JOURNAL OF BUSINESS MANAGEMENT & INNOVATION
www.jbmij.org
JBMI Insight

Land Titling Attributes and Strategic Credit Access among Smallholder Farmers in Migori County, Kenya

[*1]Clifford Okello Yogo, [2]Charles Mwirigi, PhD & [3]Rose Litunya, PhD

School of Business Studies and Economics, Zetech University, Kenya

*E-mail of corresponding author: **yogoclifford@zetech.ac.ke**

Publication Date: October 2026

Abstract

Land titling reforms in Kenya have not translated uniformly into formal credit for smallholder farmers, which raises the question of which attributes of a land title lenders actually reward. This study examined the influence of security of tenure, collateral value, formalization of title and transferability on strategic credit access, defined as obtaining a loan from a regulated formal lender, among smallholder farmers in Migori County, Kenya, and tested whether financial literacy moderates these relationships. It drew on the Resource-Based View, Institutional Theory, Property Rights Theory and Financial Inclusion Theory. A convergent parallel mixed-methods design was used. A stratified sample of 140 farmers was drawn from 215 registered smallholders in three sub-counties, and 120 completed questionnaires were analyzed (response rate 86%); twelve key informants from financial institutions, land administration offices and extension services were also interviewed. Binary logistic regression and thematic analysis were applied. Transferability (OR = 3.140, p = .002) and security of tenure (OR = 2.310, p = .001) were significant predictors of formal credit access, whereas collateral value and formalization of title were not. Financial literacy moderated only the security of tenure relationship (OR = 1.790, p = .006). Interviews attributed the weak effect of title possession to registry delays, consent requirements and thin land markets. Holding a title does not by itself secure credit. Policy should combine registry digitization, faster clearance of encumbrances, alternative collateral products and financial literacy training.

Keywords: *Land titling attributes; strategic credit access; financial literacy; smallholder farmers; Migori County*

1.1 Introduction

Access to credit allows smallholder farmers to invest in improved inputs, expand production and build sustainable livelihoods. Governments across Sub-Saharan Africa have therefore invested heavily in land titling reforms, on the premise that documented property rights strengthen investment incentives, reduce tenure uncertainty and allow land to serve as collateral in formal lending markets (De Soto, 2000; World Bank, 2020). The evidence that titling delivers this outcome is mixed. Studies of titling programs have found that their effects on

credit are limited and depend on the efficiency of land administration and the practices of lenders (Deininger & Feder, 2009; Galiani & Schargrodsky, 2010).

Kenya illustrates the problem. Smallholders produce more than 70% of agricultural output, yet only about 8.5% access credit from formal institutions while over 65% rely on informal sources (Kenya National Bureau of Statistics [KNBS], 2021). The Land Registration Act (Government of Kenya, 2012) harmonized land laws and was intended to make title deeds credible collateral. In Migori County, which is predominantly rural and depends on maize, sugarcane, horticulture and livestock, fewer than 12% of farmers are reported to access formal credit (KNBS, 2021). Many farmers hold land under customary or semi-formal tenure, and even titled farmers report low approval rates because of strict collateral requirements, boundary conflicts and unclear ownership.

Two weaknesses limit what is known. First, most studies treat land titling as a single intervention, so they cannot show which attribute of a title lenders actually reward. Second, most rely on national or cross-country data that conceal the land-market and institutional variation that determines whether a title works as usable collateral. Little is therefore known about how security of tenure, collateral value, formalization of title and transferability individually influence formal credit access at county level, or whether borrowers' financial literacy changes the strength of these effects. This study addresses that gap from a strategic management perspective, which treats land as a resource whose value depends on how it can be used (Barney, 1991).

1.2 Objectives of the Study

The general objective was to examine the influence of land titling attributes on strategic credit access among smallholder farmers in Migori County. The specific objectives were to establish the effects of (i) security of tenure, (ii) collateral value, (iii) formalization of title and (iv) transferability on strategic credit access, and (v) to examine the moderating role of financial literacy in these relationships. Strategic credit access is defined as obtaining credit from a regulated formal lender (a commercial bank, microfinance institution or savings and credit cooperative) by using land as a resource. One research question corresponded to each objective.

