

Research Article

Impacts of Land Tenure Insecurity and Property Rights on Agricultural Investment in Crop Cultivation: Evidence from Bakolori Irrigation Scheme, Nigeria

Hadi Aliyu ^a, Ibrahim Muhammad Shera ^a, Ibrahim Mustapha Dankani ^b

^aFederal University Birnin Kebbi, Kebbi State, Nigeria. ^bUsmanu Danfodiyo University, Sokoto State, Nigeria

ABSTRACT

Adequate investment is essential for productive agriculture, food security, and enhanced crop yields, with land tenure security serving as a critical determinant. This study examines the impacts of land tenure and property rights insecurity on crop cultivation investments at the Bakolori Irrigation Scheme, Talata Mafara. Utilizing primary data—including credit access, collateral types, investment amounts, cultivation costs, and yields for rice, maize, and wheat—alongside secondary data, the study employed frequencies, percentages, and Pearson correlation analysis to evaluate relationships among key variables. Findings reveal that farmers rely on formal, informal, or mixed income sources. However, due to land tenure insecurity, no farmers utilize their land as collateral. Correlation analysis demonstrates a strong, statistically significant positive relationship between land tenure security and investment levels ($r = 0.502$, $p = 0.000$). This indicates that higher tenure security directly increases agricultural investment, while tenure insecurity suppresses it. To boost effective crop cultivation investment, the study recommends land policy reforms that strengthen tenure security. Enhancing property rights will build farmer confidence and enable the use of farmland as collateral to secure formal credit.

ARTICLE HISTORY

Submitted 26 February 2026

Accepted 31 July 2026

Published 19 August 2026

GUEST EDITOR

A. M. Ahmed

KEYWORDS

Land tenure security;
Agricultural investment;
Bakolori Irrigation Scheme;
Crop productivity; Credit
access

1 Introduction

Land tenure refers to the legal or customary arrangements that govern access to, use of, and control over land and other natural resources. It defines the rights, responsibilities, and restrictions associated with land ownership and use, thereby determining who can use land, for how long, and under what conditions (FAO, 2003). As a social institution, land tenure shapes agricultural production, investment decisions, and the sustainable management of natural resources. Consequently, the security of land tenure has become a central issue in rural development and agricultural policy, particularly in developing countries (like Nigeria) where agriculture remains the primary source of livelihood.

Secure land tenure is widely recognized as a critical driver of agricultural investment and productivity. Earlier studies argued that secure and clearly defined property rights encourage farmers to undertake long-term investments by improving access to credit, reducing land-related conflicts, lowering transaction costs, and increasing confidence in realizing future returns from agricultural investments (Barrows & Roth, 1990; Besley, 1995; Feder & Noronha, 1987; Roth & Haase, 1998). Conversely, insecure tenure discourages investment in land improvement, limits access to formal credit because land cannot be used as collateral, and constrains the adoption of improved agricultural technologies, resulting in low productivity and unsustainable land-use practices (Bruce, 1993; Rukuni, 2000).

Recent empirical evidence reinforces these earlier

findings that secure and equitable land rights are fundamental for achieving sustainable agricultural development, poverty reduction, food security, and climate resilience (FAO, 2022). Similarly, FAO (2022) reports that secure land rights increase farmers' willingness to invest in soil conservation, irrigation infrastructure, agroforestry, and other productivity-enhancing practices while improving access to financial services. Moreover, Holden and Ghebru (2022) consistently demonstrate that tenure security promotes higher agricultural investment, improved land management, and sustainable resource use.

Against this background, this study attempts to address the following specific objectives in the study area (Bakolori Irrigation Scheme, Talata Mafara):

- To assess the farmers' access and sources of credit in the study area.
- To identify items used as collateral in the study area.
- To examine the level of investment by status of ownership and right in the study area.
- To suggest a proper land tenure policy for efficient investment in agriculture that guarantees food production to feed the present and future generation.

Findings from this study will add to the existing literature on land tenure, its effects on agricultural investment, and how they are related to agricultural food production. In addition, the findings will inform

policymakers on the existing situation and the voices of the people on the insecurity of land tenure in the study area and the necessary actions that are needed.

1.1 Literature Review

Land tenure refers to the institutional arrangements that define the rights, responsibilities, and relationships among individuals, groups, and institutions regarding the ownership, access, use, management, and transfer of land, while Land tenure security refers to the degree of confidence that land users will continue to enjoy their rights to occupy, use, inherit, lease, or transfer land without the risk of arbitrary eviction or loss of those rights. Secure tenure assures farmers that investments made in land development will generate future benefits (Adams, 2001; Eze et al., 2011). It governs how land resources are acquired, utilized, inherited, leased, or transferred under statutory or customary legal systems. Land tenure comprises the legal and customary rules that determine who can use land, for how long, under what conditions, and with what responsibilities. These rules provide the framework for land administration and influence social, economic, and environmental outcomes (Stephens, 1993; USAID, 2013; Rahman, 2004; and FAO, 2022).

