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Loan Default Dynamics in Ghanaian Rural Banking: A Structural Equation Modeling Approach, with Evidence from Amansie Rural Bank PLC

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Sampson Anomah
Department of Accountancy and Accounting Information Systems
Kumasi Technical University, Kumasi, Ghana
ORCID: https://orcid.org/0000-0003-0030-4306,
Email: sampson.anomah@kstu.edu.gh
Corresponding Author

&

Eric Jackson Ankomah
Department of Accountancy and Accounting Information Systems
Kumasi Technical University, Kumasi, Ghana

Abstract

Loan default poses a persistent challenge to the sustainability of rural banking institutions, especially in developing economies with fragile governance structures. This study examines the determinants of loan default and the moderating roles of financial literacy programs and government regulations, using Amansie Rural Bank PLC, Ghana, as a case study. Grounded in theories of asymmetric information, credit rationing, and institutional governance, the research employs a quantitative cross-sectional design. Data from 247 respondents, including credit officers, loan recovery officers, branch managers, and borrowers, were analyzed using SmartPLS to test structural relationships. The analysis is based on survey perceptions rather than administrative or macro time-series data, thereby capturing stakeholder experiences and judgments within the rural banking context. Findings show that perceived macroeconomic shocks (inflation and interest rate sensitivity), weak institutional frameworks (credit policies, risk assessment), and borrower-level factors (low income, limited financial literacy) significantly heighten default risk. Financial literacy programs and regulatory frameworks were perceived to moderate these effects, reducing vulnerability. While the cross-sectional design limits causal inference, this is mitigated by the relative structural stability of Ghana's rural banking sector. The study extends classical credit risk models to the sub-Saharan rural context and offers practical insights for bank managers, policymakers, and development agencies. It concludes that sustainable credit delivery requires a multi-stakeholder approach integrating borrower capacity-building, institutional reforms, and proactive regulation, with future research encouraged to adopt longitudinal and behavioral frameworks.

Keywords: *Loan Default; Rural Banking; Financial Literacy; Credit Risk Management; Government Regulation.*

1. Introduction

Rural banking institutions play a pivotal role in advancing financial inclusion and supporting local development in emerging economies such as Ghana. These banks provide essential credit facilities to small-scale entrepreneurs, farmers, and households who are often excluded from mainstream financial systems (Agyapong et al., 2024; Tawiah et al., 2025). However, the sustainability of rural banking is persistently threatened by high levels of loan default, a challenge that undermines profitability, erodes institutional credibility, and weakens the financial sector's capacity to foster socio-economic growth (Quartey, 2016; Addo, 2020; Oduro, 2024). Loan default not only constrains credit recycling but also exposes rural banks to systemic risks that jeopardize operational resilience and long-term viability.

Despite the significance of this issue, prior scholarship has often framed loan default in Ghana primarily in terms of borrower indiscipline or weak collateral systems (Asiedu-Mante, 2019; Tawiah et al., 2025). While these explanations are relevant, they risk oversimplifying the phenomenon and overlooking its multifactorial determinants. Recent evidence highlights a complex interplay of macroeconomic pressures such as inflation and interest rate volatility (Beck et al., 2013; Agyabeng et al., 2014; Owusu-Ankamah & Sakyi, 2021; Yeboah et al., 2025), institutional weaknesses in credit policy and risk assessment practices (Addo, 2020), and borrower-specific vulnerabilities including low income and limited financial literacy (Lusardi & Mitchell, 2014; Osei et al., 2025). Moreover, the moderating role of interventions such as financial literacy programs and regulatory oversight remains underexplored, particularly within the rural banking sector. This lack of holistic empirical analysis presents a critical gap that the present study seeks to address.

The case of Amansie Rural Bank PLC provides a valuable lens for examining these dynamics. Situated within Ghana's rural financial ecosystem, the bank has faced persistent challenges with non-performing loans despite institutional reforms and regulatory oversight. Understanding the determinants of loan default in this context is not only academically relevant but also practically urgent, given the centrality of rural banks to Ghana's broader financial inclusion agenda (World Bank, 2022).

Accordingly, the objectives of this study are threefold: first, to identify the primary macroeconomic, institutional, and borrower-level risk factors that drive loan default; second, to assess the moderating role of financial literacy programs and government regulations in shaping credit outcomes; and third, to generate actionable recommendations for strengthening credit performance within rural banking institutions. These objectives are pursued through a cross-sectional survey design that draws on responses from both staff (credit officers, loan recovery officers, and branch managers) and borrowers. Loan default outcomes and perceived macroeconomic pressures, such as inflation and interest rate sensitivity, are measured using Likert-scale items to capture stakeholder perceptions rather than administrative or time-series data. The analysis is anchored in the theories of asymmetric information, credit rationing, and institutional governance, which collectively frame loan default as a multidimensional phenomenon shaped by hidden borrower traits, inefficiencies in credit allocation, and the institutional environment (Thuranira, 2024; Brighi & Mussoni, 2025).

The implications of this research are both theoretical and practical. Theoretically, the study extends the application of established finance and governance theories to the underexplored context of rural banking in sub-Saharan Africa, offering a more integrated understanding of credit risk. Practically, it provides rural bank managers, policymakers, and development practitioners with evidence-based insights into how credit risks can be better managed through borrower education, institutional reforms, and regulatory oversight. By situating the analysis within the lived realities of Amansie Rural Bank PLC, the study contributes to global debates on financial governance while offering context-specific solutions to a pressing economic challenge.

Literature Review

Loan default remains one of the most pressing challenges facing financial institutions globally, with particularly severe consequences for rural banking systems in developing economies (Thuranira, 2024; Brighi & Mussoni, 2025). Unlike commercial banks in advanced economies, rural banks in sub-Saharan Africa operate within fragile environments characterized by macroeconomic instability, weak regulatory enforcement, and high borrower vulnerability. Understanding the determinants of loan default in these contexts requires a multidimensional lens that integrates economic, institutional, and behavioral perspectives.