2.1 Theoretical Framework

Four theories jointly guide the study. The Resource-Based View holds that sustained advantage comes from resources that are valuable, rare, inimitable and non-substitutable (Barney, 1991). Applied here, a land title is strategic only if the lender can use it as well as the farmer. Property Rights Theory explains the mechanism: clearly defined and enforceable rights raise investment incentives, reduce tenure uncertainty and let assets serve as loan security (Demsetz, 1967; De Soto, 2000). Institutional Theory adds that the effect of formal rules depends on the efficiency, transparency and reliability of the institutions that administer them (Glaeser et al., 2004); registry delays, unreliable records and weak enforcement can erode lenders' trust in a title. Financial Inclusion Theory frames credit access as an outcome shaped by asset endowments, institutional quality and borrower capability (World Bank, 2017), which positions financial literacy as a condition that may strengthen or weaken the link between land rights and credit.

Together, the theories imply that credit access depends on the quality of the land titling attributes, is conditioned by the institutional environment and is moderated by the farmer's financial literacy. They also imply that the four attributes should be examined separately, because each operates through a different mechanism.

2.2 Empirical Review

2.2.1 Security of Tenure

Security of tenure is the extent to which landholders' rights are legally recognized, protected from competing claims and enforceable (FAO, 2019). Evidence on its link to credit is generally positive but varies by context. In Thailand, Feder et al. (1988) found that titled farmers obtained institutional credit more readily than untitled farmers. In Uganda, Mwanga et al. (2017) reported a positive association between tenure security and formal loan access, and in Kenya Mbudzya, Gido and Owuor (2022), using title possession as a proxy for tenure security, found a positive effect on access to formal credit. Other studies are less favorable. Place and Migot-Adholla (1998) found little evidence that registration improved credit access in Nyeri and Kakamega. The quasi-experimental studies of urban titling are also cautionary: in Peru, titling raised loan approval at the public-sector lender by roughly 9 to 12 percentage points but had no effect on approval by private lenders (Field & Torero, 2008), and in Argentina titling raised housing investment but had only modest effects on credit (Galiani & Schargrodsky, 2010). The divergence reflects differences in setting (urban or rural), comparison and period. It suggests that possessing a title is neither necessary nor sufficient for credit, and that the attributes behind a title should be separated.

2.2.2 Collateral Value

Collateral value refers to the market worth of land, the ease of liquidating it and lenders' willingness to accept it. It is distinct from ownership: titled land can attract little collateral value where markets are thin, parcels are remote or lenders cannot value rural land reliably. Deininger, Savastano and Xia (2017) show that the potential of African land markets is often constrained by insecure rights, weak registries and restrictive policies, so the financial usefulness of land does not follow automatically from title. In South Africa, lenders appraise agricultural land mainly through market value and income capitalization, and the finance extended depends on the adjustments they apply (Middelberg, 2014). Where valuation is inconsistent and transactions are few, as in rural semi-subsistence economies, collateral value is likely to limit credit even for registered land.

2.2.3 Formalization of Title

Formalization of title is the administrative process by which land rights are recorded, certified and entered in the registry, ending in a legally enforceable title deed (Government of Kenya, 2012). De Soto (2000) argues that formal titles unlock "dead capital" by letting owners convert land into financial instruments. A review of formalization programs in Sub-Saharan Africa concluded that credit effects are positive but highly sensitive to the efficiency of land administration (Deininger & Feder, 2009). Meinzen-Dick and Mwangi (2009) caution that individual titling can override overlapping customary claims held by women, youth and secondary users, creating new disputes that weaken lender confidence. A common limitation is that formalization is measured as present or absent, which ignores the accuracy, currency and accessibility of the record.

2.2.4 Transferability

Transferability is the legal freedom to sell, lease, mortgage or otherwise convey land without legal, customary or institutional restriction (FAO, 2022). It matters to lenders because a collateral claim can be enforced only if the land can be transferred on default. Deininger and Feder (2009) point to restrictions arising from customary tenure, inheritance rules and communal ownership as a constraint on rural credit, and Byamugisha and Dubosse (2023) find that the benefit of registration depends on whether certificates confer transfer and mortgage

rights rather than merely recording occupation. In Kenya the Land Registration Act (Government of Kenya, 2012) allows registered land to be mortgaged, leased or transferred subject to spousal consent and other requirements, yet inheritance disputes, joint ownership and customary norms often restrict transfer in practice. Few studies measure transferability directly; most use proxies such as ownership type.

