)			336,719.2
	Return on Investment (NR/TC)			0.37
	Expense Structure Ratio(TFC/TVC)			0.17

Source: Field Survey Data, 2025

Cost and Returns of Rice production under Inheritance of Land System

The cost and return analysis of rice production under the inheritance land tenure system is displayed Table 6. The cost and return analysis of rice production under the inherited land tenure system shows that farmers incurred a total production cost of ₦871,232.80 per hectare and realized a total revenue of ₦1,242,000, resulting in a net return of ₦370,767.20 per hectare. This indicates that rice production under inherited land tenure is highly profitable and economically sustainable. The return on investment (ROI) of 0.43 implies that farmers earned ₦43 for every ₦100 invested, which the highest among the three (3) land tenure systems is considered in this study. This finding supports earlier studies which reported that inherited land systems often enhance farm profitability due to reduced land acquisition costs (Ibrahim et al., 2025; Sindhuja et al., 2025). The expense structure ratio (ESR) of 0.13 further shows that only 13% of total production costs were fixed costs, while variable costs dominated. This low fixed-cost proportion provides farmers with greater production flexibility and reduces long-term financial risk. According to Li et al. (2025), such cost structures encourage farm expansion and efficient resource allocation. The relatively high net returns recorded under this system can be attributed to the absence of rental payments and the use of family labour, which significantly reduced production expenses. This highlights the economic advantage of inherited land tenure in smallholder rice farming. The positive implication is that policies promoting secure land inheritance rights and family-based farm management can strengthen rice productivity, enhance household income, and improve food security. Therefore, inherited land tenure remains a critical asset for sustainable rice production and rural livelihood improvement in Imo State and similar agrarian communities.

Table 5: Cost and Returns Analysis of Rice Production of an Average Farmer Per Hectare of Land under Inheritance

	Item	Unit	Quantity	Unit Price (₦)	Amount (₦)
A	Revenue (Average)				
	Paddy	Ton	2.7	400,000	1,240,000
	Straw	Kg	1	2,000	2,000
	Total Revenue				1,242,000
B	Cost				
I	Average Variable Cost				
	Paddy for planting	50kg	200	500	100,000
	Fertilizer: Urea	50kg	3	15,000	45,000
	NPK	50kg	2	28,000	56,000

	Herbicides: Total herbicide	Litres	6	4,000	24,000
	Selective herbicide	Litres	6	5,000	30,000
	Insecticide	Litres	4	3,500	14,000
	Labour for land preparation	Mandays	8	4,000	32,000
	Labour for planting	Mandays	20	3,500	70,000
	Labour for herbicide app.	Mandays	12	3,500	42,000
	Labour for fertilizer app.	Mandays	15	4,000	60,000
	Harvesting/pile up	Mandays	10	8,000	80,000
	Threshing/winnowing	Mandays	12	8,333.3	100,000.8
	Transporting/Marketing				37,500
	Labour for bird scarring		2	9,000	18,000
	Loading/offloading		5	5,000	25,000
	Bags and others		50	700	35,000
	Total Variable Cost				768,500.8
Ii	Average Fixed Costs				
	Rent/Community dues				42,952
	Interest payment (13%)				39,000
	Association annual dues				5,000
	Depreciation(barrow, cutlass etc)				15,780
	Total Fixed Cost				102,739
	Total Cost (TFC + TVC)				871,232.8
	Net Returns (TR – TC)				370,767.2
	Return on Investment (NR/TC)				0.43
	Expense Structure Ratio(TFC/TVC)				0.13

Source: Field Survey Data, 2025

Productivity of Rice farmers on Communal Land System

The study ascertained productivity of rice farmers under communal land tenure system (Table 7). The average revenue per hectare of the farmers under this land tenure system was ₦316,380 while the total factor cost input was ₦241,383.2. The revenue was achieved by multiplying the average output in kilogram of paddy by the unit sales price. Also, cost of production was achieved by multiplying each factor input by its unit price to achieve total factor cost. Productivity which is the ratio of output to input was achieved by dividing output value by cost value to achieve a ratio of 1.31:1. In other words, the output outweighs the input by 0.31. The productivity of the rice farmers under communal land tenure system was high. This conforms to the study of Ben-Chendo and Joseph (2014) who noted that rice farming activities on communal land tenure system in the area is productive.

Productivity of Rice farmers under rent land tenure System

The farmer's productivity in rice production under rent land tenure system was also determined in the study. An average farmer revenue per hectare of rice under the land system was ₦352,920. The total factor input measured in naira was ₦255,421.9. This gave a ratio of 1.38:1 of output and input. The output therefore outweighs the input by 0.38 indicating that productivity of farmers under this rent system of land tenure was high.

Productivity of rice farmers under Inheritance of land tenure

The productivity of rice farmers otherwise known as technical efficiency was determined under the inheritance land tenure in this survey. An average rice farmer per hectare realized output of ₦208,420 and made factor input of ₦147,294.48. This gave a ratio of 1.41 to 1. In other words, the farmer under the inheritance land system had output which overweighs factor input by 0.41. They were therefore more productive if compared with the other land systems. The result is in consonant with the findings of Ben-Chendo & Joseph (2014) who found out that rice farming activities on individual tenure system in Imo State is productive.

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Table 7: Productivity Differences of the Land Tenure Systems

Land Tenure Systems	Average Revenue (₦)	Average Factor Cost (₦)	Ratio
Communal Land System	1,242,000	879,232.8	1:1.41
Rented Land System	1,242,000	905,280.8	1:1.37
Inheritance Land System	1,242,000	871,232.8	1:1.43

Source: Field Survey Data, 2025

IV. CONCLUSION

The study concludes that rice production in Imo State is economically viable under communal, rented, and inherited land tenure systems. However, significant differences exist in productivity and profitability across these systems. Farmers operating on inherited land achieved the highest productivity and profit levels due to lower production costs, secure land access, and greater reliance on family labour. Communal land farmers recorded moderate productivity, while rented land farmers experienced reduced profitability as a result of rental payments and tenure insecurity. These findings confirm that land tenure security is a major determinant of farmers' investment behavior, production efficiency, and income. Improving rice productivity therefore requires not only agronomic interventions but also institutional reforms that address land access and tenure security. Enhancing land tenure arrangements will contribute significantly to improved farmer welfare, sustainable rice production, and national food security.

V. RECOMMENDATIONS

The following recommendations are made based on the major findings of the study.

i. Land Tenure Security: Government should strengthen land tenure policies that protect inheritance rights and promote secure land ownership to encourage long-term farm investments.
ii. Regulation of Land Rental Markets: Rental charges should be moderated through community and local government frameworks to reduce production costs for farmers operating on rented land.
iii. Land Consolidation Programs: Policies that encourage land consolidation and cooperative farming should be promoted to reduce land fragmentation and improve economies of scale.
iv. Access to Credit: Financial institutions should design credit schemes that consider land tenure conditions, enabling both landowners and renters to access affordable loans.
v. Extension Services: Extension agents should intensify farmer training on efficient resource use, soil fertility management, and improved rice production technologies.
vi. Input Subsidy and Support: Government and development agencies should ensure timely access to quality seeds, fertilizers, and agrochemicals at subsidized rates.
vii. Community Land Governance: Traditional institutions should be strengthened to promote transparent, equitable, and conflict-free land allocation under communal systems.

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