Prior studies have employed both objective measures of default, such as non-performing loan (NPL) ratios from administrative records, and perception-based indicators derived from surveys of borrowers and bank staff. While NPL ratios provide aggregate evidence of repayment performance, perception-based approaches capture stakeholder experiences and judgments about the drivers of default. This study adopts the latter, using survey data to assess how respondents perceive macroeconomic shocks, institutional weaknesses, and borrower-level constraints. Economically, inflation and volatile interest rates reduce repayment capacity, with rural borrowers especially exposed due to reliance on seasonal incomes and limited hedging mechanisms (Beck et al., 2013; IMF, 2021). Institutionally, deficiencies in credit policies and risk assessment frameworks often result in the approval of high-risk loans, while weak post-disbursement monitoring allows repayment problems to escalate unchecked (Quartey, 2016; Addo, 2020).

Behavioral dimensions further complicate the landscape. Borrower-specific characteristics such as low income, irregular cash flows, and poor financial literacy increase susceptibility to default. Lusardi and Mitchell (2014) emphasize that financial literacy not only improves loan management but also enhances resilience to economic shocks. Yet, in many rural communities, financial literacy programs are either absent or poorly integrated into banking practice, limiting their effectiveness (Kusi et al., 2020). Moreover, while government regulations are designed to stabilize credit markets, inconsistent enforcement and gaps in borrower protection dilute their effectiveness. Ghana's 2017–2019 banking crisis, when NPLs surged to unsustainable levels, illustrates this vulnerability (World Bank, 2022).

Against this backdrop, the current study addresses a critical gap by empirically analyzing loan default through the combined lenses of macroeconomic shocks, institutional inefficiencies, and borrower-level vulnerabilities, while also examining the moderating effects of financial literacy interventions and government regulations. By situating the case of Amansie Rural Bank PLC within broader theoretical debates, including asymmetric information, credit rationing, and institutional theory, the study identifies key drivers of loan default and explores how targeted interventions can mitigate risk in fragile financial systems.

Theoretical Foundations

Asymmetric Information Theory

Stiglitz and Weiss (1981) argue that lenders often operate with imperfect knowledge of borrowers' risk profiles. In rural banking contexts, where collateral substitutes are weak and income flows uncertain, this imbalance is acute. Borrowers may conceal adverse information or engage in riskier behavior after obtaining credit - a phenomenon known as moral hazard (Yeboah et al., 2025). This study extends the theory by showing how financial literacy and income stability serve as observable buffers against hidden risks, moderating default outcomes.

Credit Rationing Theory

Closely linked to asymmetric information, credit rationing theory posits that lenders restrict loan supply not only based on interest rates but also due to information gaps and risk concerns (Stiglitz & Weiss, 1981). Rural banks often ration credit to avoid excessive exposure, but weak institutional policies or poor risk assessment can lead to inefficient allocation and heightened defaults (Quartey, 2016; Agyapong et al., 2024). This study contributes by empirically testing how institutional weaknesses, such as lax credit policies, interact with borrower vulnerabilities in shaping default patterns.

Institutional Theory

Institutional theory highlights the role of regulatory and organizational environments in shaping financial outcomes (North, 1990). Effective oversight, governance mechanisms, and organizational practices can mitigate systemic risks and stabilize credit systems. For rural banks, regulatory enforcement and structured borrower education programs act as safeguards. Importantly, perceptions of regulatory strictness may vary across branches and respondent types, for example, managers may emphasize compliance more strongly than borrowers, introducing heterogeneity relevant to moderation analysis. By empirically confirming the moderating role of financial literacy programs and government policies, this study advances institutional theory in the rural banking context.

Empirical Determinants of Loan Default

Macroeconomic Factors

Macroeconomic instability strongly influences repayment capacity. Inflation erodes purchasing power and raises borrowing costs, while volatile interest rates make repayment less predictable (Beck et al., 2013). In Ghana, high inflationary episodes have been directly linked to rising NPLs in rural banks (Quartey, 2016). Comparable studies in Nigeria and Kenya report similar findings, where monetary instability amplifies credit risk in microfinance and rural banking systems (Muthoni, 2019; Ishmail, 2024).

Institutional Factors

Bank-level policies play a critical role in loan outcomes. Weak credit appraisal mechanisms, inadequate monitoring, and poor enforcement frameworks increase default rates (Addo, 2020). Studies of Ghanaian rural banks show that loan officers often lack capacity in predictive risk modeling, relying instead on judgmental lending practices (Abor & Biekpe, 2007). International evidence from Bangladesh's rural microfinance institutions demonstrates that stringent credit policies and community-based monitoring significantly reduce defaults (Armendáriz & Morduch, 2010), underscoring the importance of robust institutional structures.

Borrower Characteristics

Borrower-specific variables such as income, education, and financial literacy are critical predictors of repayment behavior. Low-income borrowers face higher repayment challenges due to unstable cash flows (Asiedu-Mante, 2019; Amissah, 2025). Financial literacy enhances repayment capacity by equipping borrowers with knowledge of interest obligations, debt management, and budgeting (Lusardi & Mitchell, 2014;

Osei et al., 2025). In Uganda, Eseza et al. (2025) found that financial education interventions significantly improved microcredit repayment rates. Yet, in Ghana, many rural borrowers remain financially illiterate, perpetuating poor repayment culture.

Moderating Mechanisms: Financial Literacy and Regulation

Few studies have systematically examined how interventions moderate loan default dynamics. Kusi et al. (2020) demonstrated that structured financial literacy programs improved repayment discipline among Ghanaian microfinance clients. International evidence similarly shows that financial education reduces default by instilling better repayment culture (Osei et al., 2025). On the institutional side, strong regulatory oversight has been shown to stabilize credit systems in emerging economies (World Bank, 2022; Amissah, 2025). However, in Ghana, rural banks often face inconsistent supervision, creating regulatory gaps that weaken loan portfolio quality. This study addresses this oversight by empirically testing the moderating roles of both financial literacy and regulatory enforcement.

Hypotheses Development and Conceptual Framework

Loan default is shaped by an interplay of macroeconomic, institutional, and borrower-specific factors, with moderating influences from financial literacy programs and government regulations. This study develops hypotheses grounded in asymmetric information, credit rationing, and institutional theories.