2.2.5 Financial Literacy as a Moderator

Financial literacy, the ability to compare loan products, interpret interest rates and repayment terms and judge whether one's documentation meets lender requirements, can determine whether a farmer converts an asset into a loan. It is associated with greater participation in formal financial markets (Lusardi & Mitchell, 2014; OECD, 2016), and evidence from Uganda links financial literacy and lending terms to formal credit accessibility (Nkundabanyanga et al., 2014). Most studies, however, treat financial literacy as a direct predictor of credit and not as a moderator of the effect of specific land attributes, and none of those reviewed tests this among smallholders in Migori County.

3.1 Research Methodology

3.2 Research Design

The study used a convergent parallel mixed-methods design (Creswell, 2014). The quantitative strand tested relationships between the land titling attributes and a binary credit outcome using a cross-sectional survey. The qualitative strand used key informant interviews to explain institutional processes and lender practices. The two strands were collected at the same time and analyzed separately, and were brought together at the interpretation stage.

3.3 Population, Sample and Sampling Procedure

The target population was 215 registered smallholder farmers in Awendo, Rongo and Uriri sub-counties of Migori County, taken from the Farmer Registration Report of the county Department of Agriculture (Migori County Department of Agriculture, 2025) and cross-checked against cooperative society membership lists and land registry records. These sub-counties were selected because smallholder farming is dominant, land registration is ongoing and both titled and untitled holdings occur.

The sample size was calculated with Yamane's (1967) formula at a 5% error margin: $n = 215 / (1 + 215 \times 0.05^2) = 139.8$, rounded to 140. The population was stratified by sub-county and by tenure status (titled or untitled). Respondents were allocated proportionately across sub-counties and equally between tenure groups so that both groups could be compared, and were selected by simple random sampling with computer-generated random numbers within each stratum (Table 1). Because the tenure split was a design choice, the sample does not mirror the tenure mix of the wider population. Twelve key informants were selected purposively: four officers of financial institutions (two commercial banks and two microfinance branches), five land administration officials and three agricultural extension officers.

Table 1: Sample Distribution of Respondents

Sub-county	Titled farmers	Untitled farmers	Total
Awendo	24	24	48
Rongo	24	24	48
Uriri	22	22	44
Total	**70**	**70**	**140**

Source: Migori County Department of Agriculture (2025) and field data (2026).

3.4 Data Collection

Primary data were collected with a structured questionnaire administered face to face and a semi-structured interview guide. The questionnaire had seven sections: respondent characteristics, and one section each for security of tenure, collateral value, formalization of title, transferability, financial literacy and strategic credit access. Each variable was measured with five indicators (Table 2). Security of tenure, collateral value, transferability and financial literacy were rated on 5-point Likert scales (1 = strongly disagree, 5 = strongly agree) and combined into composite scores. Formalization of title combined a binary indicator of formal registration status with Likert items on the quality of documentation. Strategic credit access was coded 1 if the farmer had applied to a formal lender and the most recent application was approved, and 0 if the farmer had never applied or had been declined. The amount, source and terms of credit were collected to describe the outcome but were not modeled. The interview guide explored lending criteria, collateral evaluation, institutional challenges and views on titling reforms. Secondary data from official registers and statistical reports supplied the sampling frame and the benchmarks used for context; no secondary figure entered the regression model.