Land is one of the most valuable productive assets in agriculture because it provides the foundation for crop cultivation, livestock production, irrigation development, and other livelihood activities. Consequently, the nature of land tenure arrangements significantly influences agricultural productivity, investment decisions, and rural economic development. Secure land tenure encourages farmers to invest in long-term land improvements, adopt modern agricultural technologies, improve soil fertility, and access financial services, thereby enhancing agricultural productivity and household welfare (Famoriyo, 1971; World Bank, 2023).

Land tenure systems differ across countries depending on historical, legal, cultural, and socio-economic factors. Generally, land tenure may be classified into customary, statutory, communal, leasehold, freehold, and public land tenure systems. In many developing countries, particularly in Sub-Saharan Africa, customary tenure remains the dominant form of landholding despite increasing government efforts to formalize land rights through registration and certification programmes (Fort, 2008; Deininger et al., 2009; Ismail, 2018; FAO, 2022). While customary systems often provide social legitimacy and community recognition, they may also create uncertainty where land rights are undocumented or overlap with statutory laws.

According to the World Bank (2023), secure land rights increase farmers' willingness to invest in irrigation infrastructure, soil conservation, tree planting,

mechanization, and other productivity-enhancing technologies because the expected returns from such investments are protected.

Recent studies have consistently shown that secure land tenure contributes to agricultural transformation by increasing investment, improving access to agricultural credit, facilitating land markets, and encouraging sustainable land management practices (Holden & Ghebru, 2022; FAO, 2022). Farmers with secure tenure are generally more likely to apply fertilizers, adopt improved seed varieties, invest in irrigation facilities, and implement soil and water conservation measures than farmers with insecure or uncertain land rights. Secure tenure also reduces land-related conflicts, lowers transaction costs, and strengthens incentives for efficient land use (Maxwell & Wiebe, 1988; ECA, 2003; Adams, 2001).

Conversely, insecure land tenure discourages long-term investment because farmers may fear losing their land before realizing returns on their investments. Insecurity may also limit access to formal credit since financial institutions often require legally recognized land rights as collateral. As a result, farmers operating under insecure tenure arrangements may rely on traditional farming practices, underinvest in land improvement, and experience lower agricultural productivity (United Nations Habitat, 2023).

In Nigeria, land tenure remains a complex issue due to the coexistence of statutory and customary systems. The Land Use Act of 1978 vests all land in each state in the Governor to hold in trust for the people, while customary institutions continue to regulate land allocation and inheritance in many rural communities. This dual system often creates administrative challenges, uncertainty of land rights, and conflicts over ownership and use, particularly among smallholder farmers. These challenges have important implications for agricultural investment and productivity, especially in irrigation schemes where farmers require long-term security to justify investments in irrigation infrastructure, improved technologies, and sustainable land management practices.

Agricultural investment is widely recognized as one of the major determinants of farm productivity and rural economic development. Such investments include expenditure on improved seed varieties, fertilizers, pesticides, irrigation facilities, farm machinery, land improvement, soil conservation, drainage systems, and other technologies that enhance crop production. The willingness and ability of farmers to make these investments are influenced by several factors, among which land tenure security is particularly important (Machethe et al., 2004; Tekana & Oladele, 2011). Stronger land tenure security not only eases access to land but improves land productivity and promotes investments in land (Deininger & Ayalew, 2009).

Land tenure security enhances agricultural investment by providing farmers with confidence that they will retain the rights to use and benefit from their land over a long period. Farmers who perceive their land rights as secure are more likely to invest in permanent land improvements because they expect to recover the costs of their investments through increased future production. Conversely, insecure land tenure discourages long-term investment since farmers face the risk of losing access to land before realizing the benefits of their expenditures (FAO, 2022).

Secure land rights also improve farmers' access to formal agricultural credit (Rasul et al., 2003). Financial institutions generally require acceptable collateral before granting loans, and legally recognized land rights often serve this purpose. When farmers possess documented land rights, banks and other lending institutions are more willing to provide credit for agricultural production. Access to credit enables farmers to purchase improved seeds, fertilizers, agrochemicals, irrigation equipment, machinery, and other productivity-enhancing inputs that would otherwise be unaffordable (World Bank, 2023).