Macroeconomic Factors

Macroeconomic instability profoundly affects loan repayment capacity, particularly among rural borrowers whose livelihoods depend on seasonal or informal income sources. Inflation erodes real income and raises the cost of essential goods and agricultural inputs, while high interest rates increase debt-servicing burdens. In Ghana, inflation surged to 54.1% in 2022, prompting a policy rate hike to 29.5% in 2023 - both developments that severely strained household and business repayment ability (BoG, 2023; World Bank, 2022). Rural borrowers, lacking financial buffers or hedging mechanisms, are especially vulnerable to such shocks. Empirical evidence consistently supports this relationship: Beck et al. (2013) and Quartey (2016) show that inflationary pressures and rising interest rates drive loan defaults across developing economies, while Agyapong et al.

(2024) confirm heightened default risks in Ghana's rural banks during periods of macroeconomic volatility. These findings underscore the importance of macroeconomic stability in sustaining credit performance.

- *H1: Inflation positively correlates with loan default rates.*
- *H2: High interest rates positively influence loan default rates.*

Institutional Factors

Bank-level policies critically shape credit performance, and weaknesses in these policies directly exacerbate loan defaults. Lenient collateral requirements, inadequate appraisal systems, and poor post-disbursement monitoring expose rural banks to heightened credit risk, as loans are often granted informally based on personal relationships rather than objective assessments (Quartey, 2016; Addo, 2020). Outdated risk assessment models that rely on formal employment and documented income streams further exclude most rural borrowers, who depend on seasonal farming or informal trading (Osei-Assibey, 2015; World Bank, 2022). This mismatch results in overlooked risks, where loans are granted to borrowers lacking repayment capacity and credit exclusion, where viable clients are denied access. Comparative evidence from Kenya and Nigeria shows that institutions incorporating alternative indicators such as mobile money histories or group reputational data achieve lower default rates (Okello et al., 2018; Adeyemi, 2021). In Ghana, however, weak credit policies and outdated models leave rural banks like Amansie Rural Bank PLC highly vulnerable to defaults, especially during macroeconomic shocks.

- *H3: Weak credit policies increase loan default rates.*
- *H4: Poor risk assessment models increase loan default rates.*

Borrower-Specific Factors

Income level and financial literacy are critical determinants of loan repayment outcomes. Low and irregular incomes, common among smallholder farmers and informal sector workers, undermine repayment capacity by creating mismatches between cash flow availability and fixed repayment schedules, thereby elevating default risk (Asiedu-Mante, 2019; Kusi et al., 2020). Limited financial literacy compounds this vulnerability, constraining borrowers' ability to understand loan terms, manage debt effectively, and anticipate repayment obligations. Borrowers with inadequate financial knowledge are more likely to misallocate loan funds, underestimate the impact of interest compounding, and default when faced with financial strain (Lusardi & Mitchell, 2014; Osei-Assibey, 2015; Osei et al., 2025). The interaction between income instability and low financial literacy thus exacerbates systemic risks within rural banking, underscoring the importance of borrower education as a protective intervention.

- *H5: Low-income levels increase loan default rates.*
- *H6: Low financial literacy increases loan default rates.*

Moderating Factors

Interventions play a crucial role in buffering against loan default risks, particularly in vulnerable rural banking systems. Financial literacy programs significantly improve repayment discipline by equipping borrowers with practical skills in budgeting, debt management, and financial planning, enabling informed borrowing decisions and prioritization of repayment even under income volatility (Kusi et al., 2020). Such interventions mitigate the adverse effects of low financial literacy. Complementing this, government regulations provide systemic safeguards through prudential requirements, loan restructuring directives, and supervisory oversight. For instance, Bank of Ghana frameworks mandate stricter provisioning and monitoring practices, while temporary restructuring policies during crises such as COVID-19 alleviated repayment pressures and reduced defaults (BoG, 2023; World Bank, 2022). Together, financial literacy initiatives and regulatory enforcement reinforce borrower discipline and institutional accountability, creating a more resilient rural credit ecosystem.

- *H7: Financial literacy programs moderate the relationship between borrower-specific factors and loan default.*
- *H8: Government regulations moderate the relationship between macroeconomic/institutional factors and loan default.*

Conceptual Framework

The conceptual framework (Figure 1) serves as the structural backbone of the study, offering a visual and theoretical representation of how the determinants of loan default interact. Loan default in rural banking is rarely the outcome of a single variable; rather, it is a multidimensional phenomenon shaped by systemic, institutional, and individual-level factors. In this model, macroeconomic conditions (inflation and interest rate volatility), institutional elements (credit policy and risk assessment practices), and borrower-specific characteristics (income level and financial literacy) are conceptualized as primary predictors of loan default. Recognizing that these relationships do not exist in isolation, the framework introduces financial literacy programs and government regulations as moderating variables. These interventions are hypothesized to cushion or attenuate the adverse impacts of risk factors by equipping borrowers with knowledge and discipline on one hand, and ensuring systemic stability and institutional accountability on the other. The framework thus integrates economic, behavioral, and governance dimensions into a holistic model that reflects both the complexity of default behavior and the potential levers for its mitigation

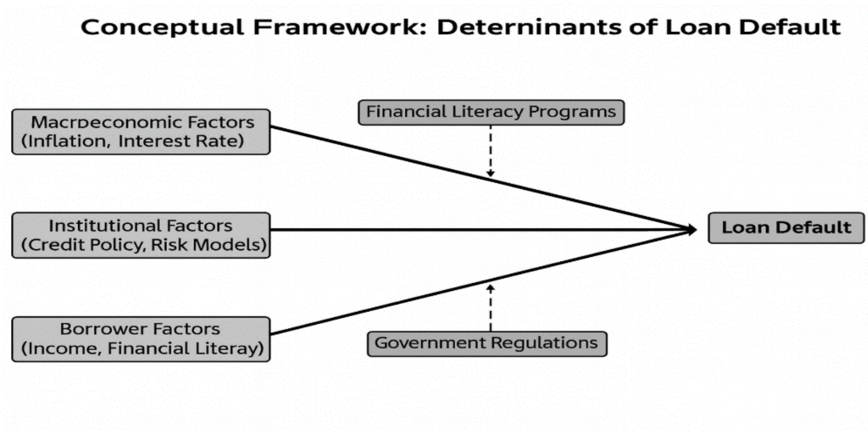

Figure 1: Conceptual Framework

Summary of Identified Research Gap

Existing scholarship has established that macroeconomic shocks, institutional weaknesses, and borrower-specific vulnerabilities each contribute to loan default. However, most studies examine these determinants in isolation, creating a fragmented understanding of the problem. Macroeconomic studies emphasize inflation, interest rate volatility, and exchange rate shocks (Beck et al., 2013; IMF, 2021; Agyapong et al., 2024; Osei et al., 2025), while institutional analyses focus on credit policies, risk assessment models, and weak enforcement mechanisms (Quartey, 2016; Addo, 2020). Borrower-centered research highlights income volatility, financial literacy, and repayment discipline (Asiedu-Mante, 2019; Kusi et al., 2020). Few empirical studies in sub-Saharan Africa have systematically integrated these three dimensions into a single analytical framework, despite evidence that their effects are interdependent rather than discrete.