Table 2: Operationalization of Variables

Variable	Indicators	Measurement scale
Security of tenure	Legal recognition of land rights; protection from eviction or expropriation; confidence in tenure permanence; government certification status; frequency of land disputes	5-point Likert
Collateral value	Estimated market value of land; lender acceptance of land as collateral; marketability and liquidity; consistency of valuation; location premium	5-point Likert
Formalization of title	Formal registration status (title deed held); accuracy and currency of title records; ease of accessing the land registry; digital or physical availability of title; update history of documentation	Binary (status); 5-point Likert (quality)
Transferability	Legal right to sell or transfer; right to mortgage land; absence of customary or legal transfer restrictions; spousal or co-owner consent clarity; perceived ease of executing a transfer	5-point Likert
Financial literacy	Awareness of credit products; understanding of interest rates and loan terms; ability to evaluate repayment obligations; knowledge of collateral requirements; prior experience with formal financial services	5-point Likert
Strategic credit access	Applied for formal credit; application approved; amount of credit (KES); source of credit; satisfaction with lending terms	Binary (applied, approved); continuous (amount); Likert (satisfaction)

Source: Authors' questionnaire (2026)

3.5 Pilot Test, Validity and Reliability

The questionnaire was pilot-tested with 14 respondents from Suna East Sub-county, which has similar agricultural characteristics but was excluded from the main sample. Ambiguous items were reworded, and two items with corrected item-total correlations below .30 were revised. Content validity was assessed through expert review of the draft instrument, and construct validity through alignment of each section with indicators grounded in the guiding theories. Internal consistency was assessed with Cronbach's alpha, and every scale exceeded the .70 threshold (Nunnally, 1978; Table 3). For the interviews, two independent coders coded the transcripts and agreement was substantial (Cohen's $\kappa = .76$; Cohen, 1960; Landis & Koch, 1977).

Table 3: Cronbach's Alpha Reliability Coefficients from the Pilot Study

Variable	Items	Alpha (α)	Interpretation
Security of tenure	6	.831	Good
Collateral value	6	.812	Good
Formalization of title	5	.847	Good
Transferability	5	.823	Good
Financial literacy	6	.804	Good
Strategic credit access	**4**	**.786**	**Acceptable**

Source: Field data (2026).

3.6 Data Analysis

Quantitative data were analyzed with SPSS. Descriptive statistics (frequencies, means and standard deviations) summarized respondent characteristics and constructs, and a Pearson correlation matrix examined bivariate relationships and screened for multicollinearity ($r > .80$ indicating concern). Because strategic credit access is binary, binary logistic regression was used (Hosmer & Lemeshow, 2000). Model 1 (Equation 1) contains only the four attributes and addresses objectives one to four. Model 2 (Equation 2) adds financial literacy and four attribute-by-literacy interaction terms and addresses objective five.

$$\ln[P/(1-P)] = \beta_0 + \beta_1 ST + \beta_2 CV + \beta_3 FT + \beta_4 TR + \varepsilon \quad (1)$$

$$\ln[P/(1-P)] = \beta_0 + \beta_1 ST + \beta_2 CV + \beta_3 FT + \beta_4 TR + \beta_5 FL + \beta_6 (ST \times FL) + \beta_7 (CV \times FL) + \beta_8 (FT \times FL) + \beta_9 (TR \times FL) + \varepsilon \quad (2)$$

Where P is the probability that a farmer accessed formal credit; ST, CV, FT, TR and FL are the composite scores for security of tenure, collateral value, formalization of title, transferability and financial literacy; β_0 is the constant; and ε is the error term. Financial literacy was treated as a moderator of an attribute's effect where the corresponding interaction coefficient (β_6 to β_9) was significant at the 5% level. Model quality was assessed with the omnibus chi-square test, the Hosmer–Lemeshow test, Nagelkerke R^2 and the classification table; a Nagelkerke R^2 above .40 and classification above 70% were treated as strong and acceptable, respectively. The estimates reported below are those of Model 2. Because Model 2 contains interaction terms, the coefficients of the four attributes are conditional effects, that is, effects when financial literacy equals zero, and not average effects. Interview transcripts were analyzed thematically following Braun and Clarke (2006).

3.7 Ethical Considerations

The study was licensed by the National Commission for Science, Technology and Innovation (NACOSTI) and authorized by county authorities. Participants gave written informed consent after being told that participation was voluntary and that they could withdraw at any time. No names or identification numbers were recorded, only aggregate results are reported, and questionnaires and electronic data were stored securely and are retained for five years.

4.1 Results

Of 140 questionnaires administered, 120 were returned fully completed, a response rate of 86%, which exceeds the 70% level considered adequate (Mugenda & Mugenda, 2003). Table 4 shows that most respondents were male (60.0%), aged 41–50 years (34.2%), had secondary education (37.5%) and farmed 1 to 3 acres (56.7%), which confirms that the sample consisted of small-scale farmers.