In many developing countries, however, smallholder farmers continue to face difficulties accessing formal credit because their land rights are based primarily on customary tenure systems that lack formal legal documentation. Although customary tenure may provide socially recognized rights within communities, financial institutions frequently do not accept such rights as collateral. Consequently, many farmers depend on personal savings, informal lenders, cooperative societies, or family support to finance agricultural activities. These sources of finance are often insufficient to support investment in modern agricultural technologies.

Empirical evidence supports the positive relationship between land tenure security and agricultural investment. Holden and Ghebru (2022) reported that secure land rights significantly increase farmers' investment in soil conservation, irrigation infrastructure, tree planting, and other long-term improvements across several African countries. Similarly, studies reviewed by FAO (2022) indicate that land registration and certification programmes have increased farmers' confidence to invest in land development, particularly where legal rights are effectively protected and enforced. The system plays a pronounced role in shaping the manner in which economic agents make decisions in relation to land use and transfer. Abdulai et al. (2011) argued that land tenure differences influence farmers' decisions to invest in land improvement and conservation measures. It has been claimed that the indigenous land tenure systems in developing economies are insecure, therefore impeding agricultural investments, soil conservation efforts, productivity

improvement, and development of land markets (Ismail, 2018). Hence, the formalization of customary land tenure systems in developing economies has been proposed as a therapy for tenure insecurity and, hence, implied to stimulate agricultural investment and evolution of land markets (Manji, 2006).

In Nigeria, access to agricultural finance remains a major constraint to smallholder agricultural development. Despite various government initiatives, including the Anchor Borrowers' Programme, the Agricultural Credit Guarantee Scheme Fund (ACGSF), and intervention programmes of the Bank of Agriculture, many rural farmers continue to experience limited access to formal credit because of inadequate collateral, weak land documentation, and high lending requirements. These challenges are particularly pronounced among farmers cultivating land under customary tenure arrangements.

Studies conducted (Bukari & Kuusaana, 2021; Place et al., 2021; Holden and Ghebru, 2022; Edeh et al., 2022; Alemu et al., 2023; Iticha & Han, 2025) have shown that farmers with more secure land rights are generally more likely to obtain agricultural loans and adopt improved production technologies than those with insecure tenure arrangements. Secure tenure encourages investments in irrigation facilities, fertilizer application, mechanization, improved seed varieties, and soil fertility management, all of which contribute to increased agricultural productivity. Conversely, insecure tenure often leads farmers to adopt short-term production strategies with limited investment in sustainable land management practices.

The pervasive nature of land tenure is evident in the areas of the agricultural sector where it has a lot of impacts. These include productivity levels, security of tenure, shifts in income distribution, rural capital formation and stability of employment. It is a means to mitigate the many manifestations of deprivation and a significant ingredient in the achievement of food security, poverty alleviation and sustainable development, as its role in agricultural productivity cannot be underestimated. Furthermore, land tenure security and market prices of agricultural commodities are determined by governmental laws and agricultural policies, which in disguise influence farmers' profit margins and land use decisions (Ehui et al., 1994; Shimelles, 2009).

The relationship between land tenure security and agricultural investment is particularly important in irrigation farming. Irrigation agriculture requires substantial capital investment in water distribution systems, pumps, canals, drainage structures, land levelling, and regular maintenance. Farmers operating under secure tenure arrangements are more likely to undertake these investments because they expect to benefit from increased productivity over many production seasons. Where tenure insecurity exists,

farmers may be reluctant to invest in permanent infrastructure due to uncertainty regarding future access to the land.

In the Bakolori Irrigation Scheme, Talata Mafara, Zamfara State, land tenure security is particularly important because irrigation farming requires substantial investments from land preparation to harvest and other soil conservation and management measures. Farmers who perceive their land rights as secure are more likely to undertake these investments, resulting in higher crop yields and improved farm incomes. Understanding the nature of land tenure arrangements within the scheme therefore provides an important basis for assessing their influence on agricultural productivity.

Nevertheless, researchers emphasize that land tenure security alone cannot guarantee increased agricultural investment. Other factors such as farm income, education, extension services, access to markets, availability of irrigation water, institutional support, and government policies also influence farmers' investment decisions. Therefore, improving agricultural productivity requires integrated policies that strengthen land tenure security while simultaneously expanding rural credit, agricultural extension services, infrastructure development, and market access.