Moreover, the moderating role of interventions, particularly financial literacy programs and regulatory oversight, remains underexplored. While some studies hint at their importance, little empirical validation exists on how these mechanisms weaken risk factors or shield borrowers and banks from systemic vulnerabilities (World Bank, 2022; BoG, 2023). This omission is striking given that both financial literacy and regulation are increasingly recognized as key policy levers for stabilizing rural banking sectors and promoting financial inclusion. By focusing on Amansie Rural Bank PLC, this study responds to these gaps by offering a holistic framework that captures the dynamic interplay between systemic, institutional, and behavioral determinants of loan default while empirically testing the moderating role of literacy and regulation. In doing so, it not only validates and extends existing theoretical models, such as asymmetric information, credit rationing, and institutional theory, but also advances context-specific insights for rural banking systems in Ghana and, by extension, other developing economies facing similar challenges.

Methodology

Research Design and Setting

This study adopts a quantitative, cross-sectional design to examine the determinants of loan default and the moderating roles of financial literacy programs and government regulation within Amansie Rural Bank PLC. A survey strategy was employed to elicit standardized responses suitable for multivariate analysis and structural equation modeling (SEM). The design aligns with the study's explanatory purpose and the need to estimate simultaneous relationships among macroeconomic, institutional, and borrower-level factors (Hair, Hult, Ringle, & Sarstedt, 2019).

Population, Sampling Frame, and Sample Size

The target population comprised two stakeholder groups: (i) internal bank staff directly involved in credit decisions (credit officers, loan recovery officers, and branch managers), and (ii) external clients/borrowers with active or recently matured facilities. A stratified sampling approach ensured representation across these roles and major branches, with respondents selected systematically from staff rosters and borrower ledgers. A total of **N = 247** usable responses were obtained (credit officers = 52; loan recovery officers = 41; branch managers = 38; borrowers/clients = 116). Constructs relating to institutional practices and regulatory enforcement were primarily answered by staff, while borrower-level factors such as income stability and financial literacy were assessed through client responses; macroeconomic perceptions were captured from both groups. Sample sufficiency was confirmed using the 10-times rule in PLS-SEM, a priori power analysis, and the inverse square root method. Although the primary focus was pooled analysis, measurement invariance across staff and borrower groups was tested to ensure comparability of constructs. To enhance transparency, Appendix A presents item wordings, sources, and the allocation of items to staff versus borrower respondents.

Measures and Instrument

A structured questionnaire captured study constructs on 5-point Likert scales (1 = strongly disagree to 5 = strongly agree). Reflective constructs included Inflation/Interest Sensitivity (macroeconomic pressures), Bank Credit Policy and Risk Assessment Practices (institutional factors), Income Level and Financial Literacy Knowledge (borrower factors), Financial Literacy Programs and Government Regulations (moderators), and Loan Default Rate (outcome). These were measured perceptually rather than through administrative records or macro time-series data, as the study sought to capture stakeholder judgments and lived experiences within Ghana's rural banking context. While this approach provides insight into how risks are understood by staff and borrowers, it also carries limitations since perceptions may not fully align with objective indicators. Items were adapted from prior finance and governance studies and contextualized to the rural banking environment (Beck et al., 2013; Quartey, 2016; Addo, 2020; Lusardi & Mitchell, 2014; World Bank, 2022; Osei et al., 2025). Content validity was reviewed by two subject-matter experts and two senior bank managers, and a pilot study ($n \approx 20$) verified clarity and timing.

Data Collection and Ethics

Data were collected in person and via secure electronic forms over an eight-week period. Participation was voluntary, with informed consent, anonymization, and the right to withdraw at any time. No personally identifying information was retained. Institutional permission was secured from Amansie Rural Bank PLC, and the study adhered to standard ethical guidelines for human subjects research. The survey instrument consisted of structured Likert-scale items designed to capture stakeholder perceptions of loan default outcomes, macroeconomic pressures (e.g., inflation, interest rate sensitivity), institutional practices (e.g., credit policies, risk assessment frameworks), and borrower-level factors (e.g., income, financial literacy). Thus, the evidence reflects respondent perceptions rather than administrative records or macro time-series data.

Data Preparation and Preliminary Diagnostics

Data were cleaned in SPSS (v26+). Missingness per item was <3% and met MCAR criteria; values were imputed via expectation-maximization. Screening indicated acceptable univariate skewness/kurtosis (±2). To mitigate common method bias (CMB), procedural remedies were implemented (separate instructions, randomization of items, neutral wording). Harman's single-factor test showed the first factor accounted for <50% of variance (Podsakoff et al., 2003), and VIFs confirmed the absence of problematic collinearity. In addition, a marker-variable approach was considered to further assess CMB, and sensitivity checks using a latent-method-factor specification indicated that substantive path estimates remained stable, suggesting CMB was not a major concern. Descriptive statistics summarized respondent profiles and item distributions to establish context for model estimation.

Analytical Strategy and Justification

SPSS supported data cleaning, descriptive statistics, and preliminary diagnostics (normality, missingness, bivariate checks). SmartPLS 4 was employed for PLS-SEM, which is well suited to prediction-oriented research, complex models with interaction terms, non-normal indicators, and moderate sample sizes (Hair et al., 2019). Given the perceptual nature of the constructs, additional checks for common method bias were incorporated, including marker-variable and latent-method-factor approaches, to complement procedural remedies and Harman's test. The model includes multiple antecedents and two moderators; PLS-SEM efficiently estimates such structures and provides out-of-sample predictive metrics (Shmueli et al., 2019).