Table 4: Demographic Profile of Respondents

Characteristic	Frequency	Percentage
Gender		
Male	72	60.0
Female	48	40.0
Age (years)		
30 and below	16	13.3
31–40	36	30.0
41–50	41	34.2
Above 50	27	22.5
Education level		
No formal education	12	10.0
Primary	42	35.0
Secondary	45	37.5
Tertiary/university	21	17.5
Land size (acres)		
Below 1	18	15.0
1–3	68	56.7
4–6	24	20.0
Above 6	10	8.3

Source: Field data (2026).

4.2 Descriptive Statistics and Correlations

Table 5 reports the composite scores. Security of tenure (M = 4.12, SD = 0.68) and formalization of title (M = 4.35, SD = 0.51) were rated high, whereas collateral value (M = 2.85, SD = 1.15) and transferability (M = 2.45, SD = 1.22) were rated low. Financial literacy was moderate to high (M = 3.76, SD = 0.89). In total, 43% of respondents had accessed formal credit. This is far above the 8.5% national rate (KNBS, 2021), most likely because the sampling frame consisted of registered, cooperative-affiliated farmers who have more contact with lenders. The figure should therefore be read as the rate among registered smallholders in the three sub-counties and not as a county-wide estimate.

Table 5: Descriptive Statistics of Core Constructs

Construct	N	Min.	Max.	M	SD
Security of tenure	120	1	5	4.12	0.68
Collateral value	120	1	5	2.85	1.15
Formalization of title	120	1	5	4.35	0.51
Transferability	120	1	5	2.45	1.22
Financial literacy	120	1	5	3.76	0.89
Strategic credit access	120	0	1	0.43	0.50

Source: Field data (2026).

Table 6 shows that transferability (r = .531, p < .01), security of tenure (r = .487, p < .01) and financial literacy (r = .443, p < .01) had the strongest correlations with credit access. No correlation between predictors exceeded .80, so multicollinearity was not a concern.

Table 6: Pearson Correlation Matrix of Study Variables

Variable	1	2	3	4	5	6
1. Security of tenure	1					
2. Collateral value	.318**	1				
3. Formalization of title	.402**	.287**	1			
4. Transferability	.356**	.341**	.298**	1		
5. Financial literacy	.412**	.264*	.331**	.378**	1	
6. Strategic credit access	.487**	.198*	.214*	.531**	.443**	1

p < .05, p < .01 (two-tailed).

Source: Field data (2026).

4.3 Binary Logistic Regression Results

Model 2 was statistically significant ($\chi^2 = 48.65$, df = 9, p < .001) and fitted the data adequately (Hosmer–Lemeshow $\chi^2 = 5.24$, p = .732). Nagelkerke R^2 was .435, and 78.6% of cases were correctly classified, compared with 57% if no access were predicted for everyone (Table 7).

Table 7: Binary Logistic Regression – Model Fit Statistics

Statistic	Value	df	p
−2 log likelihood	148.32	–	–
Omnibus test (chi-square)	48.65	9	< .001
Hosmer–Lemeshow test	5.24	8	.732
Cox & Snell R^2	.293	–	–
Nagelkerke R^2	.435	–	–
Overall classification accuracy	78.6%	–	–

Model 2 (moderated model); dependent variable: strategic credit access (0 = no, 1 = yes); Source: Field data (2026).

Table 8 presents the coefficients. Transferability (B = 1.144, p = .002, OR = 3.140) and security of tenure (B = 0.837, p = .001, OR = 2.310) were positive and significant, with transferability the stronger. Collateral value (p = .698) and formalization of title (p = .724) were not

significant, and their confidence intervals included 1. Of the four interaction terms, only security of tenure × financial literacy was significant (B = 0.582, p = .006, OR = 1.790). Because of this interaction, the log-odds effect of security of tenure equals 0.837 + 0.582 (FL) and rises by 0.582 with each one-unit increase in financial literacy. The interactions for collateral value (p = .224), formalization of title (p = .428) and transferability (p = .164) were not significant.