Overall, the literature demonstrates that secure land tenure enhances agricultural investment directly by encouraging long-term land improvements and indirectly by improving access to agricultural credit. These investments subsequently increase agricultural productivity, improve household income, and contribute to sustainable rural development. This relationship forms an important basis for examining how land tenure security affects agricultural investment among farmers in the Bakolori Irrigation Scheme, Talata Mafara, Zamfara State.

2 Materials and Methods

2.1 Study Area

The Bakolori Irrigation Scheme, with a farmer population of about 30,000.00 people, is located in present-day Zamfara State, specifically in Talata Mafara, Maradun and Bakura local government areas, between Latitude $12^{\circ}2'00''\text{N}$ and $12^{\circ}5'00''\text{N}$, and Longitude $5^{\circ}30'00''\text{E}$ and $6^{\circ}30'00''\text{E}$ (Figure 1). It is one of the first among the projects within the Sokoto Rima River Basin located at the North-west corner of Nigeria. Others include: Goronyo Dam Project, Zauro-Binin Kebbi Polder Project, Niger River Valley Project, Gagare and Bunsuru River Basin Projects, Karaduwa River Basin Development Project and Katsina Water Resources Development Project. The Dam was commissioned in 1975, with a water storage capacity of about 450 million cubic meters. The project comprises a storage dam on the Sokoto River, irrigation and

drainage canals, flood protection dikes, pumping stations for sprinkler irrigation, hydro and diesel power stations, transmission lines, road network, residential and service centers (Figure 2). The reservoir covers 8000 hectares and extends some 119 km upstream from the dam. A fifteen-kilometer (15km) supply canal carries water from the dam downstream of the irrigation area, where the water is distributed several hundred kilometers through secondary and tertiary canals (Muhammad, 2002).

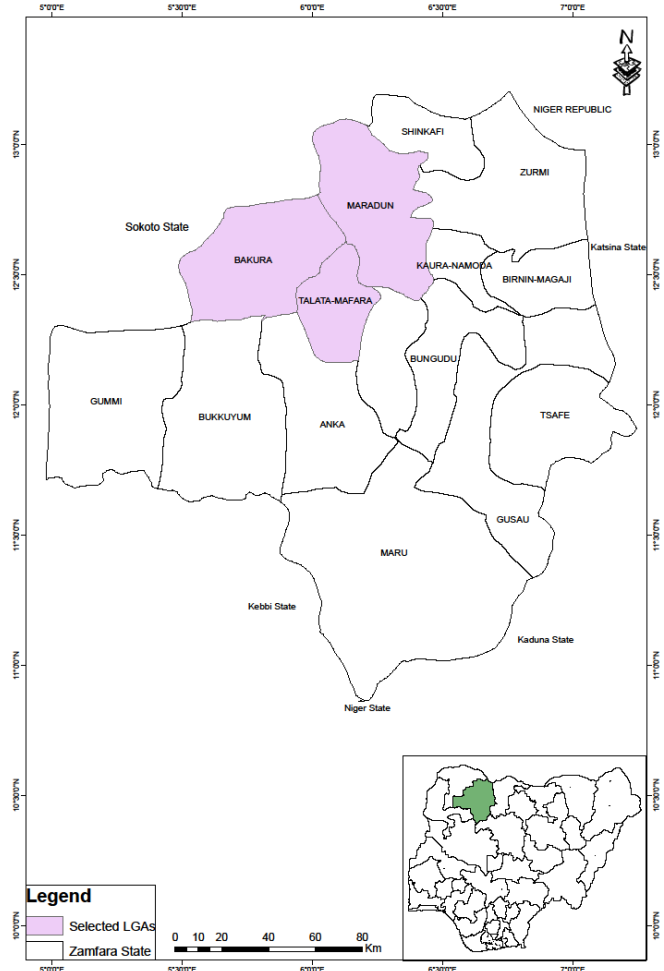


Figure 1: Locational Map of the Study Area

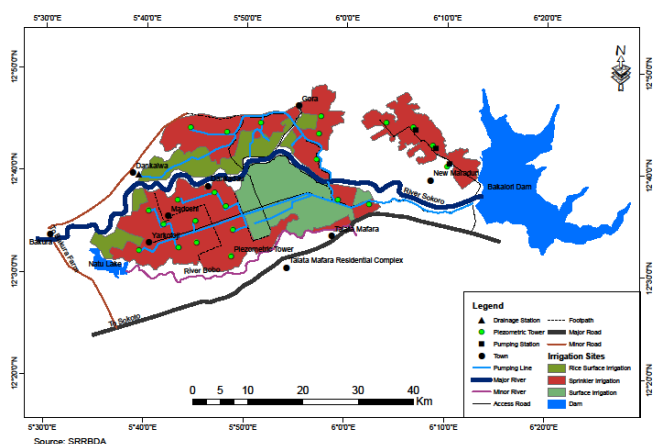


Figure 2: Bakolori Irrigation Scheme

2.2 Research Methodology

To achieve the objectives of the study, both Secondary and Primary data were collected to determine the effect of land tenure, property rights, and changes in agricultural practices on agricultural productivity in the study area.