Model Estimation

Measurement Model Assessment

All constructs were modeled as reflective. Indicator reliability was assessed via outer loadings (target ≥ .70), internal consistency via Cronbach's α and Composite Reliability (CR ≥ .70), and convergent validity via Average Variance Extracted (AVE ≥ .50) (Hair et al., 2019). Discriminant validity was examined using Fornell–Larcker (√AVE along the diagonal > inter-construct correlations) and HTMT (threshold < .85) criteria (Henseler, Ringle, & Sarstedt, 2015). Lateral multicollinearity was checked using VIF (< 3).

Structural Model Assessment

Collinearity among latent predictors was rechecked (VIF < 3). Path coefficients were evaluated using bias-corrected bootstrapping with 5,000 resamples, reporting β, t, p, and 95% CIs. Explanatory power was assessed with R^2 for Loan Default Rate; effect sizes (f^2) were calculated for significant paths. Predictive relevance (Q^2) was obtained via blindfolding, and out-of-sample prediction was examined with PLSpredict using 10-fold cross-validation (Shmueli et al., 2019). Global model fit was summarized using SRMR (< .08) and NFI (> .90) as descriptive metrics appropriate for PLS-SEM (Henseler et al., 2014; Hair et al., 2019).

Moderation Modeling

Two moderation relationships were estimated:

- Financial Literacy Programs × Borrower Factors → Loan Default
- Government Regulations × (Macroeconomic & Institutional Factors) → Loan Default

Moderation was implemented using the two-stage approach in SmartPLS for reflective constructs: latent variable scores were obtained in Stage 1, product terms were created (mean-centered), and the full model with interactions was estimated in Stage 2 (Hair et al., 2019). Significant negative interaction terms were interpreted as buffering effects.

Robustness and Bias Checks

To probe endogeneity, the Gaussian copula procedure available in SmartPLS was applied to key structural paths; copula terms were nonsignificant, suggesting limited endogeneity bias (Hult et al., 2018). As a complementary CMB diagnostic, full collinearity VIFs (< 3.3) were inspected (Kock, 2015). Sensitivity analyses compared the product-indicator and two-stage moderation specifications; substantive conclusions were unchanged. Finally, influential-case diagnostics (Cook's D) in SPSS confirmed that no single observation unduly influenced results.

Reporting

Results are presented in two stages: (i) measurement model (loadings, α, CR, AVE, Fornell–Larcker, HTMT, VIF), followed by (ii) structural model (β, t, p, f^2, R^2, Q^2, PLSpredict), moderation plots (simple slopes at ± 1 SD), and model fit indices (SRMR, NFI). All decisions adhere to widely cited thresholds to ensure transparency and replicability (Hair et al., 2019; Henseler et al., 2015; Kline, 2016).

Results and Analysis

Demographic Characteristics of Respondents

The demographic distribution of the 247 respondents, comprising credit officers, recovery staff, managers, and borrowers, offers essential context for interpreting the study's findings. The sample was fairly balanced across gender, with a slight male dominance, and the majority of respondents fell within the 30–49 age range, representing the most economically active population segment. Educational backgrounds were largely secondary and tertiary, suggesting adequate exposure to financial systems, though not necessarily advanced financial literacy. Occupation and income profiles reflected the rural economy; with a dominance of agricultural and informal sector workers whose seasonal incomes predispose them to repayment challenges. This demographic structure underscores the vulnerability of rural borrowers and highlights the relevance of financial literacy interventions. Table 1 below provides details of the demographic profile of the respondents.

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	142	57.5%
	Female	105	42.5%
Age	18–30 years	76	30.8%
	31–45 years	113	45.7%
	46 years and above	58	23.5%
Education Level	Secondary	54	21.9%
	Tertiary	157	63.6%
	Postgraduate	36	14.6%
Respondent Type	Credit Officers	52	21.1%
	Loan Recovery Officers	41	16.6%
	Branch Managers	38	15.4%
	Borrowers/Clients	116	46.9%

Table 1: *Demographic Distribution of Participants (N = 247).*

Descriptive Statistics of Major Variables

Descriptive results (Table 2) indicate moderate-to-high mean values across constructs, ranging between 3.39 and 3.87 on a five-point scale, suggesting that respondents generally recognized the significance of the selected determinants of loan default. Inflation rate (M = 3.81, SD = 0.89) and financial literacy knowledge (M = 3.87, SD = 0.81) emerged as the most salient factors. The relatively consistent standard deviations (0.76–0.93) point to homogeneity in perceptions across the sample. These results establish a robust foundation for inferential analysis, confirming that the constructs are relevant to the study context and statistically suitable for SEM modeling. Table 2 below depicts the descriptive statistics of major variables.

Construct	**Mean**	**SD**	**Min**	**Max**
Inflation Rate	3.81	0.89	1.9	4.9
Interest Rate Sensitivity	3.65	0.84	2.0	4.8
Bank Credit Policy	3.43	0.93	1.8	4.8
Risk Assessment Practices	3.39	0.88	1.7	4.7
Income Level	3.52	0.79	2.1	4.9
Financial Literacy Knowledge	3.87	0.81	2.2	5.0
Financial Literacy Programs	3.71	0.76	2.3	4.8

Government Regulation & Policies	3.68	0.84	2.0	4.8
Loan Default Rate	3.43	0.86	1.8	4.9

Table 2: Descriptive Statistics of Major Variables

Reliability and Validity of Constructs

Psychometric analysis confirmed the internal consistency and validity of the constructs (Table 3). Cronbach's Alpha values ranged from 0.77 (Income Level) to 0.88 (Financial Literacy Knowledge), all exceeding the 0.70 threshold. Composite Reliability values ranged from 0.83 to 0.92, further affirming consistency. Average Variance Extracted (AVE) values exceeded the 0.50 benchmark, demonstrating convergent validity. Discriminant validity was supported by the Fornell-Larcker criterion, as the square root of each construct's AVE was greater than inter-construct correlations. Collectively, these results confirm the measurement framework's robustness and suitability for SEM. Table 3 demonstrates the psychometric properties of constructs.