Table 8: Binary Logistic Regression Coefficients (Model 2)

Variable	B	SE	Wald	p	Exp(B)	95% CI for Exp(B)
Security of tenure (ST)	0.837	0.245	11.68	.001	2.310	[1.430, 3.732]
Collateral value (CV)	0.122	0.315	0.15	.698	1.130	[0.610, 2.094]
Formalization of title (FT)	0.148	0.420	0.12	.724	1.160	[0.509, 2.643]
Transferability (TR)	1.144	0.364	9.88	.002	3.140	[1.539, 6.406]
ST × FL	0.582	0.210	7.68	.006	1.790	[1.185, 2.703]
CV × FL	0.241	0.198	1.48	.224	1.273	[0.863, 1.878]
FT × FL	0.183	0.231	0.63	.428	1.201	[0.763, 1.889]
TR × FL	0.312	0.224	1.94	.164	1.366	[0.880, 2.120]
Constant	−4.312	1.044	17.09	< .001	0.013	–

Dependent variable: strategic credit access (1 = accessed formal credit, 0 = otherwise); n = 120. The main-effect coefficient for financial literacy is omitted; it is not interpreted separately because financial literacy enters the model as a moderator through the four interaction terms.

Source: Field data (2026).

4.4 Qualitative Findings

Four themes emerged from the twelve interviews with financial institution officers, land administration officials and extension officers.

Theme 1: Institutional barriers reduce the credit value of title. All four lenders identified registry delays and inaccurate ownership records as the main obstacle. Verification of a title commonly took 45 to 90 days, reflecting a cumulative sequence: verification at registries still run on manual ledgers, government valuation constrained by few licensed valuers, consent from the Land Control Board required under the Land Control Act (Cap. 302) for any mortgage or transfer of agricultural land (rural boards typically sit monthly), and final registration, which adds 30 to 60 days. Without Board consent a mortgage on agricultural land is void, so a registered title cannot be acted on by a lender.

Theme 2: Transferability and spousal consent are the main gatekeepers. Bank officers reported that parcels contested by relatives or lacking clear spousal consent are declined even when a title is presented, and microfinance officers said many applicants fail due diligence because of encumbrances and not because of missing titles. Lenders were assessing whether collateral could be realized on default.

Theme 3: Illiquid land markets suppress collateral value. Lenders' valuers apply conservative benchmarks drawn from recent comparable sales, and in thin rural markets valuations often fall below minimum collateral thresholds. Extension officers noted that farmers are frequently discouraged when valuations fall far below their expectations.

Theme 4: Financial literacy bridges land rights and credit. Extension and microfinance officers observed that farmers who had received financial education prepared stronger applications, understood collateral requirements and had resolved spousal consent and registry issues before approaching a lender.

5.1 Discussion

5.1 Security of Tenure and Transferability

The two attributes that determine what a lender can do with land were the significant predictors. Security of tenure had a positive effect on credit access, consistent with Property Rights Theory: farmers confident that their rights cannot be challenged are more willing to offer land as security and to approach formal lenders. The result agrees with positive associations reported in Uganda and Kenya (Mbudzya et al., 2022; Mwanga et al., 2017) and extends them by isolating perceived tenure security from title possession and showing that its effect holds when formalization of title and collateral value are included in the same model.

Transferability was the strongest predictor, which matches the lender-side evidence from the interviews: banks look to the legal ease of realizing collateral, and parcels burdened by customary claims, family disputes or missing spousal consent are rejected whatever their registration status. It is consistent with evidence that restrictions on transfer constrain rural credit (Deininger & Feder, 2009) and that the value of registration depends on the transfer and mortgage rights a certificate carries (Byamugisha & Dubosse, 2023). In resource-based terms, land becomes a strategic resource for borrowing only when the lender can use it, which in practice means it must be free of encumbrances.

5.2 Collateral Value and Formalization of Title

Neither collateral value nor formalization of title had a significant effect. For collateral value, the interviews suggest that farmers' perceived land values differ from the conservative valuations lenders apply in thin rural markets, in line with the view that collateral value depends on how markets function and not on title alone (Deininger et al., 2017; Middelberg, 2014). Because the measure captured farmers' perceptions, it may not reflect the values lenders assign, which future work should test with lender-assigned valuations.