Secondary data: Secondary data include documents from Sokoto Rima River Basin Development Authority (SRRBDA) and offices of some traditional rulers, which include: farmer's population, land coverage in each sector, etc.

Primary data: Both qualitative (face-to-face) and quantitative (questionnaire) primary data were collected. This was done through the administration of a structured questionnaire to farmers and face-to-face interviews with some key informants with a view to examining the impacts of insecurity on the land tenure system and property rights on investment level in the study area.

2.3 Sampling

A sample size of 380 respondents was drawn from a total farmer population of 30,000 using Krejcie and Morgan (1970), based on a 5 percent margin of error and 95 percent confidence level. Within the sectors, the land coverage was used in determining the number of respondents in each sector, i.e., Bakura (BKA) has 217, Talata Mafara (TMA) has 152, while Maradun (MRD) has 11 respondents.

The formula used by Krejcie and Morgan (1970) for the calculation of the sample size is as follows:

$$S = \frac{\chi^2 NP(1 - P)}{d^2(N - 1) + \chi^2 P(1 - P)}$$

S = required sample size

χ^2 = the table value of chi-square for one degree of freedom at the desired confidence level

N = the population size

P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size)

d = the degree of accuracy expressed as a proportion (0.05).

Moreover, for this study, probability sampling techniques were employed. Stratified and systematic random sampling were adopted as the sampling techniques for the structured interview. Therefore, the study area was stratified into three (3) sectors: Bakura, Talata Mafara and Maradun, and each stratum (consisting of an intake (s)) was divided into clusters. In each cluster (made up of many Units) - one (1) unit is equivalent to 20 hectares, one (1) respondent was selected and interviewed.

2.4 Data presentation and Analysis

Data were presented in tables using frequencies and percentages, and analysed using correlation techniques to determine the level of relationship between the variables. Correlation analysis is an appropriate statistical technique for this study because it measures the degree of association between two or more variables. It enables the researcher to examine whether land tenure insecurity and property rights are related to the level of agricultural investment in crop cultivation. Hence, the independent variables—land tenure insecurity and property rights—can be correlated with the dependent variable—agricultural investment—to determine whether changes in land tenure conditions are associated with changes in farmers' investment decisions. It also helps test the study's hypotheses by determining whether the observed relationships are statistically significant, which provides empirical evidence to support or reject the hypotheses.

2.5 Ethical Considerations of the Study

This study adhered to established ethical principles throughout the research process to ensure the rights, dignity, and privacy of all participants were protected. Confidentiality and anonymity were strictly maintained by ensuring that respondents' names and other personal identifiers were not recorded or disclosed in any report arising from the study. The researcher also ensured that no respondent was subjected to physical, psychological, social, or economic harm during the study.

2.6 Limitations of the Study

This study has several limitations that should be considered when interpreting its findings. First, the study was limited to farmers within the Bakolori Irrigation Scheme.

Secondly, the study relied largely on primary data collected through questionnaires and interviews. As a result, the findings depended on the honesty, understanding, and willingness of respondents to provide accurate information, which may have introduced response bias.

Thirdly, financial and time constraints limited the sample size and the duration of fieldwork, making it difficult to cover all farming settlements within the irrigation scheme.

Fourthly, the study focused specifically on the relationship between land tenure insecurity, property rights, and agricultural investment in crop cultivation. Other factors that may influence agricultural investment, such as climate variability, market access, government support, input prices, and access to extension services, were not examined in detail.

3 Results

3.1 Access to credit

Table 1 shows that 72% of farmers in the scheme had access to credit facilities as a source of capital for their farming activities. Only 28% had no access to credit. This could be attributed to the lack of interest by those in this group, based on their cultural and religious perspectives, or because they can finance their farming activities through their own sources of income, or because the sizes of their farms were small, or rather they do not have any collateral to tender for that purpose, as depicted during

the in-depth interview with farmers in the scheme. This is among the reasons for their low investments in the Scheme, because even those that have access to credit are mostly from informal sources, which may be very insufficient for a large investment in the scheme, because formal sources have the least respondents in the study, as presented in Table 2. The findings of the study agree with those of Abdulai (2008) and Hagos (2012), in their respective studies in Ghana and Mozambique, which showed that access to credit positively influenced crop productivity and long-term land investment.