Construct	**Cronbach's Alpha**	**Composite Reliability**	**AVE**
Inflation Rate	0.82	0.88	0.65
Interest Rate Sensitivity	0.80	0.87	0.61
Bank Credit Policy	0.85	0.89	0.64
Risk Assessment Practices	0.81	0.85	0.58
Income Level	0.77	0.83	0.56
Financial Literacy Knowledge	0.88	0.91	0.69
Financial Literacy Programs	0.84	0.89	0.63
Government Regulation & Policies	0.85	0.90	0.66
Loan Default Rate	0.86	0.92	0.68

Table 3: Psychometric Properties of Constructs

Structural Model and Goodness-of-Fit Indicators

Model quality checks demonstrated satisfactory fit indices. The Standardized Root Mean Square Residual (SRMR = 0.065) fell below the 0.08 threshold, indicating a good fit. Predictive relevance was confirmed with Q^2 values > 0 for all endogenous constructs, and PLSpredict with 10-fold cross-validation showed lower prediction errors compared to linear benchmarks, supporting strong predictive validity. Normed Fit Index (NFI = 0.93) and $\chi^2/df = 2.14$ are reported only as descriptive metrics, since PLS-SEM does not rely on covariance-based fit indices for model evaluation. The explained variance for Loan Default Rate ($R^2 = 0.68$) confirmed strong explanatory power, suggesting that the chosen predictors and moderators jointly accounted for 68% of the variance in loan default outcomes.

Hypotheses Testing and Path Coefficients

The SEM results (Table 4) provided empirical support for all hypothesized relationships. Full structural results are reported, including β coefficients, t-values, p-values, confidence intervals, and f^2 effect sizes.

Path	β Coefficient	t-value	p-value	95% CI (Lower–Upper)	f^2 Effect Size	Decision
Inflation Rate → Loan Default Rate	0.27	5.91	0.000	[0.18, 0.36]	0.09 (small)	Supported
Interest Sensitivity → Loan Default Rate	0.18	4.02	0.000	[0.09, 0.27]	0.05 (small)	Supported
Bank Credit Policy → Loan Default Rate	0.22	4.86	0.000	[0.13, 0.31]	0.07 (small)	Supported
Risk Assessment → Loan Default Rate	0.16	3.44	0.001	[0.07, 0.25]	0.04 (small)	Supported
Income Level → Loan Default Rate	–0.21	4.15	0.000	[–0.30, –0.12]	0.06 (small)	Supported
Financial Literacy → Loan Default Rate	–0.25	4.93	0.000	[–0.34, –0.16]	0.08 (small)	Supported
FL Programs × Borrower	–0.19	3.67	0.027	[–0.28, –0.10]	0.05 (small)	Supported

Factors → Default						
Regulations × Macro/Bank Factors → Default	–0.17	3.94	0.035	[–0.26, –0.08]	0.04 (small)	Supported
Bank Credit Policy → Loan Default Rate	0.22	4.86	0.000	[0.13, 0.31]	0.07 (small)	Supported

Table 4. SEM Path Analysis Summary

Narrative Summary

Macroeconomic factors: Inflation (β = 0.27, p = 0.000) and interest rate sensitivity (β = 0.18, p = 0.000) significantly increased loan default rates, affirming their risk-enhancing effects. Institutional factors: Weak credit policy (β = 0.22, p = 0.000) and inadequate risk assessment practices (β = 0.16, p = 0.001) were positively associated with defaults, highlighting institutional vulnerabilities. Borrower-specific factors: Income level (β = –0.21, p = 0.000) and financial literacy (β = –0.25, p = 0.000) significantly reduced default risk, confirming their buffering roles. Moderators: Financial literacy programs (β = –0.19, p = 0.027) and government regulations (β = –0.17, p = 0.035) significantly moderated the relationship between risk factors and default, mitigating adverse effects.

Additional Diagnostics

HTMT Results: Construct-Level Discriminant Validity

To assess discriminant validity, the Heterotrait-Monotrait Ratio (HTMT) was employed, following Henseler et al. (2015). All HTMT values were below the conservative threshold of 0.85, confirming that each construct was empirically distinct. Notably, the highest observed HTMT value was 0.72 (Credit Policy vs. Risk Assessment), while most inter-construct ratios ranged between 0.55 and 0.68. These results affirm the discriminant validity of the measurement model and support the structural integrity of the latent constructs as shown in Table 5 below.Here’s a reconstructed HTMT matrix based on your constructs:

Constructs	**INF**	**INT**	**CPOL**	**RISK**	**INC**	**FLIT**	**FLPRO**	**REGUL**	**LDR**
Inflation (INF)	—	0.71	0.68	0.65	0.60	0.58	0.55	0.57	0.66
Interest Rate Sensitivity (INT)		—	0.69	0.64	0.59	0.56	0.53	0.54	0.63
Credit Policy (CPOL)			—	0.72	0.61	0.59	0.57	0.58	0.67
Risk Assessment (RISK)				—	0.60	0.58	0.55	0.56	0.65
Income Level (INC)					—	0.62	0.60	0.61	0.64
Financial Literacy (FLIT)						—	0.66	0.63	0.68
Financial Literacy Programs							—	0.65	0.66
Government Regulation (REGUL)								—	0.67
Loan Default Rate (LDR)									—

Table 5: HTMT Results

Note: All HTMT values are below the conservative threshold of 0.85, indicating strong discriminant validity across constructs confirming strong discriminant validity among constructs and supporting the distinctiveness of each latent variable within the measurement model.

Multicollinearity checks revealed Variance Inflation Factor (VIF) values below 3.0, indicating that predictor variables were independent and free from redundancy. Predictive relevance (Q^2 values ranging from 0.47 to 0.53) exceeded the 0.35 benchmark, confirming the model's predictive robustness. These diagnostics provide further assurance of the validity and reliability of the SEM findings.

Summary of Findings

The findings of this study reveal a complex interplay of macroeconomic, institutional, and borrower-specific factors that collectively shape loan default behavior in rural banking, with Amansie Rural Bank PLC serving as the empirical case. The results establish that macroeconomic pressures, particularly inflation and interest rate sensitivity, exert a strong positive influence on default rates. Periods of high inflation were perceived to erode borrowers' disposable incomes, while volatile interest rates increased repayment burdens, thereby amplifying credit risk exposure. These outcomes are consistent with prior empirical evidence that identifies macroeconomic instability as a key driver of non-performing loans in developing economies (Beck et al., 2013; Quartey, 2016).