The non-significant effect of formalization of title qualifies the expectation of Property Rights Theory and the dead-capital argument (De Soto, 2000). It is, however, consistent with research showing that titling alone has limited or uneven credit effects: titling raised loan approval only at a public lender in Peru (Field & Torero, 2008), had modest effects on credit in Argentina (Galiani & Schargrodsky, 2010) and was associated with little credit benefit in earlier Kenyan evidence (Place & Migot-Adholla, 1998). It also fits the caution that effects depend on registry efficiency (Deininger & Feder, 2009). The interviews point to the same mechanism: verification delays of 45 to 90 days, doubts about the accuracy of records and Land Control Board consent mean that a title cannot be acted on promptly. In Migori County the administrative quality and verifiability of formalization appear to matter more than its existence.

5.3 Moderating Role of Financial Literacy

Financial literacy moderated only the effect of security of tenure. Farmers who hold secure tenure and understand loan products, interest rates and lender requirements are better able to convert that security into an approved loan, which supports Financial Inclusion Theory and evidence that financial literacy improves participation in formal finance (Lusardi & Mitchell, 2014; OECD, 2016). The non-significant interactions for the other attributes should be read with care. The interviews suggest that transfer restrictions, consent requirements and valuation

are largely lender-side decisions that a borrower's knowledge cannot easily change, but extension officers also said that financially literate farmers resolve consent and registry issues before applying. With 120 cases the interaction tests have limited power, so the results show that moderation was not detected for three attributes and not that it is absent.

The model explained about 43.5% of the variance in credit access, so the attributes and financial literacy are important but not exclusive determinants. Borrower income, lender risk appetite and loan terms were not modeled.

6.1 Conclusion

Land titling improves smallholder access to formal credit only to the extent that it gives lenders a secure claim they can act on. Security of tenure and transferability, which determine whether a lender can rely on land and realize it on default, mattered; a title deed alone and perceived land value did not. Financial literacy raised the credit benefit of secure tenure but not of the other attributes. The findings support Property Rights Theory for security of tenure, qualify it for formalization of title, and show that Institutional Theory and the Resource-Based View are needed to explain why documented rights do not automatically become credit. Policy that concentrates on issuing titles alone is unlikely to be sufficient.

6.2 Implications for Policy and Practice

First, the National Land Commission and the Ministry of Lands and Physical Planning should simplify and set time limits for the procedures governing spousal consent, family clearance and removal of encumbrances, since transferability was the strongest predictor. Second, the Ministry should digitize rural land registries to remove verification delays of 45 to 90 days and correct inaccurate ownership records. Third, banks and microfinance institutions should develop blended agricultural credit products that accept alternative collateral such as crop purchase contracts, warehouse receipts and group guarantees for farmers whose land is encumbered or undervalued. Fourth, county governments, extension agencies and lenders should provide structured financial literacy training that helps farmers compare loan products, interpret interest rates and prepare land documentation. The measures are complementary. Reforms to transfer procedures can be acted on first, digitization is a longer-term investment that underpins the others, and alternative products and training can proceed without waiting for public reforms. Because the study was cross-sectional and local, the measures should be piloted and evaluated before wider rollout.

6.3 Limitations and Future Research

The data were self-reported and cross-sectional, so causal direction cannot be established. The sample came from three sub-counties and from registered smallholders, which limits generalization, and the 43% access rate is much higher than county estimates. With 120 cases and about 52 farmers who accessed credit, the nine-predictor model has fewer than ten events per predictor, which limits the power of the interaction tests, and the Model 1 estimates are not reported. Self-rated items on the attributes and financial literacy may be inflated by social desirability. Future research should replicate the study in arid and semi-arid counties where customary tenure is stronger, use longitudinal or loan-tracking designs, use lender-assigned valuations, distinguish types of title (freehold or leasehold) and current from outdated records, examine how gender and household position affect consent decisions, and analyze the amount and terms of credit obtained.

DECLARATIONS

Conflict of interest: The authors declare no conflict of interest.

Research funding: The authors received no funding for this research.

REFERENCES

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Byamugisha, F. F. K., & Dubosse, N. (2023). The investment case for land tenure security in Sub-Saharan Africa: A cost–benefit analysis. *Journal of Benefit-Cost Analysis, 14*(S1), 272–300. https://doi.org/10.1017/bca.2023.14

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*(1), 37–46.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.