Table 1: Access to Credit

Access to Credit	TMA	Percent	BKA	Percent	MRD	Percent	TOTAL	Percent
Yes	110	72	157	72	8	72	275	72
No	42	28	60	28	3	28	108	28
Total	152	100	217	100	11	100	380	100

3.2 Sources of credit

Table 2 shows the frequency of respondents in the scheme about their sources of credit. Formal sources have the least respondents, with only 8%, followed by those whose sources are from both formal (such as Agricultural Development Bank, Anchor borrowers, Rifan program, etc.) and informal (i.e., combination) with a total of 15% of respondents in the scheme. The highest group of respondents is those with informal sources (77%). The major sources of informal credit by the respondents include, among others, family members, neighbors, and some well-to-do people in their communities, as detailed during the interview. Across the sectors (Bakura, Talata Mafara and Maradun), informal sources also had the highest percentages of respondents: 77%, 77% and 75% respectively.

The informal type of credit could either be offered monetarily or in the form of farm inputs, which at the end is repaid in the same manner as well, i.e. When paying, it sometimes came with gains, as was established during the Focus Group Discussion (FGD) by Mal Suleman Rini, in Bakura sector. The debtor (beneficiary) gives a quantity of the cultivated crops to the creditor during harvest (as

agreed or intended). This is to maintain a good relationship for favourable consideration at the next cropping season. Moreover, lack of access to formal credit facilities in the study area was also revealed to be caused by the non-extension of the available credit facilities to people in the remote area, making it very difficult for access by farmers in such locations. Hence, small-holder farmers suffer from lack of access to formal credit despite its positive contribution to agricultural productivity. The findings of this study agree with those of Peacock et al. (2004) and Salami et al. (2010), who opined that access to credit can significantly increase the ability of poor households with no or little savings to acquire needed agricultural inputs to invest in future production, expand farming, or diversify into producing new crops. Small-scale farmers cited lack of capital and access to affordable credit as the main factor behind their low productivity in agriculture. Programs like Anchor Borrowers, etc., have made a positive contribution to the farmers in the scheme in its early days, but presently, it gives more concentration to large-scale farmers (as confirmed by different farmers during an interview), which is not the aim of the program.

Table 2: Sources of Credit

Sources	TMA	Percent	BKA	Percent	MRD	Percent	TOTAL	Percent
Formal	9	8	13	8	1	12.5	23	8
Informal	85	77	121	77	6	7.5	212	77
Combination	16	15	23	15	1	12.5	40	15
Total	110	100	157	100	8	100	275	100

Moreover, it was also revealed from the interview conducted that due to a lack of collateral and/or credit profile, most small farmers are denied credit facilities not only by commercial and national development banks, but also by formal micro-credit institutions, and this is in agreement with the findings of Curtis and Adama (2013).

According to Khan et al. (2024), credit is important in transforming traditional agriculture by enabling the purchase of inputs and farm equipment and the adoption of new technologies. Kibaara (2006) also indicated that agricultural credit is vital for smallholder farmers to produce marketable surplus and enhances economic

growth by improving the profitability of farming enterprises. Oravee (2015) reported that late receipt of funds and low operating costs substantially impact most irrigation programs. All these assertions and studies describe how access to credit or otherwise affects productivity in agriculture, which is akin to the present situation in the study area.

3.3 Items used as collateral

Efficient utilization of agricultural land as an input for economic growth requires considerable resources and an appropriate institutional setup and legal backup. Lack of land tenure security deters investment in the land by individual farmers who cannot use the land to raise capital and who may be afraid to lease irrigated land (Merrey et al., 2002). Table 3 reveals that 63 (23+40= 63) respondents (17%) out of 380 respondents access credit from formal financial sources (out of which 37% of the respondents are for formal sources while 63% source their funds from a combination of formal and informal financial sources). Accessing credit through the formal

sources always requires collateral for the loan to be granted. Among the different collateral items tendered by farmers for the grant of capital in the study area as indicated in Table 3, 44% of the respondents use their Houses, 39% tender their plots of land, while 17% use other items like Business sites as collateral. No respondent uses his farm land as collateral to access credit. The main reasons for this were the lack of C of O to tender by the farmers, attesting to a high level of insecurity of land tenure and property rights in the scheme. This reveals a strong setback for effective investment in the scheme, which in turn affects the level of productivity as well. Besides, as gathered during FGD, some farmers (creditees) do tender their items as collateral even in informal sources to the creditors as agreed. However, this practice is not for all farmers or local creditors, and is mostly done in the form of verbal agreements between the two parties, but it requires witnesses for attestation and confirmation for any breach of contract between the two parties.