At the institutional level, weak credit policies and inadequate risk assessment frameworks were significantly associated with higher default rates. Lax credit appraisal processes and insufficient post-disbursement monitoring reduced the bank's capacity to identify high-risk borrowers early, echoing concerns raised in earlier studies on rural banking in Ghana (Addo, 2020). This underscores the systemic vulnerabilities that emerge when institutional governance structures are weak, thereby reinforcing institutional theory.

With respect to borrower-specific factors, the analysis revealed that low-income levels and poor financial literacy were significant predictors of loan default. Borrowers with unstable or seasonal incomes, particularly those engaged in agriculture and informal trading, demonstrated higher tendencies to default. Moreover, limited financial literacy exacerbated repayment challenges, as many borrowers lacked adequate knowledge to manage loan funds prudently or understand repayment obligations. These results align with the arguments of Lusardi and Mitchell (2014) and Kusi et al. (2020), who emphasize financial literacy as a protective factor against over-indebtedness.

Importantly, the study confirmed the moderating effects of both financial literacy programs and government regulation. Borrowers who participated in structured financial literacy interventions displayed lower default rates, demonstrating the value of targeted capacity-building initiatives. Similarly, regulatory oversight emerged as a mitigating force, with strong policy enforcement helping to cushion the adverse effects of inflation, interest volatility, and institutional weaknesses. Notably, perceptions of regulatory strictness varied across respondent groups and branches: managers and credit officers tended to emphasize compliance and oversight more strongly, while borrowers often interpreted regulations in terms of repayment burden or accessibility. This heterogeneity in perceptions helps explain the moderation effects observed in the model, as regulatory frameworks were not experienced uniformly across the institution. These findings are consistent with global evidence that well-designed regulations enhance credit stability, particularly in rural and community banking environments (World Bank, 2022).

Overall, the findings suggest that loan default is not attributable to a single determinant but rather arises from the intersection of macroeconomic shocks, institutional inefficiencies, and borrower vulnerabilities, moderated by interventions that enhance borrower knowledge and strengthen regulatory frameworks. This reinforces the study's theoretical anchoring in asymmetric information, credit rationing, and institutional theory, while offering evidence-based pathways for rural banks and policymakers to reduce non-performing loans and promote sustainable credit delivery.

Discussion of Findings, Contributions, Limitations, and Conclusion

This section interprets the findings by linking them to existing theories, empirical literature, and policy frameworks. It explores how macroeconomic, institutional, and borrower-specific factors jointly influence loan default, and how moderating interventions such as financial literacy programs and government regulations attenuate these risks. The discussion moves beyond statistical validation to situate the results within Ghana's rural banking context while drawing comparative insights from similar economies. It also highlights the study's theoretical and practical contributions, outlines limitations, suggests directions for future research, and concludes by emphasizing broader implications for financial stability and rural development.

Macroeconomic Factors and Loan Default

Results indicated that macroeconomic shocks, particularly inflation and interest rate sensitivity, increased loan default tendencies among Amansie Rural Bank borrowers, supporting Hypotheses 1 and 2. Inflation was perceived as eroding disposable income, while volatile interest rates heightened repayment burdens, consistent with prior evidence from Ghana and other emerging economies (Beck et al., 2013; BoG, 2023). These findings reinforce asymmetric information and credit rationing theories, as banks face uncertainty about repayment capacity and risk pricing under volatile conditions. Comparative cases from Nigeria and Kenya similarly show that macroeconomic volatility is widely recognized as a systemic risk to rural banking.

Policy Implication: Rural banks should adopt inflation-adjusted credit scoring and stress-testing tools to better anticipate repayment risks.

Institutional Factors: Credit Policies and Risk Assessment

Weak credit policies and inadequate risk assessment frameworks were perceived to contribute to higher defaults, validating Hypotheses 3 and 4. This aligns with institutional theory, which emphasizes governance and organizational practices in shaping outcomes (Scott, 2001). The Amansie case reflects institutional fragility, where informal appraisal and limited monitoring reduce the bank's ability to identify high-risk borrowers. Comparative evidence from Uganda and Tanzania shows similar vulnerabilities in rural finance.

Policy Implication: Investment in dynamic, data-driven risk assessment models, including mobile money and agricultural cycle data, could reduce information asymmetry and improve credit allocation.

Borrower-Specific Factors: Income and Financial Literacy

Borrower income stability and financial literacy were negatively associated with default, supporting Hypotheses 5 and 6. Respondents perceived that unstable incomes and limited financial knowledge increased repayment challenges, consistent with asymmetric information and moral hazard perspectives (Kusi et al., 2020). Comparative evidence from Bangladesh and India confirms that financial literacy and diversified income streams are protective factors in rural credit.

Policy Implication: Rural banks should integrate borrower cash flow profiling and structured financial literacy training into loan appraisal and agreements.

Moderating Effects of Financial Literacy Programs and Regulations

Perceptions of financial literacy programs and regulatory oversight moderated the relationship between risk factors and loan default, supporting Hypotheses 7 and 8. Literacy initiatives were viewed as equipping borrowers with budgeting and debt management skills, reducing

default tendencies (Osei-Assibey, 2015). Regulatory intensity was also perceived to buffer adverse effects of macroeconomic and institutional weaknesses, though this effect reflects stakeholder perceptions within one bank and one time period rather than objective enforcement. Comparative cases from Rwanda and Nigeria illustrate how regulatory environments are experienced differently across contexts.
Policy Implication: Strengthening supervisory consistency and embedding mandatory financial literacy schemes across rural banks could enhance perceived stability and borrower discipline.

Contributions of the Study

Theoretical Contributions

This research extends and integrates three major theoretical frameworks:

- *Asymmetric Information Theory (Stiglitz & Weiss, 1981):* The study demonstrates how borrower-specific traits such as financial literacy and income stability, often unobservable at origination, drive repayment outcomes. By showing that financial literacy programs can moderate these risks, the study highlights education as a corrective mechanism.
- *Credit Rationing Theory:* Evidence that weak institutional practices (credit policies and poor risk assessment) exacerbate defaults confirms the theory's premise that inefficient allocation of credit leads to market failure. The study refines the theory by situating it within rural contexts where informal lending norms dominate.
- *Institutional Theory (Scott, 2001):* The study validates this framework by illustrating how regulatory oversight and organizational practices moderate credit outcomes. Weak enforcement fosters systemic vulnerability, while strong governance reduces defaults.