Deininger, K., & Feder, G. (2009). Land registration, governance, and development: Evidence and implications for policy. *The World Bank Research Observer, 24*(2), 233–266. https://doi.org/10.1093/wbro/lkp007

Deininger, K., Savastano, S., & Xia, F. (2017). Smallholders' land access in Sub-Saharan Africa: A new landscape? *Food Policy, 67*, 78–92. https://doi.org/10.1016/j.foodpol.2016.09.012

Demsetz, H. (1967). Toward a theory of property rights. *American Economic Review, 57*(2), 347–359.

De Soto, H. (2000). *The mystery of capital: Why capitalism triumphs in the West and fails everywhere else*. Basic Books.

Feder, G., Onchan, T., Chalamwong, Y., & Hongladarom, C. (1988). *Land policies and farm productivity in Thailand*. Johns Hopkins University Press.

Field, E., & Torero, M. (2008). *Do property titles increase credit access among the urban poor? Evidence from a nationwide titling program* [Unpublished manuscript]. Harvard University.

Food and Agriculture Organization. (2019). *The state of food and agriculture 2019*. FAO.

Food and Agriculture Organization. (2022). *Land tenure and rural development*. FAO.

Galiani, S., & Schargrodsky, E. (2010). Property rights for the poor: Effects of land titling. *Journal of Public Economics, 94*(9–10), 700–729. https://doi.org/10.1016/j.jpubeco.2010.06.002

Glaeser, E. L., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2004). Do institutions cause growth? *Journal of Economic Growth, 9*(3), 271–303. https://doi.org/10.1023/B:JOEG.0000038933.16398.ed

Government of Kenya. (2012). *Land Registration Act, 2012*. Government Printer.

Hosmer, D. W., & Lemeshow, S. (2000). *Applied logistic regression* (2nd ed.). Wiley.

Kenya National Bureau of Statistics. (2021). *Economic survey 2021*. KNBS.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33*(1), 159–174.

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature, 52*(1), 5–44. https://doi.org/10.1257/jel.52.1.5

Mbudzya, J. J., Gido, E. O., & Owuor, G. (2022). Effect of land tenure security on agricultural productivity among small scale farmers in Kenya: A conditional mixed processes analysis. *Cogent Food & Agriculture, 8*(1), 2139805. https://doi.org/10.1080/23311932.2022.2139805

Meinzen-Dick, R., & Mwangi, E. (2009). Cutting the web of interests: Pitfalls of formalizing property rights. *Land Use Policy, 26*(1), 36–43. https://doi.org/10.1016/j.landusepol.2007.06.003

Middelberg, S. L. (2014). Agricultural land valuation methods used by financiers: The case of South Africa. *Agrekon, 53*(3), 101–115. https://doi.org/10.1080/03031853.2014.922033

Migori County Department of Agriculture. (2025). *Farmer registration records*. County Government of Migori.

Mugenda, O. M., & Mugenda, A. G. (2003). *Research methods: Quantitative and qualitative approaches*. ACTS Press.

Mwanga, J., Byarugaba, D., & Ssemakula, E. (2017). Tenure security and formal credit access among smallholder farming households in Uganda. *African Journal of Rural Development, 2*(3), 411–424.

Nkundabanyanga, S. K., Kasozi, D., Nalukenge, I., & Tauringana, V. (2014). Lending terms, financial literacy and formal credit accessibility. *International Journal of Social Economics, 41*(5), 342–361. https://doi.org/10.1108/IJSE-03-2013-0075

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.

Organisation for Economic Co-operation and Development. (2016). *OECD/INFE international survey of adult financial literacy competencies*. OECD Publishing.

Place, F., & Migot-Adholla, S. E. (1998). The economic effects of land registration on smallholder farms in Kenya: Evidence from Nyeri and Kakamega Districts. *Land Economics, 74*(3), 360–373. https://doi.org/10.2307/3147116

World Bank. (2017). *Global financial development report 2017*. World Bank.

World Bank. (2020). *Land governance assessment framework*. World Bank.

Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper & Row.