Table 3: Items Used as Collateral

Collateral Items	TMA	Percent	BKA	Percent	MRD	Percent	TOTAL	Percent
A House	12	48	14	42	1	33	27	43
A Farmland	0	0	0	0	0	0	0	0
A Plot of Land	9	36	16	44	0	0	25	40
Others	4	16	5	14	2	67	11	17
TOTAL	25	100	35	100	3	100	63	100

3.4 Level of investment by status of ownership and right

The results presented in Table 4 show the distribution of capital investment among farmers operating under

different land tenure and property rights arrangements within the irrigation scheme.

Table 4: Level of Investment by Status of Ownership and Right

Level of Investment (N)	Statutory Land Tenure	Percent	Customary Land Tenure	Percent	Statutory Right	Percent	Customary Right	Percent	Total	Percent
100,000 – 250,000	0	0	29	17	3	13	36	20	68	34
251,000 -500, 000	0	0	57	33	10	42	62	34	129	24
501, 000 – 750,000	0	0	38	22	7	29	47	25	92	17
751,000 – 1,000,000	0	0	20	11	1	4	23	13	44	12
1,001,000 – 1,250,000	0	0	13	7	2	8	9	5	24	8
1,251,000 – Above	0	0	17	10	1	4	5	3	23	5
Total	0	0	174	100	24	100	182	100	380	100

The findings indicate that 34% of the respondents invested between ₦100,000.00 and ₦250,000.00, representing the largest proportion of the sampled farmers. This was followed by 24% of respondents who invested between ₦251,000.00 and ₦500,000.00, while 17% invested between ₦501,000.00 and ₦750,000.00. Furthermore, 12% of the respondents invested between ₦751,000.00 and ₦1,000,000.00, whereas only 8% invested

between ₦1,001,000.00 and ₦1,250,000.00. The least proportion (5%) comprised farmers whose capital investment exceeded ₦1,251,000.00. Overall, the results suggest that the majority of farmers operate with relatively low levels of capital investment, reflecting the limited financial commitment to agricultural production within the scheme.

A comparison of investment levels across the various

land tenure and property rights categories further reveals that the largest proportion of respondents within each tenure group invested between ₦251,000.00 and ₦500,000.00, accounting for 33%, 34%, and 42% of respondents, respectively. This pattern indicates that investment levels remain modest regardless of the tenure arrangement under which farmers operate. Such levels of investment are inadequate to support sustainable agricultural intensification, mechanization, or the adoption of improved production technologies required for enhanced productivity.

The relatively low level of investment can largely be explained by the prevailing land tenure conditions within the study area. Evidence from the survey indicates that farmers attributed their low investment capacity to two major factors. First, farmers operating under customary land tenure are confronted with persistent land fragmentation arising from inheritance practices. The continuous subdivision of family land has substantially reduced the size of cultivable holdings available to individual farmers, thereby limiting the economic viability of investing in long-term agricultural improvements. Under such circumstances, farmers are less inclined to commit substantial financial resources to land development because the expected returns are constrained by the small size of their holdings.

Second, farmers holding customary or statutory land-use rights within the irrigation scheme expressed concerns regarding tenure insecurity, particularly the fear of eviction and the limited duration of land-use rights. These conditions discourage long-term investment because farmers are uncertain whether they will retain access to the land long enough to recover the benefits of their investments. Consequently, they tend to focus on short-term production strategies rather than undertaking permanent land improvements or adopting capital-intensive technologies.

The findings further suggest that tenure insecurity extends beyond the risk of eviction alone. Insecure land rights also reduce farmers' access to institutional credit, agricultural support services, extension programmes, and other productive resources. Financial institutions are generally reluctant to extend credit to farmers who cannot provide secure land rights as collateral, thereby limiting their capacity to finance agricultural investments. At the same time, insecure tenure increases farmers' vulnerability to economic and environmental risks, further discouraging long-term investment decisions. These challenges are compounded by customary land tenure practices that continue to restrict access to larger landholdings through repeated fragmentation associated with inheritance. As a result, even farmers with the financial capacity to invest remain reluctant to undertake substantial capital improvements because of uncertainty

regarding future ownership and control of the land.