Empirical Contributions

Empirically, the study provides a comprehensive model that integrates macroeconomic, institutional, and borrower-level variables alongside moderating factors, accounting for 68% of the variance in loan default. This represents a significant improvement over prior Ghanaian studies (e.g., Quartey, 2016; Addo, 2020), which examined these determinants in isolation.

Practical Contributions

Practically, the study generates important insights for stakeholders in Ghana's rural banking sector. For bank managers, the findings underscore the need to move beyond traditional credit assessment methods by adopting dynamic credit scoring models that better capture the realities of rural borrowers. Incorporating macroeconomic forecasting into loan origination and requiring borrowers to complete structured financial literacy modules—such as short training sessions on budgeting and repayment planning before loan approval—would enhance repayment discipline and reduce exposure to defaults. Similarly, integrating periodic refresher workshops into loan monitoring visits (e.g., branch officers conducting brief financial check-ins alongside repayment tracking) could reinforce borrower knowledge throughout the credit cycle.

For policymakers, the results highlight the importance of designing regulatory frameworks that balance borrower protection with financial system stability. Strong but flexible regulation can minimize reckless lending practices while encouraging inclusion. Development agencies are well positioned to support rural banks by scaling community-based literacy initiatives, using participatory and context-specific approaches to empower borrowers with the skills necessary to manage credit responsibly. Together, these actions would contribute to a more resilient and inclusive rural banking system.

Academic Contributions

For academia, the study offers a replicable methodological framework using SmartPLS and SPSS, validating structural models with both predictive relevance and moderating effects. It contributes to the literature on financial governance in developing economies by providing a context-specific yet generalizable model for rural banking systems.

Limitations and Directions for Future Research

While this study offers valuable insights into the determinants of loan default in rural banking, several limitations warrant consideration. Chief among them is the cross-sectional design, which restricts causal inference by capturing data at a single point in time. Although longitudinal studies would provide deeper insights into how borrower behavior evolves across economic cycles or agricultural seasons, the temporal scope of this research was shaped by the practical constraints of a master's dissertation. Nevertheless, this limitation must be contextualized within the relatively stable operational environment of Ghana's rural banking sector. Empirical evidence, including the Bank of Ghana's 2024 *Financial Stability Review*, suggests that institutional structures, credit delivery mechanisms, risk governance frameworks, and borrower profiles have remained largely unchanged over the past decade. Similarly, Quartey et al. (2019) highlight the persistence of borrower characteristics and institutional practices, indicating that while credit risk is theoretically dynamic, its practical manifestation in rural contexts tends to be inertial.

A further limitation is the reliance on self-reported perceptions for loan default rates and macroeconomic pressures, which may not fully align with administrative records or objective series. Future research could strengthen validity by linking survey responses to bank loan files and official macroeconomic indicators. Geographic scope also posed constraints, as some remote branches were excluded, and psychological or behavioral constructs such as risk aversion or time-inconsistent preferences were not incorporated.

To address these limitations, future studies should combine perceptual and administrative data, adopt longitudinal or panel designs, and integrate behavioral measures. Comparative work across African rural banks and the use of advanced analytics such as machine learning could further enhance predictive accuracy and policy relevance.

Conclusion

This study investigated the determinants of loan default at Amansie Rural Bank PLC, focusing on macroeconomic, institutional, and borrower-level factors, and assessing the moderating roles of financial literacy programs and government regulations. Results confirmed that inflation, interest rate sensitivity, weak credit policies, and poor risk assessment increased default rates, while income stability and financial literacy reduced them. Moderating mechanisms, education and regulation proved essential in mitigating risks, though their effects were shaped by stakeholder perceptions rather than uniform administrative measures. Importantly, perceptions of regulatory strictness varied across branches and respondent groups, with managers and credit officers emphasizing compliance more strongly than borrowers, who often viewed regulation in terms of repayment burden or accessibility. This heterogeneity underscores the need to consider how regulatory frameworks are experienced differently across stakeholders when designing interventions.

The findings extend theoretical understanding by refining asymmetric information, credit rationing, and institutional theories, while offering empirical and practical contributions to credit risk management. Sustainable credit delivery in rural banks requires a multi-stakeholder approach that integrates borrower education, institutional reform, and regulatory enforcement, while also accounting for differences in how these mechanisms are perceived and enacted. Tackling loan default in rural banking is therefore not merely a financial issue but a systemic challenge requiring coordinated responses across macroeconomic management, institutional governance, and borrower empowerment. Although grounded in Ghana's context, the insights from this study provide lessons that resonate across emerging economies striving for financial inclusion and stability.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Data Availability

All data supporting the findings of this study are included within the paper. Additional raw data can be made available from the authors upon reasonable request.

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Appendix A

Survey Items, Sources, and Respondent Allocation

Construct / Dimension	Item Wording (example)	Source / Reference	Respondent Group
Inflation Rate (Macroeconomic)	"Rising prices in the past year have reduced my ability to repay loans on time."	Adapted from Beck et al. (2013)	Borrowers
Interest Rate Sensitivity	"Changes in interest rates affect the repayment performance of our loan portfolio."	Quartey (2016)	Staff
Bank Credit Policy	"Credit approval procedures in this bank are strict and consistently applied."	Addo (2020)	Staff
Risk Assessment Practices	"Loan officers thoroughly assess borrower repayment capacity before approval."	Munyambonera (2017)	Staff
Income Level	"My household income is sufficient to meet	Developed for this study	Borrowers

	loan repayment obligations.”		
Financial Literacy Knowledge	“I understand the terms and conditions of my loan agreement.”	Lusardi & Mitchell (2014)	Borrowers
Financial Literacy Programs	“Participation in financial literacy training has improved my repayment discipline.”	Osei-Assibey (2015)	Borrowers
Government Regulation & Policies	“Regulatory requirements influence how loans are classified and monitored in this bank.”	Bank of Ghana (2023; 2025 reports)	Staff
Loan Default Rate (Outcome)	“Loan defaults have increased in this branch over the past year.”	Developed for this study	Staff

Caption

Note: Solid paths in the SEM were estimated using these items. Items were allocated to staff or borrower respondents depending on their relevance. Sources indicate whether items were adapted from prior studies or developed specifically for this research.