These findings reinforce the argument that land tenure and property rights should not be viewed solely as legal arrangements but as complex social institutions shaped by historical, cultural, political, and institutional processes. Land tenure determines not only who has access to land but also the nature, duration, and security of the rights associated with its use. While some farmers enjoy a complete bundle of property rights—including rights to use, transfer, lease, inherit, and make long-term improvements—others possess only limited or temporary rights. The degree to which these rights are recognized and protected by both formal institutions and customary authorities significantly influences farmers' investment decisions and land-use practices. Where tenure security is weak, farmers are less willing to invest in activities whose benefits accrue over an extended period.

It can therefore be inferred that secure land tenure constitutes a fundamental incentive for agricultural investment within the study area. Security of tenure enhances farmers' confidence that they will enjoy the future benefits arising from investments in land improvement, irrigation infrastructure, soil conservation, and the adoption of improved agricultural technologies. It also strengthens their ability to obtain formal credit, thereby increasing their capacity to finance productive investments. Conversely, insecure tenure reduces farmers' willingness to invest, resulting in lower levels of land improvement, limited use of modern agricultural inputs, and reduced productivity per unit of land. These findings highlight the central role of tenure security in promoting agricultural development and improving rural livelihoods.

The findings of this study are consistent with the broader body of empirical literature on land tenure security and agricultural investment. Hayes et al. (1997), in their study conducted in Thailand, found that secure land rights significantly increased farmers' incentives to invest in land improvement and agricultural production. Similarly, Holden et al. (2009) demonstrated that low-cost land certification programmes in Costa Rica improved tenure security and stimulated greater agricultural investment and productivity. Likewise, Holden et al. (2014) and Kamusiime et al. (2005) reported that land tenure reforms and efficient land markets enhanced agricultural intensification and productivity under conditions of increasing population pressure in Burkina Faso. More recently, Ali et al. (2017), Keovilignavong et al. (2019), and Higgins et al. (2018) similarly concluded that strengthened land tenure security promotes sustainable land management, increases investment incentives, and improves agricultural productivity. The consistency between these studies and the present findings provides further empirical support for the argument that secure

land tenure is a critical prerequisite for agricultural investment.

Table 5: Pearson Correlation Analysis on the Relationship between Level of security of Land Tenure and Property Right and Investment Level in the Study area

Variables	Statistics	Tenure Security & Property Rights	Investment Level
Tenure Security & Property Rights	Pearson Correlation	1	0.502**
	Sig. (2-tailed)	—	0
	N	380	380
Investment Level	Pearson Correlation	0.502**	1
	Sig. (2-tailed)	0	—
	N	380	380

Correlation analysis was used to further determine if a relationship exists between the Level of security of land tenure and property rights, as well as investment in the study area. The findings shown in Table 5 reveal that there exists a moderate and positive relationship of 0.502 at a 0.01 significance level when compared with a p-value of 0.000, meaning the more the security, the more the investment and vice versa, i.e., a 50% increase in security will lead to a 50% increase in investment. From the above, therefore, a relationship exists between the level of security of land tenure systems and property rights and investment level in the study area. This finding is in agreement with the studies of Dabara et al. (2019); Holden et al. (2016); Higgins et al. (2018) and Fabiyi (2009), which show similar results. The implication of this result, especially in developing countries like Nigeria, is that for better agricultural productivity, farmers need to have secured land tenures, as this encourages investments in the secured land, which consequently translates to improved agricultural productivity. In other words, the effects of secured ownership on both the availability of credit and investment incentives imply that farmers without secure ownership will have lower investments and land improvements, and lower use of variable inputs, and productivity per unit of land.

4 Conclusion

This study examined the impact of land tenure insecurity and property rights on agricultural investment in crop

cultivation in the Bakolori Irrigation Scheme, Nigeria. The findings indicate that the security of land tenure and property rights plays a significant role in influencing the level of agricultural investment undertaken by farmers. Secure land tenure not only encourages farmers to invest in long-term agricultural improvements but also enhances their access to formal credit facilities by enabling them to use land as collateral. In addition, the study reveals variations in investment levels across different forms of landholding, largely due to differences in the degree of tenure security associated with each tenure arrangement.

Overall, the study concludes that the level of agricultural investment in crop cultivation is significantly influenced by the degree of land tenure security enjoyed by farmers. Farmers with more secure and clearly defined property rights are more likely to invest in productivity-enhancing technologies, improved farm inputs, irrigation infrastructure, and sustainable land management practices than those operating under insecure tenure arrangements. Consequently, the study recommends the strengthening of land tenure security and property rights through appropriate land policy reforms, improved land administration systems, and institutional support. Such measures will enhance farmers' confidence to invest, improve access to agricultural finance, increase crop productivity, and promote sustainable agricultural development within the Bakolori Irrigation Scheme and similar irrigation schemes in Nigeria.

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